Can You, too, Profit by the Economy of *Westvaco* BARIUM SULFATE?

(BLANC FIXE)

1945

Westvaco Barium Sulfate is now being used with satisfaction and economy in manufacturing

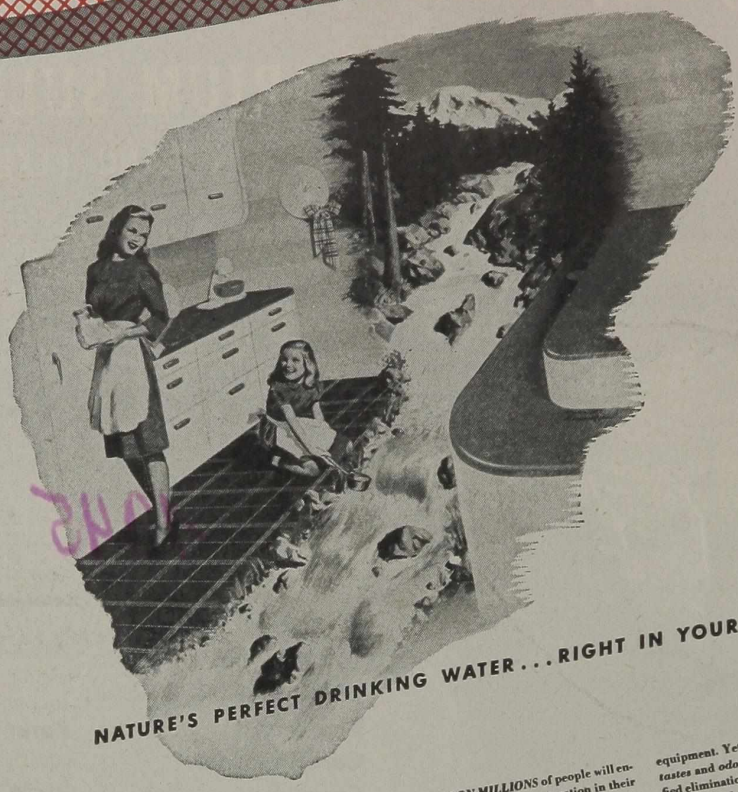
Bag Paper	Linoleum
Box Board	Paint and Varnish
Carbon Paper	Plastics
Cosmetics	Printing Paper
Color-Lakes	Textile Fillers
Dry-color Bases	Rubber Goods
Lithographic Ink	and other products

Because of its method of manufacture *Westvaco Blanc Fixe* is very uniform and of fine particle size — 99.9% through 325 mesh with 80% less than 2 microns. Also available in form of Paste containing 30-33% moisture.

Expanded production permits prompt delivery at attractive prices. We solicit inquiries for sample, technical data and price quotations.

WESTVACO CHLORINE PRODUCTS CORP.
Chrysler Building, New York 17, N. Y.
Chicago, Ill. · Greenville, S. C. · Newark, Calif.

Westvaco CHEMICALS



NATURE'S PERFECT DRINKING WATER . . . RIGHT IN YOUR HOME

SOON MILLIONS of people will enjoy a brand-new sensation in their every-day tap water. From their faucets will flow drinking water . . . cooking water...free from objectionable tastes and odors . . . as taste-satisfying as water from nature's finest spring. A startling improvement—made possible for the first time by the new Chlorine Dioxide water-treatment technique developed by Mathieson.

For many years America has enjoyed the *safest* water in the world, thanks to the combined efforts of health authorities, water works officials and manufacturers of treating chemicals and equipment. Yet certain objectionable *tastes and odors* have persistently defied elimination by all known purification methods. But now Mathieson's new, exclusive technique—requiring no expensive equipment—produces amazing results with Chlorine Dioxide formed by the chemical reaction of chlorine and Mathieson Sodium Chlorite.

Mathieson, leading producer of chemicals for water purification for nearly 50 years, invites water officials troubled with taste and odor problems to investigate the new Chlorine Dioxide technique for possible post-war use.

Mathieson
CHEMICALS

THE MATHIESON ALKALI WORKS (INC.) 60 EAST 42nd STREET, NEW YORK 17, N. Y.

SODIUM CHLORITE PRODUCTS . . . CAUSTIC SODA . . . SODA ASH . . . BICARBONATE OF SODA . . . LIQUID CHLORINE . . . BLEACHING POWDER . . . H T H PRODUCTS
AMMONIA, ANHYDROUS & AQUA . . . FUSED ALKALI PRODUCTS . . . SYNTHETIC SALT CAKE . . . DRY ICE . . . CARBONIC GAS . . . SODIUM METHYLATE

To Our Friends in Industry

REPRODUCED above is the black and white version of the Mathieson advertisement in the January 1945 issue of FORTUNE magazine. It tells of a notable achievement by Mathieson's technical staff—the development of an amazing new technique for removing objectionable tastes and odors from public water supplies by the use of Chlorine Dioxide produced from Mathieson's Sodium Chlorite.

The remarkable fact that this new reagent—Chlorine Dioxide—*has 2½ times the oxidizing power of chlorine,* plus the simplicity with which it may be generated in your own plant, may suggest its application in your business. That its usefulness will be widespread—will embrace many industries—has already been proven.

Mathieson's technical staff—the same group responsible for Chlorine Dioxide and other important new developments—will welcome the opportunity to assist in adapting Chlorine Dioxide to your use.

THE MATHIESON ALKALI WORKS (INC.) 60 EAST 42nd STREET, NEW YORK 17, N. Y.

Chemical Industries

THE BUSINESS MAGAZINE for MAKERS and USERS of CHEMICALS
Management • Research • Production • Marketing

VOL. 56—NO. 2

495 III CH.

February 1945

Contents

DEPARTMENTS

NEWS OF THE MONTH

Published monthly, except twice in November, at 1309 Noble St., Philadelphia 23, Pa., and entered as 2nd class matter July 15, 1944, at the Post Office at Philadelphia 4, Pa., under the Act of March 3, 1879. Subscription $4 a year, $6 for two years. Add $1 per year for postage to foreign countries other than Canada and Latin America. Single copies 50¢. Canadian subscriptions and remittances may be sent in Canadian funds to Chemical Industries, P. O. Box 100, Terminal A, Toronto, Canada.

Office of Publication: 1309 Noble Street, Philadelphia 23, Pa. ● EDITORIAL AND EXECUTIVE OFFICES: New York: 522 Fifth Avenue, New York 18, N. Y., Murray Hill 2-7888. DISTRICT OFFICES: Chicago: 309 West Jackson Boulevard, Chicago 6, Ill. Harrison 7890. Los Angeles: 816 West Fifth Street, Los Angeles 13, Calif., Mutual 8512. London: 37 Goldsmith Avenue, Acton, London W3.

THE READER WRITES

This month we publish two letters from readers who differ with certain opinions expressed recently in articles appearing in CHEMICAL INDUSTRIES. *We are moved to comment on the restrained and professional manner in which these opposing opinions are presented, and also in which the original authors make their rebuttals. Here is good evidence that even if people disagree they can still be polite to each other. Too often an acrimonious tone creeps into disputes of this kind which simply serves to make every party hold his point of view, much to the detriment of the reader who is more interested in the truth than in who is right and who is wrong.*—EDITOR.

Postwar Prospects for Drying Oils

To the Editor of Chemical Industries:

You invite comments on the article "Postwar Prospects for Drying Oils" by Messrs. Otto and Gerald Eisenschiml in your December, 1944 issue.

A factor which the Eisenschimls have ignored, or at least minimized, and which changes the entire complexion of the postwar drying oil picture, is the scientific and technical progress which has been made in this field since our country went to war. Indications are that it is possible to prepare drying oils, or coating compositions in which drying oils would normally be used, which can compete in price and which will excel on a quality basis the currently used linseed and tung oil, from domestically produced cottonseed or soy bean oil. Such products are not on the current market because the War Food Administration has prohibited the use of these oils for non-edible purposes. Presumably such restrictions will be removed after the war. The production of soy bean oil approximately equals the linseed oil consumption and the production of cottonseed oil is more than twice as much. This indicates that there are potentially very large supplies available, and it must be remembered that in normal times soy bean oil consistently undersold linseed. When the cottonseed and soy bean oil producers realize that they can at last successfully enter the paint and varnish field, you may be sure that they will spare no efforts to diversify their normal outlets by doing so. The United States need never again be dependent on imported oils for satisfactory paints and varnishes.

Of course this does not mean that linseed and tung oil will be relegated to a very minor position, but it does mean that they will be considered just another source of raw material to the coating manufacturer, who will no longer be content with using what nature gives him; for varnish making has become more and more like chemical manufacturing and he must apply all these skills of chemistry that he can muster to improve the quality and uniformity of his product or go out of business.

HARRY BURRELL, Research Supervisor
Heyden Chemical Corporation
New York, N. Y.

To the Editor of Chemical Industries:

The point made by Dr. Harry Burrell, Research Supervisor of Heyden Chemical Corporation, in his letter to you of January 19th, is well taken and has been given full consideration by us. We have not, however, ignored it in our survey, and if we have minimized it, we have done so for what we considered good reasons. The main reason is that in the event of another national emergency, such as war, the use of soybean and cottonseed oil will most likely again be restricted to edible purposes, making these oils inaccessible to the field of protective coatings, except in special cases. In the present conflict the shortage of edible fats made it necessary to divert even considerable amounts of linseed oil into edible channels.

Under peace conditions we are as optimistic as Dr. Burrell on the use of semi-drying oils for protective coatings. We are fully aware of the developments that have taken place, not only since, but also long before Pearl Harbor, and have stated plainly in our article that "such oils as sardine oil, menhaden oil and soybean oil . . . may eventually present us with an entirely new combination of glycerides. . . . We have discovered many things through these developments . . ." This is as far as we wanted to go in a public address.

Two other points must be considered. First, the developments we alluded to have not yet stood the test of time, and in this Dr. Burrell seems to share our opinion, because he says, "Indications are that it is possible to prepare drying oils . . . which can compete in price and which will excel on a quality basis . . . linseed oil and tung oil." Unfortunately, indications are hardly enough for a positive forecast. The second point is that commercial applications of scientific discoveries in peacetimes are made cautiously and slowly. It is quite possible that the old line materials, backed as they are by many years of familiarity, will dominate the field for a considerable length of time, regardless of their comparative merits. The ultimate consumer has always been conservative and has offered passive resistance to a precipitate introduction of new types of finishes.

As we said in our paper, we are dealing with a speculative matter when we project ourselves into the future, the more so, the farther we try to see. We were mostly concerned with what will take place in the years immediately following this war, less with what will happen later, and if we limit the scope of our discussion to that extent, we believe Dr. Burrell will agree with us.

OTTO EISENSCHIML
GERALD EISENSCHIML
Scientific Oil Compounding Co.
Chicago, Ill.

Safety of Carbon Tet

To the Editor of Chemical Industries:

I should like to call your attention to the final statement in the following quotation, appearing on page 566 of CHEMICAL INDUSTRIES, October 1944, and taken from Part II of the article on "Combating Health Hazards in the Chemical Industry," by William J. Burke, Division of Industrial Hygiene, New York State Department of Labor:

> "Highly toxic substances have been replaced by less dangerous materials in lead-free paints and porcelain enamels, and in benzol-free solvents for lacquers, etc. Other examples are mercury-free carroting solutions and *the substitution of petroleum naphtha for carbon tetrachloride in the dry cleaning industry.*" (Italics mine.)

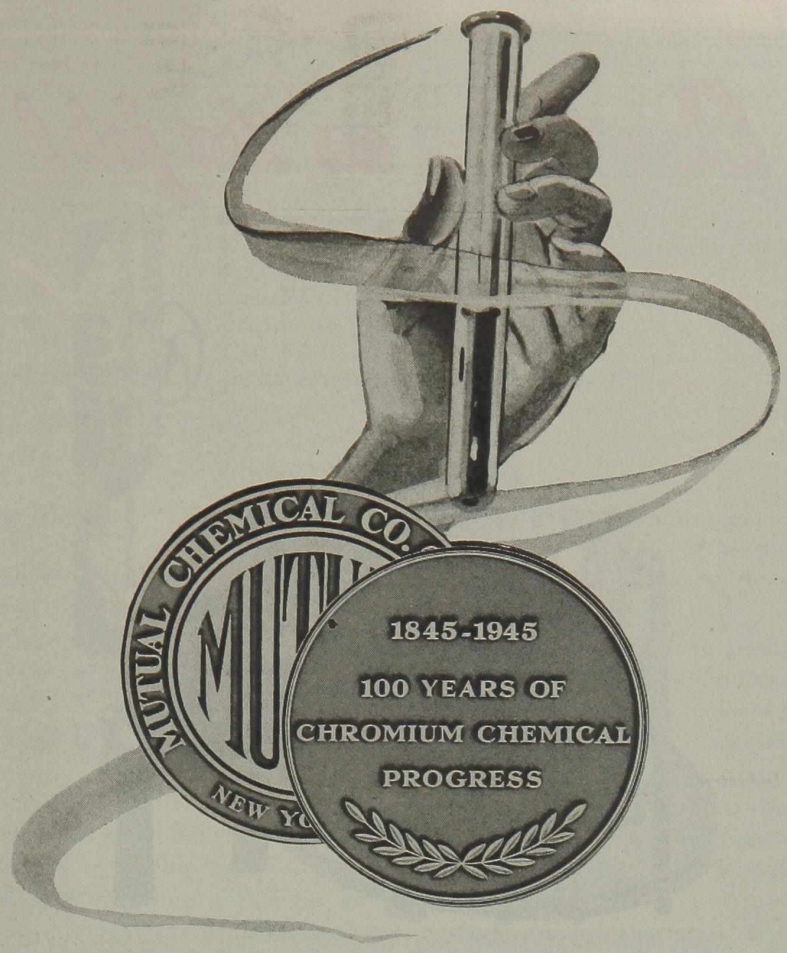
I am not in a position to comment on the accuracy of the first sentence quoted above, but I am sure the part I have italicized is open to question as regards net gain in safety of workers. Substitution of one solvent for another on the basis of less toxicity alone is hardly an end in itself. Selection of a solvent should be in terms of *total* safety.

Here is the record of industrial and commercial flammable-liquid fires for the 30-month period beginning January 1, 1942, as compiled from incomplete data by the National Fire Protection Association:

Number of flammable-liquid fires	97
Persons killed in these fires	77
Persons injured	84
Value of property destroyed, greater than	$18,000,000

As to the dry cleaning industry (the safety of which is being enhanced by the use of petroleum naphtha, according to the article quoted), the National Fire Protection Association reports that, according to its records, which include "only a small fraction of the total number of explosions and fires," this industry had 175 fires, with a property loss of

(*Turn to page 168*)



MUTUAL'S
FIRST HUNDRED YEARS

As we celebrate our hundredth anniversary, we are especially mindful of certain factors which contributed greatly to our start and development.

First, we were fortunate in having started at the dawn of an era which has made more contributions to science, industry and living than any other in history. As technology expanded, so did the country, its economy, and our company.

While we are grateful for the somewhat impersonal economic atmosphere which favored the first century of our growth, we feel a special gratitude and loyalty to the many companies which for so many years, either as customers, suppliers, or technical collaborators, supported our efforts. Without these associations which so invaluably enriched our experience, our present would be less secure and our future less promising.

While we appreciate the good things of the past, we realize they now belong to history and that future progress can only be made by unremitting effort combined with an expanding concept of the application of science and research to the problems of those we serve.

MUTUAL CHEMICAL COMPANY OF AMERICA

270 MADISON AVENUE NEW YORK 16, N.Y.

WASHINGTON

T. N. SANDIFER *reporting*

Government Reports • Natural Gas Issue • Fertilizer Policy
TNEC Revival • Export Associations

Highlights of the Month

CONSTRUCTION—Sulphuric acid and high octane gasoline facilities will lead the early 1945 construction of additional war plants. The War Production Board is stressing high octane production, but the sulphuric acid program involves a very high additional tonnage capacity, probably rivalling in scope anything on the list.

MANPOWER—The problem of staffing new plants is serving to emphasize the tightening manpower situation. However, the general feeling is that the latest listing of critical jobs by the War Manpower Commission favored chemical production rather more than did former directors. This is especially so in regard to technical personnel, where there seem to be some signs of an awakening on the part of manpower officials.

TANK CAR DEMURRAGE—As amended, I. C. C. Service Order 263 is said by industry men to come more nearly to meeting their requirements and to ironing out difficulties encountered with the earlier regulation, than anything issued recently. While it still means difficulty in some respects, industry spokesmen have expressed general satisfaction with this order as it stands currently.

STEEL DRUMS—Drum sheet steel will be critical into the second quarter, contributing to a mounting backlog that will affect drum output. Manpower is an equally strong factor in the shortage.

Chemical Products Under Attorney General's Study

THE FIRST OF A SERIES OF REPORTS on aluminum, magnesium, synthetic rubber, aviation gasoline, chemicals, and many other products and materials, may have come from the office of the Attorney General by the time this can appear. The reports on aluminum and magnesium are said to be nearing completion, and should be the first ones to be forwarded to Congress.

These studies were undertaken by the Attorney General after the authority he sought for active intervention in disposal of surplus property and related matters was granted by Congress. His interest is primarily concerned with anti-trust aspects of such disposal matters. The position indicated by recent communications from the Department of Justice to the agencies involved is a guarded, perfunctory approval of the master agency agreement worked out by the Surplus Property Disposal organization by which saleable materials of all categories will be channeled back through appropriate manufacturers into normal trade. The department is not wholeheartedly in favor of the plan, however, and has warned that where such arrangement tends to restrict distribution of scarce materials into too narrow industrial outlets, i.e., toward monopoly, it will oppose such operation. This hedging would apply in the case of chemicals as well as fabricated materials and finished articles.

Government Reports Will Continue As Postwar Requirement

EVEN BEFORE THE WAR, the numerous forms, questionnaires, circulars and other data requests flowing from Washington agencies to private business were recognized as a tremendous drain on the time of private employees. They were regarded as an expense to the concerns involved that should be ameliorated.

Largely through Congressional pressure, some control has been exerted over these reports in the past year or more. Of a total of 7,484 forms submitted to the Budget Bureau before being sent to industry, as required by current law, 907, or 12.1 percent, were halted. A larger number never got to the stage of Budget Bureau scrutiny, so the real number kept out of circulation is much larger.

It is significant that in several major instances, potential work-making data requests have been killed by compelling the agencies concerned to work up their information from material already in the files of Government bureaus. In other words, but for this intervention, there would have been a duplication of information-gathering activity. The Government already had the statistics, but was not coordinating them.

The Bureau of the Budget has now advised the appropriate Senatorial committee, however, that an analysis made by one war agency alone as to the need of present informational reports after V-E Day, shows that about 50 percent will still be required by that agency. About two-thirds of the remaining number would be discontinued, and a third taken over by different Federal bureaus.

Extension of War Powers Act

FOR THE FIRST TIME enforcement of priorities, transfers of material and equipment, based on any of the authority delegated to war agencies under the Second War Powers Act, is now backed by penal provisions.

Wilful failure to comply with such orders or regulations is now classed as a misdemeanor punishable by fine and imprisonment. However, the enactment of this clause was coupled with probably the strongest check on the use of war powers yet invoked, namely a requirement that violations were to be under jurisdiction of the courts, thus giving those affected a legal recourse they have lacked in many previous instances.

Federal-State Gas Issues Sharpening

THE FEDERAL POWER COMMISSION will complete its investigation of the natural gas industry during this year. Following this, it is expected to recommend that Congress give it authority to control the "end use" of natural gas, along the lines suggested by Supreme Court Justice Jackson in the Hope natural gas case.

In this case the Supreme Court greatly strengthened the hand of the Federal Power Commission. Among other things, it set aside certain formerly well-established doctrines, which need not be detailed here except to say that the decision gave considerable stimulus to the Commission's activities. So much so, in fact, that despite a disposition by the Commission to be more cooperative with State regulatory bodies, pressure has been brought on Congress by the latter for amendments to the Power Act that would check the Commission in any encroachment on State jurisdiction.

The investigation of the natural gas industry is a case in point. The Federal Power Commission, claiming that there is considerable misunderstanding involved on the part of the State commissions, has now written a letter to certain State authorities, including some governors, to disclaim any intent to intrude on their preserves.

"We wish to assure the representatives of all the gas-producing states," the Commission wrote, "that the Federal Power Commission has no desire to extend its jurisdiction to cover the production of natural gas or otherwise invade what are properly regarded as the functions of the conservation authorities of the several states."

Instead, said the Commission, it is merely acting within the scope of legislation already [illegible] with the purpose of assisting State authorities in checking "waste and dissipation of oil and gas."

Misunderstood or not, FPC regulation of natural gas pipelines is said to be breeding complications. The Louisiana Public Service Commission has authorized filing of an injunction suit in a Federal court against the recent FPC order permitting construction of the Memphis pipeline north from Louisiana fields, among other instances.

There has been a mounting demand, in this connection, for restriction of export of natural gas from producing states. Texas and Louisiana have been prominent in this movement. On the other hand, with alternative sources failing or hampered by present conditions, there is pressure for increased natural gas flow to the Middle West and Eastern service areas, where the pinch is felt. The Commission first denied, then authorized the building of a pipeline connecting Louisiana fields with Eastern outlets. Regardless of other developments, the coming months are expected to see stringent conservation orders being enforced more carefully than in the past.

Overall, and not particularly relative to the natural gas issue, is the President's statement on the Flood Control bill, in which he remarked that "the plan of calling upon States affected by proposed projects for their views is a desirable one" but, he added in substance, such a procedure was not to be viewed as an abrogation by the Federal Government of any part of its powers. He was referring specifically to Federal power over navigable waters, in connection with the Missouri Valley Authority proposals, but his comment attracted interest among students of the Federal-State question of jurisdiction in general.

Agriculture or TVA to Decide Fertilizer Policy?

AS IN THE NATURAL GAS INSTANCE ABOVE, symptoms of a top-heavy Federal machine are found within the machine as well as in its operations in gear with other mechanisms.

The bill introduced by Senator Lister Hill, Alabama, S 2035, to provide for certain TVA operations in postwar industry, has drawn fire from the Agriculture Department. Among other things, the bill empowers TVA to formulate a national fertilizer policy and program, and report it to Congress (involving TVA manufacture and distribution, and otherwise affecting the private industry).

This aroused Agriculture Department authorities, from which department a critical adverse analysis was addressed to the Senate Committee on Agriculture, dealing with the proposal. Conceding the importance of such a policy, the Department nevertheless stated emphatically that TVA was not the proper nor qualified agency to draft it.

"The Tennessee Valley Authority has made sub-

TELEVISION is coming of age. Spurred by war born developments in electronics and new technical refinements, the miracle of images broadcast through the ether is now emerging as a new and unique medium of communication and expression. It promises some day to be as commonplace as the radio and the printed page.

Behind this new miracle industry lie many decades of research and technical achievement. Its beginnings go far back into the genesis of radio itself and the first projection of sound waves. For the principles upon which television is based are formulated upon the work of pioneer scientists who first discovered the physical nature of sound and light. Thus, to those who labored long ago, as well as to the modern technicians who gave television concrete reality, we owe a debt for creating the "Margin of Experience" for the final achievement.

In every field of science, commerce or industry, this "Margin of Experience" proves again and again to be a factor vital to success. Niagara offers it in the field of electro-chemical products. For Niagara has pioneered constantly in the development, improvement and adaptation to new uses of Liquid Chlorine, Caustic Soda, Caustic Potash, Paradichlorobenzene and Carbonate of Potash. Rely on Niagara's "Margin of Experience" for greater success in the use of these products.

AN ESSENTIAL PART OF AMERICA'S GREAT CHEMICAL ENTERPRISE

Niagara ALKALI COMPANY

60 East 42nd Street, New York 17, N. Y.

CAUSTIC POTASH • CAUSTIC SODA • PARADICHLOROBENZENE
CARBONATE OF POTASH • LIQUID CHLORINE

ADVENTURES IN THE "MARGIN OF EXPERIENC

stantial contributions in the fertilizer field," said the Department criticism, "but its experience in technology and production has been limited primarily to phosphates. More recently it has gained some experience in the production of one kind of nitrogen fertilizer, but the Authority has had little or no experience in producing potash fertilizers."

The letter reminded the Senators of the Agriculture Department's broad work in this field, and the fact that the department has been concerned nationally with fertilizer use and programs. Finally, said the Department, the Bureau of the Budget had stated that the projected TVA bill was not in line with the program of the President.

In this connection, it should be recalled, however, that TVA has developed a very sizeable war industry producing elements that can be converted to extensive fertilizer production after the war, while the Department of Agriculture has little or no material facilities under its control, despite its unquestioned influence on the subject.

TNEC Recommendations Revived

ENACTMENT OF LEGISLATION "to more effectively stay the increasing consolidations of competing corporations" is urged by the Federal Trade Commission. Specifically it asks Congress to amend Section 7 of the Clayton Act to prohibit one corporation acquiring another corporation's properties under the same conditions that have been declared unlawful for acquisition of capital stock in the Act of 1914.

Commending the work of the TNEC, the Commission suggested that with the war approaching a climax Congress give serious consideration to the various recommendations for legislation made by TNEC in 1941.

Expect Increase in Webb Law Export Associations

RECALLING A RECENT REFERENCE here to the FTC's more aggressive interest in the Webb-Pomerene Act export trade associations, the FTC has now announced that "in spite of export restrictions and limited markets to which goods may be shipped in wartime, Webb law exports in 1942 totaled about $162,036,000 and in 1943, $134,793,000.

"It is anticipated that the operation of the Act will be an important factor in the postwar export trade of the United States, and that the associations already organized will be well equipped to meet the problems of that period, as well as the currently changing conditions now obtaining in foreign markets."

Conceding that the Webb law is the logical medium for organized exportation, the Commission predicts many additional associations to be formed in the next few years. In fact, the Commission reports, a number of such bodies are planned for operation immediately on the end of the war.

LIFE On The

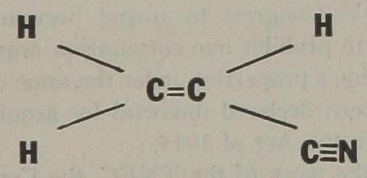
ACRYLONITRILE...
A Reactive Organic Intermediate

AERO* Brand Acrylonitrile, manufactured by Cyanamid on a large scale has until recently been limited, by military requirements, to use in the manufacture of certain types of synthetic rubber, co-polymers of butadiene and acrylonitrile. Acrylonitrile is now available to research chemists and to manufacturers for experimental purposes for other uses.

AERO Brand Acrylonitrile is a stable, colorless, mobile liquid. Because of its double bond, acrylonitrile shows remarkable additive power to a wide variety of substances such as ammonia, halogens, halogen halides, alcohols, etc. In addition, to the organic chemist the presence of a nitrile radicle suggests the use of this material as a very reactive organic intermediate.

Acrylonitrile derivatives have shown promise in a variety of fields including the production of pharmaceuticals, surface active agents, dyestuff intermediates, synthetic resins, and other products. Write for samples and quotations to Organic Chemicals Department.

ACRYLONITRILE



PHYSICAL PROPERTIES**

Molecular weight	53.03
Freezing point	—83° to —84°C.
Boiling point	77.3°C. at 760 mm.
Density	0.8004 g./cc. at 25°C. 0.8060 g./cc. at 20°C.
Refractive index	N^{25}_{D} 1.3884; N^{20}_{D} 1.3911
Specific heat	0.50 ± 0.03 cal./g
Dielectric constant	38 at 33.5 megacycles
Flash point	0°C. ± 2.5°C.
Fire point	0°C. ± 2.5°C.

***These properties were obtained using carefully purified acrylonitrile.*

SOLUBILITY**

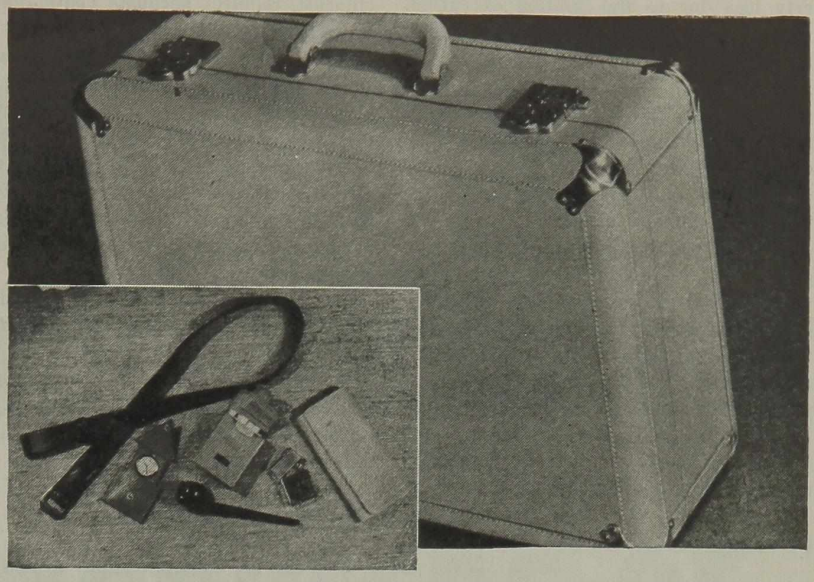
Completely miscible at room temperature with acetone, ether, methanol, ethanol, ethyl acetate, carbon tetrachloride, benzene, toluene, petroleum ether, and some kerosenes. Acrylonitrile has the following mutual solubilities with water:

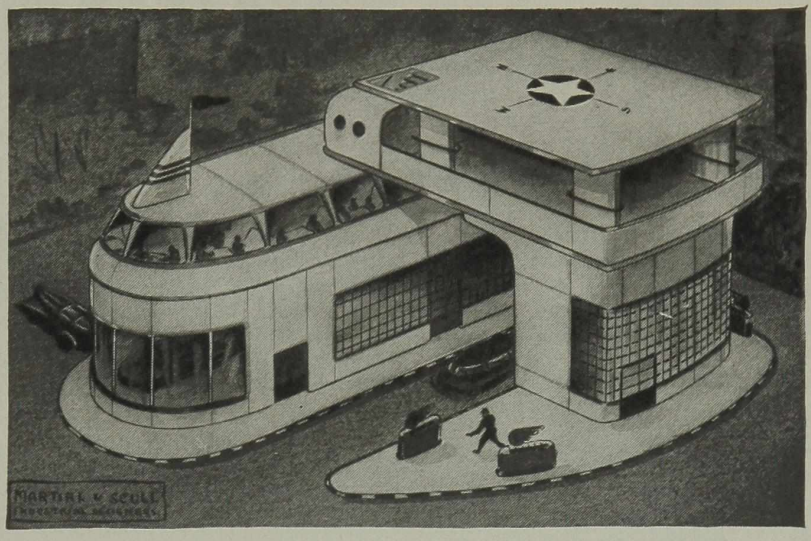
Temperature °C.	Water in Acrylonitrile (% by Weight)	Acrylonitrile in Water (% by Weight)
0	2.1	7.2
20	3.1	7.3
40	4.8	7.9

Chemical Newsfront

(*Right*) **FOR EXPERT LEATHER TANNAGE...** everything from traveling bags to billfolds... Cyanamid's wetting agent, BETASOL* OT, may be successfully applied in every operation where wetting agents are used. Due to its high wetting power, it is satisfactory and economical for coloring, in at liquoring, for wetting back crusted stock, oiling off with neutral oils, and in finishes. Cyanamid's other tanning specialties include DEPILIN* Unhairing Agent, CUTRILIN* Bate, TANAK* Synthetic Tanning Material, and TWECOTAN* Vegetable Tanning Extracts.

(*Below*) **A MODERN AND PRACTICAL PRODUCT** in Cyanamid's insulating MELMAC* are these *Devine* Plastic Food Dishes for use wherever food must be kept hot or cold till served. Designed by Devine Foods, Incorporated, Chicago, the dishes nest when empty, stack when full, to conserve space, facilitate handling. Sizes vary to meet food requirements.





(*Above*) **THIS HELICOPTER LANDING STATION** with complete facilities for servicing both planes and automobiles is one of tomorrow's designs where improved, durable, protective surface coatings will be required. Cyanamid resins will be ready to meet these postwar paint requirements, while filling vital wartime surface coating requirements today.

*Reg. U. S. Pat. Off.

The Reader Writes

(*Continued from page 160*)

nearly $1,000,000, during the period from 1923 to 1937 inclusive, and that 128 of these fires were directly due to flammable solvents. "Obviously," states the report, "the greatest hazard in dry cleaning plants is the presence of flammable and explosive vapors." (N.F.P.A. Quarterly, October, 1938, p. 158).

On the other hand, the life and property loss due to the ignition of carbon tetrachloride is zero, so that, in respect to the fire hazard, this solvent is far safer.

It is true that carbon tetrachloride, improperly handled, is toxic, and may cause injury and death to workers. The same is true of almost all chemicals. Petroleum naphtha is also toxic. From the American medical literature covering the period 1931 to 1942 inclusive, Safety Research Institute has compiled a list of 71 cases of injury, one case of death, and two cases of apparently permanent disability due to inhaling the vapors of petroleum naphtha and closely related petroleum products ("Reports of Occupational Injuries Attributed to Volatile Solvents," published in *Industrial Medicine*).

According to W. Estler ("Toxicology & Hygiene of the Industrial Solvents," by Lehmann & Flury, p. 89), the inhalation of small quantities of benzine (i.e., petroleum naphtha and allied petroleum products) quickly causes intoxication that is usually more serious than alcohol intoxication and sometimes passes quickly into deep unconsciousness. Total anesthesia, analgesia, and vasomotor disturbances, e.g., cyanosis of the extremities, have been observed. Death occurs as the result of respiratory paralysis. Therefore, petroleum naphtha, like carbon tetrachloride, requires adequate ventilation to protect workers from its fumes.

In addition, further measures, unnecessary with carbon tetrachloride, are required to safeguard life and property from the fire hazard of petroleum naphtha. Lehmann, in discussing the hazards created by solvents (loc. cit., p. 28), states that "The introduction of non-inflammable solvents marks the greatest industrial advance."

Carbon tetrachloride, properly handled, is safe to use, as long experience and an extensive literature attest. In the interest of safety, stress should be laid on proper methods of handling this solvent and not on the substitution of a far more dangerous alternative.

L. W. Hutchins, Director
Safety Research Institute, Inc.
New York, N. Y.

[illegible] to the question raised [illegible]:

In reply to the question raised by Mr. L. W. Hutchins, I wish to make the following comments:

There is no question that "Carbon tetrachloride properly handled is safe to use" but that is true of all substances.

My paper was concerned only with health hazards which may accompany the handling of industrial chemicals. From this viewpoint I do not believe that there is any question as to the relative toxicity of carbon tetrachloride and petroleum naphtha vapors. Petroleum naphtha vapors can be kept down to a safe concentration in the air with greater ease and less expense than carbon tetrachloride since the ratio of their toxicity is at least 1 to 10. With regard to the toxicity of carbon tetrachloride, it might be pertinent to point out that recent papers have shown that carbon tetrachloride is toxic in even lower concentrations than had been previously suspected.

The subject of fire and explosive prevention is important, as Mr. Hutchins' figures prove, but the prevention of toxic effects is important also, as pointed out in the first paragraph of my paper which was limited to a discussion of occupational health hazards due to absorption of substances into the body.

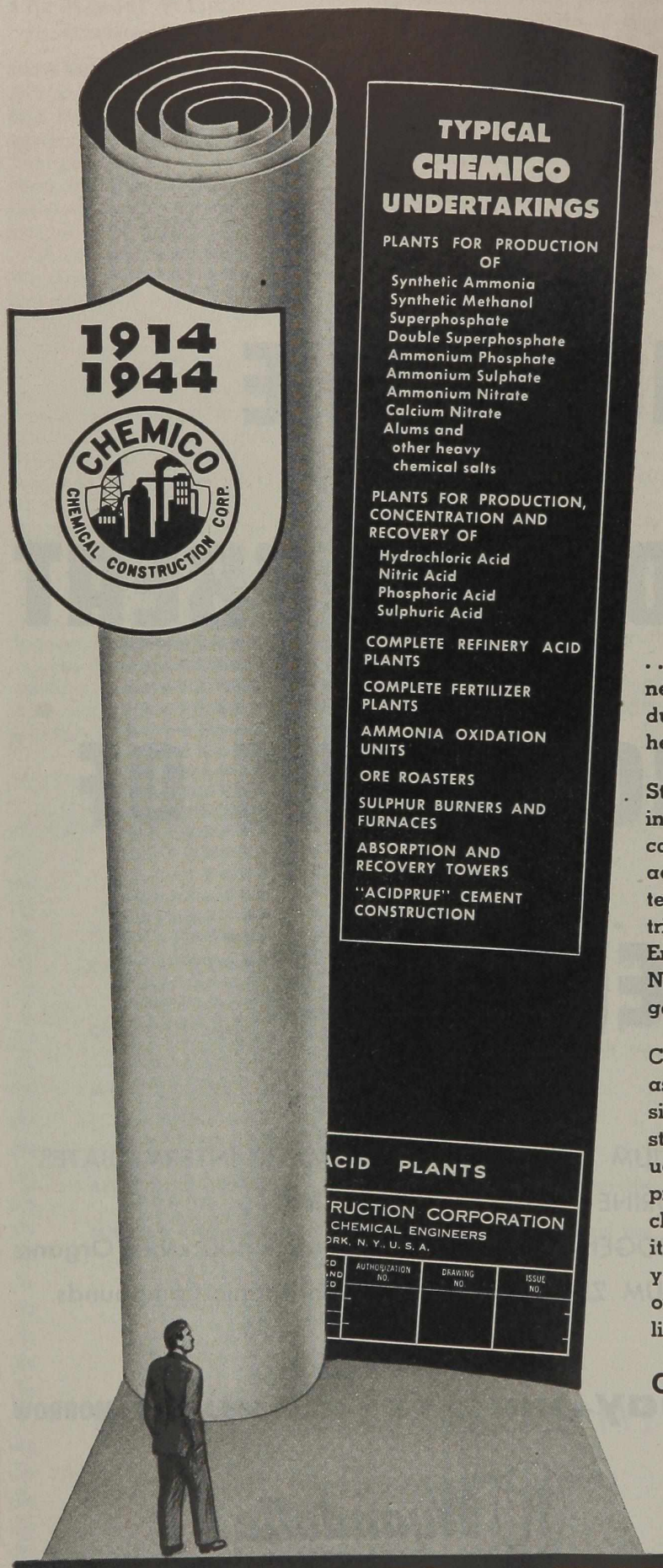
The hazard in dry cleaning plants referred to by the National Fire Protective Association is only the fire and explosive hazard due to flammable solvents. Not all fires or explosions in dry cleaning plants due to flammable solvents may be attributed to petroleum naphtha, as we have seen the use of such highly flammable liquids as diethyl ether for spotting.

It is conceded that if carbon tetrachloride were used to replace petroleum naphtha in the dry cleaning industry the fires and explosions would be reduced.

But, on the other hand, with the use of carbon tetrachloride in place of petroleum naphtha under conditions usually found in large installations, the hazard of life and health would be greatly increased. Therefore, it is my belief that the use of carbon tetrachloride under these conditions would, because of its high toxicity, result in greater hardship to the workers than from the use of petroleum naphtha.

The petroleum naphtha specially developed for dry cleaning use and called Stoddard Solvent has a flash point above 100° F. and is not so readily flammable as lower boiling petroleum naphthas. This solvent can be handled safely from the standpoint of fire and explosive hazards

William J. Burke
Chemical Engineer
Division of Industrial Hygiene
New York State Dept. of Labor
New York, N. Y.



If 30 Years Of Chemico Experience Could Be Blueprinted

. . . . . they would include most of the important new developments in the recovery and production of sulphuric acid, ammonia, and other heavy chemicals.

Starting from a small group of specialists late in 1914, the CHEMICO organization soon became the leading designer and constructor of acid plants in the United States and had extended its activities into other industrial countries. In 1934 the technical staff of the Nitrogen Engineering Corporation, leading experts in Nitrogen Fixation, was merged with this organization.

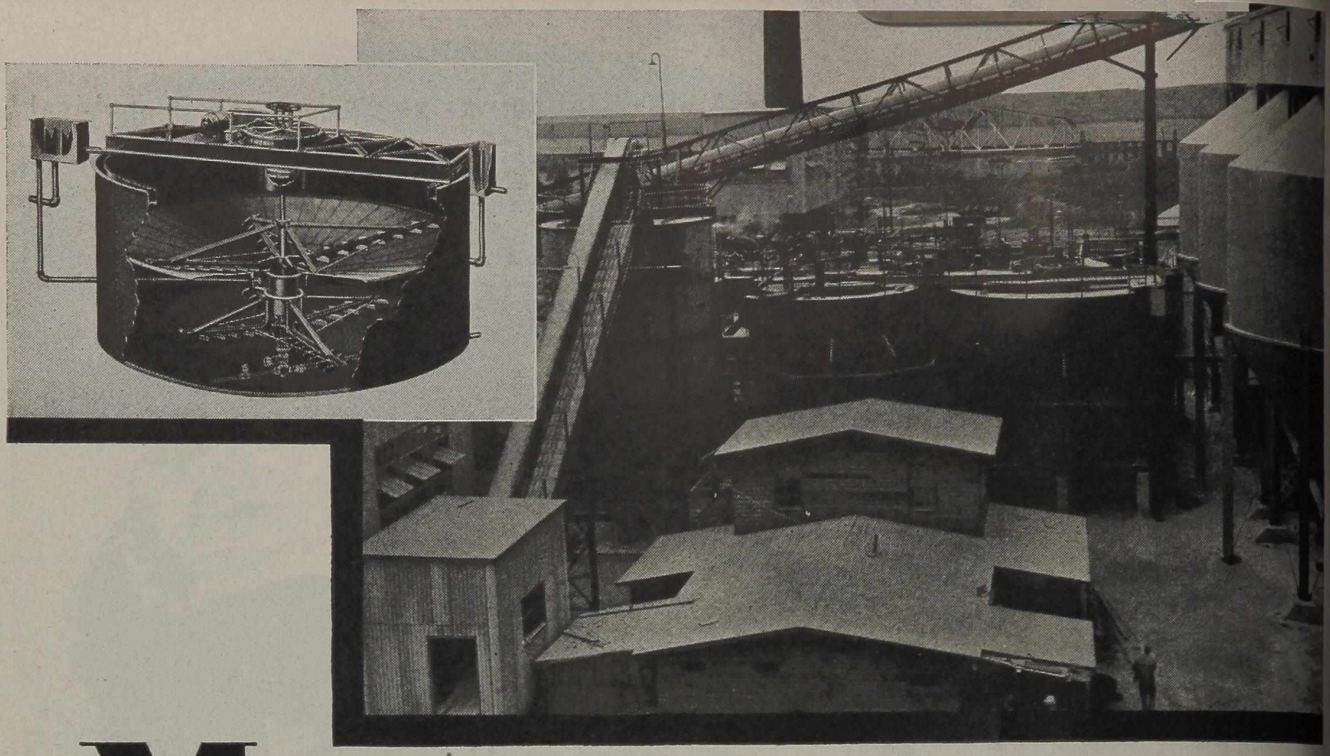
CHEMICO now enjoys a world-wide reputation as pioneers in the field of chemical plant design. Its acid and ammonia plants are the standard throughout the world and their products are contributing very substantially to the present war effort. Whether your acid or heavy chemical requirements are moderate or large, it will pay you to take advantage of the 30-year experience of the CHEMICO organization offered without charge or obligation for preliminary recommendations.

CHEMICAL CONSTRUCTION CORP.

Main Office
30 Rockefeller Plaza, New York

European Representatives:
Cyanamid Products, Ltd., Berkhamsted, Herts.
England
Cables: Chemiconst, New York

CHEMICO PLANTS are PROFITABLE INVESTMENTS



Maximum Thickener Efficiency In Minimum Tray Area

Superimposed tray compartments of the Dorr Balanced Tray Thickener make it the only type of Thickener providing 100 per cent tray efficiency and therefore maximum utilization of floor area.

Compartments are arranged in parallel, each with separate feed and overflow but having a single sludge discharge in common. Due to "Balanced Tray" construction and positive sludge seal, each compartment functions as an individual Thickener.

Compartments may vary in number from two to six, depending on diameter of the unit. *Continuous* thickening is thus effected in less space than in batch thickening or in types of Tray Thickeners the designs of which do not permit 100 per cent utilization of the area of each tray.

Maximum density of underflow completes the overall economy of the Dorr Balanced Tray Thickener.

There are Dorr Balanced Tray Thickeners as small as six foot diameter and as large as 90 foot diameter, handling either a few tons daily or several hundred tons daily—evidence that the Balanced Tray principle (exclusive with Dorr) is adaptable to the needs of both small and large processors.

FEATURES

- Maximum Utilization of Floor Area.
- 100 per cent Tray Efficiency.
- Each compartment operates as a separate Thickener.
- Maximum Underflow Density.
- The Design lends itself to construction of any of the following materials: Standard Steel • Corrosion Resisting Metals • Rubber Covered • Wood Trays • Insulated Tanks.

Write for Bulletin No. 3001, "Thickening and Clarification"—or call in a Dorr Engineer and let him help you with your thickening problems.

DORR

RESEARCH ■ ENGINEERING ■ EQUIPMENT

ADDRESS ALL INQUIRIES TO OUR NEAREST OFFICE

DORRCO

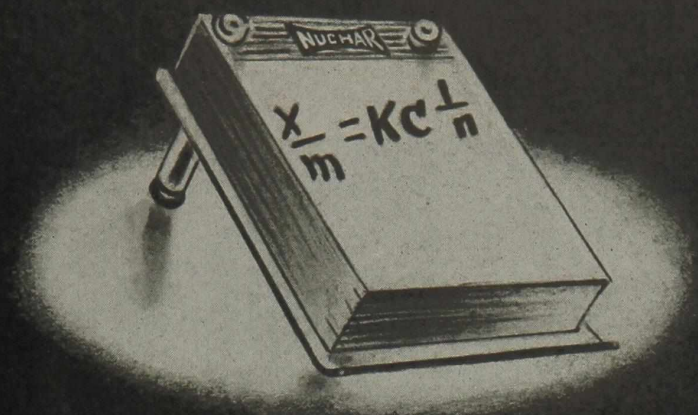
THE DORR COMPANY, ENGINEERS

NEW YORK 22, N. Y. . . 570 LEXINGTON AVE.
ATLANTA 3, GA. . . WILLIAM-OLIVER BLDG.
TORONTO 1, ONT. . . . 80 RICHMOND ST. W.
CHICAGO 1, ILL. . . . . 221 NO. LA SALLE ST.
DENVER 2, COLO. . . . . COOPER BUILDING
LOS ANGELES 14, CAL. . . . 811 WEST 7TH ST.

RESEARCH AND TESTING LABORATORIES
WESTPORT, CONN.

SUGAR PROCESSING
PETREE & DORR DIVISION
570 LEXINGTON AVE., NEW YORK 22, N.Y.

7886



What does this equation mean to you?

This equation is known as the Freundlich equation and is used by physical chemists in problems of adsorption. To the scientist, this equation expresses the relation that is found between the concentration of the impurities on the activated carbon as compared with the concentration remaining in the solution.

But don't let this confuse you. As applied to activated carbon, the average practical man realizes that activated carbon is used to remove impurities from solution. These impurities may represent colors, odors or other intangible impurities.

Nuchar Activated Carbon offers a simple means of replacing the older purification methods with the assurance of successful elimination. Adsorption by carbons of the impurities means their removal and because of the great progress made in the direction of increasing the adsorptive power per unit of carbon, Activated Carbon has shown marked monetary savings over other purification processes. In addition, in many instances, it has been possible to purify many liquids and solutions that did not respond to other methods of treatment.

To the chemist, the Freundlich equation means the removal of off-colors, tastes and odors and to the chemical process industries, Nuchar Activated Carbon means the most effective way to purify . . . by *ad*sorption.

Nuchar Active Carbons ★ Snow Top Precipitated Calcium Carbonate ★ Abietic Acid ★ Lignin ★ Indusoil Distilled Tall Oil ★ Sulphate Wood Turpentine ★ Liquid Caustic Soda ★ Chlorine ★ Tall Oil Pitch ★ Ligro Crude Tall Oil

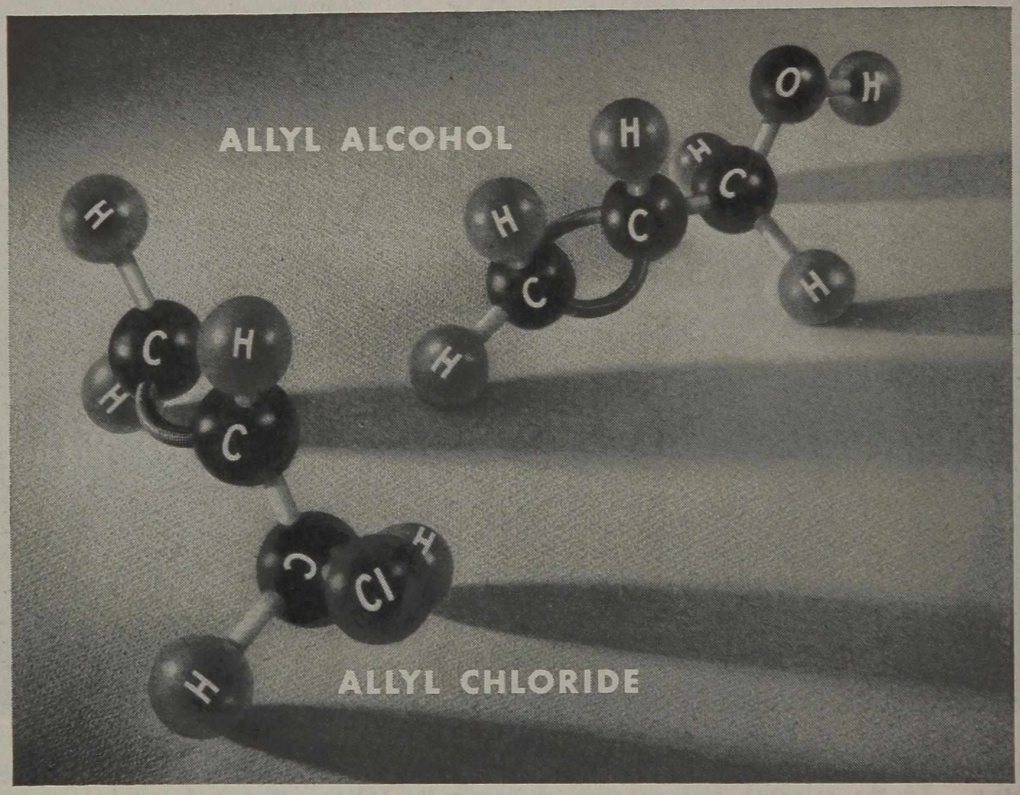
NUCHAR

INDUSTRIAL CHEMICAL SALES

DIVISION WEST VIRGINIA PULP & PAPER COMPANY

230 PARK AVENUE, NEW YORK 17, N.Y. · 35 E. WACKER DRIVE, CHICAGO 1, ILLINOIS · 748 PUBLIC LEDGER BLDG., PHILADELPHIA 6, PA. · 844 LEADER BLDG., CLEVELAND 14, OHIO

PROGRESS REPORT ON SHELL CHEMICAL'S FORTHCOMING ALLYL COMPOUNDS



BY APRIL, 1945, it is expected that Shell's new plant at Houston will be finished and ready to begin commercial-scale manufacture of allyl alcohol and allyl chloride.

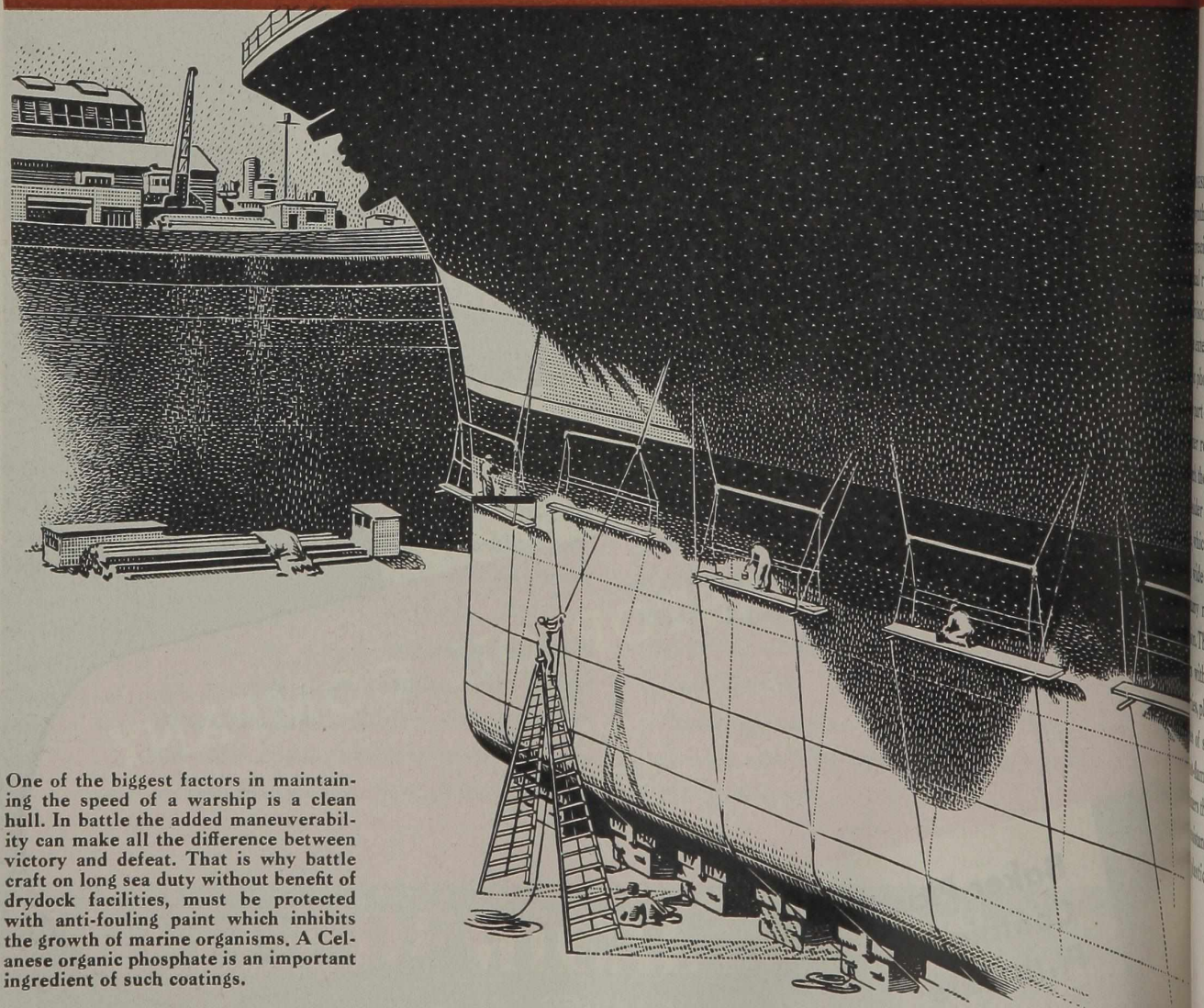
Capacity will be sufficient to meet all normal requirements for these base chemicals, which can be converted into many interesting materials.

For instance... low pressure laminating and casting resins... surface coatings... flavorings... pharmaceuticals... anaesthetics... and chemical intermediates . . . are some of the many indicated fields where one or the other of these chemicals will be found useful.

Your inquiries are invited. Perhaps we shall be able to assist with your problems.

SHELL CHEMICAL Division of SHELL UNION OIL CORPORATION
100 BUSH ST., SAN FRANCISCO 6, CALIFORNIA
R. W. GREEFF & CO. *Eastern Sales Agent* 10 ROCKEFELLER PLAZA, NEW YORK 20. TRIBUNE TOWER, CHICAGO 11

Celanese Chemicals *



One of the biggest factors in maintaining the speed of a warship is a clean hull. In battle the added maneuverability can make all the difference between victory and defeat. That is why battle craft on long sea duty without benefit of drydock facilities, must be protected with anti-fouling paint which inhibits the growth of marine organisms. A Celanese organic phosphate is an important ingredient of such coatings.

CELANESE CORPORATION OF AMERICA

. . . research in terms of your objectives

ELANESE RESEARCH has always stated the premise at synthetics can and should meet specific needs ith precision. This policy has been translated into ractical results many times by the Celanese chem- al division.

The extensive development of an entire series of ganic phosphates has resulted from a willingness the part of Celanese to thoroughly study specific stomer requirements and then through research match the material to the need.

Consider the field of vinyl compounds, for in- nce, which requires a great variety of plasticizers th a wide range of characteristics. Celanese has et many new needs, each with ecision. The result has been plas- izers with improved electrical operties, plasticizers with special alities of solubility, plasticizers th non-flammable characteristics, sticizers that combine flexibility th resistance to high tempera- res, plasticizers for non-toxic films coming in contact with foods.

Today Lindol*, Lindol* E.P., Lindol* M.P., Celluflex* and Cellube* are dependable names to the chemical engineer.

Lindol E.P. in particular is playing a direct war role in aviation motor oil. Used as a lubricant additive, it increases film strength many times over and acts as a solvent for resinous deposits. It supports greatly prolonged periods of engine operation.

Many of the most useful synthetic developments have come from approaching a need with an entirely open mind, from working to create a new combination of characteristics to meet a goal, rather than modifying a goal to an existing set of characteristics. The Celanese organization is qualified to handle and welcomes research in terms of your objectives. Celanese Chemical Corporation, a division of Celanese Corporation of America, 180 Madison Avenue, New York 16, New York.

*Reg. U. S. Pat. Off.

PLASTICIZERS

ORGANIC PHOSPHATES

LUBRICANT ADDITIVES

INTERMEDIATES

DYE-STUFFS

EXTILES • PLASTICS • CHEMICALS

HARDESTY'S *Red Oil* speaks for itself...

Yes, a sample of HARDESTY'S Red Oil (Oleic Acid) is its own advertisement!

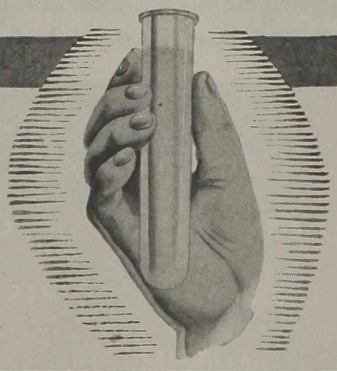
Send for one and subject it to whatever tests you require. HARDESTY is confident that, after thorough tests, you will give its Red Oil an unqualified endorsement.

HARDESTY can supply you with a wide selection of standard grades over a broad range of titres and colors both in distilled, redistilled and saponified grades, as well as custom-made products to meet your own specifications.

HARDESTY'S Red Oil speaks for itself — its purity, uniformity and stability are self-evident.

Describe the process in which you would like to use Red Oil, and write for a sample today. See HARDESTY, too, for other interesting products with unusual characteristics.

STEARIC ACID RED OIL GLYCERINE PITCH WHITE OLEINE
HYDROGENATED FATTY ACIDS ANIMAL AND VEGETABLE DISTILLED FATTY ACIDS

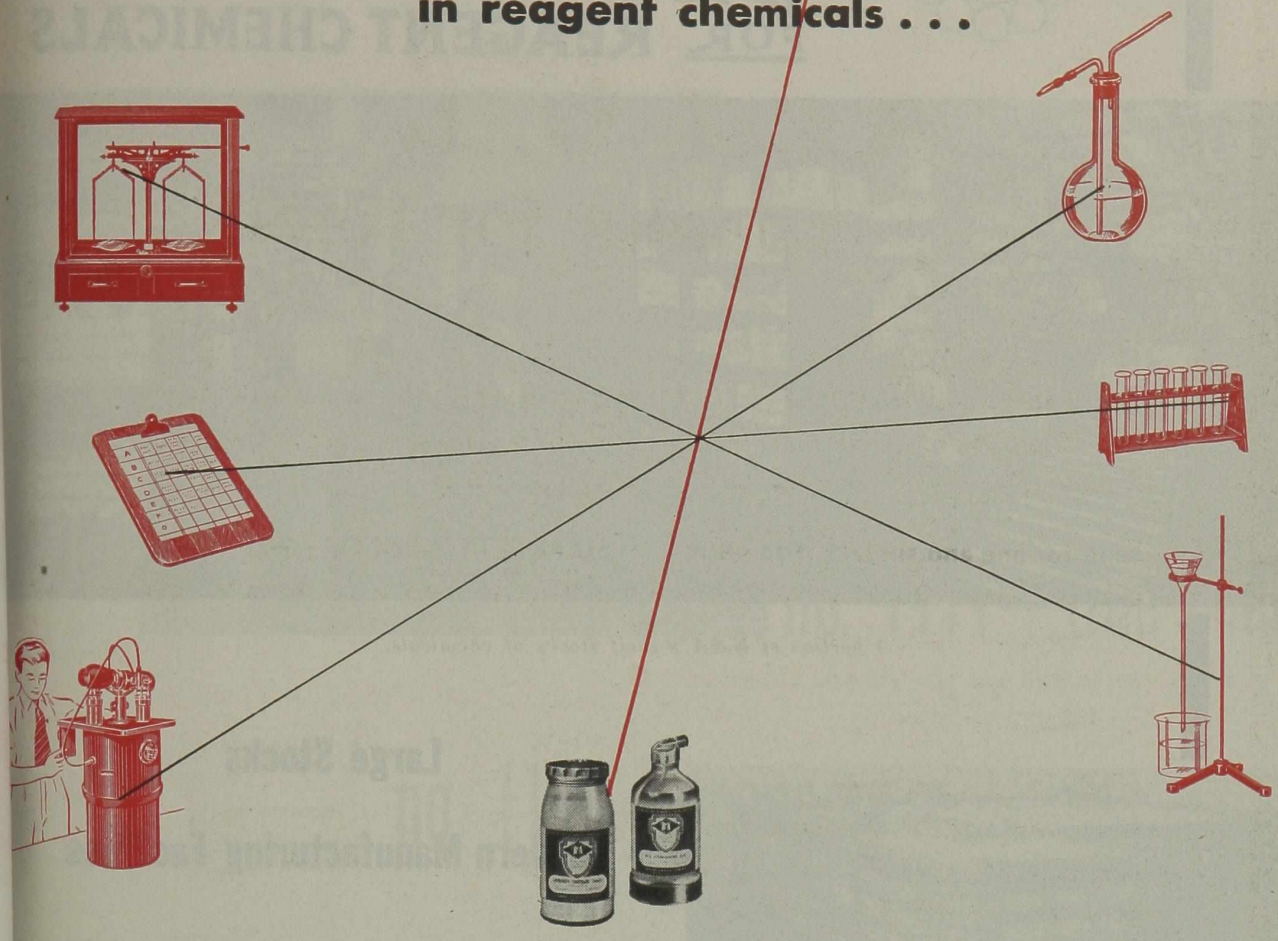


HARDESTY

W. C. HARDESTY CO.

41 EAST 42nd STREET • NEW YORK 17, N.Y.
FACTORIES: DOVER, OHIO · LOS ANGELES, CALIF. · TORONTO, CANADA

The only way to measure QUALITY in reagent chemicals . . .



Set rigid specifications and strict limits on impurities for product after product; then make these your inflexible standards for lot after lot—and you have the *true measure of quality for laboratory reagents.*

Exacting . . . difficult to achieve, particularly under present conditions? Yes, but this is the measure of quality by which Baker & Adamson produces all its reagent chemicals to assure their consistently dependable performance in your laboratory . . .

And B & A continues to establish new, higher standards of chemical quality—to set closer tolerances on impurities—even during today's trying times.

With good reason, then, Baker & Adamson quality has earned the confidence of chemists everywhere. That's why so many chemists always specify B&A to be sure of getting the full measure of reagent chemical quality.

Setting the Pace in Chemical Purity Since 1882

BAKER & ADAMSON B&A QUALITY STANDARD OF PURITY

BAKER & ADAMSON *Reagent and Fine Chemicals*

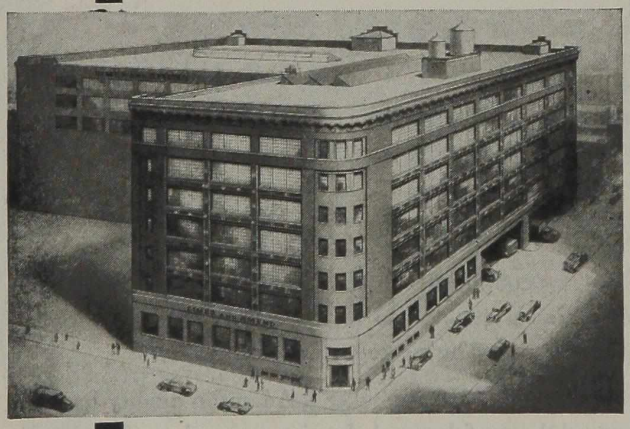
Division of GENERAL CHEMICAL COMPANY, 40 Rector St., New York 6, N. Y.

Sales and Technical Service Offices: Atlanta • Baltimore • Boston • Bridgeport (Conn.) • Buffalo Charlotte (N. C.) • Chicago • Cleveland • Denver • Detroit • Houston • Kansas City • Los Angeles Milwaukee • Minneapolis • New York • Philadelphia • Pittsburgh • Providence (R. I.) • San Francisco Seattle • St. Louis • Utica (N. Y.) • Wenatchee • Yakima (Wash.)

In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

EIMER and AMEND
First Source FOR REAGENT CHEMICALS

A portion of E.&A.'s shelf stocks of chemicals.



Eimer and Amend's plant in New York is devoted exclusively to providing modern apparatus and high purity chemicals for laboratories.

Write for free booklet, "Eimer and Amend Chemicals."

Large Stocks

Modern Manufacturing Facilities

Eimer and Amend maintains large and comprehensive shelf stocks of chemical reagents and standardized solutions, prepared especially for analytical, testing and experimental work.

These reagents are produced in E.&A.'s manufacturing plant at Edgewater, N. J., and in its laboratories at Greenwich Street, New York.

EIMER and AMEND

Headquarters for Laboratory Supplies

635 Greenwich Street • New York, N. Y.

Maybe it's natural to rest a bit on today's sales laurels. Pleasant dreams!

But when the awakening comes, competition may be pounding around the sales curve way out in front. That is, unless you're planning a product surprise or two today — for tomorrow.

If you haven't studied the potent possibilities of product improvement available through the use of Nimco Brand Lanolin, Degras and other grades of wool fat, this is the time to begin your experiments.

The facilities and the know-how that have made Malmstrom America's Largest Supplier of Lanolin and Degras are available to you, together with samples, should you prefer to conduct your own tests.

America's No. 1 Choice Because It's 5 WAYS BETTER

MALMSTROM · NIMCO BRAND · LANOLIN

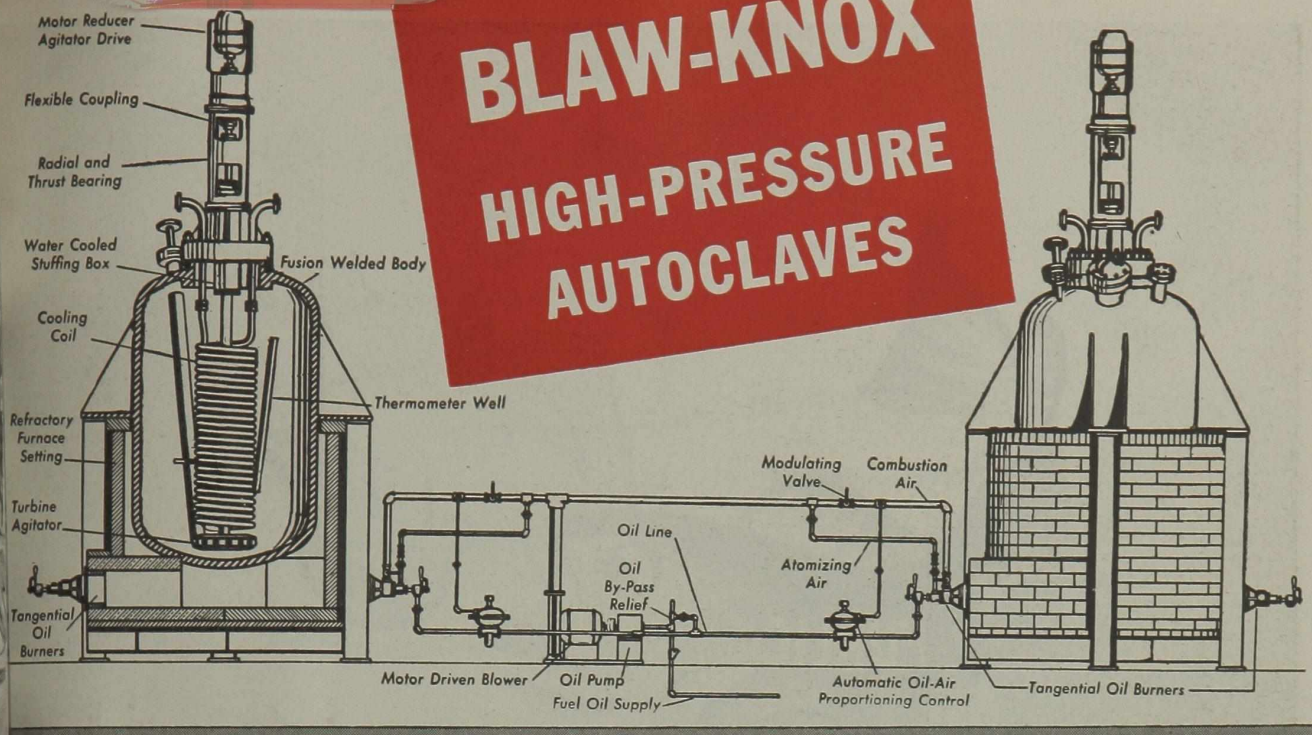
1. LOWEST *ODOR* VOLUME
2. GREATER *UNIFORMITY*
3. BETTER *COLOR* QUALITY
4. SMOOTHER *TEXTURE*
5. FINER *BODY* CONSISTENCY

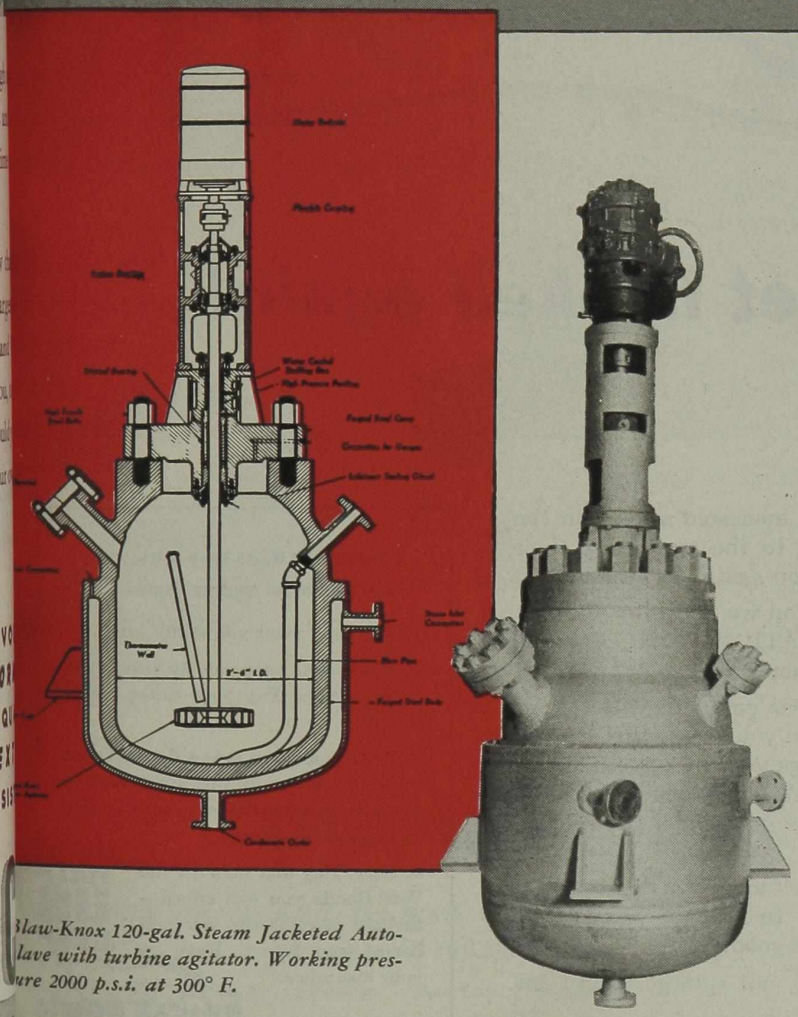
N. I. MALMSTROM & CO.

America's Largest Suppliers of { **LANOLIN** • Anhydrous U.S.P. • Hydrous U.S.P. • Absorption Base • Technical
DEGRAS • Neutral and Common • **WOOL GREASES**

147 LOMBARDY STREET • BROOKLYN, NEW YORK

BLAW-KNOX HIGH-PRESSURE AUTOCLAVES





Blaw-Knox 120-gal. Steam Jacketed Autoclave with turbine agitator. Working pressure 2000 p.s.i. at 300° F.

The drawing above shows the installation of two Blaw-Knox Direct-fired Autoclaves with furnace setting, arrangement of oil burning equipment and controls. Note that each autoclave is equipped with cooling coil for control of reaction and quick cooling before discharge.

Blaw-Knox Autoclaves are built for all working pressures up to 10,000 p.s.i. from small laboratory units to large commercial sizes. They are constructed of steel or corrosion-resisting alloys and equipped with suitable methods of heating.

Blaw-Knox furnishes a complete service to the process industries, including welded process vessels and other equipment of steel, alloys and other metals. Blaw-Knox facilities include complete engineering personnel, chemical engineering laboratories—field erection and plate fabrication of every description.

BLAW-KNOX DIVISION OF BLAW-KNOX COMPANY

2[illegible]ANK BUILDING, PITTSBURGH, PA.

Don't get hooked again!

Only yesterday (YOU remember!) men sold apples on the streets, saw their furniture go back to the store, lost their houses, lost their farms. Will it happen again? It needn't.

But to avoid the kind of depression we had after the last war—WE MUST HEAD OFF INFLATION NOW! And the best way to do that is to save your money.

When you don't buy a thing you can get along without . . . *that's helping to prevent inflation.* When you decide this is a bad time to ask more money for the things you sell or to fight for a raise . . . *that's helping to prevent inflation.* When you pay up all your debts . . . *that's helping prevent inflation.* AND SOMETHING MORE!

It's the best way to protect yourself against a depression if one should occur, *and* the best way to prepare yourself for tomorrow's opportunities if times are good.

The smart thing today is to save, not splurge. Don't get hooked again!

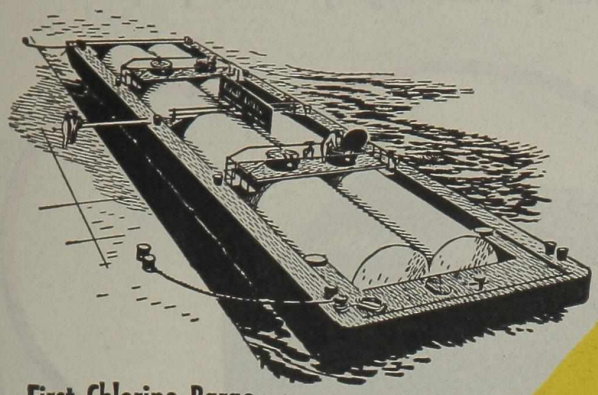
4 THINGS TO DO to keep prices down and help avoid another depression

1. Buy only what you really need.
2. When you buy, pay no more than ceiling prices. Pay your ration points in full.
3. Keep your *own* prices down. Don't take advantage of war conditions to ask more for your labor, your services, or the goods you sell.
4. *Save.* Buy and hold all the War Bonds you can afford—to help pay for the war and insure your future. Keep up your insurance.

HELP US KEEP PRICES DOWN

A United States War message prepared by the War Advertising Council, approved by the Office of War Information, and contributed by this magazine in cooperation with the Magazine Publishers of America.

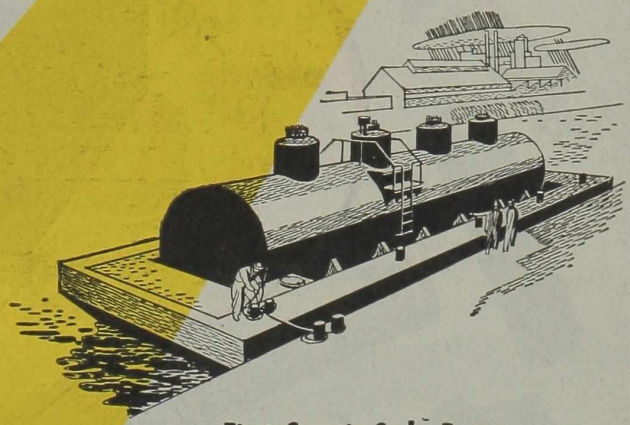
Columbia Spotlight



First Chlorine Barge

ewest development in the transportation of quid Chlorine is this barge, especially de-gned by Columbia to facilitate shipments via land waterways. All river shipments of this emical were previously limited to one-ton ntainers—a slow, tedious and costly method comparison.

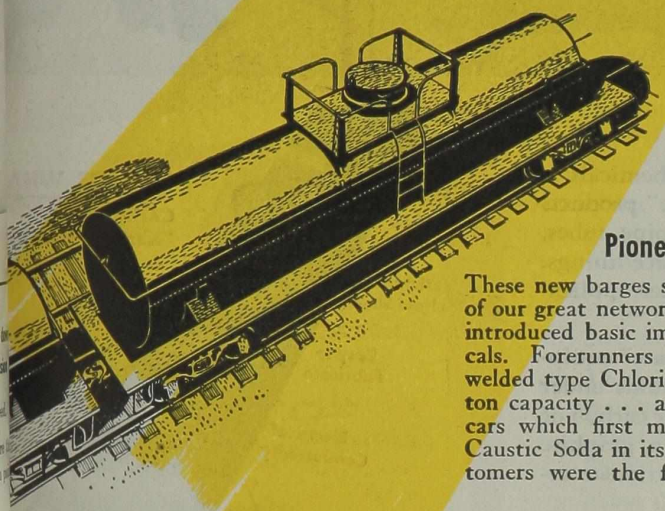
Cradling four fusion welded steel tanks in 135-foot steel hull, the new barge has a pacity of 380 tons of Liquid Chlorine. It y be loaded or unloaded from either side; nnections are so designed as to prevent nifolding of the tanks.



First Caustic Soda Barge

Another 135-foot barge has just been placed in service by Columbia. This one, the first designed specifically for Caustic Soda, will carry approximately 500 tons of Caustic Liquor. Its huge, welded tank is supported by suitable framework in a heavy steel hull.

Foamglas insulation guards the Caustic from freezing and a caustic resistant lining prevents metallic contamination of the chemical in transit.



Pioneer in Better Transportation

These new barges show the way to the more advantageous use of our great network of inland waterways. Similarly, Columbia introduced basic improvements in rail transportation of chemicals. Forerunners of these barges were Columbia's fusion welded type Chlorine tank cars . . . then Chlorine cars of 55 ton capacity . . . and the insulated and specially lined welded cars which first made possible the shipment of 73% Liquid Caustic Soda in its purest form. In every case, Columbia customers were the first to profit by these innovations.

COLUMBIA CHEMICALS

PITTSBURGH PLATE GLASS COMPANY · COLUMBIA CHEMICAL DIVISION

GRANT BUILDING, PITTSBURGH 19, PENNSYLVANIA

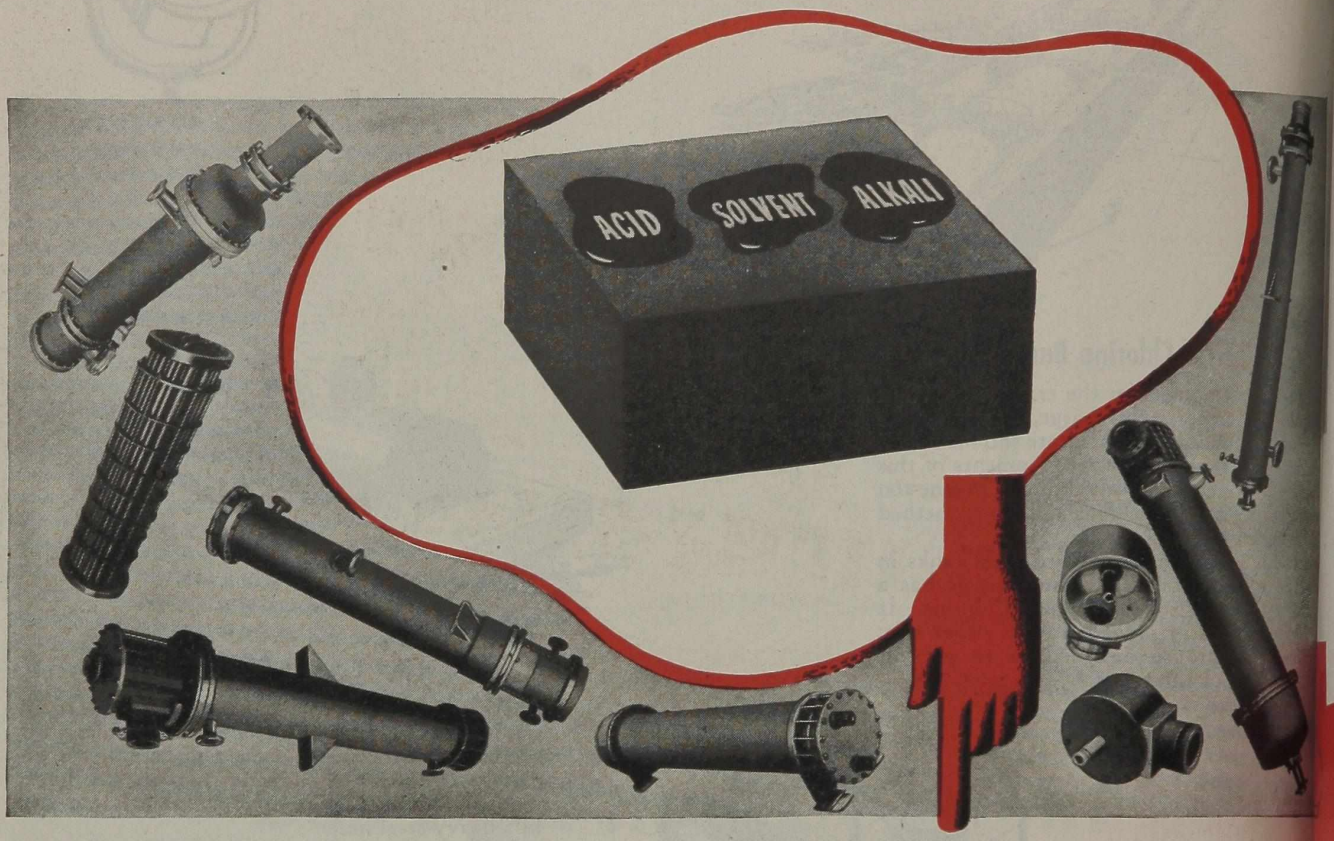
Chicago · Boston · St. Louis · Pittsburgh · New York · Cincinnati · Cleveland · Philadelphia · Minneapolis · Charlotte · Los Angeles

COLUMBIA ESSENTIAL INDUSTRIAL CHEMICALS

oda Ash · Caustic Soda · Sodium Bicarbonate · Liquid Chlorine · Silene EF (Hydrated Calcium Silicate) · Calcium Chloride · Soda Briquettes
Modified Sodas · Caustic Ash · Phosflake · Calcene T (Precipitated Calcium Carbonate) · Calcium Hypochlorite

What! CORROSION RESISTANCE, TOO?

Right! Uniquely combined with many other highly useful properties!



WHERE UTMOST RESISTANCE to the action of strong chemicals is required, "National" carbon and graphite and "Karbate" products excel. This means for heaters and heat exchangers. For pipe, tubes, fittings, pumps, valves. For tanks, tank linings and furnace linings. For flooring and porous products. For innumerable other applications.

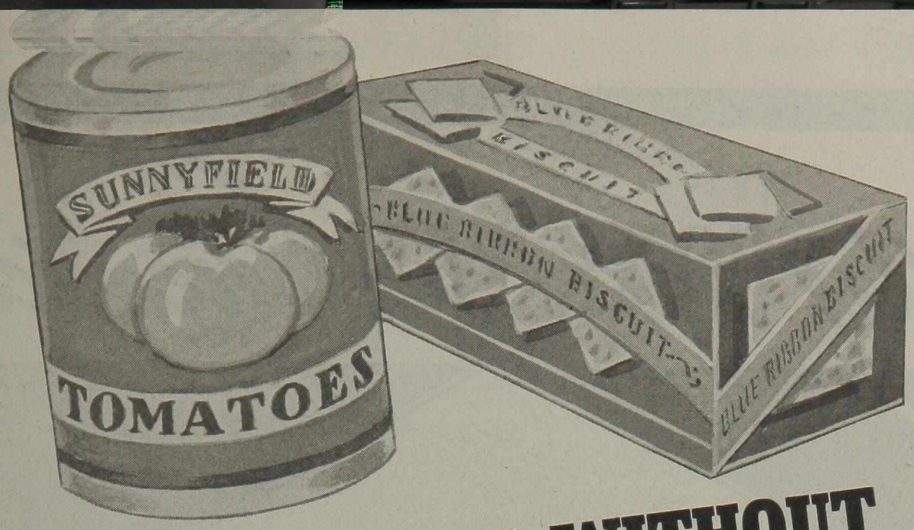
In many of these, "Karbate" material is used. "Karbate" equipment, in addition to being impervious to seepage of fluids under pressure, has adjustable properties, according to whether carbon or graphite is the base. Specifically, the properties of carbon, graphite or "Karbate" products can be prescribed for your particular requirements.

"National" carbon, graphite, and "Karbate" specialty products and structural shapes today solve industrial problems because no other material matches their *uniquely combined* physical, chemical, and electrical properties.

Keep Your Eye on the Infantry . . .
The Doughboy Does It!

The registered trade-marks "National" and "Karbate" distinguish products of National Carbon Company, Inc.

NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide and Carbon Corporation
UCC
General Offices: 30 East 42nd Street, New York 17, N.Y.
Division Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco



PACKAGES WITHOUT COLOR OFFER LITTLE SALES APPEAL

Pictures of foods in color stimulate the taste glands. Take color out of food labels, packages and advertising, and sales will drop. This is true of many products.

Artists use brilliant hues, and printers reproduce them, to increase your enjoyment of a beautiful picture, and to promote your desire for innumerable things.

These arresting hues would be far less persuasive *without* chemical purity. Chemical purity, as found in Baker's Sodium Tungstate, Sodium Molybdate, Lead Acetate or Lead Nitrate, is essential to printing inks of brilliant color—gives them a brilliance that remains alive even when attacked by sunlight and moisture.

The printing and lithographic industry is only one of the many industries where a fine or industrial chemical, manufactured by Baker to exacting standards, makes possible the betterment of products or services.

Baker Chemicals, purity by the ton, have been made for a large number of the nation's leading concerns for the manufacture and processing of numerous products.

If you have a special chemical requirement involving purity to the decimal for war production or for the post-war reconversion program, we invite you to discuss your needs in confidence with Baker.

7

Baker Chemicals

THE COLOR AND PRINTING INK INDUSTRIES

- Sodium Tungstate
- Sodium Molybdate
- Lead Nitrate
- Lead Acetate
- Magnesium Carbonate
- Acid Nitric
- Stannous Chloride

J. T. Baker Chemical Co., *Executive Offices and Plant:* Phillipsburg, New Jersey · *Branch Offices:* New York, Philadelphia and Chicago

Baker's Chemicals

C. P. ANALYZED • • FINE • • INDUSTRIAL

Sharples Research . . . PIONEERING FOR THE FUTURE

The first derrick for drilling oil was erected near Titusville, Pa., by "Colonel" Drake. On August 27, 1859, oil was struck at a depth of sixty-nine and one-half feet.

LIKE the petroleum industry of 1859, the new Sharples alkylamines listed below are in their infancy. The known uses are at present very few, but experimental quantities are available to those who are interested in examining them for post-war applications.

As suggestions, the following possible uses may be of interest, although many others may be indicated by the properties tabulated below:

As intermediates in the synthesis of pharmaceutical chemicals.

As raw materials for the preparation of new resins.

As raw materials for the manufacture of washing, wetting, and emulsifying agents.

As agents for making textiles water-repellent.

Sharples Research and Development Departments will gladly co-operate with those who are interested in evaluating these products, and samples will be submitted promptly upon receipt of your request on company letterhead. Don't pass up the opportunity of starting your research program with these compounds—NOW!

SHARPLES TRADE MARK CHEMICALS

NEW SHARPLES AMINES

Name	Formula	Theoretical Mol. Wt.	Sp. Gr. at 20/20° C.	Boiling Range ° C.	Water	Ethanol	Benzene
n-Amylamine	$C_5H_{11}NH_2$	87.2	0.758	104**	Complete	Complete	Complete
n-Hexylamine*	$C_6H_{13}NH_2$	101.2	0.772	125-130	Partial	Complete	Complete
n-Heptylamine	$C_7H_{15}NH_2$	115.2	0.779	150-160	Partial	Complete	Complete
n-Octylamine	$C_8H_{17}NH_2$	129.2	0.780	169-179	Partial	Complete	Complete
n-Decylamine	$C_{10}H_{21}NH_2$	157.2	0.799	218**	Negligible	Complete	Complete

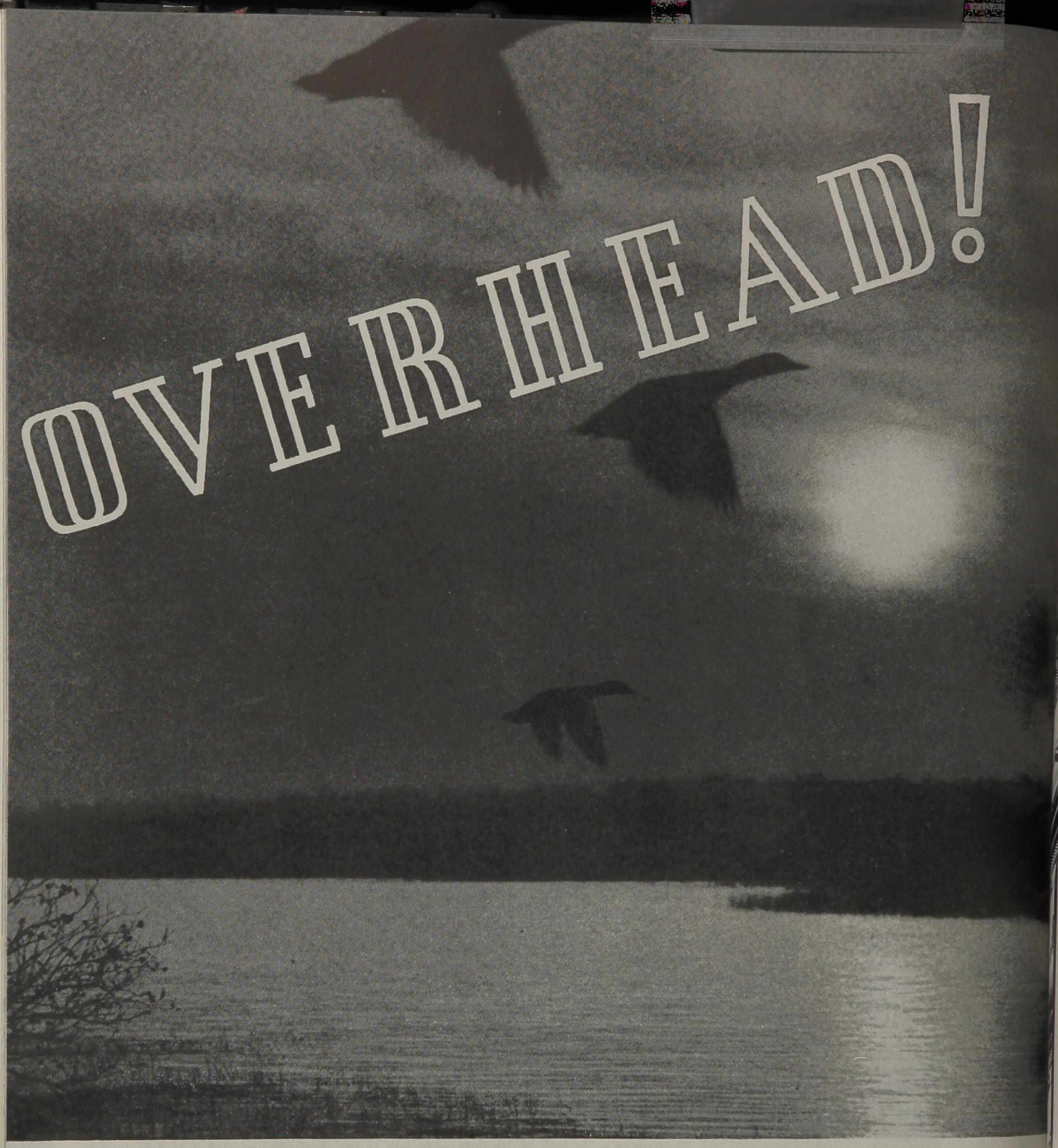
amples not available at present. ** Literature values.

Sharples Chemicals Inc.

ARMY E NAVY

PHILADELPHIA • CHICAGO • NEW YORK


Chemicals....
A WAR BIRD'S VIEW OF STAUFFER CHEMICALS · · · IN ACTION!
Official U. S. Coast Guard Photo
Look at Stauffer Chemicals through the eyes of our fighting men. Into these ships, planes and lighter-than-air craft have gone Stauffer Chemicals — the materials of which they are made, the fuel which powers them, the uniforms on the crews who man them. In all these capacities Stauffer has served. It has been Stauffer's privilege — as well as its duty — to join in the deafening roar that is American industry at war. And after victory, it will be Stauffer's privilege to join in the overwhelming effort that will be American industry helping to rebuild America and the world.
STAUFFER PRODUCTS
*Aluminum Sulphate
Borax
Boric Acid
Carbon Bisulphide
Carbon Tetrachloride
Caustic Soda
Citric Acid
*Copperas
Cream of Tartar
Liquid Chlorine
Muriatic Acid
Nitric Acid
Silicon Tetrachloride
Sodium Hydrosulphide
Stripper, Textile
Sulphur
Sulphuric Acid
Sulphur Chloride
*Superphosphate
Tartar Emetic
Tartaric Acid
Titanium Tetrachloride
(*Items marked with star are sold on West Coast only.)
STAUFFER CHEMICAL COMPANY
420 Lexington Avenue, New York 17, N. Y.
221 N. LaSalle St., Chicago 1, Illinois.
424 Ohio Bldg., Akron 8, O.—Orlando, Fla.
555 South Flower St., Los Angeles 13, Cal.
636 California Street, San Francisco 8, Cal.
North Portland, Oregon — Houston 2, Texas
Stauffer CHEMICALS SINCE 1885
STAUFFER



OVERHEAD? That word went out at Pearl Harbor. Nowdays, folks talk about priorities, taxes and winning the war. Overhead—is a peace time word anyhow. Today, the big presses and all the machinery in the Heekin factories are all-out for war. But, with the coming of peace, will come peace time problems of package designing and colors . . . metal packages that are round or square, tubular or oval. Heekin lithography on metal is famous . . . carrying many essential war time packages to the boys in the service . . . from bullets to bombs. When victory is achieved, Heekin metal lithographed containers will again carry peace time merchandise to market. When that time comes, remember Heekin has the facilities to produce whatever quantity you may desire.

THE HEEKIN CAN COMPANY, CINCINNATI, OHIO.

HEEKIN CANS

Lithographed

WITH HARMONIZ

No Two Alike

Although they look alike, these are all different types of General American tank cars. Each one has special protective features all its own—lining, insulation, pressure or heat control. Thus, correct handling is given to the great number of varied products carried in General American tank cars.

General American will design and build the tank cars needed for your product, no matter how hard it may be to handle.

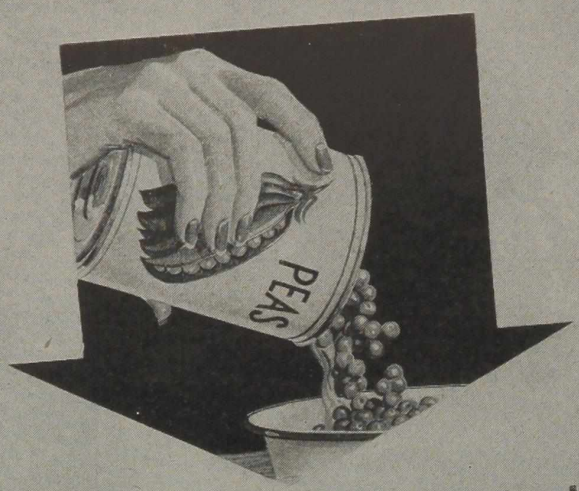
For Your Postwar Products

General American engineers are ready now to consult with you—to plan new tank cars with every feature needed to transport your products safely. Call or write our general offices — 135 South LaSalle St., Chicago 90, Ill.

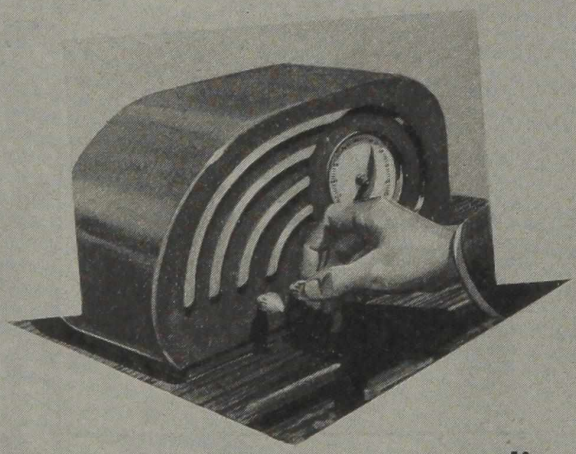
GATX GENERAL AMERICAN

ENERAL AMERICAN TRANSPORTATION CORPORATION

ders and Operators of Specialized Railroad Freight Cars ★ Bulk Liquid Storage Terminals ★ Pressure Vessels and other ded Equipment ★ Aerocoach Motor Coaches ★ Process Equipment of all kinds ★ Fruit and Vegetable Precooling Service



Cans to protect the family's food . . . Crowns to keep drinks right



The plastic case for your radio . . . . . And containers, liquid-tight

. . . ARE ALL MADE BY CONTINENTAL CAN COMPANY

Products and Divisions of Continental Can Co.
100 E. 42nd St., New York 17, N. Y.

CONTINENTAL PRODUCTS: Metal Containers · Fibre Drums · Paper Containers · Paper Cups · Plastic Products · Crown Caps and Cork Products · Machinery and Equipment.

OPERATING DIVISIONS: The Container Co., Van Wert, Ohio · Keystone Drum Company, Pittsburgh, Pa. · Boothby Fibre Can Division, Roxbury, Mass. · Mono Containers, Newark, N. J. — Plastics Division, Cambridge, Ohio · Bond Crown & Cork Co., Wilmington, Del. · Cameron Can Machinery Co., Chicago, Ill.

FOREIGN SUBSIDIARIES: Continental Can Company of Canada, Limited, Sun Life Building, Montreal · Sociedad Industrial de Cuba, S. A., Havana.

HERE'S THE SECOND ad in the new Continental advertising campaign telling folks about all the different things we now make. These ads not only point up the advantages of all kinds of products in cans—they also point out our expanded facilities and complete services. Watch for these full-color ads in such leading national magazines as *Time*, *Newsweek*, *U. S. News*, *Business Week* and *Fortune*. And keep your eye on Continental and the Continental trademark, too. The Triple-C stands for one company with one policy—to give you only the very best in quality and service.

Continental—for packaging and plastic products

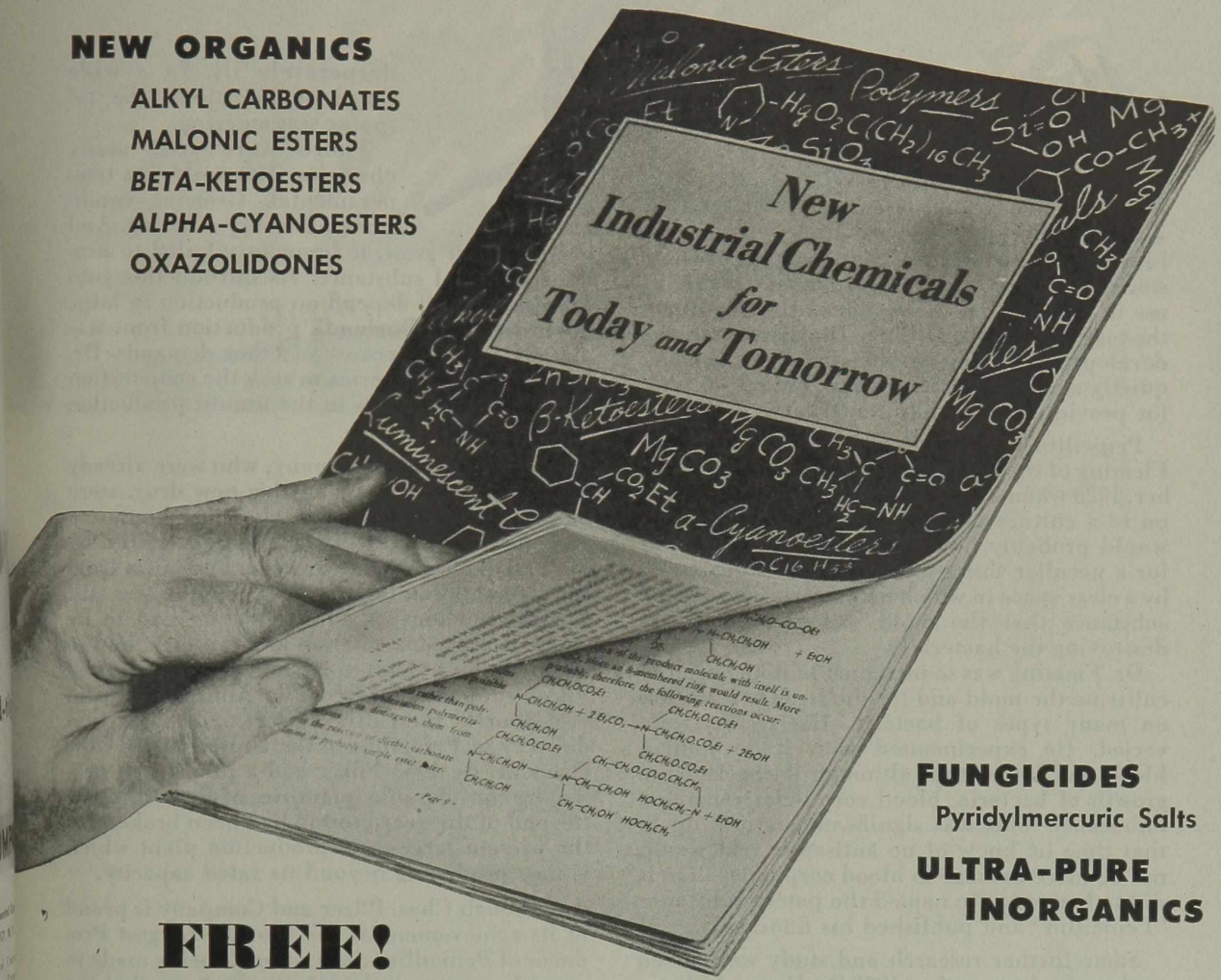
REPORT TO THE NATION," every Saturday over CBS coast-to-coast network.

NEW ORGANICS

—Worth Looking Into!

NEW ORGANICS

- ALKYL CARBONATES
- MALONIC ESTERS
- *BETA*-KETOESTERS
- *ALPHA*-CYANOESTERS
- OXAZOLIDONES



FUNGICIDES

Pyridylmercuric Salts

ULTRA-PURE INORGANICS

FREE!

These new organics, fungicides and ultra-pure inorganics are now available either in commercial, semi-commercial, or laboratory quantities—for your war and post-war research. If you do not have the latest booklet describing these interesting compounds, write for your copy today.

MALLINCKRODT CHEMICAL WORKS

74 GOLD STREET
NEW YORK 8, N. Y.

FINE CHEMICALS
Mallinckrodt
SINCE 1867

MALLINCKRODT STREET
ST. LOUIS 7, MISSOURI

A Lowly Mold that is making Medical History

MANY stories have been written about the casualties of this war — stories of men saved who would not have survived in other wars — stories of nurses and surgeons working with an effectiveness hitherto impossible. And in nearly all of these stories the word "Penicillin" appears. While its use in this war has monopolized the headlines, the men behind Penicillin — the discoverer, the developer and the manufacturer — working quietly and known to but a few, are responsible for providing this really remarkable drug.

Penicillin was discovered by Sir Alexander Fleming of the University of London in September, 1928 when a mold spore accidentally drifted on to a culture plate of bacteria. Dr. Fleming would probably have discarded the plate, but for a peculiar thing—the mold was surrounded by a clear space in which no bacteria grew. Some substance that the mold was giving off was destroying the bacteria!

Dr. Fleming was so intrigued that he began to cultivate the mold and try the strange secretion on many types of bacteria. His results were varied. He experimented with it on human blood and found that although it checked the growth of bacteria, blood corpuscles remained unharmed. This was significant because up to that time he knew of no antiseptic that would not do more damage to blood corpuscles than it did to bacteria. He named the potent substance "Penicillin" and published his findings.

Some further research and study were given to these findings and in 1938 Sir Howard Florey of Oxford and his co-workers set out to grow the mold and isolate the material that would kill bacteria. It was a long, tedious process. The mold product was unstable. Test after test had to be made, substance after substance eliminated. By 1940 they were rewarded. The pinch of brown powder they had tracked down was so potent that one part in several million would slow bacterial growth.

Although Dr. Fleming had made test-tube tests with Penicillin and human blood, it remained to be seen how the patient would react. The scientific route of mice to men was followed. Mice were injected with a notorious wound-infector. Penicillin was administered to some. In 24 cases out of 25 Penicillin won. Dr. Florey felt justified now in subjecting human beings to the test. Patients who had failed to respond to every other drug were chosen—people who were desperately ill. In a wide range of infections, the response was amazing.

There were still many obstacles. The mold was temperamental. Growing conditions were very exacting. And even when it grew, it frequently failed to produce the vital substance. Its introduction into hospitals would depend on production in large quantities. But England's production front was already limited because of other demands. Dr. Florey came to America to seek the cooperation of our manufacturers in the utmost production of Penicillin.

Chas. Pfizer and Company, who were already doing laboratory work on this new drug, were one of the first American chemical houses to collaborate with the British group. Pfizer by the Fall of 1941 were recovering Penicillin from the fermentation liquors. As Penicillin was still so new, methods of administration had to be studied; surgeons, civilian and military, had to be taught how to use it. In the Winter of 1941-42 Pfizer supplied the first Penicillin for clinical use. Shortly thereafter Pfizer made their first delivery of Penicillin to the United States Government. By 1943 Pfizer had a pilot plant producing considerable quantities of Penicillin. By the end of the year ground had been broken for the present large-scale production plant which is now producing beyond its rated capacity.

Although Chas. Pfizer and Company is proud of its achievement as the World's Largest Producer of Penicillin, every effort is being made to exceed present production in the hope that the supply of Penicillin will be sufficient to meet every demand.

The World's Largest PFIZER QUALITY **Producer of Penicillin**

Chas. Pfizer & Co., Inc.

Manufacturing Chemists • *Established 1849*

81 Maiden Lane, New York 7, N. Y.
444 West Grand Ave., Chicago 10, Ill.

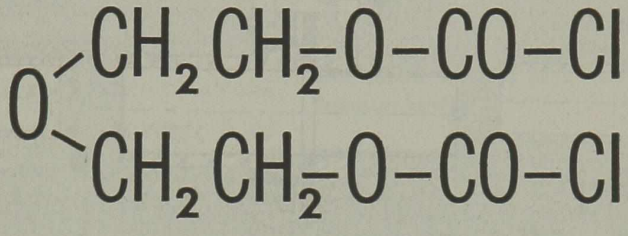
Chemicals for those Who Serve Man's Well-Being

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

A *NEW* Product of Columbia Research

Diglycol Chloroformate

[Diethylene Glycol Bis(chloroformate)]



Here is a new chemical intermediate to fill the need for a non-volatile, relatively easily handled organic dibasic acid chloride.

Diglycol Chloroformate is reactive, for example, with alcohols or amines to form other organic intermediates and derivatives . . . suggesting important applications in the fields of Pharmaceuticals, Rubber, Paints, Resins and Plastics. At the right is a partial listing of the physical properties of Diglycol Chloroformate.

SAMPLES AVAILABLE FOR YOUR EXPERIMENTS

Samples of Diglycol Chloroformate will be furnished at no charge to responsible organizations and individuals who desire to test the applications of this new acid chloride in their processes. Write to the General Sales Offices at the address shown below.

PHYSICAL PROPERTIES

Diglycol Chloroformate [Diethylene Glycol Bis(chloroformate)] is a colorless, relatively non-volatile liquid of mild odor.

Molecular Weight, $C_6H_8O_5Cl_2$	231.0
Specific Gravity, 20°C./4°C.	1.389
Density, lbs./gal. at 20°C.	11.6
Refractive Index, $n_{20}D$	1.4542
Boiling Point, °C. at 5 mm. Hg. pressure	125-127
Melting Point, °C.	5.3-5.7
Vapor Pressure, 50°C.	<0.1 mm. Hg.
100°C.	0.8 mm. Hg.
150°C.	17.5 mm. Hg.
200°C.	194 mm. Hg. (with dec.)
Latent Heat of Vaporization, cal. per gram at 115-185°C.	82.6
Viscosity, Centipoises, at 20°C.	9.6
at 50°C.	3.5
at 100°C.	1.4
Flash Point, °C.	above 200
Surface Tension, 20°C. dynes/cm.	37.8
Solubility of water in compound, 25°C., % by weight, 0.2	

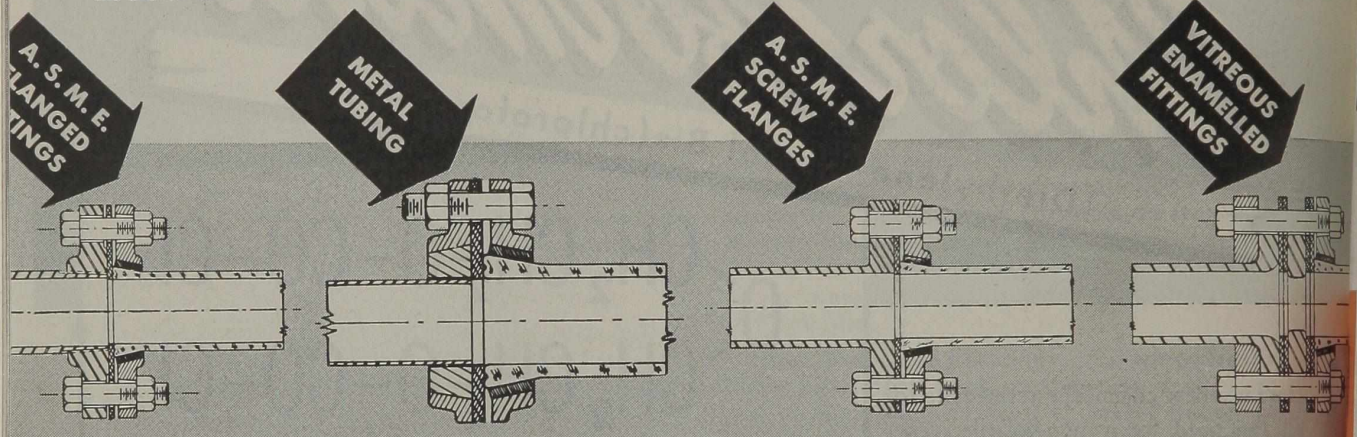
COLUMBIA CHEMICALS

PITTSBURGH PLATE GLASS COMPANY · COLUMBIA CHEMICAL DIVISION

GRANT BUILDING · PITTSBURGH 19, PA.

Chicago · Boston · St. Louis · Pittsburgh · New York · Cincinnati · Cleveland · Minneapolis · Philadelphia · Charlotte · Los Angeles

How to connect PYREX PIPE *to*



You can easily join Pyrex Pipe anywhere in your existing line. You can get tight, leak-proof connections to whatever piping or equipment you are now using—pipe lines, valves, pumps or tanks.

Standard adaptor connections are stock items for coupling Pyrex Brand Glass Pipe to steel, cast iron, lead, stainless steel, porcelain, hard rubber and rubber covered metal. A good way to find out what Pyrex Pipe will do for you, is to order it for your next unit replacement. Once you experience the advantages, even in partial installation, you will want to install an entire line of Pyrex Pipe.

Where acid conditions prevail, use Pyrex Pipe. Here is a material for use in those acid handling processes where freedom from contamination is important. The high resistance of Pyrex Pipe to acid attack also means a long life for your pipe line and the elimination of the cost and bother of frequent replacement. Lasting transparency, resistance to thermal shock, a smooth hard interior surface that minimizes friction in liquid flow are some of the other advantages of Pyrex Pipe that make it thoroughly efficient, practical and economical. For further information, write today to

Industrial Sales Dept., CI2
CORNING GLASS WORKS
CORNING, NEW YORK

GLASS PIPE
AND INDICATES MANUFACTURE BY CORNING GLASS WORKS, CORNING, NEW YORK

INDUSTRIAL SALES DEPT., CI2
CORNING GLASS WORKS, CORNING, N. Y.

Please send me the following literature:

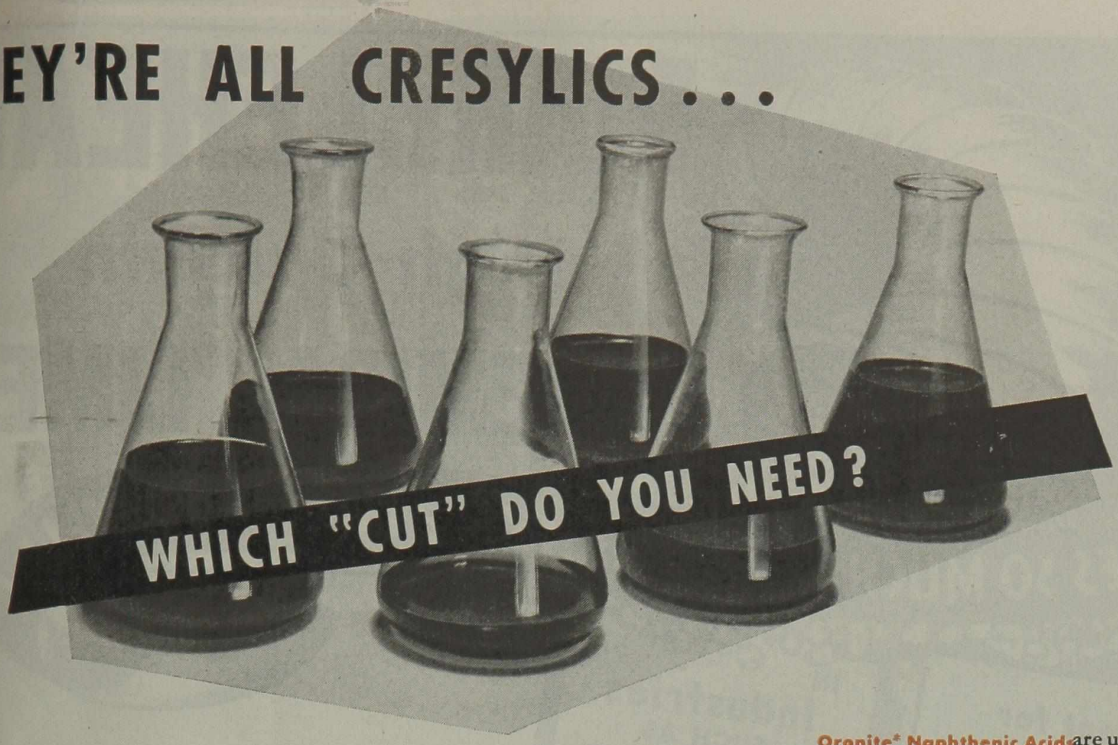
☐ Pyrex Pipe Bulletin
☐ Installation Manual
☐ Adaptor Connections
☐ Pyrex Valves

Name ..... Title.....

Firm .....

Address .....

THEY'RE ALL CRESYLICS . . .



ORONITE CRESYLIC ACIDS offer you the choice of several uniform grades, each having properties which adapt it to special commercial uses. Close control of boiling ranges in the manufacture of each "cut," and uniformity of the petroleum bases from which they are recovered—these are the factors which impart to Oronite Cresylics many important advantages over their coal tar analogues.

The several grades of Oronite Cresylics have found successful application in flotation, phenol-formaldehyde resins, adhesives, plastics, surface coatings, disinfectants, insecticides, detergents and special solvents. Because of their petroleum origin, Oronite Cresylics have over twice the phenol coefficient of the coal tar compounds, and their bactericidal efficiencies are correspondingly higher. They are also to be preferred as disinfectants because of their appreciably less injurious effect on skin tissue.

Write for laboratory samples and for a copy of our technical bulletin, *"Oronite Cresylic Acids."* This bulletin will provide you with valuable information on the various commercial grades of Oronite Cresylics and their particular applications. Oronite Research Service is at your disposal without obligation.

Oronite* Naphthenic Acids are used in soaps and other detergents, greases, water soluble oils and wood preservatives, and as flotation agents.

Oronite Sodium Sulfonates, derived from petroleum sulfonic acids, are used as emulsifiers, emulsion breakers, anti-rust compounds, fat-splitting agents, metal cleaners; in oil emulsions, insecticides and sprays.

Oronite Wetting Agent, consisting of selected petroleum sulfonates, is used in textile, paper and pigment manufacturing, leather processing, metal treatment and detergency.

Oronite Drying Oil Extenders are neutral unsaturated hydrocarbons suitable for use with all drying oils, in oleo-resinous varnishes, paints, enamels, adhesives, binders and plastics.

Oroplast*: an Oronite trade name for sulfur-reactive petroleum products specially developed for use as compounding ingredients for natural and synthetic rubbers.

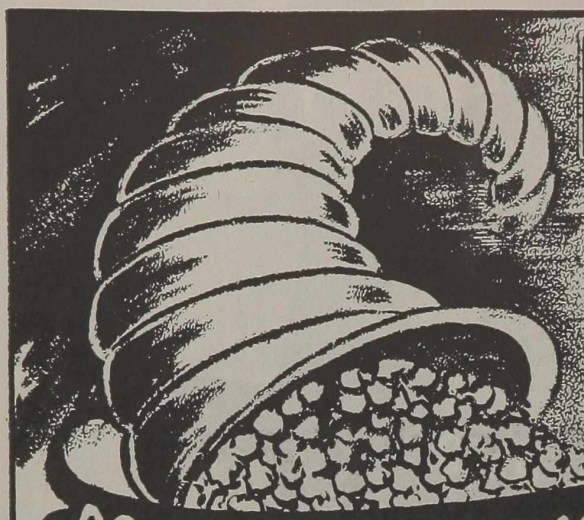
*Reg. U. S. Pat. Off.

ORONITE

CHEMICAL COMPANY

Building, San Francisco 4, California . . . 30 Rockefeller Plaza, New York 20, New York
te-Henry-Stewart Bldg., Seattle 1, Wash. . . . Standard Oil Bldg., Los Angeles 15, California

ORONITE CHEMICALS



MARBLEHEAD

High Calcium

CHEMICAL LIME

DOES SO MUCH FOR SO MANY *and* DOES IT SO WELL!

Efficient for

DYEING
BONDING
CLEANSING
BLEACHING
PURIFYING
OXIDIZING
ABSORBING
CLARIFYING
LUBRICATING
PRECIPITATING
NEUTRALIZING
CAUSTICIZING

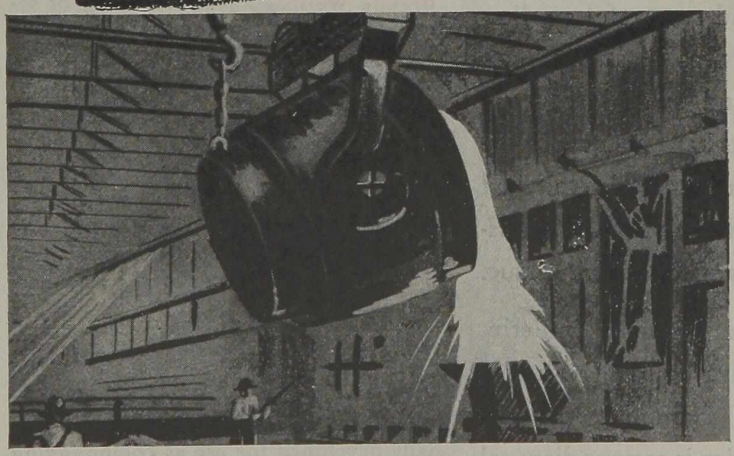
IN Industries SUCH AS

GLUE . . GREASES
STEEL . . RUBBER
SUGAR . . TEXTILES
PAPER . BOXBOARD
GLASS . . PAINTS
BRICKS . . LEATHER
VARNISHES
DYE STUFFS
INSECTICIDES
FOOD PRODUCTS
WATER TREATMENT
MANY CHEMICALS

THERE is hardly another chemical reagent that has so broad an application throughout industry as *chemical lime* — and Marblehead has been right up front in serving hundreds of the most prominent users over a period of 70 years.

Inborn high calcium quality inherent in the choicest of raw limestone, preserved intact by exacting manufacturing methods, provides a full share of chemical energy to do your job faster, more thoroughly, more efficiently.

And Marblehead's physical qualities — soft, fine texture, a choice of fast or slow-settling characteristics, quick slaking where needed, freedom from grit — offer added values for lime-using processes.



Marblehead Chemical Lime is used in open hearth steel manufacture as a basic flux to remove acid elements and impurities from the molten mass.

★ FOUR FORMS ★

TRY A CAR NOW IN YOUR OWN PLANT

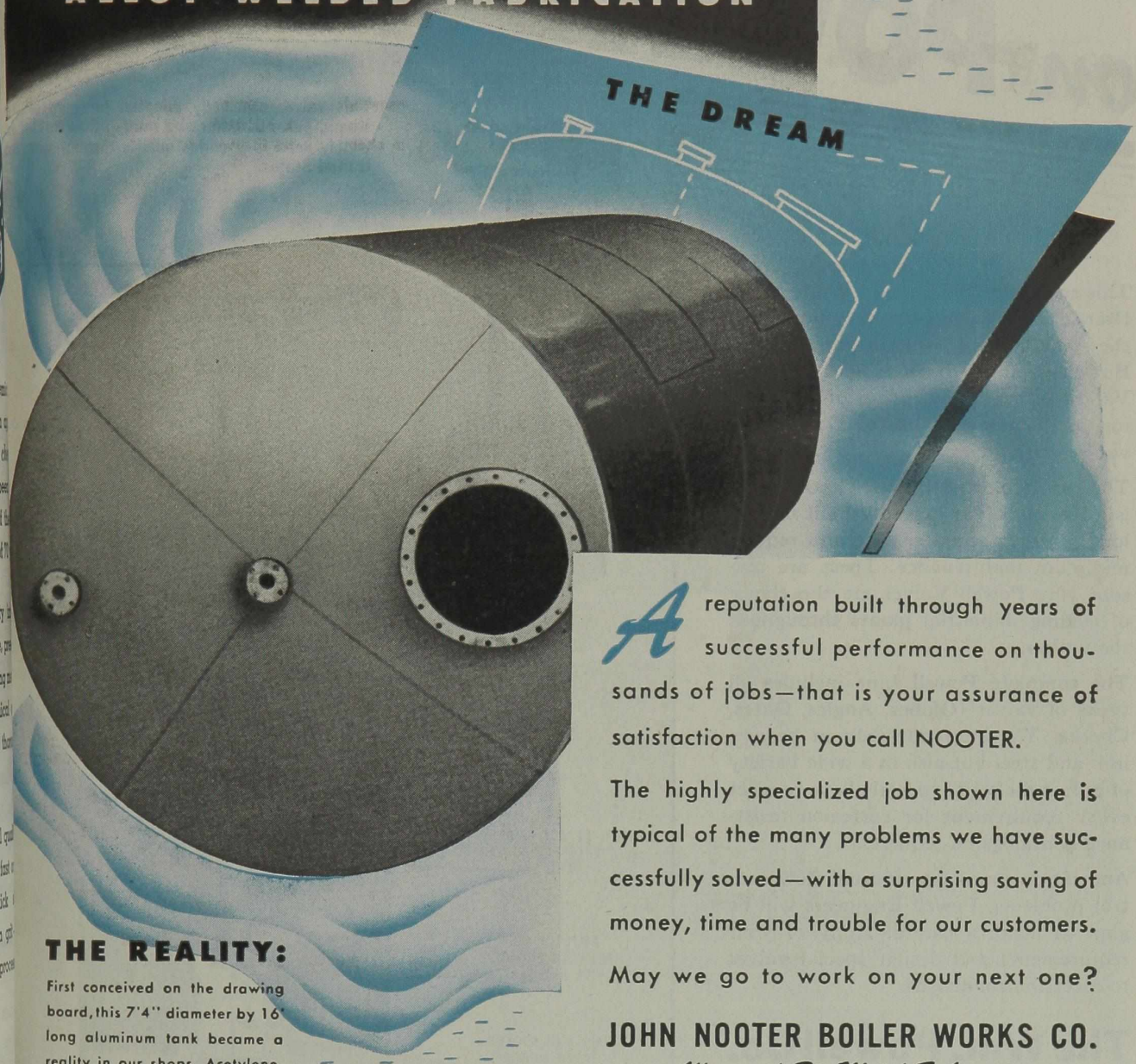
POWDERED QUICK LIME — PEBBLE LIME — HYDRATED LIME — LUMP LIME

MARBLEHEAD LIME CO.

160 N. LaSalle St. Chicago 1, Ill.

A NAME TO BE TRUSTED

FOR STEEL, PURE METAL AND ALLOY WELDED FABRICATION



THE REALITY:

First conceived on the drawing board, this 7'4" diameter by 16' long aluminum tank became a reality in our shops. Acetylene, electric and atomic hydrogen welding, all contributed to its fabrication.

A reputation built through years of successful performance on thousands of jobs—that is your assurance of satisfaction when you call NOOTER.

The highly specialized job shown here is typical of the many problems we have successfully solved—with a surprising saving of money, time and trouble for our customers.

May we go to work on your next one?

JOHN NOOTER BOILER WORKS CO.

Alloy and Bi-Metal Fabricators

1408 South Second Street • St. Louis 4, Missouri

ARMY NAVY

NOOTER
ST. LOUIS

More inside information on POWELL VALVES

This small size 200-pound "White Star" Bronze Gate Valve looks very much like the same type of valve in other makes. But back of it—back of every Powell Valve—is nearly a century of specializing in the manufacture of Dependable valves for Industry.

The result of this Powell "know how" is a line of valves ruggedly built to give long, uninterrupted service and require minimum maintenance. These are reasons why Powell Valves are the choice of leading industrial plants throughout the nation.

The complete Powell Line includes all types of valves (Globes, Angles, Gates, Checks, Y's, etc.) not only in bronze, iron and steel but also in a wide variety of pure metals and special alloys to meet every requirement for corrosion resistance (Catalogs on request).

And if you have any unusual flow control problems, Powell Engineers will be glad to make a careful study of your requirements and design special valves to meet the conditions.

The Wm. Powell Co.

Dependable Valves Since 1846

Cincinnati 22, Ohio

This valve, especially adapted for controlling steam, gas, oil, water and many other fluids, is widely used in chemical plants throughout the United States.

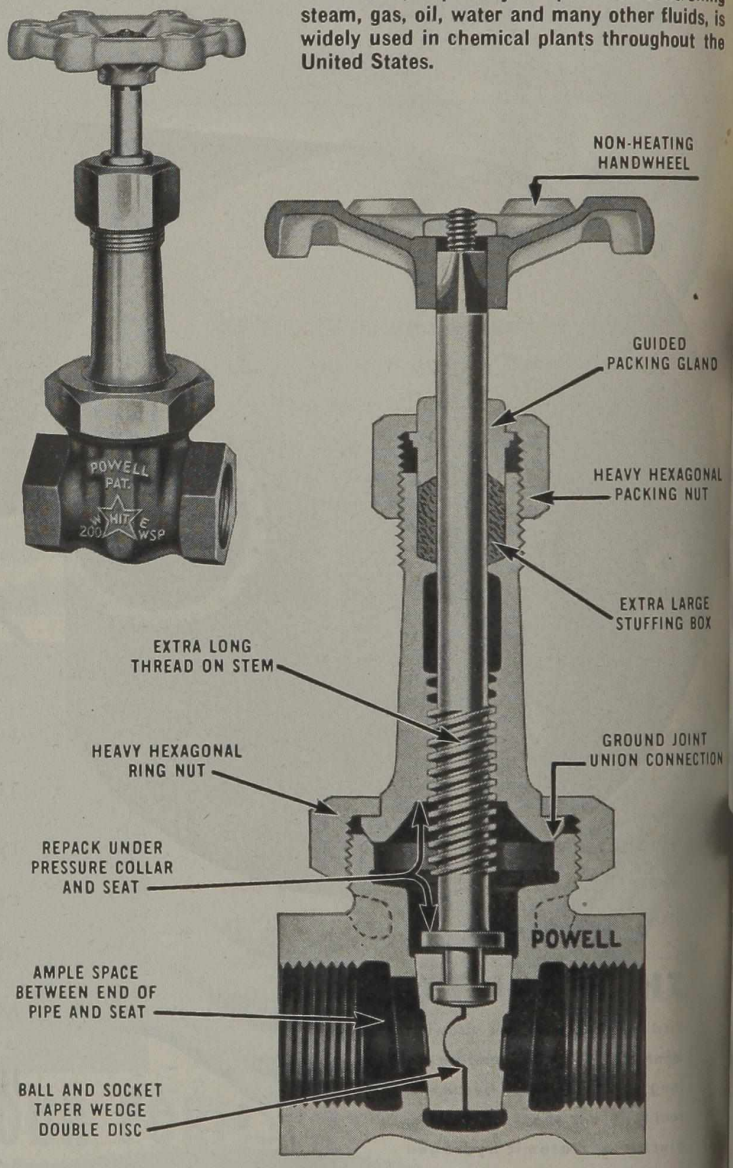
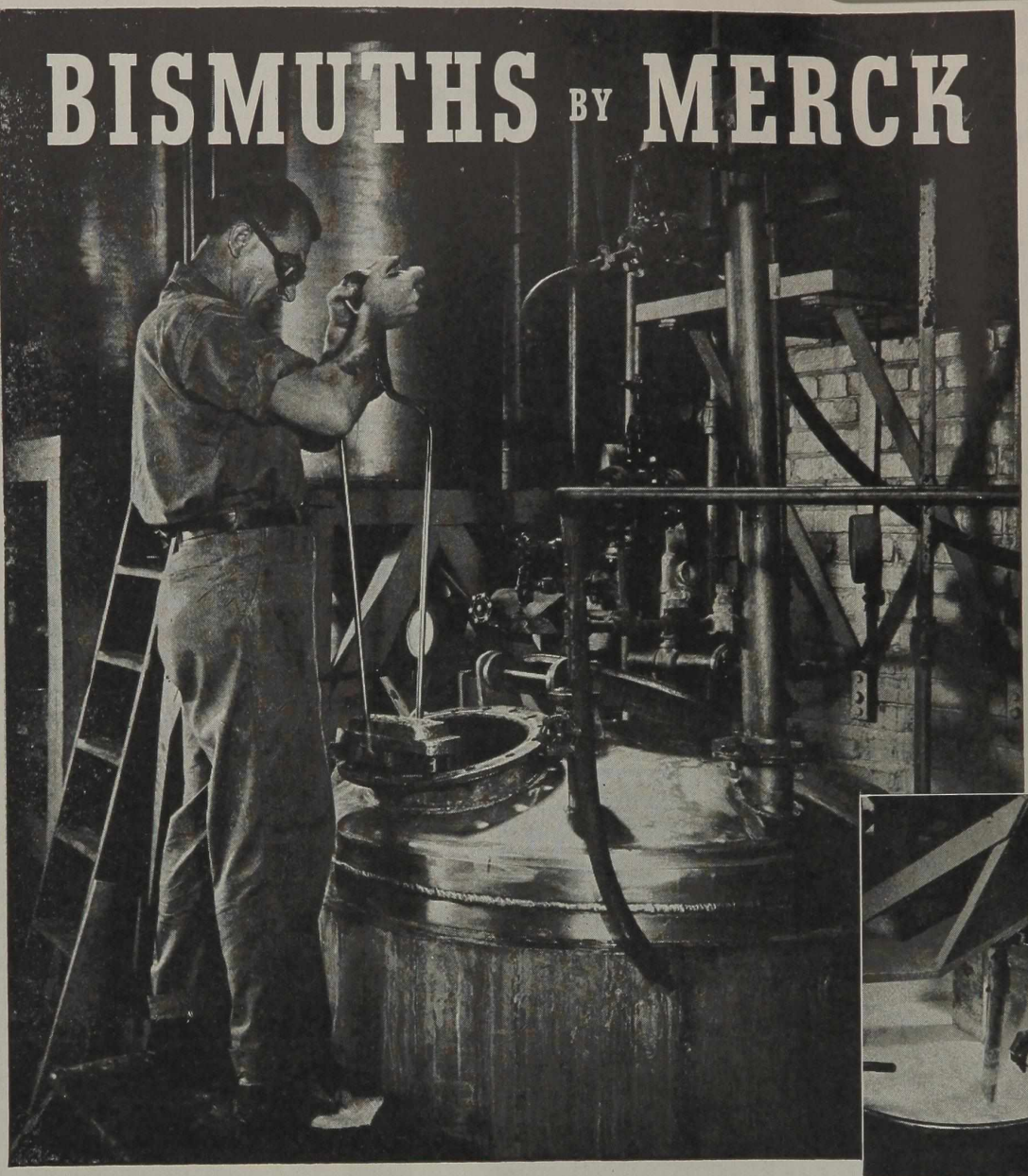


Fig. 375
BRONZE "WHITE STAR" GATE VALVE

POWELL VALVES

BISMUTHS BY MERCK



Two steps in the production of Merck Bismuth Products

Standardize

ON MERCK BISMUTHS
FOR PURITY,
RELIABILITY, AND
A CENTRAL SOURCE
OF SUPPLY

Subcarbonate

Subnitrate

Subgallate

Subsalicylate

and other Bismuth Salts

MERCK

FINE CHEMICALS FOR THE PROFESSIONS AND INDUSTRY SINCE 1818

ARMY E NAVY
Speed the Victory with War Bonds

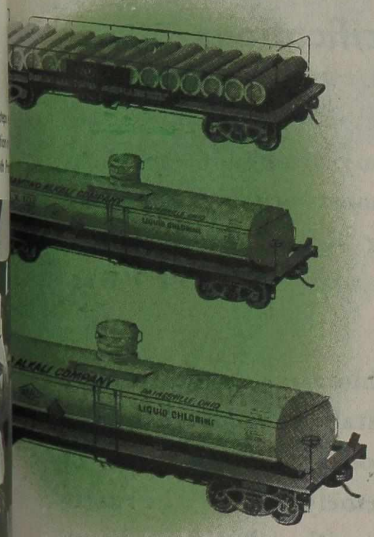
MERCK & CO., Inc. *Manufacturing Chemists* RAHWAY, N.

New York, N. Y. • Philadelphia, Pa. • St. Louis, Mo. • Elkton, Va. • Chicago, Ill. • Los Angeles, C

In Canada: MERCK & CO., Ltd., Montreal and Toronto

ALKALI

DIAMOND LIQUID CHLORINE



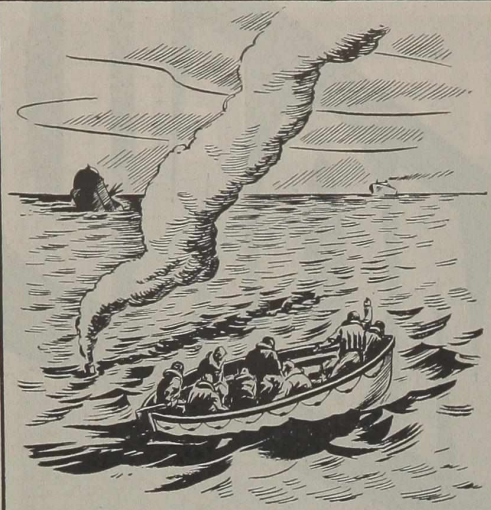
E DEPENDABLE CHLORINE
ECIFICATION FOR PROCESSING
GINEERS THE YEAR 'ROUND

ENDABLE

UNIFORM

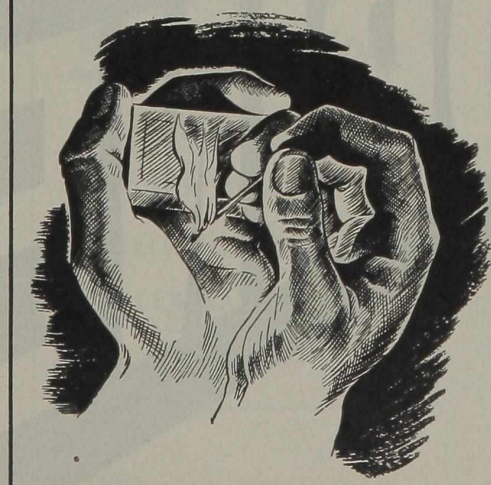
SAFE

OND ALKALI COMPANY · PITTSBURGH, PA., AND EVERYWHE



SMOKE BOMBS

PRIMERS



MATCHES

PENN SALT

POTASSIUM CHLORATE

helps them meet specifications

Smoke bombs that meet Navy specifications! Primers that meet Army ordnance specifications! Matches that meet specifications for quick, sure and lasting lights! Products are made *right* when made with Penn Salt Potassium Chlorate.

Penn Salt Potassium Chlorate is made to rigid standards in grades suitable for match manufacture or the production of different types of explosives. It is extremely active . . . reacts rapidly and completely with other ingredients to produce an excellent fusion. Its uniformity and high standard of purity are guaranteed because Penn Salt controls its manufacture from the raw material to the finished product.

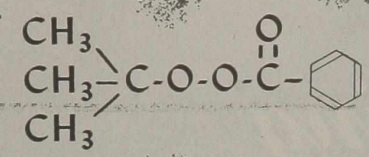
For further information about Penn Salt Potassium Chlorate, write us

PENNSYLVANIA SALT MANUFACTURING COMPANY

Chemicals

1000 WIDENER BUILDING, PHILADELPHIA 7, PA.

New York • Chicago • St. Louis • Pittsburgh • Cincinnati • Minneapolis • Wyandotte • Tacoma



t-Butyl Perbenzoate*

A New, Liquid Peroxide, easily miscible with many Monomeric Materials, which effectively catalyses them, and because of its high decomposition point and the nature of its decomposition, forms extremely clear, bubble-free films.

GENERAL DESCRIPTION

A liquid, organic peroxide (8.00–8.50% available oxygen) which is relatively non-volatile and highly stable.

SUGGESTED USES

1. As an effective catalyst in bulk polymerizations.
2. As an extremely good high temperature polymerization catalyst.
3. Wherever organic peroxides are of interest.

PROPERTIES

Molecular Weight	*194*
Specific Gravity at 20° C.	*1.035*
Vapor Pressure	*Less than 10mm. of mercury at 100° C.*
Decomposition Poiut	*113–116° C.*
Freezing Point	*–2° to –4° C.*
Refractive Index at 25° C.	*1.489*
Available Oxygen	*8.00 to 8.50%*
Color	*Light Yellow*
Solubility	Soluble in all proportions in all common organic solvents.
Sensitivity	Insensitive to shock, rubbing, grinding.
Stability	Highly stable at room temperature. Stable over iron, aluminum, copper, tin and zinc. Decomposes slowly over lead.

Practically all the technical information known at present about this interesting new peroxide is given here. The product is in limited commercial production, and samples will be gladly sent to anyone interested in investigating its possibilities.

TWO OTHER PEROXIDES OF INTEREST . . .

t-BUTYL HYDROPEROXIDE*

An organic, alkyl peroxide that is standardized at a concentration of 60% (10.66% available oxygen). Use of proper activators increases rate of release of the oxygen. In limited commercial production at present. Samples will be gladly sent anyone interested.

1-HYDROXYCYCLOHEXYL HYDROPEROXIDE-1*

An organic, cycloalkanyl peroxide in white crystalline solid form that is extremely stable at room temperature and possesses 12.13% active oxygen. Has been produced in our laboratory on a small scale and can be made in commercial quantities if there is sufficient demand. Samples will be gladly made up upon request.

*U. S. Pats. 2176407, 2223807 & 2298405

Address all inquiries to the Union Bay State Chemical Company, Peroxides Division, 50 Harvard Street, Cambridge 42, Massachusetts.

UBS

UNION BAY STATE
Chemical Company

Serving Industry with Creative Chemistry

ORGANIC CHEMICALS · SYNTHETIC LATEX · SYNTHETIC RUBBER
PLASTICS · INDUSTRIAL ADHESIVES · DISPERSIONS
COATING COMPOUNDS · IMPREGNATING MATERIALS · COMBINING CEMENTS

Molten sodium silicate for heat transmission?

Yes, it sounds like a paradox since PQ Silicates are fireproofing agents and are used as binders for insulating compounds.

This new use was discovered when chrome-nickel steel for retorts in the production of magnesium became scarce and ordinary steel was substituted. The problem of corrosion by furnace gases was solved by surrounding each retort with molten silicate of soda glass, our "SS" Brand.

At 1600°F. the glass is fluid and transparent to infra-red rays. Reaction in the retorts proceeds as desired while the metal itself is "insulated" from corrosive atmospheres by the silicate in which it is immersed. And the silicate glass keeps in usable condition for long periods. The low iron and alumina content of "SS" Brand gives high transparency to infra-red rays.

Whether your problem is one of corrosion prevention, or special heat transmission, investigate sodium silicates. Let PQ help you get the right grade and the best method of application.

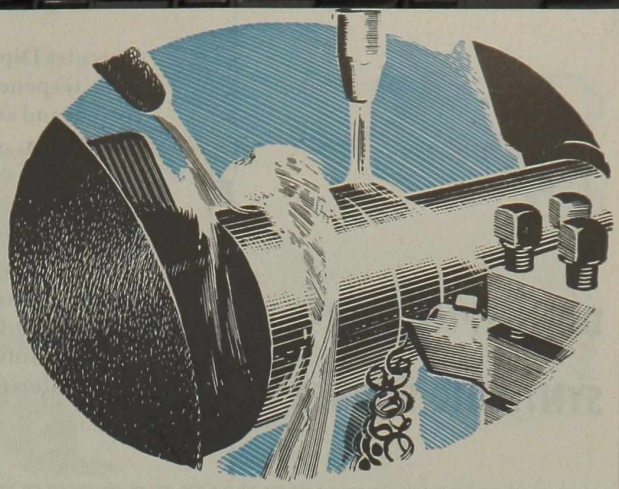
PHILADELPHIA QUARTZ CO.
Dept. B, 119 South Third Street, Phila. 6, Pa.
Chicago Sales Office: 205 West Wacker Drive

Interior of furnace unit showing reaction tube before embedding in the "SS" Silicate

WORKS: Anderson, Ind. • Baltimore, Md. • Chester, Pa. • Gardenville, N. Y. Jeffersonville, Ind. • Kansas City, Kans. • Rahway, N.J. • St. Louis, Mo. • Utica, Ill.

PQ SILICATES OF SODA

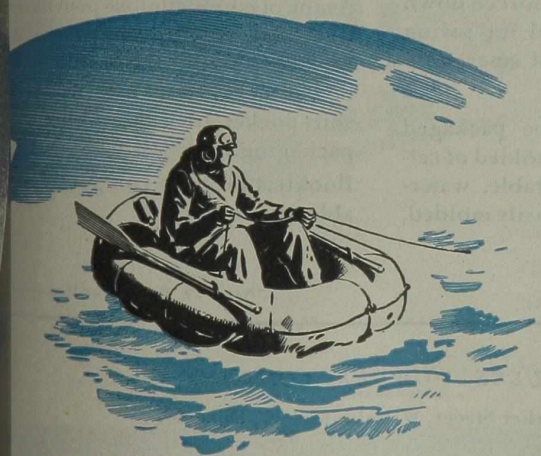
DELUMPING GR-S SYNTHETIC RUBBER with Hercules Dipentene makes smoother tire compound. Small percentages of Hercules Dipentene are used to give good workability and aid processing, and to assist in extrusion operations. Details on Dipentene on next page.



SCARCE PETROLEUM SULFONATES may be extended with the liquid Dresinates in making soluble cutting oils. Used alone during the extreme shortage of the sulfonates, these Dresinates now show up as excellent combination emulsifiers. See next page for details.

CUES AND CLUES

for improved products



POTENTIAL LIFE-SAVER. A light-weight emergency kit has everything that a shipwrecked aviator or sailor needs for catching fish anywhere in the world. Molded of tough cellulose acetate . . . easily unsealed and resealed with red tape of ethyl cellulose. Please turn to next page.

From test-tube to carload is too often a matter of 5 to 10 years. In hopes of shortening this long period between successful experiment and commercial acceptance, Hercules presents CUES AND CLUES . . . early reports on promising new products . . . new methods . . . new uses for old products. Your finding a cue that's a valuable clue will benefit us both. Your inquiries on any product will receive prompt attention. Write Hercules Powder Company, 992 Market Street, Wilmington 99, Delaware.

HERCULES

SEE NEXT PAGE FOR DETAILS

1

DELUMPING GR-S SYNTHETIC RUBBER

Hercules Dipentene No. 122* is a monocylic terpene used for many years as a solvent and anti-skinning agent in paints, varnishes, and enamels. Dipentene No. 122 has strong solvent and wetting power for many types of complex organic materials.

The newest use for dipentene, smoothing out GR-S, may be a clue for solving one of your problems. This material is an excellent solvent for GR-S, and disperses readily during milling. It raises tensile strength and lowers modulus, with c siderable increase in elongation. Cu stocks are effectively softened. Rebo undergoes only slight changes, and l variation occurs in tear resistance.

With these proved characteris Hercules Dipentene No. 122 is indic for GR-S stocks both in compoun and as a softener during reclaim o tions. In requesting further informa please state your problem as full possible.

2

SCARCE PETROLEUM SULFONATES

Dresinates* No. 87 and No. 90 are the water-soluble salts of selected and specially treated rosins in concentrated liquid form. Used in combination up to 25% with petroleum sulfonate as emulsifiers in soluble oils, for metal cutting and other purposes, they provide a uniformity of saponification not possible when the resinate is made in ordinary equipment, or by usual methods. These Dresinates, so used in combination, give stable emulsions that are economically efficient, and leave no residue or gummy deposits on work being processed

Because of their low cost and versa the many grades of Dresinate have important uses in a variety of indus as emulsifying and foaming agent tergents, binders and stickers, flo agents, and wetting agents.

Dresinates vary in their properti pending on the rosin or resin used raw material, on the alkali, a whether other ingredients have added. Details on each Dresinat samples, will be supplied on requ

3

POTENTIAL LIFE-SAVER

Stowed away in life-boats, rafts, inflatable rubber boats and in jungle kits are thousands of small boxes containing "hook, line, and sinker" . . . everything that shipwrecked sailors, or aviators forced down at sea, might possibly need for saving their lives with a fish diet if emergency rations run out.

These fishing kits must be packaged safely. Therefore, they are molded of cellulose acetate . . . tough, durable, waterproof, yet light in weight. Easily molded, for speedy production. Over 200 of instructions are imprinted int on) cover and bottom—impossi lose them.

A tape of ethyl cellulose provides a tight seal, easy to remove and as replaced. Only about 3" x 3" x box is small enough to be carrie shirt pocket. It's a clue for better p packaging.

Booklets on both compounds are able on request.

*Reg. U. S. Pat. Off. by Hercules Po

RETURN COUPON FOR FURTHER INFORMATION

HERCULES POWDER COMPANY
INCORPORATED
992 Market Street, Wilmington 99, Delaware

Please send me further information on: _____

_____

Name _____

Company _____

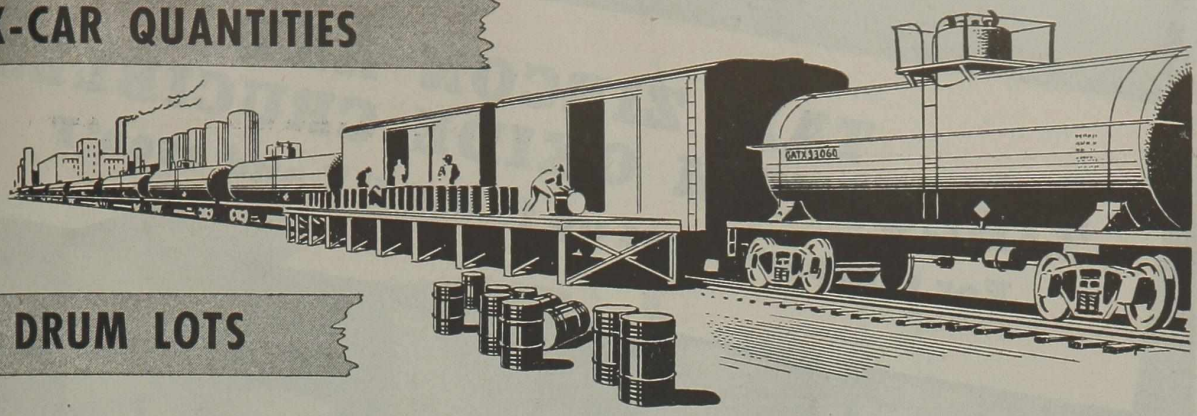
Address _____

City _____ *State* _____

HERCULES

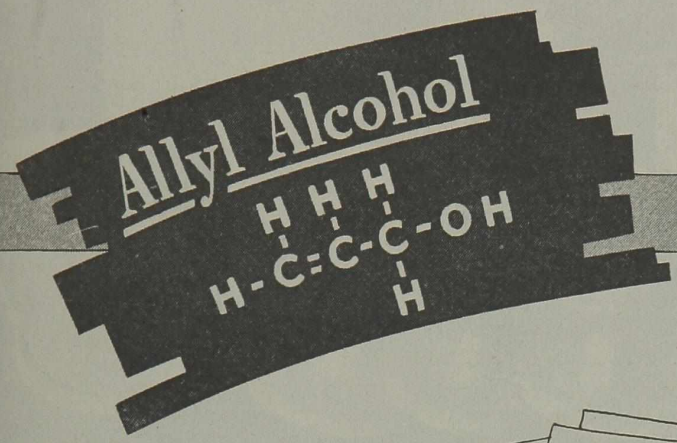
LULOSE PRODUCTS • TERPENE & ROSIN CHEMICALS • SYNTHETICS
EMICAL COTTON • EXPLOSIVES • PAPER MAKERS CHEMICALS

TANK-CAR QUANTITIES

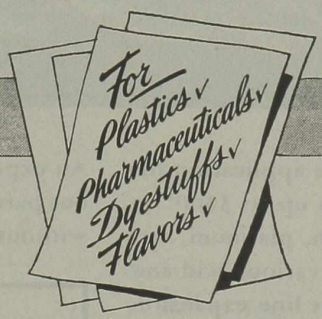


AND DRUM LOTS

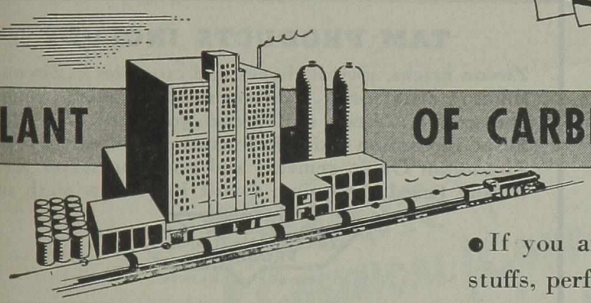
OF Allyl Alcohol AT NEW LOW PRICES



ARE NOW AVAILABLE FROM A NEW



PLANT OF CARBIDE AND CARBON CHEMICALS



● If you are working with pharmaceuticals, plastics, dyestuffs, perfumes, flavors, or any other field of organic synthesis, you should investigate the unusual chemical properties of this unsaturated alcohol. Write today for the technical data and the new prices.

BUY UNITED STATES WAR BONDS AND STAMPS

CARBIDE AND CARBON CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

UCC

30 East 42nd Street, New York 17, N. Y.

SYNTHETIC ORGANIC CHEMICALS

TAM ZIRCON AND ZIRCONIUM OXIDE CRUCIBLES

For temperatures up to 3500° F and 4500° F

TAM Zircon crucibles are finding wide application for various high temperature applications up to 3500° in non-ferrous melting such as aluminum, platinum, etc. These Zircon crucibles not only resist various acid and alloy reactions, but due to the straight line expansion coefficient of Zircon, exhibit exceptionally good heat shock properties. Refractory bonds consisting of other compounds are not necessary in the manufacture of TAM Zircon crucibles thereby assuring the user of a pure Zircon product.

TAM small crucibles and shapes of semi-vitreous Zirconium oxide are manufactured for use in quartz fusions and high temperature applications up to 4500° F.

An experienced staff of field engineers, located in various parts of the country, are available for consultation without obligation. Write.

TAM PRODUCTS INCLUDE

Zircon bricks, special shapes and crucibles... Zircon insulating refractories... Zircon ramming mixes, cements and grog... Zircon milled and granular... Electrically Fused Zirconium Oxide Refractories... Electrically Fused Zirconium Oxide cements and ramming mixes... Electrically Fused Zirconium Oxide in various mesh sizes.

TAM ZIRCONIUM TITANIUM PRODUCTS
Registered U. S. Pat. Off.

TITANIUM
ALLOY MANUFACTURING COMPANY

FOR VICTORY
Buy
U. S. War
Bonds and
Stamps

GENERAL OFFICES AND WORKS: NIAGARA FALLS, N. Y., U. S. A.
EXECUTIVE OFFICES: 111 BROADWAY, NEW YORK CITY
Representatives for the Pacific Coast States: L. H. BUTCHER COMPANY, Los Angeles, San Francisco, Portland, Seattle
Representatives for Europe: UNION OXIDE & CHEMICAL CO., Ltd., Plantation House, Fenchurch St., London, E. C., Eng.

When the Understudy Outshines the Star

War has worked changes, substitutes and turnover for both manpower and products. When it comes to products, often the understudy outshines the original star.

An example—delicate perfumes and rich flavors. Before the war, water insoluble oily bases were dissolved with alcohol, to make the flavors and perfumes your lady knows. But war made alcohol hard to get.

Atlas research men developed understudies that do a better job, yet cost less—Atlas Tweens, a group of real mixers that make even oil and water get together, and like it. The Tweens started as the understudy—but now they are permanent stars.

This substitute that excelled the original is one of many achieved by Atlas research. With the synergistic* approach—our technical men and yours studying a problem from the same side of the table—results are apt to exceed expectations. Consult us, if your activities come within our scope, for help in finding understudies that may convert your "problem products" into stars.

***Synergism**—*a growing habit in American industry. Men bring problems and ideas together so that minds "click" to produce a result far greater than the sum of ideas expressed. So to speak, they make 2+2=5.*

Tweens: Reg. U. S. Pat. Off.

ATLAS INDUSTRIAL CHEMICALS DEPARTMENT

CHEMICALS ATLAS EXPLOSIVES

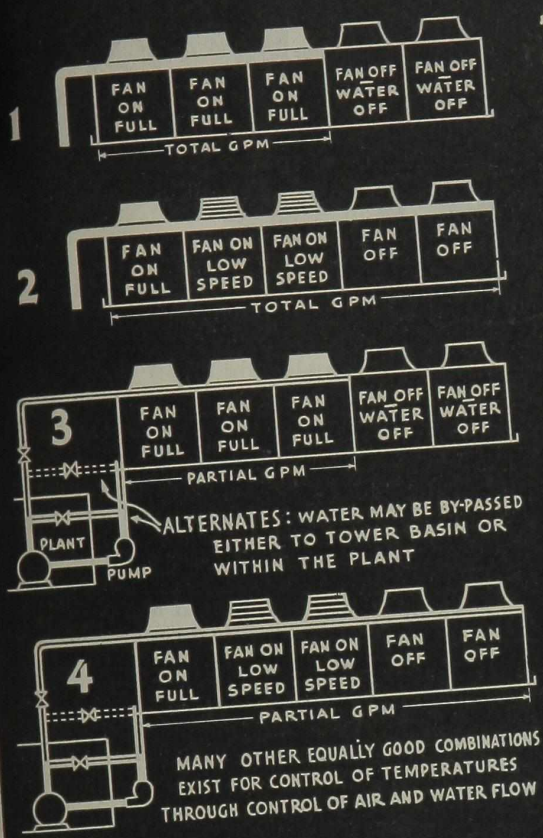
ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

Cooling Tower DOs and DON'Ts
-by MARLEY

(No. 1 of a series)

COLD-WEATHER OPERATION

Trouble-free cold-weather operation can be had with modern cooling towers by proper control and maintenance of air and water temperatures within the tower. Water temperatures in all types of towers can be regulated by (a) utilizing only a portion of the tower, (b) by-passing some of the water, or (c) simply throttling the quantity.



Air flow, which affects internal air temperatures, is difficult to control in natural draft towers but is relatively simple with mechanical draft, particularly if fans have 2-speed motors.

To maintain required temperatures, any of these methods, or a combination, may be used:

1. *Circulate all the water over only a portion of the tower, shutting down the remainder completely.*
2. *Circulate all the water over the entire tower with all fans idle or any combination with fans at high speed, low speed or idle.*
3. *By-pass some of the water and shut down some sections of the tower completely.*
4. *By-pass some of the water and circulate the rest either over the entire tower or only some sections of it, with fans variously set at full speed, low speed or idle.*

Except in the case of poorly designed towers, good operating practice can avoid "icing" troubles. But should ice have to be removed, thaw it by raising air-and-water temperatures, preferably in one section at a time. If done with hot water or a steam hose, start at top and work down. Induced draft towers can be de-iced by leaving water run and (a) reversing fan rotation if motor and drive permit, or (b) stopping each fan and covering it.

MARLEY COOLING TOWERS

DO YOU KNOW — that Marley led in developing and advocating the induced draft tower largely because of its all-around operating advantages. Cold-weather features include: 1. Effective performance by natural draft, with fans idle. 2. Only *hot* air passes through fans, keeping them free of ice.

THE MARLEY COMPANY, INC. · KANSAS CITY · KANSAS

CANCER

KILLS 1 ADULT OUT OF 6

IT MAY WELL KILL YOU!

GIVE!

GRIM FACTS: Yes, 1 out of 6 who read this page may die of cancer unless more money is given to wipe out this scourge.

The present one million dollars that Americans are giving is not nearly enough. Eminent scientists lack funds for experiment . . . cancer clinics are starved for equipment . . . sufficient money to care for pitiful advanced cases is not available.

Nearly every American family is destined to number a cancer victim with all the misery and expense involved . . . 17 million living Americans are now doomed to die of cancer!

Yet Americans give to the conquering of cancer less than one million dollars annually, as compared to one hundred billion dollars a year to the war. *More must be done!*

GREAT HOPE: You, by giving, can save perhaps yourself, perhaps a dear one, from cancer.

Leading cancer scientists say that five million dollars a year would cut the cancer death rate ⅓ to ½. And this even if not another fact were discovered . . . merely through wider education, more clinics.

Science wiped out yellow fever, solved small-pox, typhoid, diphtheria, found sulfa, penicillin. With funds, science can also find the answer to cancer for us all.

Do your part! Give, and give again to banish the dread curse of cancer, to save lives by treating cases in time. Send us any amount from 10¢ to $1,000. Every bit helps!

Be as Generous as you can in this Life and Death matter.

CONTRIBUTIONS ARE DEDUCTIBLE FROM INCOME TAX

YOUR GIFT MAY SAVE YOUR LIFE AND THE LIVES OF THOSE YOU LOVE

AMERICAN CANCER SOCIETY
350 Fifth Avenue
New York 1, N. Y.

I enclose my contribution of $_____
to aid in the War Against Cancer.

NAME_____

STREET ADDRESS_____

CITY_____ STATE_____

One of the FOUR Major Properties of

PETRONATE

(OIL-SOLUBLE PETROLEUM SULFONATE)

#4 INHIBITION OF RUST AND CORROSION with PETRONATE

There are numerous actual or potential uses of Petronate which are related to the four major functional properties of this highly purified oil-soluble petroleum sulfonate (mahogany soap). These properties are:

1. **Emulsification and Dispersion of Liquids.**
2. **Dispersion and Wetting of Solids.**
3. **Wetting and Dispersion of Liquid-Solid Systems.**
4. **Inhibition of Rust and Corrosion.**

Petronate has won wide acceptance as an important basic material for many industrial adaptations. It lends itself to a great variety of uses, among which are the accompanying examples of its functions as a rust and corrosion inhibitor. Typical functions of Petronate in the other logical fields listed above were covered in earlier issues of this series (*reprints on request*).

If you desire a sample of Petronate for laboratory experimentation, or if we may co-operate with you in a study of the adaptation of Petronate to a specific problem, we shall welcome your request.

Typical Analysis of PETRONATE

Sulfonates	62%
Mineral Oil	35%
Inorganic Salts	none
Water	3%
	100%

★ **EXAMPLES** ★

USE	PRIMARY FUNCTION OF PETRONATE	SECONDARY FUNCTION
Preservative Lubricating Oils	Rust and Corrosion Inhibiting Agent	Acts as Moisture Absorbent
Additives for Lubricating Oils	Acts as Detergent	Inhibits Bearing Corrosion
*Extreme Pressure Lubricants	Stabilizing Medium for Extreme Pressure Agent	Prevents Corrosion
Soluble Cutting Oils	Emulsifying Agent for Mineral Oil	Rust Inhibitor
Rust Preventive Compounds	Rust and Corrosion Inhibiting Agent	Acts as Moisture Absorbent
Automobile Radiator Coolants	Inhibits Internal Rust and Corrosion	Aids in Dispersion of Scale
*Steel Pickling	Acts as Passivating Agent Against Pickling Acid	Aids in Dispersing Scale and Rust

*Subject to further development

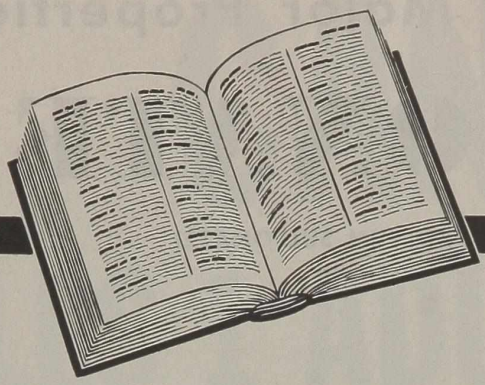
NOTE.—By reason of its present use in the manufacture of war-important products, PETRONATE is available only on allocation. However, ample postwar supplies are anticipated.

WHITE OIL DIVISION

L. SONNEBORN SONS, INC.

Refiners of Petroleum

88 LEXINGTON AVENUE • NEW YORK 16, N. Y.



Webster defines

"EXACT"

In Webster's dictionary we find this definition of the word "exact":

Habitually careful to agree with a standard, a rule, or a promise; accurate; methodical; punctual.

That word defines

Natural BICHROMATES

exactly.

NATURAL PRODUCTS REFINING COMPANY

902 GARFIELD AVE., JERSEY CITY 9, N. J.

Is There A Rubber Question?

Editorial

by ROBERT L. TAYLOR, editor

FROM THE REPORTS THAT WERE MADE PUBLIC, it appears that the international conference on rubber held in Washington last month accomplished little more than to bury its head neatly in the sand. "World production of rubber, synthetic and natural," reported the conference via the New York *Times*, "will rise in the first few years after the war to almost twice the estimated demand. . . . However, a marked upward trend in consumption will develop as the result of wider markets and new uses for rubber. These sources of utilization *ultimately* will solve the overproduction problem." The italics are ours.

The word on rubber that the United States is waiting for—and the plantation-owning countries, too, for that matter—is much more than this. What American industry and the American public want to know is how the synthetic industry and the plantations are going to split up the postwar rubber demand which the conference admits could be satisfied in full by either source alone. Will world markets be divided among the three major rubber producing nations—the Netherlands, Great Britain and the United States—or will there be free competition? In case of the latter, what measures, if any, will be taken to maintain the production of synthetic?

IF THE CONFERENCE CONSIDERS IT IMPOSSIBLE OR UNwise to come to any decision on these questions now, it would have done better to say so. Such a report would be understandable and acceptable at this time. But to come forth with the admission that either synthetic or natural rubber alone will be able to take care of world requirements after the war, and then to turn around and blithely dismiss the matter with the prediction that the dislocation will be only temporary, that new and expanded markets will ultimately take up the surplus, is sidestepping the problem to say the least.

Even if it were easier to believe, such reasoning hardly makes for confidence in those who presumably will be influential in determining official United States rubber policy. It seems rather obvious that an important decision must be made with respect to synthetic production in this country fairly shortly after the war. It is what is done then that will determine to a large extent just how great these future new markets the conference speaks about will be. To say that the markets will be there regardless is putting the cart before the horse.

WHEN THE DECISION DOES COME, it will be based on several considerations.

One of these will be the fact that over $700,000,000 of the taxpayers' money is already invested in synthetic plants. This will probably receive more weight than it deserves, for some of the plants will be high-cost producers, and, as those in chemical industry well know, a high-cost plant is frequently worse than no plant in a competitive market.

A much more cogent argument on the side of synthetic will be that at this stage it appears to offer a better gamble for eventually bringing better rubber at lower cost to the American public, and, coincidentally, for achieving the expanded markets the Washington conference members pin their hopes on. While according to the experts the plantations probably will be able to lay natural rubber down in New York after the war for so little as 11 or 12 cents a pound and still make a profit, most of this price will represent labor and shipping costs and hence not be very susceptible to reduction. Synthetic rubber of the Buna-S type, on the other hand, although unlikely to be capable of profitable production at a market price of less than 15 cents in the immediate future, presumably will not be unyielding to improvements in process design and efficiency, which, with the right kind of encouragement, are bound to come in so young an industry.

Likewise from a performance standpoint synthetics seem to offer the greater long range possibilities by virtue of their infinite basic compositions and properties, although at the present moment those in the lower price classes are inferior to natural rubber for many applications.

Still another consideration will be that of national security. The assurance of never again having to risk dependency on an outside source for our rubber supply will in itself be a powerful argument.

Against these factors will be the influence of the British and Dutch to get us to go back to natural rubber to provide exchange for much-needed imports from America. Washington will find it very difficult to tell these nations that we will be able to use only a small part of their rubber from now on.

CONSIDERING ALL SIDES OF THE SITUATION, however, we do not see how there can be much question about the desirability of a positive U. S. stand in favor of synthetic rubber.

Such a stand would of course be favorable to the

chemical industry, for synthetic rubber constitutes a better market for chemicals than does natural rubber. But the question obviously is one that far transcends the interests of any one industry and will be decided, we hope, on the basis of what will be best for the American people. It is on that basis that we believe the United States Government should be ready, if and when necessary, to protect synthetic rubber to whatever extent necessary to insure a thriving domestic production. Such action, we feel certain, will ultimately bring to America cheaper and better rubber products than they could ever expect from natural rubber.

Preventive Entomology

THE MODERN APPROACH TO CROP PROTECTION is preventive rather than remedial. Dr. S. A. Rohwer, Assistant Chief of the Bureau of Entomology & Plant Quarantine, Department of Agriculture, described recently how entomologists are perfecting methods which enable them to forecast pest emergencies in a given area before they occur and thus be prepared for them. Not unexpectedly, however, the entomologists are having some difficulty in selling the farmers on the old adage that "an ounce of prevention is worth a pound of cure" when it comes to buying and using insecticides.

Here is an opportunity for insecticide manufacturers to lend a hand in something that should benefit both themselves and their customers. The manufacturers might well make it a point to keep abreast of progress in methods and techniques of preventive entomology, perhaps let their salesmen be traveling emissaries of the art. By getting their heads together with the entomologists they may even find out some ways in which their products can be made more suitable for preventive work.

Dr. Rohwer estimated that if calcium arsenate were used as recommended as a preventive, the normal consumption would be 150,000,000 lbs. a year as against the all time peak of 65,000,000 lbs. expected for 1945. Many ounces of prevention can total up to more than a few pounds of cure, and the farmer can be saved his crops all of the time instead of part of the time.

Gain on the Manpower Front

THE WAR MANPOWER COMMISSION has at last accorded recognition to the importance of technically trained personnel in war industries. The latest WMC directive states that "all technical, scientific, and research personnel" employed in an essential industry "are regarded as being engaged in critical activities."

This is a step in the right direction, but it does not put chemists and chemical engineers back into chemical industry nor does it guarantee that further inductions will not take place if the need is great enough. Manufacturers are going to have to continue to spread their technical men thin. Let us hope, however, that chemists and engineers will be among the first to be released as soon as such action is possible.

Technical men are the creators of industry, and when the war orders begin to fall off in earnest the chemical industry will need all the creators it can get. They will have to step out of a uniform, because the only other source—the colleges—is practically dry already.

Chemical Selling Methods

SEVERAL MONTHS AGO the comment was made on this page that the trend toward marketing of more chemicals as industrial specialties that has been taking place for many years is now showing signs of swinging back toward commodities.

As was mentioned at the time, this does not mean that there will no longer be a demand for specialties. In certain fields, specialties are firmly established and no doubt will continue so. There are signs, however, that the future will see sharper distinctions between commodities and specialties and the methods of selling them.

A commodity will tend to be sold strictly as a commodity, on a price and specification basis only, with a minimum of service. Specialties, likewise, will be sold as specialties only, with lots of service and test and application work. There is also likely to be more direct competition between the two, with each finding a share of the buyers in accordance with whether service or price is the more important consideration.

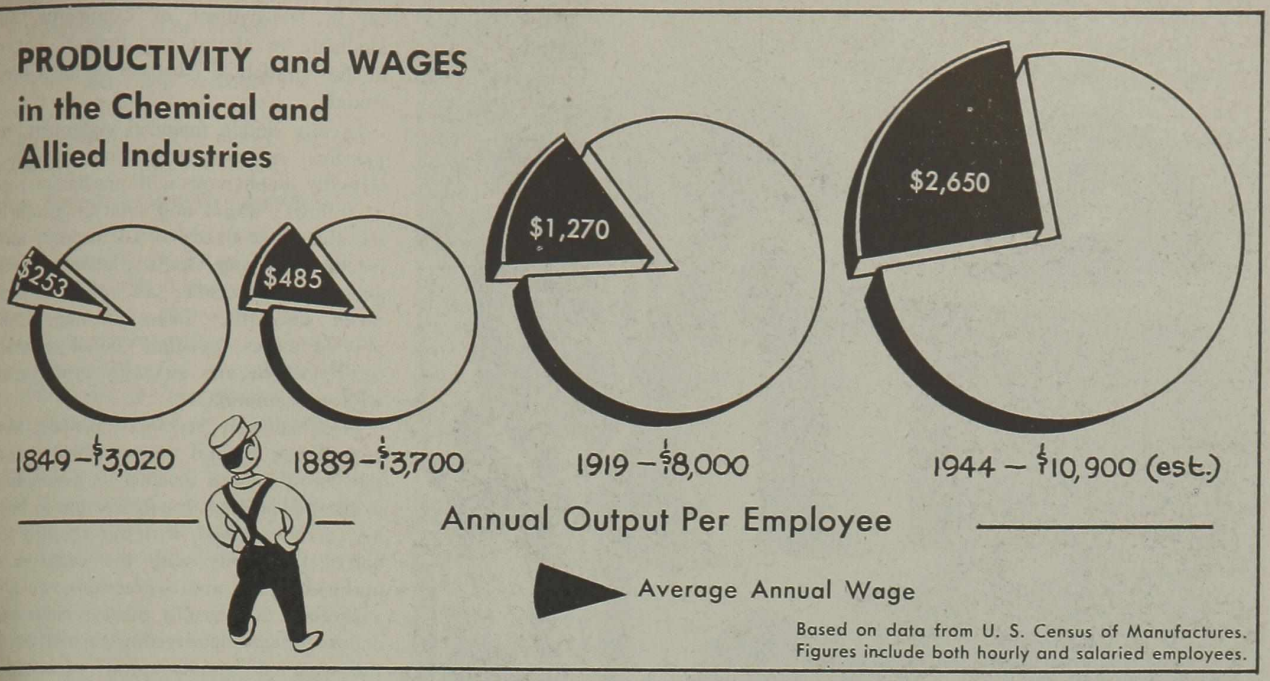
Sellers of chemicals will do well to keep these things in mind. If they don't, our guess is that they may get reminders the hard way from some customers.

Pacific Plastics Industry

ANOTHER STIMULUS TO THE fast growing chemical industry in the Far West is a 37-page report by Arthur J. Norton, consulting chemist of Seattle, for the Bonneville Power Administration on the resources and facilities for plastics manufacture in the Pacific Northwest.

Significant factors are mentioned as being tremendous low-cost hydroelectric power resources; adequate natural resources including wood, coal, petroleum, vegetable and animal products, and minerals; and favorable domestic and foreign market potentialities.

Summarizing the marketing prospects, the report states that while the population of the west coast's trading area is only eight to ten per cent of the population of the United States, local markets for plastic materials are considerably higher than this would indicate because of the concentration of plywood and aircraft industries in the area. Pacific Northwest plywood industries now consume about 10 million pounds of phenolic resins annually.



TAX REVISION and the CHEMICAL INDUSTRY

by CLINTON DAVIDSON
President, Management Planning, Inc., Jersey City, N. J.

TOO-BURDENSOME TAXATION, if carried over into the period of peacetime production, may throttle the corporate form of organization and threaten chemical technology at its most inspired moment in history. Therefore it is important to the winning of the peace that the chemical industry join in encouraging Congress to remove this hazard to future progress.

CHEMICAL COMPANIES have patriotically accepted excessive corporation taxes as a contribution toward winning the war. Given wartime demands for production, they have devoted themselves to their fulfillment. But when government orders cease, all management responsible to its trust must—if still confronted by such taxes—eliminate every possible factor of risk and curtail those very elements of speculation which are inherent in the nature of scientific and industrial progress. Too-burdensome taxation, if carried over into peacetime, may throttle the corporate form of organization and threaten chemical technology at its most inspired moment in history. That is why postwar tax revision is of paramount importance to chemical management.

No move by industry in the direction of reducing taxes, however, can succeed unless the entire public—and particularly the wage-earners—clearly understands it. Wage-earners and consumers *will* understand the problem if management employs the lessons of history to demonstrate the close correlation between the well-being of the public and the development of the corporation set-up, which has done so much—in the chemical industry particularly—to make present living standards possible.

Consider the progress which has been made in real wages for chemical workers since 1845 when, according to documented history, a skilled worker in a New England plant was paid $1.75 a day! In that same year, during a period of great prosperity, the typical wage of unskilled labor was $1.00 per day. The *minimum* work-day was ten hours long, and the take-home yearly income of the average chemical worker was about $248.

Such a wage was not even half enough to maintain a family of five at subsistence level, in spite of the lower prices for commodities which governed at that time. In 1851, Horace Greeley's "Tribune" published this weekly budget for five:

Barrel of flour, $5.00, will last eight weeks	$ .62½
Sugar, 4 lbs. at 8 cents a pound	.32
Butter, 2 lbs. at 31½ cents a pound	.62½ (sic)
Milk, two cents a day	.14
Butcher's meat, 2 lbs. beef per day at 10 cents per pound	1.40
Potatoes, a bushel	.50
Coffee and tea	.25
Candle light	.14
Fuel, 3 tons of coal per annum, $15.00; charcoal, chips, matches, etc., $5.00 per annum	.40
Salt, pepper, vinegar, starch, soap, soda, yeast, cheese, eggs	.40
Furniture and utensils, wear and tear	.25
Rent	3.00
Bed clothes	.20
Clothing	2.00
Newspapers	.12
Total	10.37

Two years later, the New York "Times" published a family budget requiring fifty weeks' work at a wage of $12 a week.

This scene showing the manufacture of nitric acid at the works of Martin Kalbfleisch's Sons in 1880, "largest establishment of its kind in the industry," illustrates how far chemical industry has progressed in 65 years, largely under the corporate form of organization.

To dramatize what the chemical industry has accomplished for the average man since that time, compare the typical worker in that field today with the pauperized, overworked laborer of 100 years ago. The modern "unskilled laborer" is seldom a laborer at all in the traditional sense. His manual efforts seldom require much muscular effort. He works in clean, well-ventilated, and well lighted surroundings, in good clothes and with sanitary facilities. His wages, for an eight hour day, are from five to ten times those of a hundred years ago, and with them he can buy in terms of housing accommodations, home comforts, food luxuries, fashionable clothing, medical services, education, entertainment and social security—values not available a century ago at any price.

What has happened in the industry during the past hundred years to bring about such improvement in the chemical worker's earning capacity? The following tabulation affords a clue:

Productivity and Wages in the Chemical and Allied Industries

Year	*Annual Output Per Employee*	*Average Annual Wage*
1849	3,020	253
1859	3,730	304
1869	3,150	306
1879	3,660	352
1889	3,700	485
1899	3,340	472
1909	4,440	880
1919	8,000	1,270
1929	9,450	1,430
1937	8,700	1,425
1944	10,900 (est.)	2,650 (est.)

Based on data from U. S. Census of Manufacturers.

From the foregoing it is evident that the way workers earn more is by producing more.

But there are contrary viewpoints, variously epitomized, as by the following typical assertions:

1. "Sure, more production means more wages, but it also means fewer jobs."

2. "Technological unemployment is the logical result of scientific advances."

3. "What we need is to slow down. If we work too efficiently, we do ourselves out of jobs."

The test of these alleged truths is to restate them in some specific form and let the restatement reduce itself to absurdity.

One cotton gin does the work of 18,000 persons. Therefore, the 12,000 new cotton gins installed in the year 1929 alone in our nation of 40,000,000 workers must have put 216,000,000 people out of work —not to mention persons replaced by the ginning machines installed in other years, and by the spindles, looms, etc.

A similar absurdity was noted when the application of bleaching chemicals to textiles in the single town of Oldham, England, freed from use as "bleaching walks" more green open fields than there were in all England, Scotland, Ireland and Wales.

Wages and Prosperity Interdependent

In industry as a whole, that is, in the entire national economy, it is a matter of simple bookkeeping that wages and production closely parallel one another, even throughout violent fluctuations.

This phenomenon is recorded in the ınd Expenditures, published annually by the U. S. Department of Commerce, and available in almost any general library in the "Statistical Abstract of the United States."

In this simple financial statement, the principal items under income (which is virtually synonymous with production) are as follows: wages and salaries, comprising about two-thirds of all income; farm income, about one-twelfth; business profit, about one-sixteenth; all other income, about one-fifth. These income items, plus or minus "savings," equal expenditures (which are virtually synonymous with consumption).

Whereupon it becomes apparent that any change in total wages, which constitute two-thirds of income, or production, is accompanied by drastic change in business activity. And, with our recently acquired familiarity with the vagaries of business booms and depressions, we also appreciate the possibly more serious secondary effects manifesting themselves in the so-called "vicious spiral" of inflation and deflation.

In recognition of this known fixed relation between wages and prosperity, many able economists have recently been stressing the supreme importance of maintaining wage levels and full employment. Among these are such diverse protagonists as Claude R. Wickard, Secretary of Agriculture, Frederick C. Crawford, President of the National Association of Manufacturers, and Chester Bowles, OPA Administrator.

How Workers' Output Is Increased

But just what has enabled the worker to increase his output so stupendously during the past century? The answer may be found in the following tabulation:

Year	*Horsepower per worker*	*Annual Output per Worker*	*Annual Wages*
1849	Very little	$1,050	$248
1879	1.3	1,960	346
1899	2.2	2,460	420
1909	2.9	2,180	510
1939	6.4	7,200	1,150

To demonstrate the effect of horsepower on wages by contrasting extremes: The Chinese coolie charges thirty cents per ton for carrying freight and yet he earns only ten cents a day. The average railroad employee in 1939 earned $6.00 a day, while the railroad (which has invested $25,000 for every worker) uses so much horsepower that it can afford to charge less than one cent per ton-mile.

In 1938, according to *Steel Facts*, here is the number of hours of labor required by steel workers in various industrialized countries to earn the equivalent of a big basket of food:

United States	1½ hours
England	3¾ "
France	4½ "
Germany	6½ "
Italy	10½ "
Russia	23½ "

What then was made possible the application of increased horsepower to output per worker? The answer is: increased capital investment.

But what has made possible the procurement and employment of increased capital investment? The answer is: the corporation.

High Productivity and the Corporation

Far more important than any single scientific discovery or invention the corporation is the one indispensable tool of the Industrial Age. By coordinating men, materials, machines, methods, and money under management, the corporation provides the means and the medium for the efficient use of capital. It facilitates the large-scale application of horsepower to the efforts of workers and thereby increases their output. By increasing the output of workers, it enables them to earn more than would otherwise be possible.

This is especially true of the chemical industry wherein labor constitutes a relatively small item of cost and wherein the primary nature of its operation of converting by continuous process methods requires the work to be carried out on an immense scale not approachable by manual labor.

Postwar Prosperity and the Corporation

It follows, therefore, that the maintenance of postwar wage levels and employment requires these two things:

More capital to build up small successful corporations into larger corporations so that they can provide workers with services that are available only through large organizations. Risk capital to launch new inventions and ideas.

Will this risk capital be provided after the war? Not at present tax rates. Not with an excess profits tax of 95 per cent, not alone the regular corporation income tax of 40 per cent and personal surtax rates at the currently abnormally high rates.

Various branches of the government, both Houses of Congress and practically all business associations have been talking about reconverting. They are all making plans to reconvert business after the war. I should like to say here that we cannot have high level employment after the war unless we reconvert our wartime taxes. Today's double taxes on corporate earnings were planned to "take the profits out of war." If these are allowed to stay unchanged—if they are not reconverted—they will *take the prosperity out of peace.*

Action NOW the Prerequisite

Postwar tax plans which will leave industry free to reconvert have been published by the Research Committee of the Committee for Economic Development, by the Business Committee of the National Planning Association, and by the Twin Cities Committee. It does not matter so much which of these excellent plans is adopted. The important thing is that some plan drastically reducing the tax burden on income earned from risk-taking investment be adopted before the war ends.

The small plants are in great need of tax modification, and are in danger of being closed due to lack of cash capital. Small corporations used their own money wherever possible in providing facilities and plant expansion, hoping to repay this out of earnings. Renegotiation took the earnings which they had expected to use for this purpose. These companies have been living on tax reserves. Every subcontractor's statement I have seen shows no cash available to meet reserves set up for taxation. They have been paying the previous year's taxes out of earnings and cash advances of the current year, as reserves for previous year's taxes were invested in inventory, equipment, etc. This situation must be corrected, otherwise hundreds of thousands of potential jobs will be destroyed.

The following four modifications will keep thousands of small businesses alive during the transition period, which otherwise would die from lack of working capital:

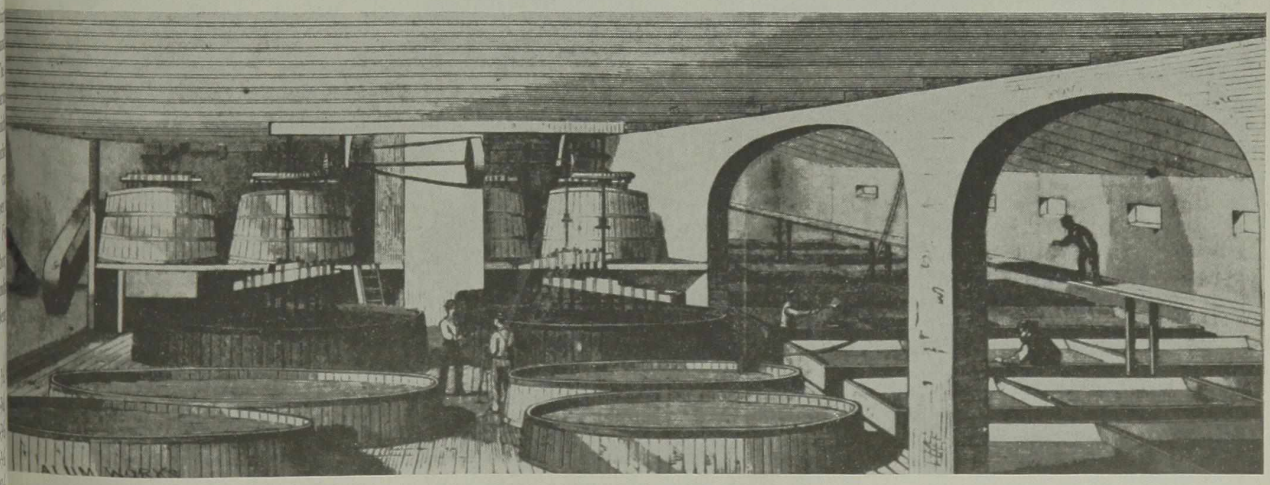
1. *Carry-back.* Make it possible for a corporate taxpayer anticipating a net operating loss or an unused excess profits credit, to postpone outstanding tax liabilities to the extent of such estimated loss or unused credit.

2. *Excess Profits Tax.* Instead of waiting until the "Cease firing!" to repeal this tax, why not provide *now* for a 50% reduction when the war ends in Europe, and the other half when the Japanese phase comes to a close?

3. *Amortization.* Congressman Disney has presented a bill which provides that if 36 months or more have been amortized, the remainder of the cost of a war plant can be amortized at the option of the owner. This provides quicker action, less uncertainty and enables the plant to get ready for peace production sooner.

4. *Postwar Refund.* The present postwar refund is useable only after the official cessation of hostilities, which may be years after the shooting stops. Some re-negotiation officials have expressed a desire that the postwar refund bonds be acceptable for payment of renegotiation. This would be paying a government debt with a government debt. This should be done. The law should also provide that the bonds shall become usable when the President or the Director of Demobilization proclaims the cessation of hostilities for the purpose of this Act.

Unless these steps are taken, new investment will be blocked, wages will be drastically cut, twenty million workers may be idle and farm prices may hit all-time low. I do not mean to say that the proper revision of our tax laws is all that is necessary to provide a high level of national prosperity after the war—but I would like to say, as emphatically as possible, that we will not and cannot have prosperity and high level employment at proper wages unless this action is taken. And no industry is more dependent on continuous and large scale production than the chemical industry.



The alum works of Martin Kalbfleisch's Sons at Buffalo, N. Y., as it appeared in 1880.

NEW LIGHT TECHNIQUES Further Science of SYNTHETIC RESINS

by HOWARD C. E. JOHNSON, Assistant Editor, Chemical Industries

THE PHYSICAL PROPERTIES OF SYNTHETIC RUBBER, plastics, and fibers have depended in the past mainly on empirical results and "cook book" procedures. Now new techniques, as well as adaptations of old ones, will be used to delve into the very nature of the molecules themselves. From these studies is expected a closer duplication of the desirable properties of natural polymers and a deeper insight into their fundamental nature.

THE Polytechnic Institute of Brooklyn has assembled, for its High Polymer Laboratory, several pieces of equipment which are expected to shed new light on the nature and properties of plastics.

Among these are an air-driven ultracentrifuge, an apparatus which has heretofore been used mainly in biochemical studies, and equipment for X-ray diffraction studies. In addition, three new machines have been developed: the Turbidimeter, for determining the molecular weight of plastics in solution by their light-scattering power; the Rayleighometer, for determining particle shapes of plastics in solution by an application of the same principle; and a low-angle X-ray diffraction apparatus, which is particularly applicable to giant molecules.

Turbidimeter

Calculations by Dr. Peter Debye, Cornell University, have shown that the light-scattering power of molecules in solution is a function of their molecular weight.

On the basis of this principle, Dr. Paul M. Doty, research associate at the Institute, in collaboration with Dr. Herman F. Mark, professor of organic chemistry, designed an instrument which gives a quantitative measurement of this effect. A beam of monochromatic light from a mercury-vapor discharge is split, part of it being used as a control and the rest passed through the polymer solution of known concentration. The optical system brings the two beams together as two hemispheres, the light intensities of which are matched, much as in a refractometer, by controlling the amount of incident light. A quantitative measurement of the turbidity is thus obtained for a series of concentrations and extrapolated to zero concentration. This information, coupled with the difference in refractive indices of the solvent and solute, is sufficient to permit calculation of the molecular weight. Since it is the square of the difference in refractive indices which enters into the calculations, it is necessary to employ a solvent whose refractive index is quite different from that of the polymer.

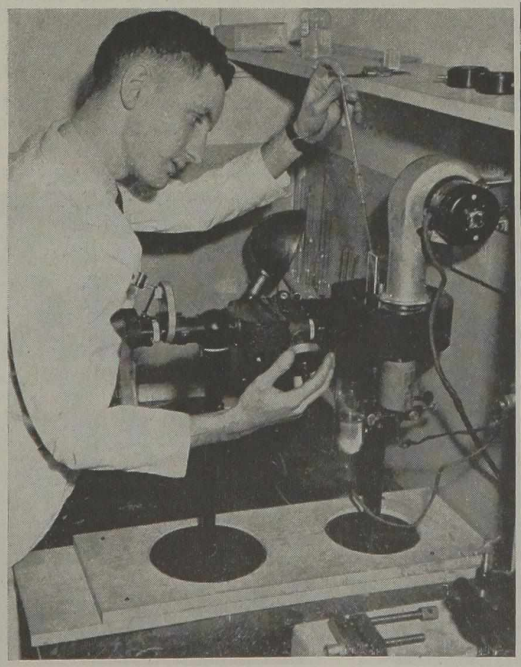
The refractive index of a polymer depends only upon its chemical constitution. Once the indices are determined, then, for a particular polymer-solvent pair, only the turbidity of the solutions need be measured. Thus this instrument will provide rapid control analyses in plastics manufacturing plants.

With Dr. Bruno E. Zimm, also of the Polytechnic Institute, Dr. Doty has verified this method by checking it against the classical methods employing osmotic pressure or ultracentrifuge measurements. They check within 10 to 20 per cent, which is considered very good for measurements of this kind.

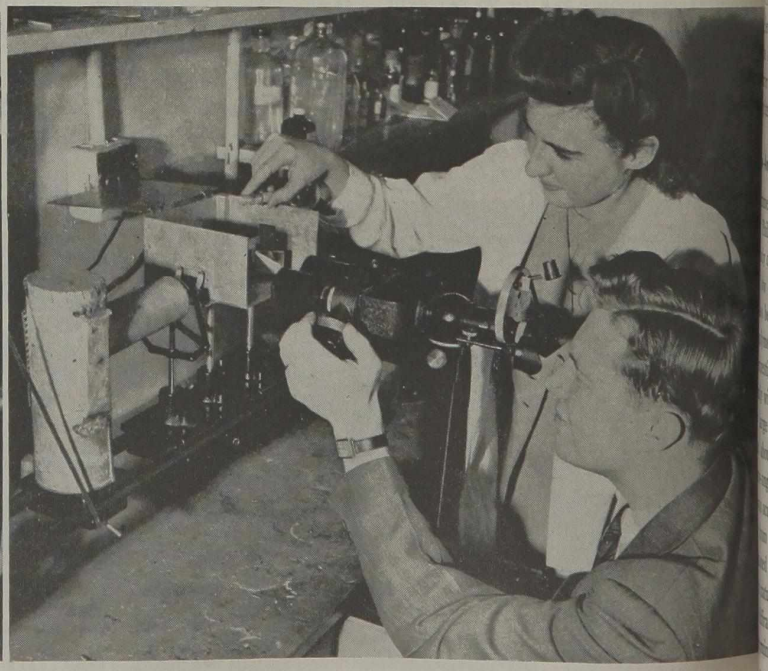
Carrying the principle a step further, they have shown how to obtain the distribution of molecular weights in a polymer which contains, as most of them do, molecules of many different degrees of polymerization.

Rayleighometer

The Rayleighometer, named after Lord Rayleigh, the British scientist who contributed much to our knowledge of optica



Richard Stein, Polytechnic Institute student, determines molecular weight with the Turbidimeter.



Dr. Paul M. Doty, instructor of physical chemistry at the Institute, and Joanne Bunker, research associate, use the Rayleighometer to observe molecular shape.

properties ... ment of the Turbidimeter which permits evalution of the molecular shape.

Here a beam of light is passed through a polymer solution, and an optical system permits comparison, with the Turbidimeter, of the light scattered forward and backward at an angle of 30° from the incident beam. A spherical particle will scatter the light equally in all directions, but if the dimensions are different, the light scattered forward and backward will differ according to the ratio of the particle dimensions.

This instrument, too, will find wide use in industry. The most important processes for manufacturing various types of rubber, plastics, and fiber are extruding, molding, casting, and spinning. Upon the successful execution of these processes depend the properties of rubber tires and hoses, plastic parts, and fibers like nylon, orlon, and vinyon. At the present time chemists use viscosity as a rough criterion of acceptability, but this method is far from satisfactory. These new instruments will allow a ready measurement and standardization of spinning and casting solutions on a routine basis to produce fibers of high fatigue resistance, plastics of high impact strength, and rubbers of high endurance against abrasion.

As research tools, these instruments can be used to study the shape and degree of polymerization of natural polymers. It will then be possible to duplicate these with tailor-made synthetics, overcoming the undesirable properties of the natural materials without sacrificing their advantages.

These instruments are being given their first use on a coatings and films project which the Institute is carrying out for the Quartermasters Corps to provide lighter, stronger, and more durable army equipment. Their use in industry is already required. Several industries are planning to copy the instruments at once, and one manufacturer has requested future production rights.

Illustration courtesy North American Philips Co.

Instrument designed to measure low-angle X-ray diffraction.

Low-Angle X-ray Diffraction[1]

An instrument developed by the North American Philips Company, Inc., to enable the study of X-ray diffraction by materials at low angles from the incident beam is also being used by the Institute in high polymer investigations.

Early investigators concerned themselves mainly with scatter making a comparatively large angle with the primary beam. But about fifteen years ago the study of low-angle scattering was begun, and there was accumulated increasing evidence that from this type of scattering could be obtained useful information about synthetic and natural fibers and resins.

Ordinary diffraction studies have been useful in determining the arrangement of atoms within a material. If we represent the atomic arrangement in the common salt crystal, for instance, we obtain a projection like this:

Na Na Na
Cl Cl
Na Na Na

It is obvious that the same arrangement repeats itself at short intervals. But in nylon:

$$-(CH_2)_4CONH(CH_2)_6NHCO(CH_2)_4$$
$$CONH(CH_2)_6NHCO-$$

it is evident that the pattern repeats itself only after a comparatively long interval. For materials like this—and almost all polymers, natural and synthetic, are of the same general pattern—ordinary diffraction techniques are of little value. Low-angle diffraction, however, is observed in just such cases—when the periodicities occur at long intervals, i.e., from 10 to 1000 angstrom units. (The angstrom unit is 10^{-8} centimeters.)

A number of highly oriented polymers, such as viscose rayon, cellulose acetate, nylon filaments, and highly stretched rubber bands have been investigated. In all cases the presence of rather long (more than 500A) bundles of chains, the average widths of which are as follows:

Substance	*Average Width of the Crystallized Areas, in A.*
Tobacco Mosaic Virus	150
Fibrous asbestos	200
Highly stretched rubber	80
Drawn nylon fiber	200
Highly oriented viscose rayon	50-200

In some cases, the scattering is rather diffuse but occurs in a kind of layer line, indicating the presence of a super period along the fiber axis. Nylon shows this to a marked degree, and recently polyethylene has been found to give a scattering almost identical with that of nylon.

Operation

In practice, a monochromatic beam of X-rays from an iron, copper, cobalt, or chromium target is passed through a series of slits in order to get a small parallel beam. The beam is passed through the sample, after which it is caught on a photographic plate. A lead stop, only slightly larger than the primary beam, absorbs the direct radiation so that only the diffracted rays are recorded on the plate.

The specimen is usually powdered and mixed with a binder, such as collodion or ethylcellulose, and pressed into the sample holder. Amorphous substances can often be pressed directly into the plate, and fibers can be mounted with scotch tape or modelling clay directly across the aperture. Exposure times may vary from 2 to 200 hours; 1 to 8 hours are usually sufficient for a fibrous substance.

For a long time the technical emphasis in many fields has been on chemical structure, and it cannot be denied that the intrinsic chemical makeup of a material is directly related to its physical properties and possible uses. Nevertheless, it has become evident in more and more diversified fields, such as heavy metals and plastics, that many factors other than the merely chemical play an important part in determining physical characteristics.

In exactly the same way as heat treatment or cold working affect the properties of metals, so in the field of high polymers does the previous history of the material appear to be important. Many of the desirable characteristics of such materials are dependent upon obtaining certain geometrical discontinuities whose magnitudes are determinable by size and shape measurements and by low-angle X-ray scattering, and whose presence and character are determined by the processing of the material rather than by its chemical constitution.

[1] The material in this section is abstracted from a paper by F. G. Firth, application engineer, North American Philips Co., Inc.

Pulpwood floating down a river in northern Wisconsin. Note the difference in color of two years' crops.

Illustration courtesy Allis-Chalmers Mfg. Co

Streambarkers speed wood-chemical developments by removing the bark economically.

PLASTICS from LIGNIN—I

by ROBERT S. ARIES, Polytechnic Institute, Brooklyn, N. Y.

THE LIGNIN WASTED by paper mills, the lumber industry, and agricultural processors is a huge potential source of raw material for chemical manufacturers. Its profitable utilization, possibly by some of the methods described here, will exert a telling influence on the economy of the wood saccharification and plastics industries. The author, who is field director of the Northeastern Wood Utilization Council, has had several years' experience in the lignin field.

THE materials from which organic plastics are derived have been the subject of investigations for over a century, although it was not until comparatively recent times that the plastics industry was well established in the United States. Its rapid growth has followed the development of new synthetic materials, improvements in the art of forming and fabricating them, and the extent of their application to engineering problems. While lignin has proved to be an interesting plastic material with a relatively wide range of potential industrial applications, the shortages of other chemicals during the last few years have not contributed significantly to the exploitation of this product of nature. Unreasonable specifications, inertia, and the fact that it had no pre-war history have kept lignin from having any significant war accomplishments in the field of plastics, although it is available in large quantities.

Every year, more lignin is wasted in the United States than our entire plastics production since the time of Hyatt's discovery of celluloid. Sulphite pulp mills dump 1,750,000 tons of it annually, while soda and sulphate mills could make available another 1,250,000 tons[5]. The 30,000,000 tons of sawmill waste, much of which is readily available[6], and more than five times that amount in the form of agricultural wastes[8] are ample evidence that lignin *is* wasted and *is* available in tremendous quantities. These, however, are not sufficient arguments for a successful plastics raw material.

Another advantage of lignin is that it is cheap; most sulphite mills would be glad to get rid of their lignin with n extra profit. The wood-hydrolysis pla in Oregon, scheduled to start operati in a few months, will produce about te pounds of lignin for every gallon of alc hol. It will undoubtedly be glad to di pose of it at present, even at a very lo price. But the chemical industry is n interested in raw materials whose on virtue is cheapness. Cheap lignin woul in general, be a low quality product, d graded by the harsh way in which it is se arated from the cellulose in the lignocellu losic material. Moreover, the resins a plastics industries require a constan carefully controlled quality of raw mat rials which is in many instances difficu to attain when natural and waste produc are used. Lignins may vary with t species of wood used, and a slight vari tion in the pulping or hydrolysis proc dure may give us a different produc Synthetic materials, although initiall higher priced, usually win acceptanc and, as costs are lowered with quanti production, they are able to underse many cheap natural products.

Present indications are that lignin pla tics will not assume any significant pla in the plastics industry during the ne few years unless research further in proves their properties.

Chemistry of Lignin

The main obstacle to the successful u of lignin in the chemical industries is th its constitution is not yet firmly estal lished. It is defined as the non-fibrou matter which is combined with the cellu lose in wood and other plant materials Oftentimes researchers fail to state th means of separation of the lignin fro the cellulose, although that may affect it

With present techniques seventy-five per cent of this log will be wasted. Fuller utilization will result from new developments in the use of lignin and sawdust.

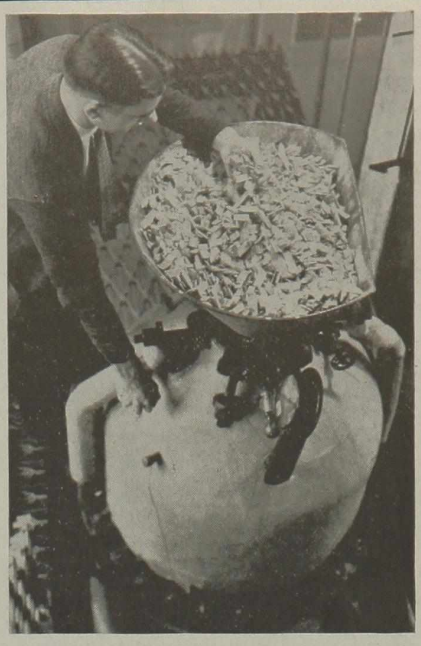


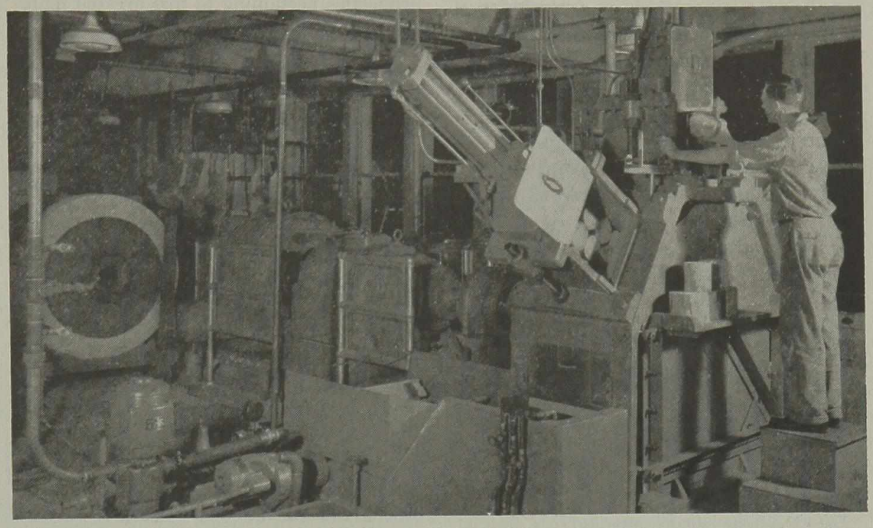
Illustration courtesy Forest Products Laboratory

An experimental digester of chips for the production of lignin plastics.

properties considerably. Lignin has been characterized by a combined aromatic and aliphatic structure and may be detected best by its methoxyl content. An excellent review of the chemistry of lignin appeared recently[36].

It is of interest that coal is formed from wood by the destruction of the cellulose and the conversion of the lignin compounds into bituminous materials. It may be said, therefore, that plastics derived from coal are originally based on lignin compounds. Why not then convert the latter directly into plastics?

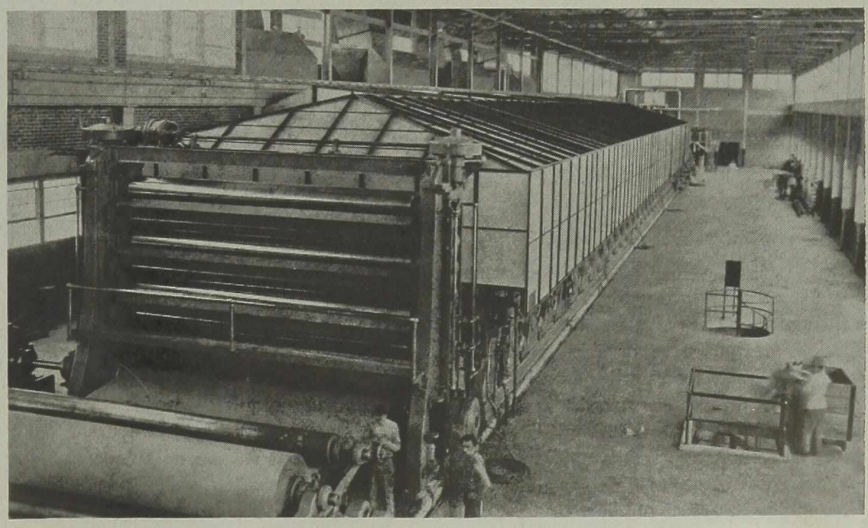
A large part of our lignin plastics technology has consisted in a haphazard heating with various chemicals to make resinous and fusible substances. For example, on heating with phenol, aniline, and β-naphthylamines, furfural, etc., a dark bituminous compound is formed. Determination of the structure of lignin would permit us to analyze what we are doing in these and a number of other processes.



Equipment for grinding wood.

Plastics Manufacture

Very few companies produce commercial lignin plastics at the present time, but patents[11, 13, 17, 18, 19, 32, 39, 41] and other literature[40] have numerous references to its utilization. The Forest Products Laboratory has been investigating for about a decade the production of "Hydroxylin" plastics by means of pre-treating wood[44]. Several types of pretreatment have been employed to reduce the wood to a satisfactory lignin-cellulose mixture which can later, with the addition of plasticizer, be molded. Most attention has been given to acid hydrolysis and aniline hydrolysis. By variation of time, temperature, and



A modern paper machine which produces paper at the rate of 10,000 sq. ft. per minute from lignin-enriched pulp. This paper is becoming increasingly important for plastic laminates.

acid concentration in the acid hydrolysis pretreatment, the lignin-cellulose ratio can be controlled. It has been found that this ratio very largely determines the properties of the finished material, other things being equal. A low ratio of lignin to hydrolyzed cellulose gives high strength values and low water resistance, whereas the opposite effects are obtained by a high lignin-cellulose ratio.

Acid Hydrolysis Method[45]

The sawdust is cooked with dilute sulfuric acid in a rotating digester made of acid-resisting material or lined with acid-resisting tile. The residue remaining in the digester is drained free of the resulting acid-sugar liquor, washed with water until neutral to litmus, and dried. The yield will be approximately 62 per cent by weight of the original wood waste—somewhat higher if lower concentrations of acid are used. This material, preferably after being ground to a particle size ranging from 40 to 100 mesh, may be subjected to hot pressing at a relatively high temperature (190° C.) with the addition of water alone. By the addition of a more specific plasticizer, such as a combination of aniline and furfural, pressing will proceed at a temperature of 150° C. with marked modifications and improvements in the properties of the product.

The product obtained is hard and dense and exhibits many of the useful properties common to the more expensive pressed materials. Values for a number of physical properties of the material are as follows:

Color—black, opaque
Finish—lustrous
Density—1.4
Machinability—good
Tensile strength—3,500 pounds per square inch
Compressive strength—21,000 pounds per square inch
Flexural strength—6,000 pounds per square inch
Breakdown voltage (60 cycles)—484 volts per mil.
Water absorption (48-hour immersion)—2.2 percent
Impact (Izod) energy absorbed per inch of notch—0.33 ft.-lb.
Hardness (Rockwell ¼-inch ball, 15 kg. load)—93-94
Distortion under heat—251° F.

The cellulose-derived sugars obtained as a by-product of the hydrolysis process could eventually be fermented to produce ethyl alcohol in operations large enough to guarantee sufficient production and yields.

Aniline-Hydrolysis Process[46]

The cooking with dilute aniline is performed as described under the acid hydrolysis process. The resultant digested mass is drained free of acid liquor and washed with water until neutral to litmus. It is dried and ground to a particle size ranging between 40 and 80 mesh. The yield will approximate 95 per cent by weight of the original wood waste. The molded product obtained is hard and dense, with strength values and water resistance somewhat higher than those obtained from the acid-hydrolysis composition. Values for a number of physical properties pertaining to this pressed material are as follows:

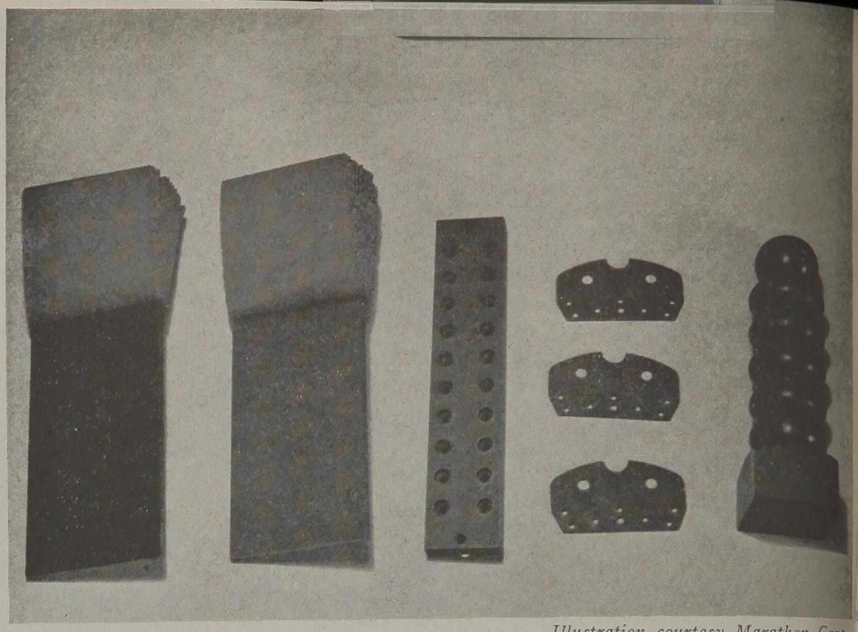


Illustration courtesy Marathon Corp.

Lignin laminates are made by impregnating paper with a lignin resin and compressing it.

Color—black, opaque
Finish—lustrous
Density—1.40
Machinability—good
Tensile strength—5,500 pounds per sq. in.
Compressive strength—21,000 lb. per sq. in.
Flexural strength—7,000 to 8,000 lb. per sq. in.
Breakdown voltage (60 cycles)—420 volts per mil.
Water absorption (48-hour immersion)—1.07 percent
Impact (Izod) energy absorbed per inch of notch—0.44 ft.-lb.
Hardness (Rockwell, ¼-inch ball, 15 kg. load)—95-96
Distortion under heat—275° F.

Both of the above described molding materials are capable of being molded in relatively thick sections (experimental moldings of more than 2 inches in thickness have been made) with almost no difficulty in obtaining a uniform cure throughout the molded piece.

They are both characterized by a relatively low mold flow and are not completely thermo-setting. That is, the molds must be cooled approximately 20° C. before removing the molded article from the mold.

Both of these characteristics can be remedied, if a high-flow, fast-curing compound is required, by the addition of 15 per cent phenolic resin to the aniline-furfural plasticized powders.

Wood Saccharification

The hydrolysis of wood to produce sugars and alcohol produces over 10 lbs. of lignin per gallon of 190 proof alcohol. A necessary requirement for the sound peacetime economy of the wood saccharification process is a profitable outlet for the lignin residue[4]. Under present conditions, alcohol from wood can compete successfully with alcohol from grain and molasses, but in normal times this would hardly be possible if the lignin residue is used for fuel only. The plant in Oregon which is scheduled to start shortly will produce about forty million pounds of lignin for which a profitable outlet should be sought. It is estimated[4] that if a one cent per pound profit is made on the lignin, the price of the alcohol can be brought down within 10 cents a gallon. Recovery of the acetic acid and furfural can bring further economies[35].

The work on "Hydroxylin" by the Forest Products Laboratory, as well as the plastics obtained by the Northwood Chemical Company referred to below, can be considered in this category, although the primary object in them is the production of a plastic.

Many other attempts have been made for the utilization of lignin from wood saccharification by means of oxidation, reduction under normal conditions, under heat and pressure, methylation, bromination, etc. Burmeister[11] claims a plastic product by mixing together pulverized lignin, phenol, and benzine, kneading the mass for 4 hours at 75° C. and removing the solvent and unchanged phenol. Bergius, Koch and Farber[8] claim to be able to press the lignin residues into flooring and wall materials, without the use of a binder. Since it is not soluble, the applications of wood saccharication lignin as such are limited. Recently Grasser[15] converted the lignin into an alkali soluble product by treatment with an oxidizing agent and then into a water soluble resin by treatment with a sulphite or a bisulphite. A similar product is obtained by Karsch[23].

A treatment similar to that described by Sherrard and his co-workers has been investigated by Russian workers[26] who also add lime and calcium or barium hydroxide to neutralize the humic acid[27].

and acid resistance.

A very promising condensation of Scholler lignin for thermosetting plastics has been done by Seiberlich at the Engineering Experiment Station of the University of New Hampshire[42]. By a treatment of zinc sulfate or zinc oxide and reducing this reaction product with hydrogen sulfide, a material was obtained which was molded at 2000 p. s. i. at 300° F. for three minutes. The properties of the product obtained show promise as a material for wallboards and other structural purposes.

Numerous other investigators are looking into the problem of utilizing the lignin obtained by wood hydrolysis in the field of plastics and several other outlets. It is the opinion of the writer that fields such as hydrogenolysis or the use in fertilizers involving larger tonnages and being less exacting in the requirements of the final products, offer better possibilities for the use of that type of lignin.

Lignocellulose

The lignocellulose, resulting from hydrolysis of part of the cellulose in wood or other plant fibers, has the inherent properties of a true thermosetting plastic yet it is limited in plasticity and speed of cure to the extent that it is not satisfactory as such for commercial molding operations. By utilizing hydrolyzed lignocellulose as a semi-plastic filler with standard resins, however, it has been found that these disadvantages can be overcome; and major advantages result—such as conservation of resin and acceleration of molding cycles for thick molded articles. Special properties can also be imparted.

Hydrolyzed lignocellulose from the continuous process developed by the Northwood Chemical Company[24] has been combined with standard phenol-formaldehyde and phenol-furfural resins in the proportions of 3 parts of lignocellulose filler to 1 part of resin to yield molding compounds which are acceptable by the molding trade for general-purpose molding. This compares with an average ratio of 1 to 1¼ parts of filler to 1 part of resin for general-purpose phenolic molding powders using wood flour as a filler.

The reduction in cost of molding powders by the use of a greater proportion of an inexpensive filler is interesting, although it becomes less important with the diminishing cost of phenol and phenolic resins.

This lignocellulosic plastic[25] has been produced and modified with the realization that standard procedures in the plastics industry must be adhered to as closely as possible. As a result, the techniques of compounding and molding continuously-hydrolyzed lignocellulose-filled phenolic plastics have been developed so that there is no major deviation from current practice, except for an acceleration of both operations—a result which is highly desirable. Particularly important is the reduction in the time required for molding cure, where a decrease by approximately one-half greatly increases the productive capacity of the expensive molding machinery and thus reduces the number of units necessary for a given through-put.

It should be noted that the Northwood Process is continuous; thus it has several advantages, such as maximum uniformity in quality of end products; maximum efficiency and uniformity of performance in all units; minimum general labor-power cost per unit of production; minimum dependence upon technical control personnel and hence a minimum control cost (the continuous through-put of materials is automatically controlled by instrumentation); minimum amount of equipment necessary per unit of production.

At present, this process is being further investigated by the Diamond Alkali Company, although no large scale plant has been erected yet.

Impregnated Papers

For laminating purposes the lignin-enriched material produced by the Marathon Corporation is first defibrated by a mechanical refining operation. The fibers are then screened and thoroughly washed to remove soluble matter, coming off the washing and lapping machine as lignin-enriched pulp in lap form. This lignin-enriched pulp is then run over a Fourdrinier paper machine to form lignin laminating paper in rolls up to 118 in. in width and an average thickness of approximately .015 inch. This lignin paper is made in several grades for laminating both with and without auxiliary resins.

Lignolite

To make the natural lignin laminating material "Lignolite," a grade of lignin paper is used that contains approximately 35 to 45 per cent of lignin resin uniformly distributed throughout the fibers of the sheet. Since this resin has thermoplastic characteristics in the presence of moisture, the lignin paper is made to utilize controlled amounts of moisture as a plasticizer. The material is allowed to remain under full hydraulic pressure and heat for a length of time depending upon thickness and other factors, and it is cooled before it is removed from the press. The temperatures range from 275 deg. to 360 deg. F. and the pressures from 1500 to 2000 p. s. i. or more.

Table I lists the physical and electrical properties of lignin laminates.

The lignin laminated material can be readily sawed, drilled, tapped, turned, punched and generally machined. It can also be permanently formed or bent to simple curved shapes by the application of heat. The fibrous structure restricts such bending or forming to the thinner sheets and limits the extent to which it can be formed. To accomplish this the material is heated to about 160 deg. F., formed in a die or fixture, and then allowed to cool, either in place or in a supplementary cooling jig. This particular characteristic of the lignin laminated product and its good machining qualities permit wide possibilities in fabricating.

Buffing the lignin laminated product

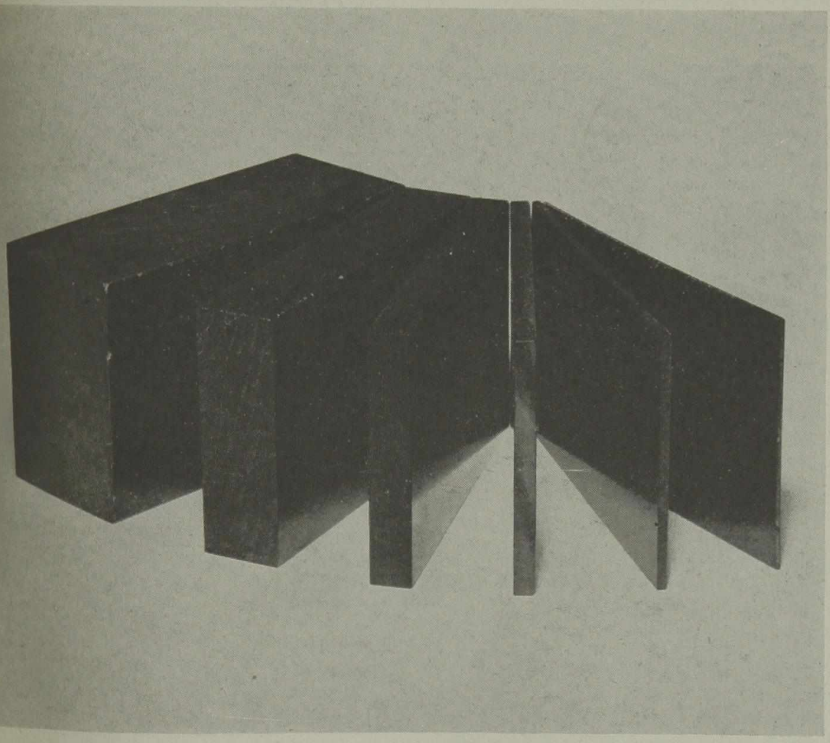


Illustration courtesy Marathon Corp.

"Lignolite" laminated lignin boards are produced commercially in many thicknesses

produces a uniform black color with a high gloss. It can also be coated and painted and most oil-base paints adhere well and make a satisfactory surface. Coatings or lacquers containing such solvents as alcohols, acetones or ketones may cause bleeding so they should be used in the darker shades only. For enamels that require baking, only those that will bake at temperatures less than 176 deg. F. should be applied.

Uses

Many uses have been developed for this lignin laminated product. In the electrical industry its high mechanical strength, excellent electrical properties, low moisture absorption and ease of fabrication make it suitable generally as an insulating material. At present it is being used for such electrical applications as switchboards, switch bases, barriers, spoolheads, connection blocks, terminal strips, insulating spacers, mounting plates, insulating washers, cabinets for housing electrical equipment, bus clamps, insulating supports, etc. It is also being used for signs, nameplates, dies, conveyor guides, ice cube trays, shower stalls, aircraft data boxes, ice boxes, filing cabinet rollers, desk drawer runners, office chair bearings, work and inspection table tops, handles and thermometer backs, door kick and push plates, templates, foundry patterns and other applications. Of considerable interest is the use of the lignin laminated product for foundry pattern plates to replace metals. This application requires a material with high strength, extreme flatness, close thickness tolerance, resistance to moisture and machinability.

Another grade of lignin laminating paper is suitable for use with phenolic resins to make lignin phenolic laminated products. For this combination the lignin paper is coated on one side with 8 to 15 per cent phenolic resin and laminated under the same conditions as [illegible] scribed for the standard paper, or any fabric-base phenolic laminated materials. The lignin laminated product fortified with phenolic resin is a little more resistant to water and heat than is the natural lignin laminated product. Other properties are comparable, but there can be some variations, particularly in electrical properties, depending upon the type of phenolic laminating varnish used. Such lignin phenolic laminated products have been used for various electrical and mechanical applications and when surfaced with colored sheets have been used for table tops, wall panels and other decorative purposes.

Soda Pulp Lignin

Soda pulp lignin has also been investigated for laminates.[1, 43] The use of [illegible] however, as adding lignin to the beater. The latter method eliminates costly items, such as refinement of lignin, the use of volatile solvents, and separate impregnation operations. The strength properties of all-lignin resin paper plastics made by either method are approximately the same, and are somewhat below those usually attained with all-phenolic resin. Soda pulp lignin is comparable with phenolics for resin varnishes, however, in some cases. A balance of properties, particularly between water absorption and impact resistance, can be achieved by varying the proportion of lignin resin to phenolic resin or by the choice of solvent.

Unextracted Lignins

The well known "Masonite" boards are prepared by a thermal hydrolysis followed by an "explosion" of the wood. Masonite products are somewhat out of the scope of this study, for they cannot be considered as true plastics. Boehm[9] has made a good survey of these products. Chips are subjected to about 1000 lbs. steam pressure for several seconds. By releasing the pressure suddenly, they disintegrate into a fibrous mass. The lignin in the latter is activated and a series of temperature and pressure treatments yield a wide variety of boards. By a modification of the above process, the Masonite Corporation[29] increases slightly the time, temperature and pressure before exploding the chips to obtain an amorphous product which can be dried, ground, or molded directly; or it may be formed into thin sheets. The latter may be hot pressed to give a dark, hard, water-resistant product.

The concluding portion of this article and the bibliography will appear in the next issue.

Table I—Physical and Electrical Properties of Lignin Laminate * (1)

Specific gravity	1.40
Tensile strength, p.s.i.	7,500-12,000
Compressive strength, p.s.i.	25,000-35,000
Flexural strength, edgewise, p.s.i.	16,000-20,000
flatwise, p.s.i.	16,000-20,000
Impact strength, Izod, ft.-lb. per in. of notch	0.6-0.8
Surface hardness	
Rockwell, M scale	104
Brinell	40
Maximum heat resistance, °F.	176
Moisture absorption, 24 hr. immersion, %	
Thickness in inches	
1/16	3.5-4.5
1/8	3.0-4.0
1/4	1.5
1/2	0.70
Dielectric strength, short time test, volts per mil	
Thickness in inches	
1/16	700-900
1/8	550-700
1/4	500-700
Dielectric strength, step by step test, volts per mil	
Thickness in inches	
1/16	450-650
1/8	550-600
1/4	350-500
Dielectric constant	4.40
Power factor	0.037
Loss factor	0.162
Arc resistance, sec.	183-188

* These tests were made in accordance with accepted A.S.T.M. methods.

[1] Modern Plastics 19, 46—May, 1942.

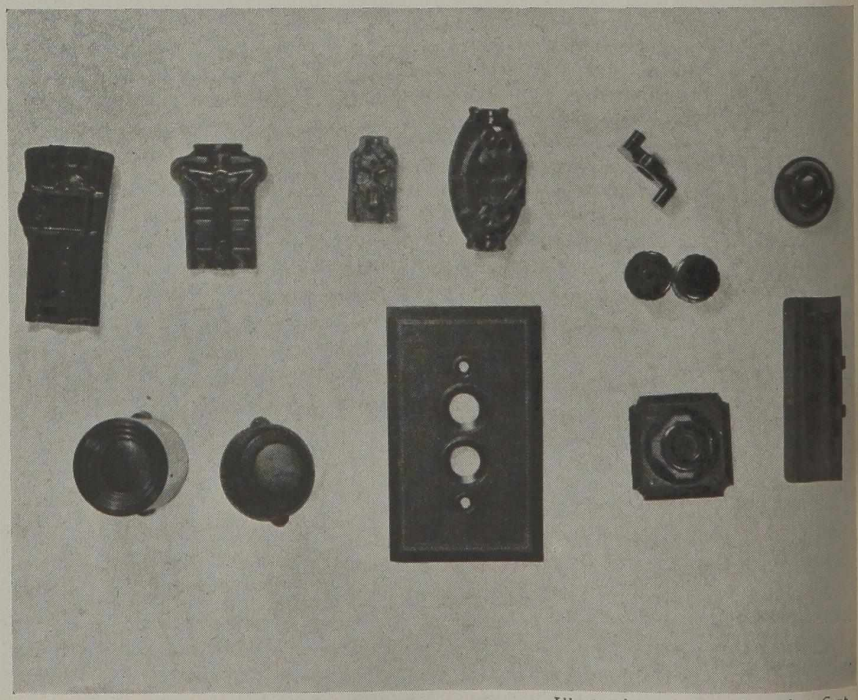


Illustration courtesy Marathon Corp.

A multitude of items is being produced in commercial quantities from lignin plastics.

PLANT OPERATION

MORE PRODUCT with LESS STEAM

by Z. G. DEUTSCH, Deutsch and Loonam, Consulting Engineers and Metallurgists, New York, N. Y.

COAL IS STILL THE MAJOR CRITICAL SHORTAGE this winter. Last month R. F. Stilwell told how to get more steam from less coal. This month Mr. Deutsch offers some valuable practical pointers on how chemical manufacturers can save steam in the plant.

MR. STILWELL last month excellently showed how to get more steam with less coal. The same reasons which urged you to follow his advice, herein urge you to make more product with less steam. All ways of saving coal are now of high national importance. Methods of coal-saving now learned will contribute to advancement in the competitive industrial struggle to follow the wars' end.

One kind of steam waste, the plant operator knows about but just hasn't got around to fixing. Another, about which most of this article is concerned, isn't so well known.

Among the first are included the leaky traps, ragged and torn steam pipe lagging, leaky stuffing boxes on steam valves, etc., all of which get worse so gradually, that the time for fixing them all too often sneaks by unnoticed. In addition to such nuisance leaks are the less obvious ones, such as leaking evaporator tubes which can be much more serious, especially so with today's high pressure production schedules where there is less opportunity for testing to find them. Mr. Stillwell has drawn attention to a large number of fuel losses within the boiler plant itself. The corresponding points in the manufacturing plant demand like attention.

Now, as to the steam losses about which the operator is not so well aware: Undoubtedly it will appear to many who have used a certain amount of steam per unit of product for years and years, that any significant reduction in steam is impossible, or at least uneconomical. Of course, this *may* be true, but from the past experience of many who have worked along this line, in 95 cases out of 100 some steam savings can be made, and in perhaps 30 cases out of these 95, steam savings will be big and important and astonishingly easy to achieve. An engineer with long experience in power plant modernization, when called in to advise on best ways to relieve a steam shortage in a plant said: "There are always two ways of doing it. First you can put in more boilers; second, you can use less steam."

In many spots steam is being used because it is a handy pressure fluid and not because of its special high energy properties. For example, one dye manufacturer was using a ¾-inch steam line, operating at 150 psi, jetting into a stack which vented a bank of kettles. To create enough draft to be assured of carrying away the fumes, steam corresponding to perhaps 50 kilowatts was being used. What he accomplished with that steam line could have been done much more effectively with a one or two horsepower motor driving an exhaust fan. He was therefore wasting the equivalent of almost 70 horsepower continuously, which corresponds to perhaps 25 or more tons of coal per month. This type of thing is not infrequent, although the size of pipe involved may not always be as large.

Many a cooking or digesting tank has an open steam pipe reaching down to the bottom, and during a large part of the cycle the hammering and bouncing of steam will be heard, using some fraction of a percent of the energy in it to do a bit of agitating or radiation-loss replacement.

In every one of such processes, the engineer or operator should ask himself: "What is it I am trying to accomplish with this steam?" In the first of the two examples given above, the answer is: create a small draft; and in the second: stir up a kettle. In both these cases a low powered electric motor would accomplish the desired result at a small fraction of the energy consumption in terms of the nation's coal pile.

Re-Use Your Steam

With less obvious examples, the savings may not be so big percentagewise, but may be much larger in terms of tons of coal per month. Suppose a certain solution has to have half of its water content evaporated off. Readers of this journal are familiar with the fact that doing this with steam in a single-effect evaporator will mean the consumption of something over one pound of steam per pound of water removed. Double effect almost halves the steam consumption and triple effect cuts it into three, etc. It is well known that it seldom pays to use more than three effects, seldom enough even to use three. However, it is not nearly so well known nor so well understood that the water which is evaporated off, is itself steam which can be used in an entirely separate process, rather than in an additional effect. Often steam is considerably throttled when run into a first effect, and in another part of the same plant, steam may also be throttled into a still. A higher pressure evaporator might take the steam with much less throttling and deliver its vapor to the still instead of sending it to a condenser. Conceivably, under favorable conditions the still then gets "free" steam.

Such radical changes are hardly applicable to the wartime measures herein recommended, but the evaporation cycle is used as an example to illustrate a principle. The mechanical engineer of the central station and industrial power plant shouldn't be the only one to be recommending "topping plants." In evaporation, the work which is done is almost zero when considered from the first law of thermodynamics. The second law of thermodynamics, which is a much better gauge of the efficiency of heat utilization in process industries, is elusive and much more difficult for the average man to grasp.

A mechanical analogy illustrates the principle point this paper tries to make. Suppose a manufacturer of forgings received sized chunks of cold steel as his raw material. He feeds these billets into a 1900°F. furnace, removes them one at a time, pounds them into the desired shape and tosses the forgings aside to cool before shipment. The actual heat that he has put in is not sold with his product. He merely holds the metal at a high temperature for a short time so that he can do the work on it. If, immediately after finishing the forging operation, he placed a finished forging in an insulated pot together with a cold billet, the latter would be heated up part way, and thus might consume less fuel in his furnace in getting up to the forging temperature. However, he can't thus get it all the way up. In fact, it would take a "theoretical" pot to get it half way up, and the finished forging half cooled off. Suppose, however, that the incoming billets travelled toward the furnace on a chain belt above a similar chain belt carrying the forgings as they come off the hammer, in the

opposite direction. At the hammer end of such a conveying system, a red hot forging is radiating against a billet which has already been preheated by long travel through an insulated tunnel above cooler forgings. In this way the incoming billets might be heated almost up to forging temperature and only a small fire would be needed in the furnace.

This simple illustration is intended to show how counter-current heat recuperation can work in any system where the heat going out with finished product is substantially the same as that coming into the plant with raw material. In all three examples, the plant's first-law thermal efficiency is zero. The heat content of raw material and of the shipped product is the same, and whatever fuel was used in the furnace is "wasted." However, the first arrangement uses much more fuel than the third, and the second is intermediate. The second-law efficiencies are direct indices of fuel consumption.

In some chemical plants, however, the finished product definitely contains some of the heat which was supplied to the plant as fuel. It may contain it as higher chemical energy or heat of solution. Generally speaking, however, most of the heat which comes into industrial plants as fuel, leaves it (1) as chimney gases, (2) as warmed condenser water and (3) as radiation. None of these three can be reduced all the way to zero, but all three can be significantly reduced in the overwhelming majority of industrial plants, large as well as small. It is the intent of this paper to show where such reductions are most readily found.

Where to Look for Steam Wastes

In most process industries, in fact in manufacturing operations in general, the uses of steam could be divided into:

1. Simple heating processes.
2. Cooking process where heat is actually consumed over and above maintenance of temperature.
3. Distillation and evaporation where an actual separation takes place.
4. Drying.

Fundamentally 3 and 4 are alike, but because drying is such a common operation, it is considered separately.

Heating Processes

The universality of space heating gives it first place in this discussion. Many factory spaces which are heated throughout the winter season might be left unheated because:

1. Men seldom, if ever, work there, or
2. The apparatus being held at desired temperature can be as well protected by lagging.

The first and probably most profitable place to look for steam savings would be in "turning off the heat" in all places where it is not continuously needed. In many cases this can be whole floors of factory buildings months at a ti[illegible] your process, without any preconceived notion as to the demand. other cases, it can be turned off everywhere except in the control room and valve room, for example, of a certain floor. This usually can be done without spending more than needed to shut the steam valve, drain the system, etc., and therefore it is among the most attractive of all of the suggestions made herein.

Another big waste in space heating is the excess of ventilation resorted to because of faulty placement of steam radiators. Workmen who do not move about require a higher air temperature for comfort than others. However, if they are placed too near the steam radiator they may feel too warm when others further away are not warm enough. This introduces much jockeying of windows forth and back with the steam valve to the radiator usually wide open. A little careful thought in placing of benches relative to radiators or radiators relative to work benches and counters, can do such a situation a tremendous amount of good.

In some places it will be necessary to insulate certain apparatus or certain pipes and, in extreme conditions, provide for a little heat inside of the insulation. For example, suppose a distilling column runs up through four stories of a building. On the first floor is the boiler section with the control instruments and laboratory. On the fourth floor will be a reflux condenser and certain vapor valves and seal loops in which a relatively cold liquid (which can freeze) has a slow flow. Heating will probably have to continue on those two floors. The other two floors of the building are mere access platforms to the manholes in the still and the vertical runs of pipes involved in the operation. If, once a week, or once a month a still is opened and men occupy these floors on maintenance work, the heat can be turned on at that time. However, it should be shut off between those times and if there is any danger of freezing of the pipe lines, this can generally be taken care of with a relatively thin layer of insulation. Where insulation will not suffice due to lack of flow, or due to high melting point, a ¼-inch steam line enclosed inside of the insulation often offers sufficient protection at a small fraction of the former steam consumption. Sometimes when shutting off the heat from a portion of the building, it is necessary to put temporary flooring over a stair well, or to close up other openings, so that the used space may be heated with its present radiators.

Distillation and Evaporation

Frequently, such processes consume a major fraction of the total steam generated for a plant. It is much less likely that a "quick and easy" saving can be made, but on the other hand a relatively small percentage saving may mean many tons of coal per month or many pounds of coal per unit of product. It is therefore advisable promptly to reconsider the heat

As in the cooking process described beyond, the theoretical requirements of each operation could be set down and broken up into discernible categories for better understanding. There is usually the preheating, to bring the fluid up to the temperature of processing or reaction; the actual separative work; the radiation and vent losses, etc.

As explained earlier, most evaporation processes have "zero" efficiency from the standpoint of the first law of thermodynamics. That is, usually the product contains only a minor amount of added heat of dilution, above that of the feed. However, much steam is consumed in the evaporation of water, but this heat ultimately goes to the condenser.

Assuming that you have now put traps and valves and such auxiliaries all in good physical condition, the savings that could be made in an evaporation installation concern themselves with two possibilities. The first is to increase the number of effects or the pressure level of operation, which generally will be unprofitable or impractical because of wartime restrictions on materials. Keep considering it for postwar.

The second has to do with the installation of heat regeneration or heat trapping equipment. The steam condensates coming from evaporator heat exchangers are generally trapped and allowed to flash away their potential heat at a lower heat level than necessary. Instead, all condensates should be cooled to the lowest possible temperature in heat exchange with incoming liquors. Flashing of condensates to a lower effect is relatively wasteful of heat potential.

To put the foregoing into a more concrete illustrative example, consider a common triple-effect evaporator wherein the liquor enters the first effect and flows parallel to the steam, with the final solution emerging from the third effect. In such an installation, the first effect is usually operated on steam at 15 to 30 psi gauge. The raw feed solution generally is not much above room temperature. The condensate from the first effect goes to a flash tank vented to the steam chest of the second effect from which it is trapped to join the condensate from the second effect. Together, these are similarly vented to the steam chest of the third effect, with the third effect condensate joining the others in a hot well. The solution flowing from one effect to the next is automatically controlled by a level loop and is allowed to flash into the vapor space. This provides a simple and easily controlled operation and can probably be found with only minor variations in many chemical plants. The most serious coal waste in such an installation results from the cold solution entering the first effect. This solution can be heat-

ed most effectively in counter-current flow with the condensates. These condensates should not be flashed in such an installation, but should be trapped at the outlet side of heat exchangers. Where the feed volume (as in the more frequent cases) is much larger than the condensate volume, an additional source of heat should be taken from the vapors on their way to the third effect in one exchanger and on their way to the second effect in a higher exchanger. That is, as most plant operators would describe it, "getting the heat out of steam already *used* once or twice." The installation of such auxiliary heat exchangers can frequently be justified in wartime, not alone for fuel savings but because a marked capacity increase is simultaneously obtained.

Distillation processes are analogous to long strings of multiple effect evaporators enclosed in a single shell. For this reason they are moderately efficient and the principal loss to look for is in the amount of water cooling at the top. If this water cooling section can be eliminated or reduced to a small fraction by using incoming liquid for most of the condenser sections, a substantial heat economy can result. Frequently it is better to operate stills at higher pressures to permit a bigger fraction of the outgoing heat to be absorbed by the incoming solution. Many stills are designed to operate safely at much higher pressure than they are being operated at and often this requires only throttling the valve at the top; that is, the needed steam is being throttled wastefully at the bottom most of the time. Sometimes the vapors from stills or gas strippers can be delivered directly to the next process without compression, thus saving the fuel used by the compressor.

Many stills have "closed boilers," and the steam condensate therefrom can be used effectively in a manner similar to that described for evaporation.

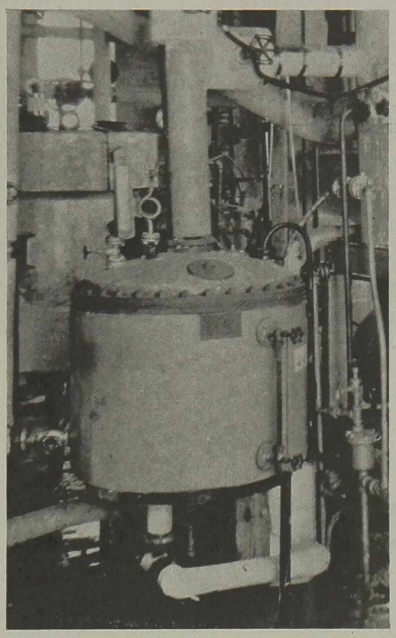
Cooking Processes

Most cooking processes require heating of a kettle or pot or autoclave during only one period of a cycle. A few require continuous heating for continuous flow processes. In the batch type cooking process, there are certain theoretical demands for heat. These can be considered under three headings:

1. Heating up the reactants.
2. Furnishing the endothermic demand.
3. Supplying the radiation and other losses.

The steam equivalent to the net endothermic demand is the irreducible minimum and shows what is left to work on in the way of steam reduction. Usually the biggest possibility for savings at minimum expense will be under heading 3, radiation, etc. Replace removed or damaged lagging! Lag all hot surfaces, no matter how small.

Much can be done to reduce the steam demand for heading 1, the heating of reactants. Frequently a cycle can be so arranged that the temperature developed during the cooking period can serve to pre-heat the next batch by transferring contents from kettle to kettle. This generally involves little or no expense for new equipment. The outgoing hot solution can always be made to warm the incoming cold material through use of suitable heat exchangers. However, exchangers usually represent a considerable outlay in money and introduce new maintenance expenses to offset the coal economies. For batch type operations the ingenious cycle is the more promising



Proper use and maintenance of lagging is one of the cardinal principles of heat conservation.

lead. Nevertheless, all such possibilities should in these times of coal shortage be considered carefully and thoughtfully.

Frequently in a cooking process, the product goes through one or more fusions or remeltings in the cycle. A mild degree of agitation can often serve to maintain an acceptably fluid condition, even though some of the solids are freezing out. In this way, the heating up or cooling down cycle can be expanded to cover a necessarily long period without the use of so much heat.

Drying

The ultimate purpose of drying is to evaporate off some residual moisture. It is thus an evaporation process, but it differs in that the evaporation usually takes place at a lower temperature and into a medium where the partial pressure of water is well below 100 percent. The chances for wasteful operations in drying are much greater than those in evaporation. In many dryers air is heated with steam and then swept over the product and on to the atmosphere. Thus the heat which is in the discharged air can and does represent a major fraction of the coal consumption. It is of course impossible to have the same temperature and humidity in the outgoing air as in the incoming air and do any drying work. However, an approach to this condition is to be sought for maximum fuel economy. Here again the theoretical requirements of:

1. Heating product
2. Evaporating the water
3. Providing for radiation and other losses

can be calculated and mulled over separately. In most drying operations, the heat in the product is small relative to radiation and vent losses, while the actual evaporation load is also small, although not invariably so.

The heat economy of dryers, furthermore is intimately associated with their capacity. It is therefore important to recognize the necessary driving force for drying in considering item 3. The most important contribution toward drying economy is made through consistent use of the counter-current principle. That is, the most nearly dry product should meet the incoming superheated air or the hottest part of the dryer, and the wettest product should cool the outgoing damp air.

Where there is no controlled flow; that is, where the moisture is merely being "baked out" of the product, a low economy is bound to result and relatively large savings in coal can be effected by simple remedies. Some remedies might involve the use of a small rotary drum, others the use of circulatory fans and still others, some means of moving belts in long ducts. The insulation of the outsides of dryers is often thought to be unimportant because the temperatures are relatively low. However, the largest saving, percentagewise, results from the first thin layer of insulation on the warm bare surface.

Summary

Most of the admonitions of the foregoing bear repeating here in brief form. They are given in the order of the ease with which steam savings usually result, rather than in the order of estimated size of the resulting saving:

1. Turn off the heat wherever and whenever it is not needed.
2. Fix other places so that the heat can be turned off in as much space as possible.
3. Fix leaky traps; repack steam valve stems; replace damaged lagging; repair leaky condenser and evaporator tubes.
4. Study all steam-consuming apparatus to break down the demand into the useful part, the necessary but unavoidable part, and the improvable part.
5. Work on the improvable part on the general principle that the outgoing hot material can heat the incoming cold material.

D. P. C. plant at Austin, Texas, where dolomite serves as the basic ingredient for production of magnesium.

PLANT OPERATION

Production of MAGNESIUM CHLORIDE from DOLOMITE

by E. E. WREGE and C. J. ANSTRAND,* International Minerals & Chemical Corp.

A NEW PROCESS FOR MAKING magnesium chloride from Texas dolomite was developed and put into use in 1942 by the International Minerals & Chemical Corporation for the Austin, Texas, magnesium plant of the Defense Plant Corporation. The dolomite (magnesium and calcium carbonate) is calcined to magnesium oxide and calcium oxide, which are wet-slaked to the hydrates. The calcium hydroxide is then preferentially carbonated to calcium carbonate, thus permitting selective neutralization of the magnesium hydroxide by HCl to magnesium chloride. Although postwar continuation of operations probably will depend on creation of large industrial demands for the calcium now wasted, the process has contributed greatly to the war production of magnesium, and is of general interest because of the number of unit operations and inorganic unit processes involved.

WITH the tremendous expansion in the production of magnesium planned by military and industrial strategists in 1941, it became necessary for the American industry to invent and devise new processes for the production of magnesium. In 1941, International Minerals and Chemical Corporation entered into a contract with the Defense Plant Corporation to design, build, and operate a plant to produce magnesium from dolomite and a waste brine from International's potash plant in Carlsbad, New Mexico. It was decided that proven processes and equipment would be used wherever possible in order to expedite an early completion of the plant. The Dow Chemical Company, sole pre-war producer of magnesium in the United States, was engaged as consultants for that part of the process concerned with the concentration, flaking, and drying of 34% magnesium chloride and for the electrolytic separation of the metallic magnesium from the dried magnesium chloride.

Magnesium is produced in the Dow Cell by electrolyzing a fused bath containing magnesium chloride as one of the major components. International's problem was one of producing a 34% magnesium chloride brine from the Carlsbad plant waste material and from dolomite, which, when further processed to finished cell feed, would meet the Dow Cell requirements as to specifications. The problems concerning the production of magnesium chloride cell feed from the Carlsbad plant's waste brine has been adequately discussed by P. D. V. Manning and S. D. Kirkpatrick. It is the purpose of this article to discuss the process developed by International for the production of 34% magnesium chloride from dolomite.

Description of Flow Diagram

Figure 1 is the flow diagram of the process used at the Austin, Texas, magnesium plant for converting dolomite to a 34% magnesium chloride solution. Dolo-

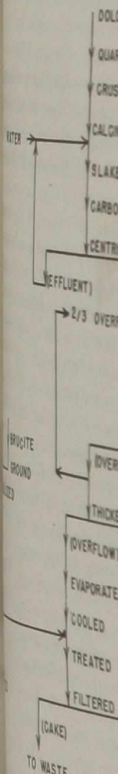
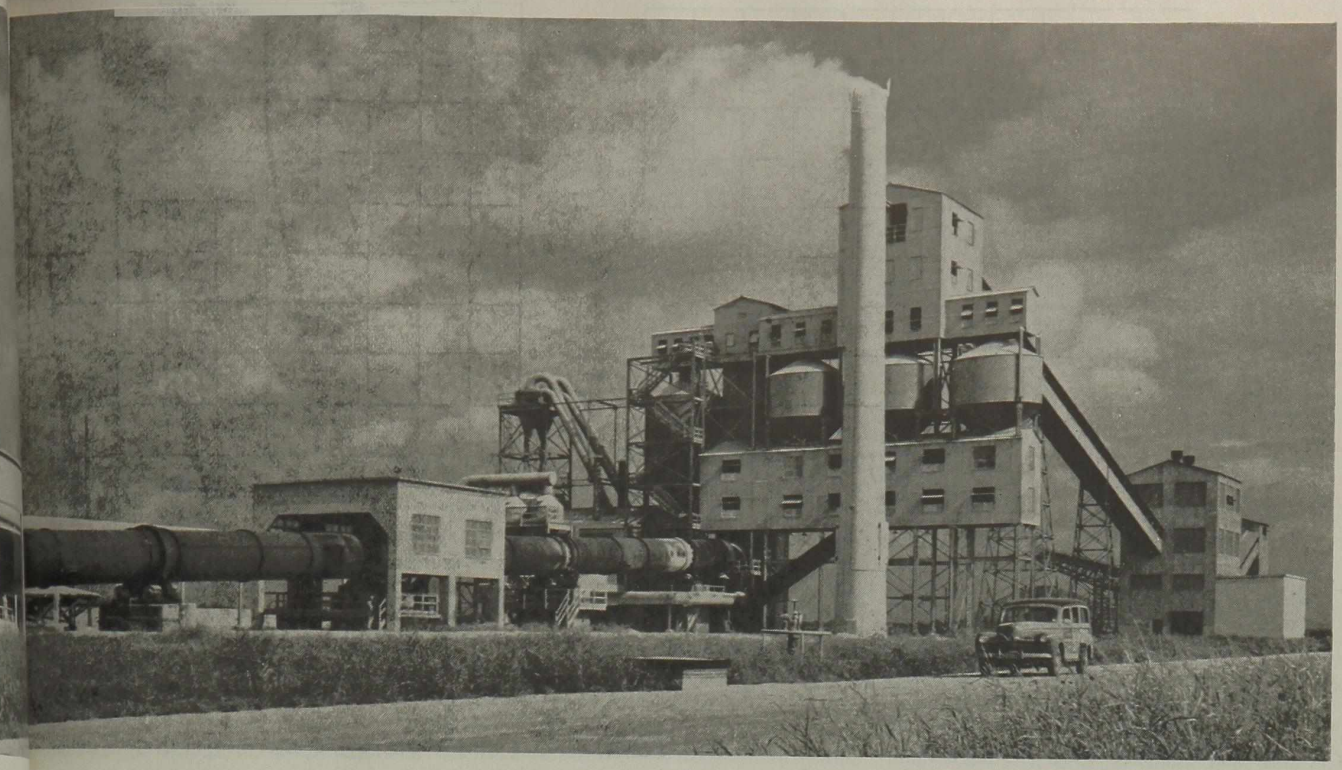


Fig. 1. Fl

* Respectively plant chemical engineer and superintendent of the Chemical Section, D. P. C. Magnesium Plant, Austin, Texas, operated by International Minerals & Chemical Corp.



mite, having an approximate analysis 42% $MgCO_3$, 55% $CaCO_3$, and less than 3% combined SiO_2 and R_2O_3, is crushed at the quarrysite, screened to a sizing of −1 in. + 3/16 in. and shipped to the Austin plant in open gondola cars. The dolomite is calcined in a rotary kiln, the product being "dolime"—a mixture of calcium and magnesium oxides. The exit gas from the kiln averages 25-30% CO_2 by volume, at normal operating loads. The dolime is slaked in water to a solids concentration of approximately 11% $Mg(OH)_2 + Ca(OH)_2$. This slurry is carbonated with kiln gas to the point of complete conversion of calcium hydrate to calcium carbonate without any carbonation of the magnesium hydrate and, after carbonation, is dewatered to 55% solids with continuous centrifuges. The cake is repulped to a slurry consistency in weak magnesium chloride solution containing some dissolved calcium and adjusted to approximately 10% solids. The repulped cake is continuously carbonated for the removal of the soluble calcium as calcium carbonate, after which it is reacted with 20% hydrochloric acid for neutralization of the magnesium hydrate.

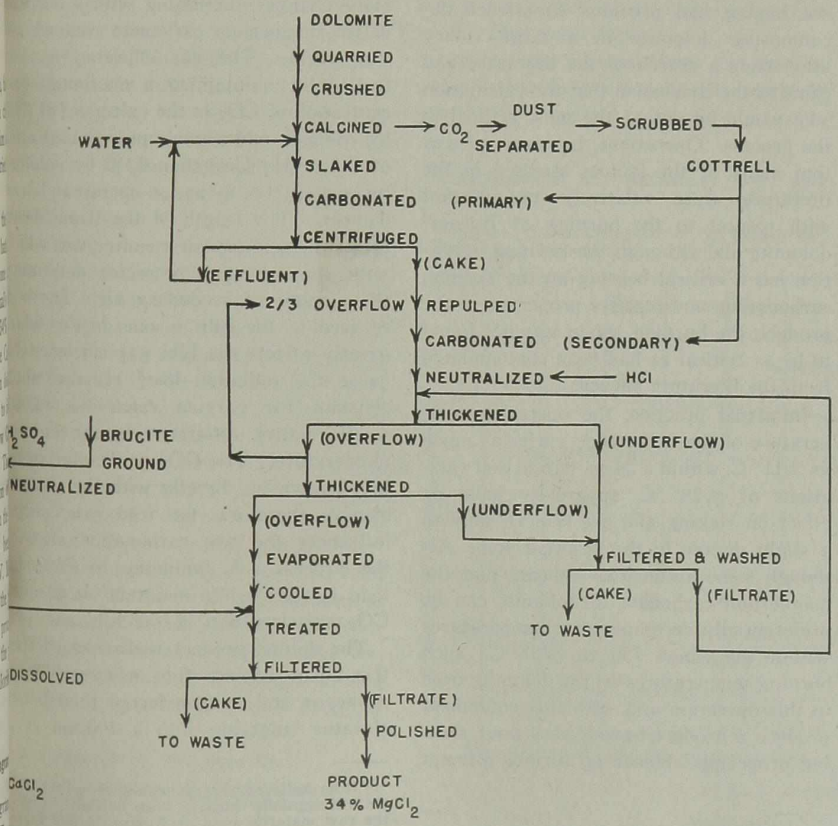


Fig. 1. Flow Diagram 34% $MgCl_2$

After neutralization, the suspended $CaCO_3$ is settled out in thickeners, its complete removal being effected by filtering the thickener underflow on continuous vacuum filters. Approximately one-third of the thickener overflow is concentrated by submerged combustion evaporators to 34% $MgCl_2$ and the remaining two-thirds is recycled to repulp the dewatered centrifuge cake. Before treating for the control of the excess soluble calcium or sulfate, the 34% $MgCl_2$ solution is cooled to approximately 60° C. by flashing at a vacuum of 27-28 in. of mercury. The solution is treated for excess calcium or sulfate by precipitating these constituents as gypsum, with the addition of magnesium sulfate or calcium chloride, respectively. The precipitated gypsum is removed by means of continuous vacuum filters and the filtered 34% $MgCl_2$ solution is polished with a plate-and-frame press to remove all traces of solids.

The dolomite used in this operation is a "true" dolomite[1] with all the magnesium in the form of the double salt, magnesium-calcium, carbonate ($MgCO_3 \cdot CaCO_3$). The origin of the rock is Cambrian dolo-

[1] Some so-called "dolomites" are actually magnesitic limestones, being a mixture of magnesite and calcite crystals.

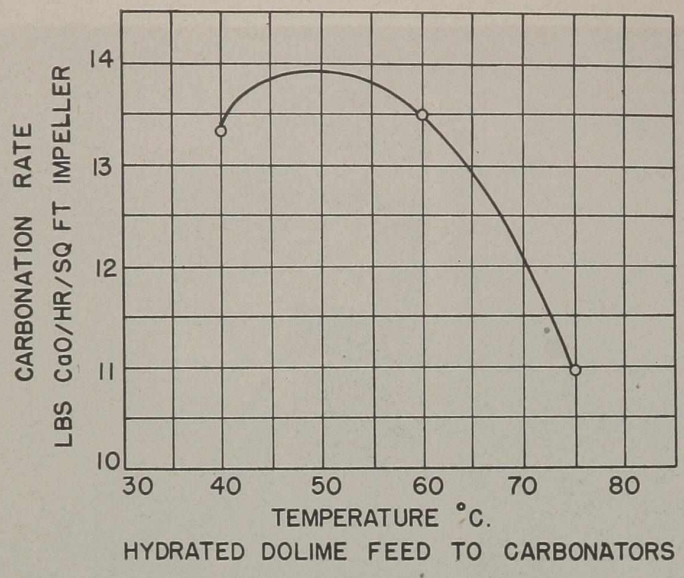


FIGURE 2 – EFFECT OF FEED TEMPERATURE ON CARBONATION RATE OF HYDRATED DOLIME

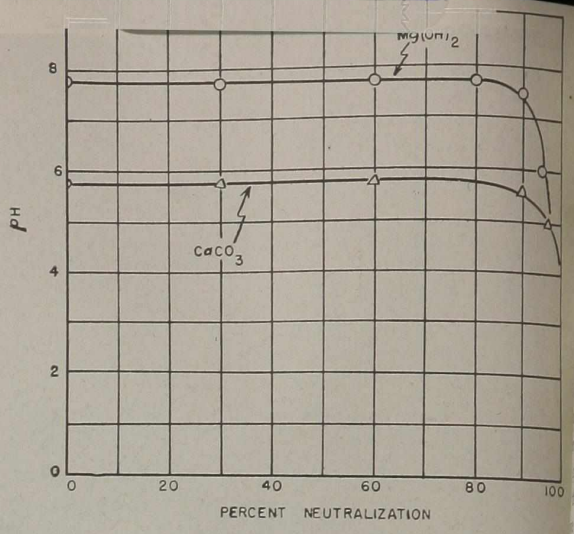


FIGURE 3 – NEUTRALIZATION CURVES FOR $Mg(OH)_2$ IN 14.5% $MgCl_2$ AND $CaCO_3$ IN 14.5% $MgCl_2$ REACTED WITH 1N. HCl

mite and analyzes 40-43%[2] magnesium carbonate. The unit processes used at Austin are designed to break down this unit crystal of magnesium-calcium carbonate and convert the resulting magnesium and calcium components into such forms that they can be easily separated and the magnesium component made into the desired cell feed. The unit processes used to accomplish this are calcining, slaking, carbonation, neutralization, and treating. The unit operations connecting these unit processes are centrifuging, thickening, evaporation, and filtration. The following will discuss most of these unit processes and unit operations in the order in which they occur in the process.

Calcining

The first unit process is the calcination of the dolomite to the oxide of magnesium and calcium, which chemically separates the magnesium and calcium into two component chemical compounds. The reaction is:

$$MgCO_3 \cdot CaCO_3 + 48.8 \text{ Cals.} \rightarrow MgO + CaO + CO_2$$

The dolomite is reacted in a Unax[3] rotary kiln 308 ft. long × 8 ft. in diameter, using natural gas.[4] The kiln is equipped with a heat exchanger at the feed end for preheating the feed with the exit gas and the Unax coolers at the product end for preheating the secondary air. By these means the exit gas is cooled to approximately 340° C. and the dolime product to approximately 50° C. The sized dry dolomite is fed by feeders, accurate to ±5 lbs. per minute, which are controlled by the kiln operator.[5]

The product of any thermal decomposition is the result of a time and temperature treatment of the material being decomposed. The operating conditions will vary according to the raw material processed, the product desired, the equipment used, and the fuel burned. Realizing this, the production engineers at Austin, not having had previous experience decomposing dolomite in a large rotary kiln, made a search of the literature and came to the conclusion that the calcination step would be one of the most critical in the process. Operations, however, proved that many of the factors stressed in the literature were relatively unimportant with respect to the burning of Burnet[6] dolomite and although the burning operation has a critical bearing on the slaking, carbonating, and reactive properties of the product, the burning range was not found to be as critical as had been contemplated from the literature survey.

In actual practice, the operating temperature of the firing zone varies as much as ±11° C. within a 24-in. period and variations of ±28° C. apparently have no effect on slaking and are noticed only to a slight degree in the reaction step. Although some authorities indicate that the magnesium carbonate in dolomite can be preferentially decomposed at temperatures within the range 730 to 875° C., such burning temperatures on the dolomite used in this operation and with this equipment produce a product having very poor slaking properties. Hence no serious attempt has been made to selectively calcine at Austin.[7]

In plant operation, the product quality is controlled by means of the exit gas temperature, which is maintained at the average temperature of approximately 340° C., and the kiln lining temperature in the firing zone, which is maintained in the range of 940° C. ± 28° C. The optimum temperature in this range shifts somewhat as the magnesium carbonate content in the stone changes, increasing with a decrease of the magnesium carbonate content, and vice versa. The gas efficiency is controlled by maintaining a maximum concentration of CO_2 in the exit gas (31-32% by volume) and a minimum concentration of $CO + H_2$ (less than 0.1% by volume) by means of a motor-operated louver damper. The length of the flame determines the primary air requirement, which, with the exit gas pressure, determines the amount of secondary air. The rate of feed to the kiln is one factor which greatly affects the kiln gas efficiency because the radiation loss[8] remains about constant for varying rates due to the small relative difference in the burning temperature. The CO_2 percentage in the kiln gas varies directly with the gas efficiency; therefore, the feed rate greatly influences the two carbonation steps of the process. A minimum of 75% full load is required to maintain an adequate CO_2 concentration in the kiln gas.

The dolime product is discharged from the Unax coolers into a covered-flight conveyor and is transferred to a bucket elevator emptying into a 100-ton surge

[2] There are some lenticular deposits having an excess of $CaCO_3$ in the dolomite bed, which lowers the $MgCO_3/CaCO_3$ ratio below the theoretical for $MgCO_3 \cdot CaCO_3$.

[3] Manufactured by F. L. Smidth.

[4] Gas analyzes 95% methane, heating value 1,000 B.t.u./cu.ft.

[5] The complete operation of the kiln is controlled from a control panel by one operator.

[6] Quarry location, Burnet County, Texas.

[7] It is believed that it would be very difficult to preferentially burn a true dolomite, such as the raw material used at Austin, in this type of kiln; however, it might be accomplished by "flash-calcining" a finely pulverized material.

[8] Approximately 20% for full load.

bin which stores the dolime for the slaking operation.

Slaking

Slaking, the second unit process, produces the first physical separation of the calcium and magnesium components of the dolomite. The reaction for this hydration is:

$$(MgO + CaO) + 2H_2O \longrightarrow Mg(OH)_2 + Ca(OH)_2 + 20.6 \text{ Cals.}$$

A standard 8,000-gal. Dorrco[9] wet slaker, equipped with a Turbo agitator, rake classifier to remove silica grit and unburned cores, and Ross feeders for controlling the dolime feed rate, is used for the above reaction.

The slaking process has an important bearing on the operation and efficiency of the following carbonation and neutralizing processes and the centrifuging operation. The slaking is done continuously with the solids concentration controlled at approximately 17% and the slaking temperature controlled at 95-100° C. The high solids concentration and slaking temperature are necessary to obtain maximum hydration of the magnesium oxide, which increases the yield of available magnesium hydrate from dolomite. These conditions also aid in the flocculation of the magnesium hydrate to increase the particle size to an optimum which results in a higher centrifuge capacity. The slaked material overflows the slaking compartment to the rake classifier, where additional water is added in order to dilute the slurry to 11% solids and to cool the slurry to 60° C. Dilution is necessary to settle out the silica grit and unburned cores by reducing the specific gravity and viscosity. Cooling the slurry below 60° C. provides for optimum gas absorption efficiency in the carbonation process as indicated in Figure 2.

The slaking temperature is maintained by an open steam jet located in the slaker which is automatically controlled by a Foxboro temperature recorder and controller operating a steam regulating valve. The effluent from the centrifuges is collected in a well provided with a float level control valve for make-up water and is pumped to the slakers with the flow manually proportioned to the slaker and classifier units. By correlation of hydrated solids concentration against specific gravity, measurements of the latter are used for control of the former. Calibrated back-pressure manometers[10] are used for specific gravity measurements. The hydrated slurry, cooled to 60° C. and diluted to a specific gravity 1.06-1.07 (approx. 11% solids), overflows into a 10,000-gal. surge tank, from which it is pumped to constant-head tanks feeding the carbonators.

Primary Carbonation

The purpose of this unit process is to convert the calcium hydrate of the hydrated dolime into such a form that a maximum of the magnesium hydrate can be dissolved in the neutralization step with a minimum dissolution of the calcium. The neutralization curves illustrated in Figure 3 indicate that such a preferential neutralization of the magnesium hydrate can be obtained in the presence of calcium carbonate. The primary carbonation reaction is:

$$CO_2 + Ca(OH)_2 + Mg(OH)_2 \longrightarrow CaCO_3 + Mg(OH)_2 + H_2O + 26.8 \text{ Cals.}$$

The hydrated dolime slurry is carbonated at atmospheric pressure in two groups of 12 ft. diameter × 13 ft. high steel carbonators, three carbonators in each group connected for series operation. The slurry is fed to the first carbonator of each group by means of constant-head tanks, which overflow back to the slaker surge tank. Each carbonate is equipped with a 25-hp. Duplex Turbomixer[12] for dispersing the carbon dioxide gas through the slurry. Kiln gas,[13] averaging approximately 30% by volume CO_2 and compressed to a pressure of approximately 5 lb./sq.in. gage by centrifugal blowers, is used to carbonate the slurry. The carbonated slurry overflows the final carbonator of each group into a surge tank which feeds by gravity to the Bird centrifuges.

Conductivity measurements are used to control the carbonation at the point of practically complete conversion of calcium hydrate. Figure 4[14, 15] shows the relationship of conductivity to degree of lime carbonated and also the change in viscosity which occurs as carbonation of the lime proceeds. The conductivity decreases slowly until approximately 90% of the calcium hydrate is removed as carbonate and thereafter decreases more rapidly, decreasing most rapidly between 98-100% calcium conversion. It is important to maintain a carbonation rate which is slower than that for the dissolving of calcium hydrate, otherwise equilibrium will not be attained and a false conductivity measurement will be recorded. The calcium hydrate is completely reacted before carbonation of the magnesium hydrate begins. As the magnesium hydrate carbonates, the conductivity and viscosity of the suspension increases due to the formation of basic magnesium carbonate, the viscosity increasing very rapidly to the point where the suspension loses its fluidity. As this occurs, the time rate of carbonation is decreased due to the inability of the Turbomixer to maintain good gas dispersion and it is impossible to carbonate any appreciable quantity of magnesium hydrate in the plant equipment and still maintain required output. As the conductivity curve reverses itself at 100% lime carbonation, control is maintained on the undercarbonated side as indicated by the control range *A* in Figure 4, leaving approximately 0.1% of the lime uncarbonated.

The operation is controlled by a specially designed Leeds and Northrup Micromax Conductivity Recorder and Controller which activates an automatic valve regulating the addition of small quanti-

[9] Manufactured by The Dorr Co.

[10] Spindle measurements were found to be inaccurate due to the high viscosity of the suspensions.

[12] Manufactured by Turbomixer Corp., New York City.

[13] Approx. 5,000 c.f.m. at 50° C. evenly distributed to 6 carbonators.

[14] Courtesy of International Minerals and Chemical Corp. research report on Carbonation. Project 44-727-*A*-8 by H. H. Cudd.

[15] This is not specific conductivity but an arbitrary value measured by a given cell with a constant a.c. voltage impressed across the terminals.

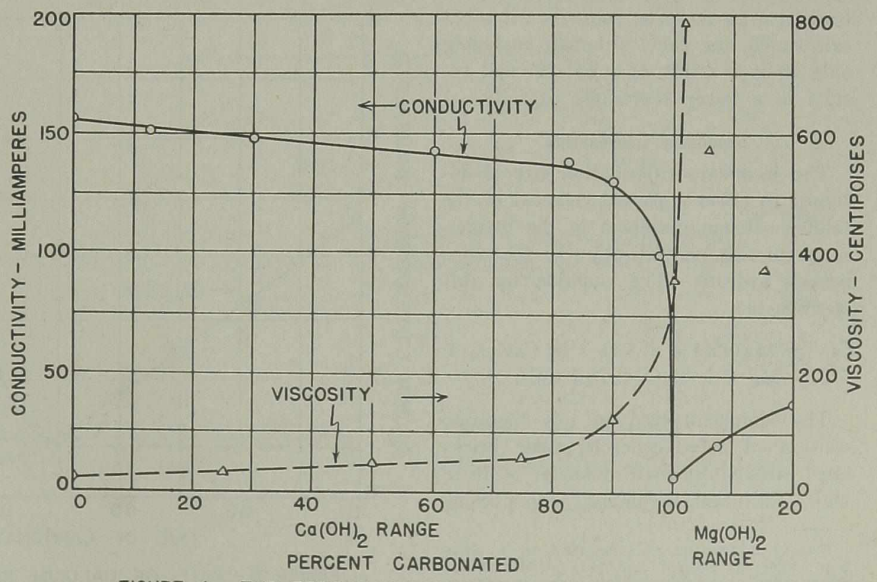


FIGURE 4 – THE EFFECT OF DEGREE OF CARBONATION ON THE CONDUCTIVITY[14] AND VISCOSITY OF DOLIME SLURRY

ties of uncarbonated slurry into the final carbonation tank of each group. As long as sufficient gas is added to the system, this unit process is almost trouble-free and operation over the past 18 months has proven the accuracy and sensitivity of the conductivity control.

Centrifuging

In order to decrease evaporation cost to a minimum, as much water as possible is removed from the carbonated dolime slurry by Bird Machine Company continuous centrifuges. Three 72 in. × 36 in. centrifuges, operating at 1400 r.p.m. and driven by 60-hp. motors, are used to dewater approximately 245 tons per day dry solids from a 17% solids slurry to a 55% solids cake. The cake discharged from the centrifuges is transferred, by means of an inclined-flight conveyor, to a repulper, where it is repulped with 16% $MgCl_2$ solution. The centrifuge effluent is recycled back to the Dorrco slakers.

Control of the operation is maintained by correlating the specific gravity of the Bird effluent with the motor load. The specific gravity of the effluent is not permitted to go above 1.030 (corresponding to approximately 2% solids) and on reaching this gravity, the feed rate is reduced accordingly. The particle size range of the solids is 1-5 microns,[16] the major proportion of the particles being about 2 microns. To obtain maximum capacity, the centrifuges were speeded up to 1400 r.p.m. from the original 1050 r.p.m. and the feed pipe was relocated to discharge into the compartment of the inner bowl nearest the effluent discharge ports. These changes were made after operations had started and considerably increased the efficiency of the centrifuging operation. The degree of carbonation has a considerable influence on the physical quality of the cake and a minor effect on the per cent solids. If the material is under-carbonated, the cake is semifluid and difficult to transfer with the drag conveyor; if over-carbonated, the cake, although analyzing only 50-55% solids, is quite stiff and results in a lower centrifuge capacity.

Secondary Carbonation

The secondary carbonation step is designed to effect a partial removal of the soluble calcium dissolved in the magnesium chloride neutralization of the magnesium hydrate. The equation for this reaction is:

$$Ca^{++} + Mg(OH)_2 + CO_2 \longrightarrow CaCO_3 + Mg^{++} + H_2O + 20.1 \text{ Cals.}$$

The equipment used for this operation consists of three concrete, shale brick-lined carbonators 24 ft. diameter × 16 ft. high. Each tank is equipped with a 25-hp. 72-in. tilted Turbo agitator and a 6-in. pipe, branching off the main overhead CO_2 header, to introduce the gas beneath a 50-in. diameter circular dispersion disk, with a 6-in. serrated skirt, centered 18-in. under the agitator. A 3-in. orifice is located in the 6-in. line to measure the rate of gas flow into the carbonator. The three carbonators are connected, by means of 10-in. overflow pipes, for series operation.

Since there is a large excess of magnesium hydrate always present for this reaction, the rate of calcium removal holds constant until the soluble calcium concentration decreases to a relatively low value. Figure 5 shows that the break in the rate of calcium removal occurs at a soluble calcium concentration of approximately 0.8 grams per liter, the rate thereafter dereasing very rapidly. For this reason, a close control is not required for this unit process and, providing there is sufficient reaction space for the quantity of calcium being handled, only a periodic check need be made to assure the maintenance of a small excess of carbon dioxide. Control of the operation is based on a total alkalinity titration of a portion of the filtrate obtained from the overflow of the final carbonator. As indicated by the alkalinity curve of Figure 5, a rapid increase in alkalinity results on carbonating a solution containing less than 0.8 g./l. soluble calcium. By adjustment of the gas flow, an alkalinity titration between 1-8 ml. of 1*N* HCl for 25 ml. of filtrate is maintained and optimum calcium removal is attained with minimum load on the gas compressor.

Neutralization

The neutralization step is the unit process which first makes it possible to obtain an actual physical separation of the magnesium and calcium constituents produced from dolomite. This is done by selectively reacting the magnesium hydrate, remaining in suspension after the secondary carbonation step, with hydrochloric acid, leaving the calcium carbonate undissolved. The reaction is:

$$Mg(OH)_2 + 2HCl \longrightarrow MgCl_2 + 2H_2O + 29.4 \text{ Cals.}$$

The neutralizing equipment consists of eight steel reaction tanks 14 ft. diameter × 9 ft. high, each reactor having a flat steel cover and a 24-in. stack for venting the liberated gases and fumes. The reactors are arranged in two parallel rows of four, each row of tanks being interconnected by means of overflow troughs for series operation. Simplex Turbomixer agitators, powered with 10-hp. drives, are installed in each reactor. The slurry is pumped into the first reactor of each row, the flow being regulated by means of a free discharge pipe orifice. The partially reacted slurry overflows, by gravity, through the remaining reactors. The hydrochloric acid is proportioned to each reactor by means of rotameters. A 72-in. diameter octagon ring of 3-in. Karbate pipe is bracketed to circumscribe the stator vanes of the agitator and is located in a horizontal plane 2 in. above the vanes in order not to interfere with the agitation pattern. A row of ⅛-in. holes, spaced 3 in. apart and drilled in the underside of the ring, distributes the acid into a myriad of tiny streams projecting into the region of greatest turbulence just outside the stator vanes. The neutralized slurry, overflowing the last reactor of each row, enters an open trough which carries the slurry to the Dorr thickeners.

To selectively neutralize magnesium hydrate in the presence of calcium carbonate the neutralization cannot proceed any faster than the solid magnesium hydrate can dissolve and maintain the neutralization pH of 7.8. See Figure 3. If this

[16] It is interesting to note that, in a situation where the effluent can be recycled and also where efficient washing of the cake is not important, this type of machine can filter such small solid particles very satisfactorily.

[17] To a methyl red end point.

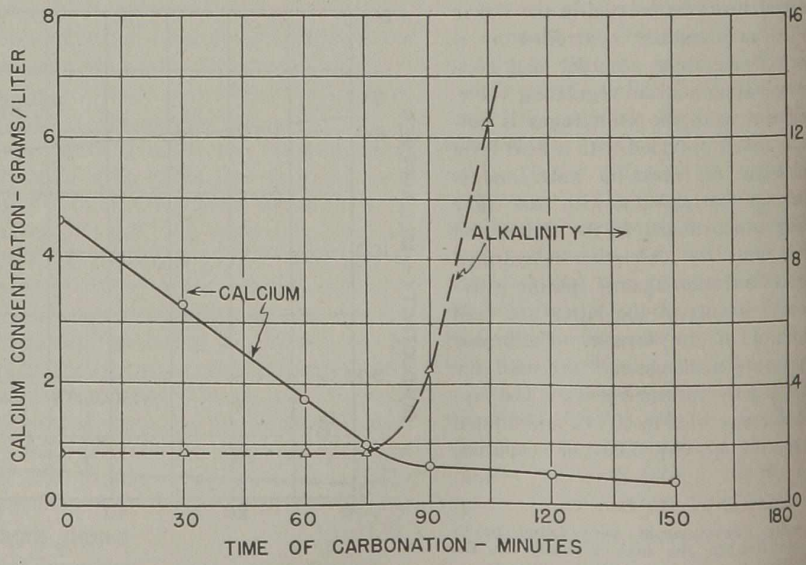


FIGURE 5 – RATE OF CALCIUM REMOVAL AND CHANGE OF ALKALINITY[17] DURING SECONDARY CARBONATION PROCESS

condition is not obtained, the pH range for the neutralization of calcium carbonate will be approached and calcium will be dissolved. The rate of neutralization in the immediate area of the point of acid addition is important and the degree of acid dispersion is the controlling factor. The curves in Figure 4 show: (1) the theoretical curve for 100% neutralization of the acid added by magnesium hydrate alone, no calcium carbonate being dissolved, and (2) the actual neutralization curve obtained under plant operating conditions. As indicated by the second curve, considerable calcium is neutralized due to local excess acid conditions. The secondary carbonation step is used partially to overome this by reprecipitating approximately two-thirds of the reacted calcium as the carbonate. All or part of the remaining one-third reacts with the 1.2% sulfate present in the plant hydrochloric acid and is later removed as gypsum. Final control of the soluble calcium and sulfate is obtained in the treating step of the process.

Control over this operation is obtained by analyzing the feed to the reactors for total magnesium hydrate content and regulating the total flow of acid to each bank of reactors to correspond to the total hydrate entering each bank. A predetermined ratio for proportioning the acid between the reactors of each bank is used for each rate of total acid addition. In general, a decreased rate of acid addition in each successive step is used in order to suppress any tendency for local overacidulation as the equivalence point of the neutralization is approached. It has been found that a part of the magnesium hydrate is relatively unreactive above a pH of 6 and dissolves but slowly in a slight excess of acid. The proportion of unreactive hydrate apparently varies with variations in the kiln and slaker operations. Since the control is based on the titration for total hydrate, a change in the proportion of reactive hydrate will throw the operation off and, depending on the direction of the change, either too much calcium will be dissolved or all of the reactive hydrate will not be neutralized. This means that the neutralization step is always a critical one (particularly when the high cost of calcium removal is considered) requiring close supervision and constant checking by the technical group.

Thickening

The neutralized slurry overflows the final reactor of each bank into an open launder which discharges into the first of two 100-ft. diameter Dorr thickeners operating in series for the separation of the calcium carbonate and unreacted magnesium hydrate solids from the weak magnesium chloride solution. The feed to the thickeners analyzes approximately 5% calcium carbonate, 0.3% magnesium hydrate, 0.1% gypsum, and the supernatant

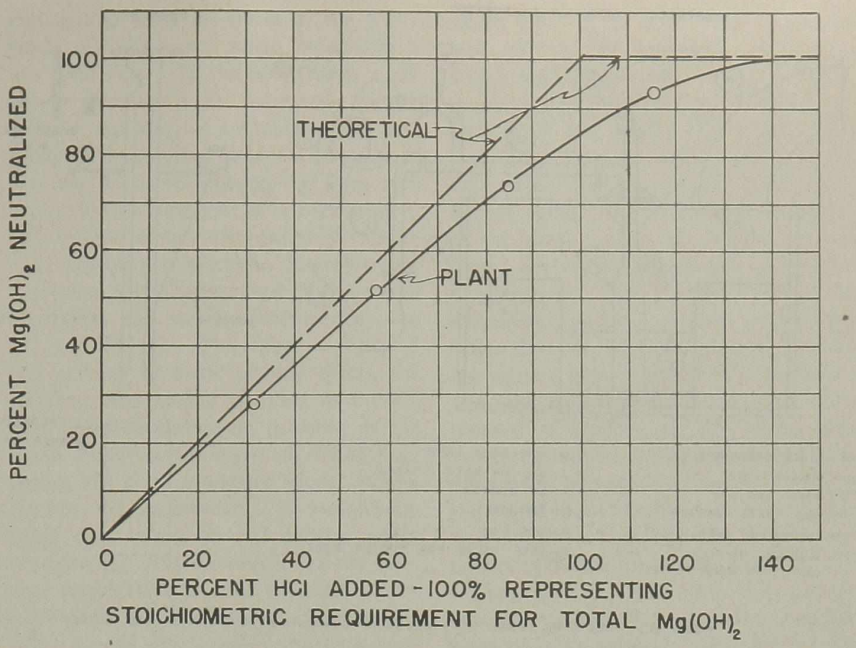


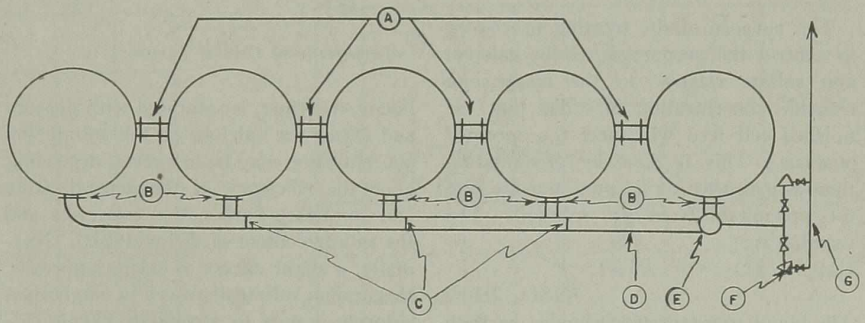
FIGURE 6 - PLANT NEUTRALIZATION OF $Mg(OH)_2$ SHOWING DEVIATION FROM THE THEORETICAL DUE TO LOCAL EXCESS ACID CONDITIONS

liquor 16% magnesium chloride. The underflow from both thickeners contains approximately 30% solids and is pumped to the carbonate filters. The overflow from the primary thickener is divided, with two-thirds being pumped back to the Bird cake repulper and one-third pumped to the launder of the secondary thickener. The overflow from the secondary thickener contains practically no solids in suspension and is pumped to either one of two 100,000-gal. storage tanks.

Evaporation

Submerged combustion evaporators, designed by the Ozark Chemical Company, are used for concentrating the 16% magnesium chloride to 34%. Five identical units, constructed of mild steel shells 16-ft. diameter × 10 ft. with a 3-in. acid brick lining and a stainless steel top, are interconnected with 10-in. pipe for series operation and an open launder system is provided for by-passing any unit requiring maintenance and repair work. Figure 7 illustrates the physical layout of the five units. While in operation, the liquid level in each tank is controlled to within 24 in. of the top and the burner is ignited by means of an electric igniter tip welded to a 10-ft. section of 1-in. pipe, which slides down through a gate valve attached to the top of the burner. A 6-ft. diameter circular baffle is attached to the tank wall by four vertical baffles located 90° apart. The products of combustion act as an air lift and circulate the liquor in the tank through the circular baffle, the vertical baffles preventing excessive surging. Figure 8 is a sectional plan of a unit.

The magnesium chloride concentration



A - 10" FLANGED SPOOL

B - 10" FLANGE AND LIQUOR SEAL

C - SLIDE GATES

D - 20" X 20" OPEN LAUNDER

E - PUMP SUMP 42" D.X 6'

F - 100 GPM. STAINLESS STEEL PUMP

G - 3" STD. PIPE

FIGURE 7 - PLAN VIEW OF OZARK EVAPORATORS

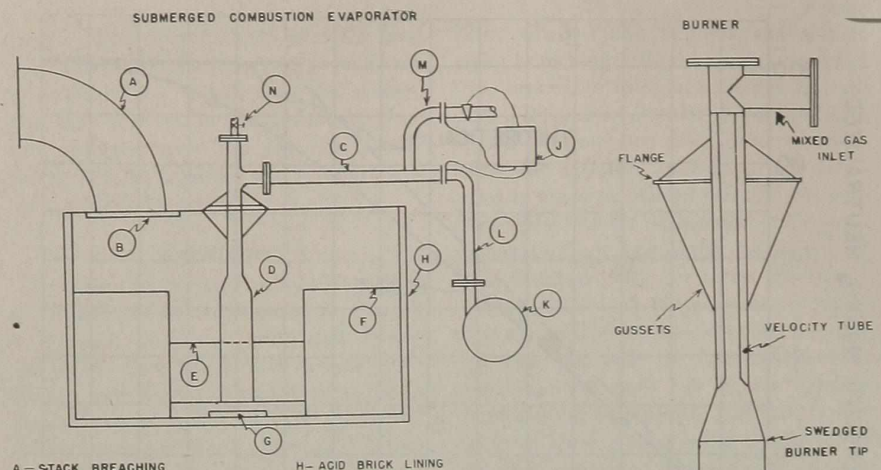


FIGURE 8 — SECTIONAL VIEW OF SUBMERGED COMBUSTION EVAPORATOR AND BURNER

of the product is controlled by the equilibrium temperature of the liquor in the final concentrator, which is manually regulated by the flow of weak liquor to the units. The equilibrium temperatures of the solutions in the concentrators are depressed below atmospheric boiling point temperatures by the partial pressure effect of the combustion gases. On the other hand, the presence of dissolved calcium elevates the equilibrium temperature above that for a pure magnesium chloride solution. The effects of these two factors are tabulated in Table I. The thermal efficiency of this type of evaporator is unusually high, averaging approximately 85%, with the exit vapor temperature averaging only 1° C. higher than the equilibrium temperature of the liquor in the unit. As would be expected, the magnesium chloride loss in the exit vapor varies directly as the concentration of the solution in the unit.

Treating

The purpose of the treating process is to control the proportion of the calcium and sulfate relative to the magnesium chloride concentration in order that the finished cell feed will meet the specified analysis. This is done by precipitating these constituents as gypsum and filtering the precipitate from the solution. The reaction is:

$$Ca^{++} + SO_4^{--} + 2H_2O \longrightarrow CaSO_4 \cdot 2H_2O$$

The liquor to be treated is cooled by flash evaporation, at approximately 27 in. Hg vacuum, in a steel tank 12-ft. diameter × 15 ft. high and pumped to one of four 50,000-gal. treating tanks which are constructed of steel, acid brick lined, and are equipped with two 10-hp. side-entering agitators. The liquor is treated batchwise in these tanks.

As mentioned in the discussion on neutralization, sulfate in the plant acid precipitates gypsum from the solution and, as the solution is concentrated to 34% magnesium chloride, gypsum continues to precipitate. Table II shows the effect of magnesium chloride concentration on calcium sulfate solubility. The concentrated liquor, therefore, is saturated with gypsum and either the calcium or the sulfate ion concentration may be in excess, depending upon the efficiency of the neutralization and secondary carbonation processes and the sulfate content of the acid used. Normally, a slight excess of calcium prevails. Magnesium sulfate dissolved in magnesium chloride is used to precipitate excess calcium and is made by [illegible] pulverized brucite, suspended in water, with 66° Be. sulfuric acid. Excess sulfate is treated with a calcium chloride solution made by dissolving flake calcium chloride in water.

Table II.—Effect of $MgCl_2$ Concentration on $CaSO_4$ Solubility at Saturation and a Temperature of 26° C.

% $MgCl_2$	$CaSO_4$ grams/liter[18]
15	7.72
20	5.65
25	3.49
30	2.10
35	1.37

[18] International Critical Tables.

Figure 9 indicates that maximum precipitation of gypsum can be attained by lowering the temperature and increasing the magnesium chloride concentration as much as possible. The plant conditions, however, for optimum gypsum precipitation are 35% magnesium chloride and approximately 55° C., for lower temperatures and higher concentrations cause filtering difficulties and low filter rates due to the increased viscosity of the solution and crystallization of magnesium chloride. Also, gypsum, when precipitated from high salt content solutions, forms minute crystals which grow very slowly and are difficult to filter from the suspension. For this reason conditions for good crystal growth must be maintained and a temperature lower than 50° C. is not advisable.

Close analytical control is maintained over this unit process and all additions of the precipitating solutions are calculated on the basis of chemical analysis made by the main control laboratory. The temperature is controlled at 55° C. by means of the vacuum on the "flash" cooler, which, with a uniform magnesium chloride concentration of 34% in the Ozark product, also controls the magnesium chloride concentration at 35%. The calculated volume of precipitating solution is added over an 8-hr. period in order to control the nuclei formation for maximum crystal size, and the treated solution is "aged" for a minimum of 24 hrs. while maintaining slow agitation in order to obtain optimum crystal growth. After chemical analysis indicates the proportions of calcium and sulfate are within specified limits, the suspension is filtered. This operation has been relatively trouble-free with the above conditions being easy to maintain.

Filtration

The following three filtration operations are required in the process:

1. The removal of suspended calcium carbonate from the thickener underflow.
2. The removal of precipitated gypsum from the treated concentrated magnesium chloride.
3. The polishing of the filtrate obtained from filtration step (2) above.

Calcium Carbonate Filtration: Two 10-ft. × 18-ft. Oliver rotary vacuum filters equipped for wire discharge of the cake are used to filter the thickener underflow. The filter drums are constructed of monel, the pans of mild steel. Each filter is equipped with a cake repulper, a wash water spray, and a complete vacuum system.

There is very little relative change in such factors as temperature, pH, solids

Table I.—Effect of Partial Pressure of Combustion Gases and of Dissolved Calcium Chloride on the Equilibrium Temperature of the Submerged Evaporator

	Atmospheric Boiling Point			Ozark Equilibrium Temp.		
% $MgCl_2$	0% $CaCl_2$	0.9% $CaCl_2$	1.3% $CaCl_2$	0% $CaCl_2$	0.9% $CaCl_2$	1.3% $CaCl_2$
24.4	110° C.	111° C.	112° C.	98° C.	99° C.	100° C.
26.7	112° C.	114° C.	115° C.	102° C.	104° C.	105° C.
33.0	120° C.	124° C.	125° C.	106° C.	110° C.	111° C.

analysis, etc., from day to day, due to the preceding thickener operation which tends to level out any variations which might occur. Operational control for maximum washing efficiency and high solids cake analysis, therefore, is all that is required of this operation. The distribution of wash water and washing efficiency is checked by the cake temperatures at various points along the filter drum, an elevation of temperature at any one point indicating insufficient wash water at that point. The thickener underflow, containing 25-30% solids, is filtered to a ⅜-in. — ½-in. thick cake analyzing 55% solids and 0.2% residual magnesium chloride. The cake analysis (solids content) is maintained by adjustment of primary and secondary vacuums, normal operation being 15 in. Hg. for the primary stage and 10-in. Hg. for the secondary. Strips of waste filter cloth, fastened to the filter frame, are allowed to drag over the drum to smear the cake and prevent excessive cracking. This helps to maintain a high solids cake. The cake is discharged by a wire, repulped with water, and pumped to waste settling ponds. The clarified water is recycled to the repulpers. The filtrate, diluted to 13% by the wash water, is pumped to the primary thickener.

Gypsum Filtration: Two 8-ft. × 10-ft. Oliver rotary vacuum filters, similar to the ones described above (except the pans are rubber lined) are used to filter the treated 34% magnesium chloride. As the cake is only 1/16 in. thick, a wire discharge will not work and fishtail water sprays, operating at 40 lb./sq.in. gage, remove the cake from the drum. A double squeegee board, with rubber strips, seals the drum below the cake discharge sprays to prevent excessive dilution.

The filter rate varies according to the pH and the temperature of the feed as indicated in Figure 10. If the pH is above 4.0, sufficient magnesium hydrate is precipitated to blind the pores of the filter-cloth and the cake, which results in a low filter rate. On the other hand, a pH below 4.3 cannot be tolerated, as the solution becomes too corrosive. The viscosity of the solution increases as the temperature decreases causing the filter rate to decrease. However, it is necessary to maintain the temperature below 55° C. for good gypsum precipitation. Therefore, the operating pH is maintained in the range of 4.3-5.0, and the temperature between 48° and 55° C. The cake is repulped and pumped to waste settling ponds, the clarified water being recycled to the filters. Due to insufficient pressure of the pump recycling the water to the fishtail sprays, the cloth gradually blinds causing the filter rate to decrease. By periodically using clean water at full process water pressure, the cloth is cleaned and the filter rate re-established. The blinding of the filter cloth is minimized by operating the filters at the low primary stage vacuum of 10 in. Hg. and the secondary at 5 in. Hg. The filtrate, diluted from 35% to 34% magnesium chloride, is pumped to two 30,000-gal. holding tanks which feed the polishing press.

Polishing: Gypsum crystals, carried in the filtrate from the rotary filters, continue to grow in the holding tanks mentioned above. A 24-in. × 24-in. × 1-in. frame Shriver filter press, constructed of bronze and having 15 frames, is used to remove this last trace of solids, producing a clear filtrate. The press is operated until the pressure exceeds 60 lb./sq.in. gage, at which time it is broken and the cake removed. The filtrate is discharged to two large storage tanks.

Conclusion

Unit costs, derived from plant operation, have proven this process to be economically feasible. The process, as discussed, includes certain improvements which were made after plant operations had started, the secondary carbonation step being a major one. Other improvements are contemplated for a further reduction of unit costs. One of the more important changes, which have been developed but not yet put into operation, is a carbonation step to remove practically all the soluble calcium present in the weak liquor feed to the submerged combustion evaporators. This would eliminate the magnesium sulfate treatment of the 34% magnesium chloride, the necessity for having sulfuric acid in the plant hydrochloric acid, and the gypsum filtration step. The removal of calcium by this carbonation process would be similar, in principle, to the present secondary-carbonation process and would make possible over-acidification in the neutralizing step to increase the recovery of magnesium from dolomite.

The postwar future for this process probably will depend upon the development of large industrial demands for the calcium which is at present a waste material. However, this process has contributed greatly to the economical production of magnesium during the war crisis and thus has served well.

Acknowledgment

The authors wish to express their appreciation to Wm. B. Leach and his staff operating the Austin, Texas, Magnesium Plant, to P. D. V. Manning, Vice-President in Charge of Research, International Minerals and Chemical Corporation, and to Prof. W. A. Cunningham, Chemical Engineering Department, University of Texas, all of whom have contributed valuable suggestions to the operation and improvement of the process herein discussed.

Presented before the 37th Annual Meeting of the American Institute of Chemical Engineers, St. Louis, Mo., Nov. 19-21, 1944, and published in the Feb. 25, 1945 number of the Institute's Transactions, page 1.

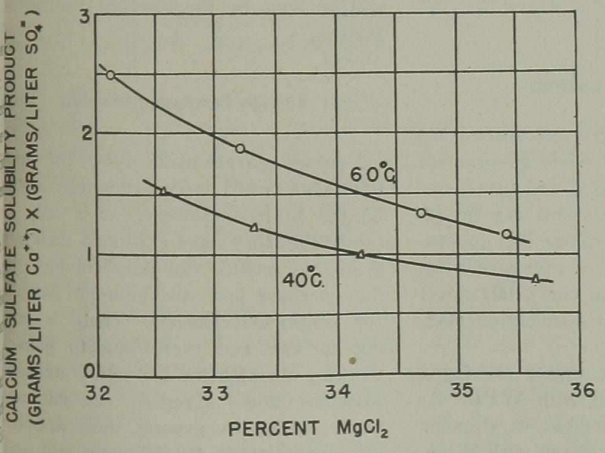


FIGURE 9 - EFFECT OF MAGNESIUM CHLORIDE CONCENTRATION AND TEMPERATURE ON THE SOLUBILITY OF CALCIUM SULFATE.

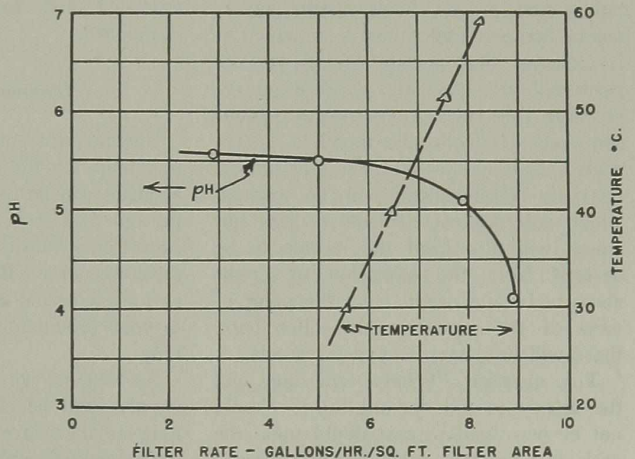


FIGURE 10 - EFFECT OF pH AND TEMPERATURE ON FILTER RATE FOR VACUUM FILTRATION OF GYPSUM FROM 34 % MAGNESIUM CHLORIDE

An Early Glance at FOREIGN MARKETS

by JACK LAST, Director of Foreign Trade
The Research Institute of America

THE DEMAND FOR GOODS OF ALL KINDS by European countries after the war will be enormous, and the United States will be the only nation in a position to supply them. That money or credit will be available to pay for them is made virtually a certainty by the compelling arguments of suffering and social and political unrest which prolonged poverty would bring to Europe. Here is a preview of how these foreign sales are likely to be handled, and an appraisal of the probable needs of the principal countries.

BEGINNING now and continuing for some years after the end of both wars, the flow of international trade will be governed by supply and demand. For foreign trade, this is not normal. It results from distress, from abnormal, emergency conditions in the four corners of the world. Crippled industries, devastated cities, ruined transport and communications systems have to be rebuilt as do countless roads, homes, mills, factories. Food, clothing, medicines and fuel will have to be supplied to millions. The western hemisphere will supply all of these needs—the U. S. most of them. It does not appear that this basic situation can be altered by any theory of business or government, no matter how strongly supported, or by the triumph of one economic or political policy over another, no matter how complete. Goods will flow from here everywhere and Uncle Sam will become history's largest creditor.

The foreign countries engaged in the war have virtually exhausted their supply of dollars. Until they are again able to send goods, we shall have to take their paper. This will be made possible through public and private loans, credit agreements between governments in which it is expected that private capital will be permitted to participate. Legislation restricting this type of investment (Johnson Act) is due to be modified or repealed. It is likely that some government guaranty arrangement will be adopted which will remove elements of risk but which will also limit the income to be derived from the extension of credit abroad. In any event, from the point of view of the producer and seller here, there will be money to pay for goods.

The question "Where will they get the money to pay for all this?" should not be permitted to cast doubt upon the basic fact that the goods for postwar reconstruction will come from our producers. Just how the financing of the distress period will come, what forms it will take, are matters of special interest to bankers and investors. Suppliers will be satisfied with the assurance that it will, in fact, be accomplished. The certainty that money or credit will be made available is as final as anything beyond tomorrow can be. It is made so by the compelling arguments of suffering, social and political unrest and instability which prolonged poverty and unemployment would bring to Europe.

With shipping space critical and likely to be scanty for some time; with supplies of American goods restricted; with supplies of foreign exchanged limited, no foreign government with a hungry, sick, ill-clad and ill-housed population is going to be in the market for our luxury goods. The political tenure of most foreign governments will depend largely on their ability to satisfy the urgent demands of their people. This means that "normal" business is a long way off. It means that imports will be programmed—rigidly controlled by buying countries. It means that import licenses will continue long after the relaxation of U. S. formalities. It means that bulk purchasing by foreign government purchasing missions will be extended and expanded—certainly not abandoned.

Government Controls

Businessmen both here and abroad are impatient for the time when government agencies can be by-passed and person-to-person, firm-to-firm relations can be resumed on a "business" basis. But government agencies will be in the picture for as long a period as you can safely cover in your production and distribution planning.

As long as we have supply shortages, exports will be cleared with WPB. As long as there are shortages of shipping space, exports will be cleared with WSA. As long as foreign countries must limit their imports, they will control them. As long as the war goes on, FEA will want to supervise exports from the point of view of possible advantage to the enemy.

Until recently, the government was considering a cut in the number of products subject to export quotas and licenses. Of the 1,000 on the list, about 800 were to be freed of regulation. Control was to be retained on only a few—such as forest products, chemicals, textiles and some consumer goods. This policy was designed to give American exporters a fast re-entry into world markets. But now that most domestic controls (such as L and M orders) are almost sure to continue beyond V-E Day, it is highly unlikely that any large number of export controls will be lifted.

Far from dismantling export control agencies, the government is planning to oversee foreign trade more closely by integrating the policies of the various agencies through a top policy board. Inquiries of exporters and importers will be channeled through one agency, perhaps the Bureau of Foreign and Domestic Commerce.

Out of these pros and cons, conflicting interests and conflicting prognostications, this much emerges clearly: Resumption of export trade on anything like a normal basis cannot be hoped for until long after V-J Day. Commercial exports on a substantial scale certainly cannot be resumed before import trade approaches something closer to normal. Many foreign countries, in their effort to rehabilitate as quickly as possible, will operate their production—and consequently their purchasing—on a nationalized basis. This means that for some time to come the major purchasing for the foreign market will be done by the Foreign Purchasing Mission.

Foreign Purchasing Missions

Foreign governments have for some time maintained buying missions in the United States. However, it is only recently that they have expanded their programs to include not only colonies, but the purchase and stockpiling of supplies for continental Europe. There is nothing to lose and everything to gain in working through the Foreign Purchasing Missions now. Even if manufacturers never intend to expand their activities into export trade, the Missions still make good customers. And if they do have an eye on an expanded post-war export business, the Missions offer a valuable opportunity to get the manufacturers' goods

into the fo[illegible] ing overseas demand for them.

Loosening of Restrictions

Earliest relaxation of controls will affect shipments in the direction of Latin America. The internal economies of Western Hemisphere countries have been less drastically affected by the war and they have been able to accumulate considerable dollar credits.

It is also expected that restrictions on commercial transactions and communications—including civilian air travel over the Atlantic—will be relaxed early in 1945 to permit the resumption of private trading with France. The Treasury will release funds for that purpose. The Treasury will also help manufacturers get a private passport to France right now if their application is accompanied by a French request. The French Embassy will make such a request for the manufacturer if his visit to France will help re-establish important export industries there.

It is important to keep in close touch with foreign buying missions and the activities of the FEA. At present, these are the most effective means of projecting your business overseas. Despite the FEA policy that applications from private exporters will be treated on an equal basis with those from foreign government buying missions, it is still wise to get export licenses through foreign government missions wherever possible. Their statements as to the end use that will be made of the goods carry authority; and they are in a favorable position to get State Department intervention for special consideration of applications.

Help in Reaching Foreign Markets

Today the manufacturer can't show his line to foreign prospects who are eager and waiting to buy. But the door to overseas trade may be opened for you by the United States Commercial Co.—an agency of the Foreign Economic Administration. One of its main jobs is to put American and foreign companies in touch with each other. The agency maintains overseas offices to which foreign business men bring their inquiries concerning American products. The U. S. C. C. answers these inquiries from its library of catalogues, supplied by United States companies.

The manufacturer can send a description of his line to the U. S. C. C. It is anxious to build as complete a library as possible. It will "showcase" the line to potential foreign customers whenever an opportunity presents itself. The address is U. S. Commercial Co., Naval Division Pouch, Department of State, Washington, D. C., marked for any or all of the cities mentioned below.

At the moment, foreign inquiries coming into U. S. C. C. offices are running most heavily to producers' machinery and equipment, machine tools, hand tools, textile machinery, mining machinery, transportation equipment, printing machinery, chemical equipment, electrical machinery, automotive equipment, etc. Manufacturers should send their catalogues along even if their products do not fall directly under the categories mentioned, and even if they are not now able to fill orders from abroad. Important postwar sales opportunities may show up.

At the present time this service is limited to the Middle East where the U. S. C. C. has established offices in Alexandria, Baghdad, Beirut, Cairo, Damascus, Jerusalem, Jidda and Teheran.

The extension of this service or a similar service to other areas is a good possibility.

Anyone who has specific questions about the possibility of buying or selling certain types of goods from abroad, can write to the FEA or the Bureau of Foreign and Domestic Commerce, Washington, D. C.

Sales Inquiries

Many businessmen who have never had any export experience are uncertain how to treat inquiries from would-be foreign purchasers. Demand for American goods has been stimulated by actual sampling of them abroad in places where they were never seen before Lend-Lease and our armies introduced them.

It is important not to ignore foreign inquiries. They should be treated exactly like business leads from a nearby state. The very fact that a manufacturer has received an inquiry is sufficient proof of the existence of a market for his goods. He needn't be frightened by foreign languages. And should not worry about the complexities of export controls and rationing of shipping space. Today, these problems are taken off his hands completely.

Much of export business is done on a cash-on-the-barrel basis. Foreign customers, anxious to obtain American merchandise, are willing to draw letters of credit in connection with orders f.o.b. mill or factory or warehouse receipts—or even, in some cases, against certificate of completion. This is equivalent to domestic cash business. It is the foreign purchaser who worries about shipment and formalities which are handled by his bank or agent here.

(Information is now available on foreign markets in the following countries.)

The Netherlands

The Netherlands have been forced to take on one job they did not expect: a subsistence relief program for the population of a country which previously always en-

CAN YOU MAKE ANY OF THESE?

THE NAVY Department, through the National Inventors Council, is seeking solutions to the following problems of a chemical nature. Suggestions should be sent in full detail to the National Inventors Council, Department of Commerce, Washington 25, D. C.

1. A satisfactory shock-proof aerial delivery container not requiring a parachute; possibly pneumatic cushioned, the cushions to be inflated from a CO_2 bottle after leaving the plane. Inexpensive enough to warrant its being classed as expendable after being used once.

2. A durable plastic-impregnated fabric, waterproof, lightproof, weighing less than 6 ounces per square foot. Suitable for tentage.

3. A gasoline resistant coating for the interior of gasoline drums and not adversely affected by gasoline.

4. Proofing material which will make tentage and tarpaulin more resistant to the rapid rotting that now occurs in humid, tropical climates.

5. A portable fire extinguisher using liquid similar to the carbontetrachloride (or Pyrene) type, suitable for use around electrical equipment which will not form phosgene or other toxic gas when used to extinguish fires, as is the case with the carbontetrachloride extinguishers.

6. A continuous sampling combustible gas indicator with automatic alarm which is simple, positive, inexpensive and suitable for installation in gasoline-driven motor boats for continuous sampling of the vapor in the bilges.

7. A method of welding high pressure piping without the aid of backing straps or with back straps which would be soluble in a harmless solution which could be introduced in the pipe before putting same into service.

8. A "non-slipping" shoe sole which will give good footing on an oily, steel deck of a ship rolling as much as 17°. This shoe sole should be non-injurious to feet, non-sparking and reasonably long wearing.

joyed a high standard of living. At the same time, the Netherlands must continue preparations for re-entry into world trade.

Pre-war Netherlands economy included the production of high-grade agricultural items, some of the world's finest dairy products. High grade seeds for cauliflower, spinach, cabbage and similar vegetables have been raised in the country for generations past, as well as bulbs and seeds for flowers. But a large part, perhaps half, of the dairy production area has been flooded and that land will be necessarily idle for four years or more.

This means new and more dredging and pumping apparatus. Whether such facilities will be purchased here or taken from Germany as partial indemnification has not yet been decided.

Of the 2,900,000 tons of Dutch merchant shipping, almost two and one-half million remains intact. However, there has been little replacement of the more than a million tons that have been sunk. This loss will mean a considerable new ship program for the Netherlands after the war.

The great diamond industry must also be rebuilt. Skilled cutters now operating in New York, London and Palestine will, in some instances, not return to the old center. However, early efforts will be made to get the cutters back to their former locations.

Ireland

Irish markets may provide the earliest opportunity for selling overseas. Ireland not only has established a state-owned merchant shipping trade during the war, but her civilian airport is the busiest in Europe today. In addition, her expansion programs for both shipping and air traffic make her a good potential market for aircraft, airport facilities, ships, marine production and outfitting items. Her post-war housing program will need construction and engineering equipment.

Ireland's credit position is favorable, if only as a result of the large trade she has carried on during the war. The Post-War Commission of Eire is now at work on a survey of future Irish-American trade.

Belgium

Belgium, the most densely populated country in Europe, has always been an extensive manufacturing country short on natural resources. Normally in need of raw materials, she will require even more to get back to peacetime production. In addition, Belgium will need more manufactured products, principally locomotives, thread, timber props for mines, food, clothing, and machinery of various kinds.

Belgium should be a sound credit risk. She holds a large reserve of gold in this country which she plans to retain as bedrock for a conservative credit foundation for the future.

All purchasing in the United States for the Belgian Government for relief and rehabilitation purposes is done by the Commercial Counselor of the Embassy, through offices in Washington at 101 Leroy Place, N.W. Wherever possible, Belgian policy will be to foster purchase of all other Belgian requirements through normal trade channels without intervention of the government. The New York office at 630 Fifth Avenue is concerned with promoting these trade connections between private business in the home country and in the United States.

Swedish Markets

Sweden, like many other neutrals, has accumulated large amounts of gold and foreign exchange during the war. Her need for many types of goods is enormous. Application of Pan-American Airways for certification to route five flights weekly from American to Stockholm highlights the advisability of establishing Swedish commercial relations early.

The Swedish standard of living is the only other in the world as high as that of the United States. Swedish incomes permit the purchase of many American items which would be regarded as luxuries in nearly all other European countries.

1. *Housing.* Sweden is planning a housing program of 45,000 dwellings per year to last three to five years. In connection with this construction there is a market for equipment machinery, especially such types as bulldozers and excavators. For housing construction itself, piping is especially needed.

2. *Clothes.* The war has seen some development in the Swedish manufacture of ready-made clothing—especially for women and children—but Sweden's demands are far from satisfied in this field. The country is a particularly good market for sales of misses' and children's wear The variety of styles which the American clothing manufacturer can offer will be an added inducement in the Swedish market.

3. *Appliances.* American electrical appliances, especially washing machines, ironers, food mixers, toasters, may all find ready markets if American companies act quickly.

4. *Port facilities.* The Swedes are making plans for development of Gothenburg as a port. This may be partially due to the destruction of Hamburg, which leaves a large part of North Europe without port facilities.

5. *Roads.* Another item that has not been sold to Sweden in the past, but should find ready sale among Swedish municipalities, is the automotive snow plow for road clearance.

6. *Aviation.* Preparatory work is already under way for the construction of a transatlantic airport in Stockholm. Swedish aviation has already contracted for the purchase of ten large Douglas planes to [illegible] and also in traffic with America.

7. *Radio.* Sweden will need both radio and radar equipment.

8. *Miscellaneous.* Sweden also needs varying quantities of the following items: coal and coke, petroleum products, asphalt, ship plates and sheet metal, aluminum and magnesium, copper profiles and wire, automobiles and tractors and their parts, electronic equipment, fertilizer, soda, pigments of all kinds, boric acid and borax, vegetable oils, glycerine, vitamins, synthetic resins for plastic molding, rubber tires and belting, asbestos and brake lining, cotton and rayon yarns including tire cord, raw cotton and wool, solvents for the paint industry, toluol, benzol and phenol, canned and dried fruits.

In selling to the Swedish markets it is now possible not only to transact business through the Purchasing Mission, but also to negotiate with private Swedish firms through private channels. All inquiries as to trade possibilities with Sweden may be directed to the Swedish-American Chamber of Commerce, 630 Fifth Avenue, New York. Inquiries will be forwarded to the proper party.

Not only is Sweden a ripe seller's market, but it offers many buying opportunities. Swedish inventions may be licensed for manufacture in this country. This practice has already been in operation in the case of Electrolux refrigeration, ball bearings, gauge blocks and various electrical equipment. Two outstanding opportunities now available for licenses are an arsenic treatment of lumber which makes it weather resistant and a new butter manufacturing process which eliminate the cream stage.

Free France

United States recognition of the De Gaulle Government has sparked new interest in French trade possibilities. The Post Office Department announced on November 4 that five cent postal service to France was available. Treasury officials disclosed that funds previously frozen in this country may now be freely used by the De Gaulle Government. But normal business conditions cannot be reestablished for some time to come, if only because most railroad bridges in France have been destroyed and transport and communications are in serious condition.

Meanwhile France needs $63 million worth of gasoline, $5 million worth of synthetic rubber and carbon black, $24 million of wood, $15 million of textile raw materials. This is by no means the total of her requirements, but indicates her most serious immediate shortages.

For some time to come most French purchases here will continue to be made through the French Supply Council. Metropolitan French Division is located at 2100 Adams Mill Road, N.W., Washington, D. C.

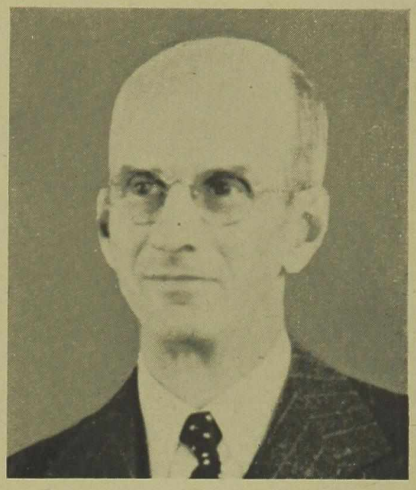
HEADLINERS in the NEWS

DR. IVOR GRIFFITH was the first recipient of the Proctor Medal, given by the Philadelphia Drug Exchange for distinguished service in the pharmaceutical field.

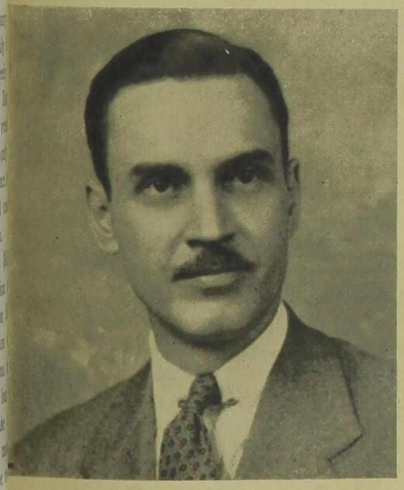
ROBERT J. QUINN, Mathieson Alkali Works, was elected president of the Compressed Gas Manufacturers Association at its recent 32nd annual meeting in New York.

F. H. HIRSCHLAND was recently elected chairman of the board of directors of the Metal & Thermit Corporation. He has been president of the company since 1922.

DR. WALTER CECIL BUTLER has been named head of the Department of Animal Remedies and Agricultural Chemicals, recently created by McKesson & Robbins, Inc.

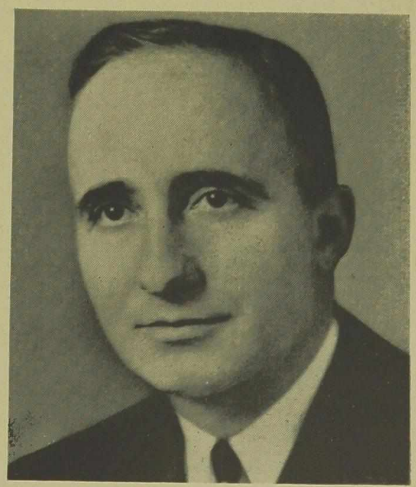


DR. JOHN CLARK BAKER, Wallace and Tiernan Co., Inc., will receive the Osborne Medal from the American Association of Cereal Chemists for excellence in that field.



DR. ROBERT V. YOHE, manager of a Goodrich-operated synthetic rubber plant, has been named vice-president of American Anode, Inc., a B. F. Goodrich Co. affiliate.

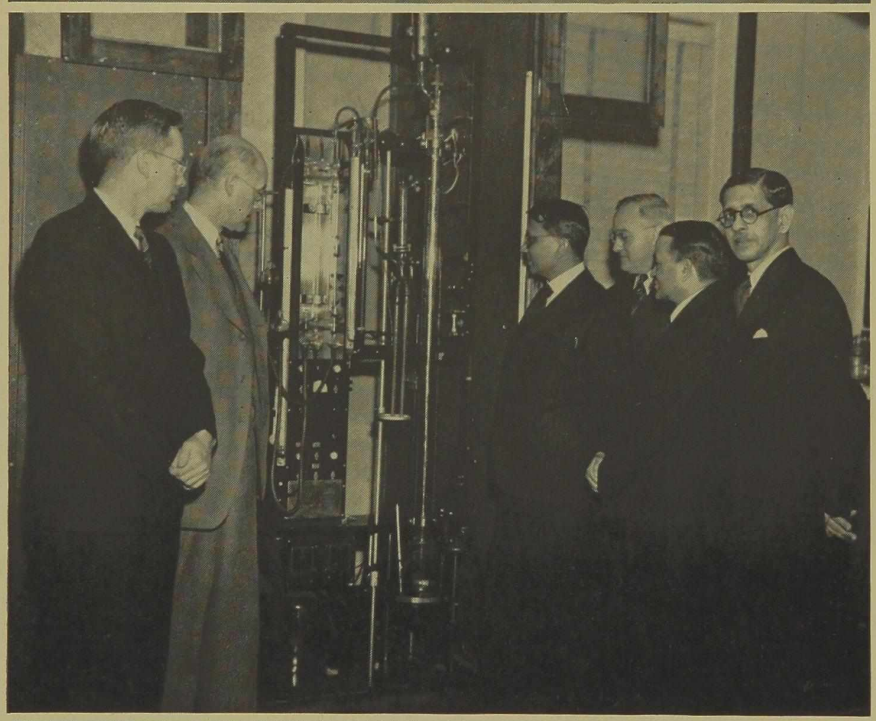
BOURDON W. SCRIBNER, National Bureau of Standards, will receive the TAPPI Medal for his contributions to the technical advancement of the pulp and paper industry.



LOUIS A. HOFFMAN, president of Hilton-Davis Chemical Co., was elected vice-president of Sterling Drug Co. when the latter acquired the Hilton-Davis concern.

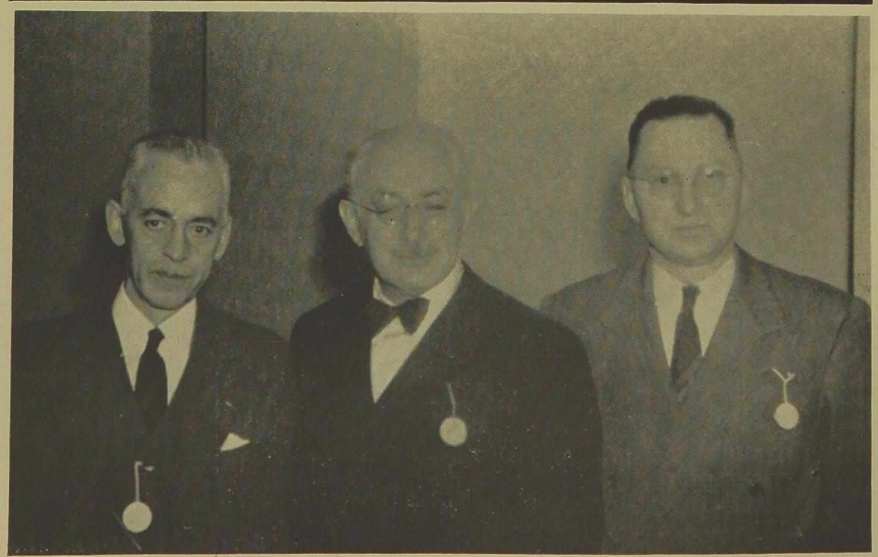
Brazilians Visit U. S.

Members of the Brazilian Technical Mission, currently touring laboratories throughout the country, visit the Battelle Memorial Institute. Left to right are Dr. Homero Barbosa de Assis Martins, Univ. of Sao Paulo; Dr. Filinto Antonio Guerra, of the same school; Dr. J. Silgado Bueno, Inter-American Development Commission; Dr. Paulo Guimaraes da Fonseca, Univ. of Sao Paulo; Dr. Alono da Silveira, Univ. of Brazil; Dr. O. E. Harder, Battelle Institute; Dr. Ruy de Lima e Silva, Univ. of Brazil; Clyde Williams, Battelle Institute. and Dr. Mauricio Joppert de Silva, Univ. of Brazil and head of the mission.



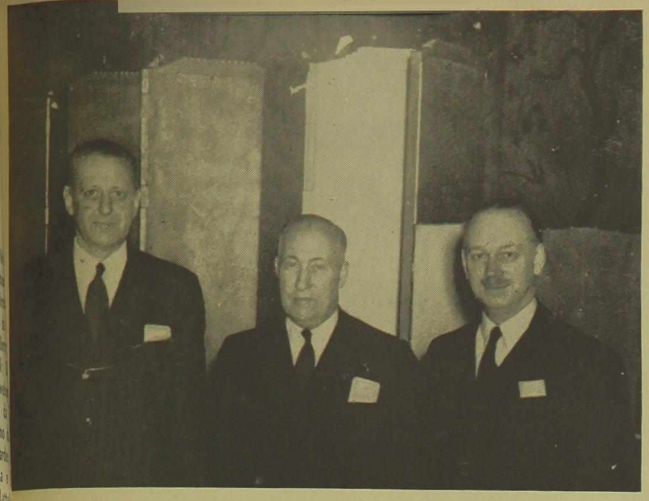
Mission from India

The Indian Scientific Mission, viewing research facilities in the United States, are shown visiting Battelle Institute. Left to right are Dr. F. C. Croxton, Battelle Institute; F. J. Coan, U. S. State Department; Sir Jnan Chandra Ghosh, president, National Institute of Sciences of India; Clyde Williams, director, Battelle Institute; Sir Shanti Swarup Bhatnagar, director of scientific and industrial research for the Government of India; and Professor J. M. Mukherji, University College of Science, Calcutta.



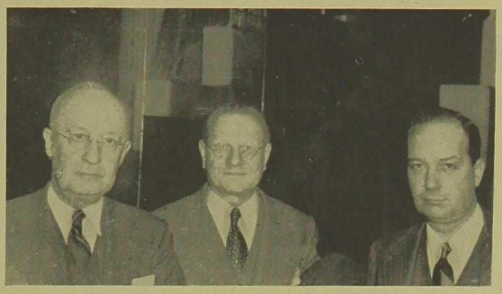
Officers of Consultants

The Association of Consulting Chemists and Chemical Engineers elected officers for this year at its annual meeting. Left to right are H. M. Shields, vice president; A. P. Sachs, president; and C. F. Davis, secretary. Sam Tour, who was elected treasurer, was absent when the picture was taken.

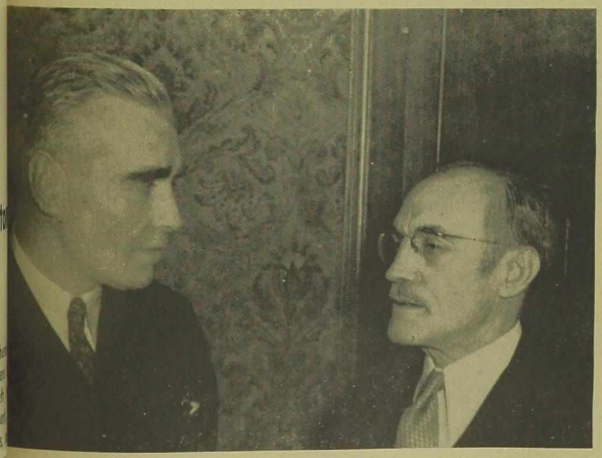


Gas Manufacturers Meet in New York

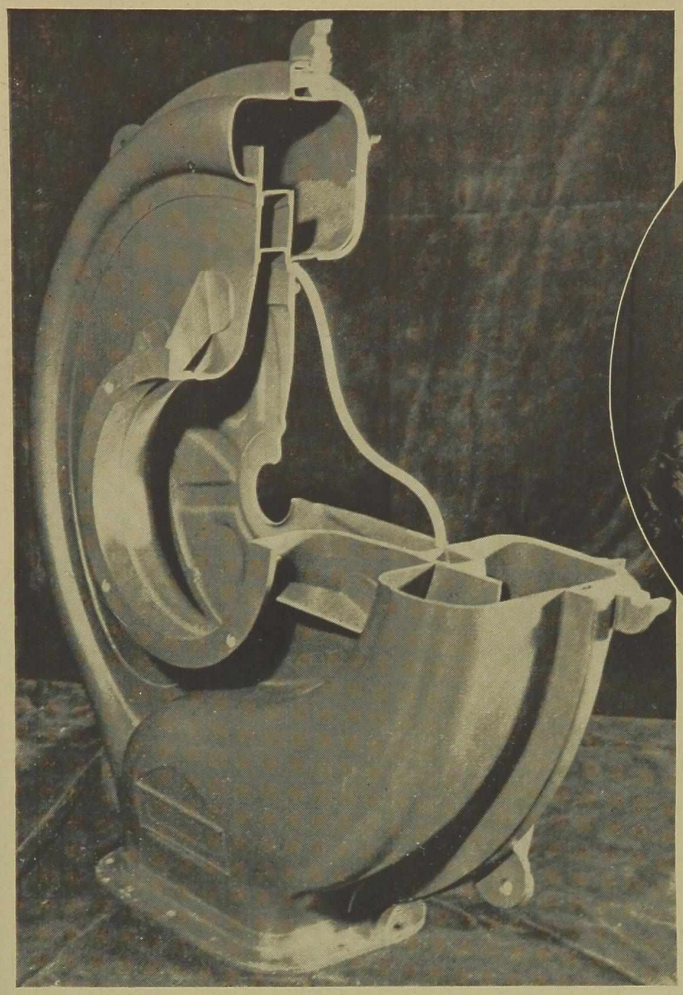
Meeting in New York City January 22-23, members of the Compressed Gas Manufacturers' Association elected new officers and heard several technical papers. Above at the left are the new officers: C. G. Andrew, 2nd vice-president; Robert S. Quinn, president; and Clarence McL. Pitts, 1st vice-president. At the right above are K. G. Johnson, Linde Air Products Co., and Major F. R. Fetherston, secretary (on leave). Under these are Thomas Coyle, Du Pont Co.; F. H. B. Fowler and R. S. Slater, American Car & Foundry Co.; L. G. Seebach, Du Pont Co.; R. S. Roeller, Pennsylvania Salt Mfg. Co.; and O. R. Meier, Armour & Co. Below these are W. L. Brown, Jr., Liquid Carbonic Corp.; G. A. Nelson, Shell Oil Co.; L. H. Brandt, Pennsylvania Salt Mfg. Co.; P. G. Wesley, National Cylinder Gas Co.; and W. P. Uhler, S. S. White Dental Mfg. Co.



New York A. I. C. Meets

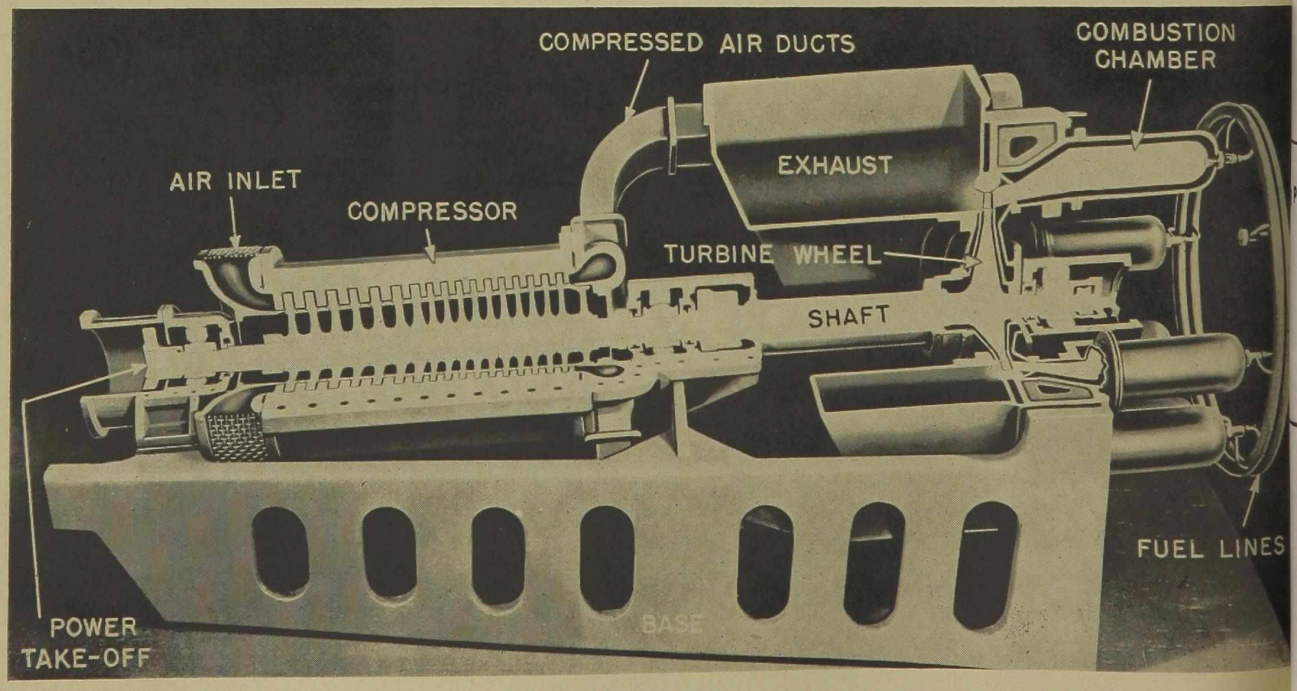


E. C. Williams, director of research, General Aniline & Film Corporation, who addressed the group on "The Chemist in Management," talks with Dr. Gustav Egloff, national president of the American Institute of Chemists. At the right are Dr. Donald Price, vice-president of A. I. C.; Dr. M. L. Hamlin, chairman of the New York Section; and C. L. Gabriel, vice-president, Publicker Commercial Alcohol Corporation. Mr. Gabriel discussed the contributions of fermentation chemistry to our national economy.

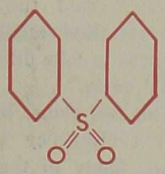


1944 Developments of Chemical Interest

Reviewing the past year's progress, the General Electric Company listed three items of particular interest to the chemical field. Above is a turbo-supercharger cut away to show the silicone gasket. Silicone is uniquely useful in that it remains flexible over a wide range of temperatures. At the right is a plastic foam, lighter and lower in heat conductivity than glass wool, cork, or rock wool. Its use as an insulating material is foreseen. Below is a model of a 3000-hp. gas turbin Compressed air and fuel are separately forced into the combusti chambers. The greatly expanded gaseous combustion products iss from the turbine nozzles and strike against buckets of turbine whe Power units like this may change the postwar fuel picture treme dously if they widely replace internal-combustion engines.



NOW AVAILABLE
in working quantities



DIPHENYL SULFONE

The announcement of this new product, Diphenyl Sulfone, some months ago created considerable interest in a number of special applications to which it suggested itself: as an intermediate in organic syntheses, in the preparation of diphenyl sulfides, selenides and their derivatives.

Now it is in pilot plant production and Monsanto invites you to send in for experimental samples.

Diphenyl Sulfone, sometimes called sulfobenzid, was first described in 1834 by Mitsderlich, who obtained it as a by-product in the sulfonation of benzene with oleum or sulfur trioxide.

It can be chlorinated, sulfonated and nitrated, although under certain conditions these and other reactions result in splitting the molecule at the sulfone link. The nitro compounds can be reduced to the corresponding amino derivatives. Heating with sulfur or selenium produces diphenyl sulfide or diphenyl selenide.

For experimental samples simply fill in and mail the coupon below. MONSANTO CHEMICAL COMPANY, Merrimac Division, Everett Station, Boston 49, Mass.

PROPERTIES

Appearance:	Technical: Grayish white powder Purified: White needles or leaflets	**Solubility:**	Both grades: Slightly soluble in hot water. Soluble in most of the usual organic solvents. Technical grade contains a trace of insoluble material.
Melting Point:	Technical: 120° - 125°C Purified: 127° - 129°C	**Acidity:**	Technical: Approx. 0.1% calculated as H_2SO_4 Purified: None
Boiling Point:	Both grades: 380°C at 760 mm. 230°C at 15 mm.	**Suggested Uses:**	The characteristics of Diphenyl Sulfone suggest use as an intermediate in organic syntheses or in the preparation of diphenyl sulfides, selenides and their derivatives.

MONSANTO CHEMICALS
SERVING INDUSTRY...WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY
Merrimac Division Everett Station, Boston 49, Mass.

Please send me literature and experimental samples of Diphenyl Sulfone.....Pure Form.....Technical Grade.

Name.....
Firm.....
Your Title.....
Address.....
City.....

BETWEEN THE LINES

Government Patents and Research

Senator Kilgore's subcommittee has been laying the groundwork for a radical revamping of the machinery for handling the vast body of Government-held patents and research results, as well as administration of the private patent laws. Though the Kilgore investigation is still in progress, enough of the results have been disclosed to indicate the scope of Governmental research during the war.

FOR several years, the National Patent Planning Commission, an official body, has been surveying the scope of Government patent ownership and preparing to recommend a policy for use of such patents.

While the exact number of patents owned by the Government will not be known until completion of the survey, it appears that the Government possesses approximately 500 unexpired patents and that nearly the same number have been expressly dedicated to the public. This refers primarily to patents resulting from inventions made by Government employees. Enemy-owned patents are *not* included. The Commission is treating this latter group, for the moment, as a special wartime problem.

The ownership of a patent by the Government, it has been pointed out, is somewhat anomalous. The chief advantage flowing from patent ownership is the right to exclusive exploitation of the patent, and in the case of the Government, if it exercised this right literally, it would be compelled to go into business, or to license others to use the patent. Patents are of value to the Government principally as a protection against interference with governmental functions. This is a very broad summary of the situation, obviously, since there are refinements and conditions involved that space does not permit.

However, as a general rule, the Government has followed a policy of licensing its patents on very nominal terms, without attempting to restrict manufacture and without even royalty.

The Commission, in its second report on the subject, recommended that the Government as a general rule continue its historic policy of not exercising its patent-ownership right to exclude, and of not seeking to derive revenue from its patents where licensed and of not undertaking control by means of patents.

These ends, it is pointed out, can be served by the sale or assignment of a Government-owned patent to the highest bidder in competition, as required in general government practice, or by the grant of exclusive licenses. In this connection, the Commission suggests, however, monetary consideration should *not* necessarily control, but proper weight should be given to obligations assumed by the purchaser to assure effective service and benefit to the public."

Exclusive licenses would be governed by restrictions as to the time in which such exclusive rights would operate, or by geographical considerations, and in any case would be subject to forfeiture, or revocation of ownership, for failure promptly to commercialize the patent and supply the public at reasonable prices. Also, such a grant or sale would be surrounded by requirements for public hearings on the proposal, and certain other provisions.

The Commission recommended, in the line of such ideas, that legislation be enacted authorizing the various Government agencies to issue exclusive licenses in cases where it appeared evident otherwise, that the invention in question would not come into general use. This authority would be subject to approval of a "central control body" establishment of which is recommended by the Commission. (Legislation to establish a central patent administration in the Government is pending.)

Committee Still at Work

This report has been summarized here as to certain of its highlights, as a prelude to briefly discussing the initial findings of Senator Kilgore's subcommittee which has been laying the groundwork for a drastic, and even radical, revamping of the machinery for handling not only the vast body of patents and research results within the Government, but administration of the private patent laws as well. The Kilgore investigation is still in progress, but enough has been disclosed of its work to date to indicate the scope of the Government's research during the war. This work now lends a different significance to any recommendations as to patent control, than might have been the case under the [illegible] ments of peace years. In the latter instance, some research expert in the Government career service has usually spent years on some obscure problem, and the result has been a technical paper, or a patent owned by the Government, with no practical application for reasons indicated by the Commission.

"Inventions covered by patents owned by the Government should be available for commercial and industrial exploiation by anyone," said the Commission, "with, however, the recourse open to the Government to take different action in exceptional cases."

This last clause brings up a very pertinent contingency under present conditions. Many of the government's recent ventures into new fields are well known—alcohol from wood waste, hydrogenation of coal, etc.—and while it does not necessarily have these in mind, the Commission has observed:

"There undoubtedly are Government-owned patents which should be made available to the public in commercial form but which, because they call for a substantial capital investment, private manufacturers have been unwilling to commercialize under a non-exclusive license.

"Accordingly, it seems evident that the Government has been handicapped in its effort to further the promotion and development of some of its inventions to the point where they are available to the public in the form of a commercial product."

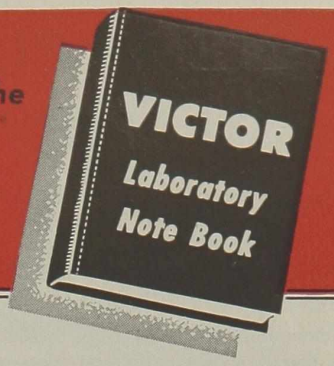
For over 20 years, the Commission has recalled, publicly and privately this has been cited as a major shortcoming in Government management of its patents. In short, venture capital is not attracted to manufacture of a product covered by license that is revocable, non-exclusive and non-assignable. Quoting various official observations along this line, the Commission has expressed its feeling that the present law is not sufficiently broad "that in suitable instances the Government should have the authority and the power to depart from the general policy hitherto followed, and to take steps to insure the proper commercial development of an invention covered by any one of its patents whenever this course is necessary and in the public interest." This last phrase incidentally, "necessary and in the public interest," is one that private industry has learned to watch with considerable trepidation when it is being read by a Government lawyer. It is one that has come to be highly prized among certain agencies in Washington.

The Commission has excluded from current comment the large number of former enemy-owned patents, but obviously these have a place in any large-scale appraisal of the patent outlook. They are not going to be turned back to their owners, from all present indica-

(*Turn to page 292*)

RESEARCH REPORT ... from the

New Chemicals Available for Industrial Research



SUBJECT—PHENYLPHOSPHORUS ACID CHLORIDES

SUMMARY OF PROPERTIES

Name	PHENYLPHOSPHORUS DICHLORIDE	PHENYLPHOSPHORUS OXYDICHLORIDE	PHENYLPHOSPHORUS THIODICHLORIDE
Formula	$C_6H_5P\begin{matrix}Cl\\Cl\end{matrix}$	$C_6H_5P(=O)\begin{matrix}Cl\\Cl\end{matrix}$	$C_6H_5P(=S)\begin{matrix}Cl\\Cl\end{matrix}$
Physical State	Liquid	Liquid	Liquid
Color	Colorless	Colorless	Colorless
Molecular Weight	179	195	211
Specific Gravity	1.319 (20°C)	1.375 (20°C)	1.376 (13°C)
Refractive Index		1.556 (N_D)	1.622 (N_D)
Acidity	Acid	Acid	Acid
Hydrolysis	Fast	Fast	Very slow
Boiling Point	224.6°C (atm.)	258°C (atm.)	205°C (130 mm)
Melting Point	−55°C	3.0°C	Viscous at −70°C
Solubility	Soluble in common inert org. solvents.	Soluble in common inert org. solvents.	Soluble in common inert org. solvents.
Solubility in Water	Reacts	Reacts	Reacts
Chemical Properties	Fumes in air. Hydrolyzes in water to form phenylphosphinic acid. 2 chlorine atoms reactive with alcohols, phenols, amines, and aldehydes. Adds oxygen, sulfur, and halogens.	Hydrolyzes in water to form phenylphosphonic acid. Two reactive chlorine atoms capable of reacting with alcohols, phenols, and amines to form the corresponding esters and amides.	Decomposes slowly in water. Two reactive chlorine atoms capable of reacting with alcohols, phenols, and amines to form the corresponding neutral esters and amides.
Possible Uses:	Intermediate in preparation of phosphinic acid derivatives and anti-oxidants. Oil-additive.	Intermediate in preparation of plasticizers and oil-additives.	Intermediate for org. synthesis. Extreme pressure lubricant additive. Plasticizer intermediate.

COMMENTS—Phenylphosphorus dichloride is a highly reactive acid chloride from which many derivatives containing trivalent phosphorus can be made. It should be handled with caution.

Phenylphosphorus oxydichloride is a reactive acid chloride which is used as an intermediate in the preparation of the phenylphosphonates. It reacts smoothly with a large number of compounds containing an active hydrogen.

Phenylphosphorus thiodichloride is a less reactive acid chloride which will react directly with phenols to give phenylthiophosphonates.

NOTE—Because of present limitations in the supply of certain critical materials, samples of the above and other Victor Research Chemicals announced from time to time are not always available. Those that are will be sent promptly upon request. Others, for which research has established important uses in essential war production, are already available in commercial quantities.

NEW PRODUCTS & PROCESSES

Corrosion-Resistant Alloy

A new plating process using three common metals—copper, tin and zinc—provides a tough, non-magnetic coating for the delicate parts of a host of instruments, the Westinghouse Meter Division at Newark, N. J., disclosed recently. The new process has been made available to all American industry through the Hanson-Van Winkle-Munning Company, of Matawan, N. J., which has been licensed by Westinghouse for the commercial manufacture of ingredients and processing equipment.

The new process, designed to "step up" the resistance of electrical instruments to corrosion, permits use of very much thinner coatings than do conventional anti-corrosives. To protect instrument parts with nickel plate, for example, at least five ten-thousandths of an inch of metal is needed—two and a half times the 2/10,000th-inch thickness needed when bright alloy coating is used. Electrical performance is also improved by the non-magnetic quality of bright alloy plate.

Bright alloy plate can be electrolytically deposited on virtually any size or shape of metal object to uniform and closely controllable thicknesses—even to coatings as infinitesimal as one one-hundred-thousandth of an inch.

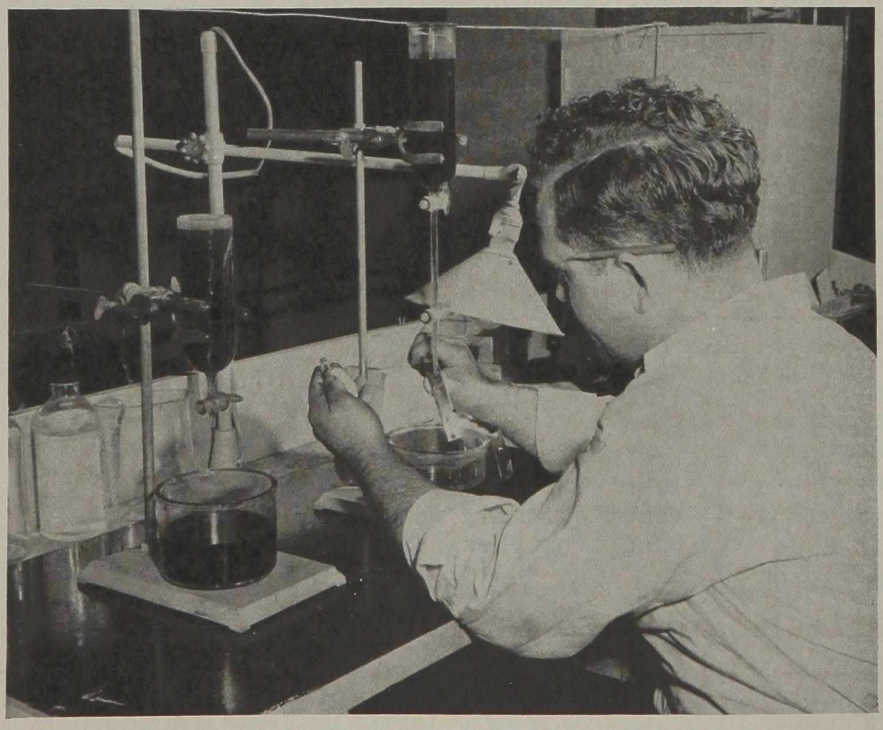
Fischer-Tropsch Process

A new engineering development of the Fischer-Tropsch process is announced by The M. W. Kellogg Company, petroleum and chemical engineers of Jersey City, N. J., and New York, N. Y. This development makes possible the production of gasoline with a clear octane number of 75 motor (83 research) from natural gas for about five cents per gallon, bringing gasoline synthesis from natural gas definitely within the range of successful commercial operation by the American refining industry. The process is equally adaptable to the economical production of high cetane Diesel oil.

The announcement states that the five cent cost is based on natural gas at five cents per thousand cubic feet and a plant depreciation rate of 10% per year. The gasoline produced can be easily leaded to 80 motor (89 research) with 1 cc. T.E.L. for post-war consumption.

Based on many years of technical exploratory and development work in the Kellogg laboratories in Jersey City, the new Kellogg method [illegible] overcomes the problems of heat dissipation and accurate temperature control. By this new process, a yield of 80% of 75 octane motor (83 research) gasoline is obtained as a major product compared with the pre-war European yields by the then existing methods of 30% to 40% of gasoline of approximately 25 octane number. The Kellogg Company now is prepared to build hydrocarbon synthesis plants employing this process.

Designs for synthesis plants as developed by Kellogg now utilize natural gas, which is doubtless the most favorable source as long as large volumes are available. However, the basic constituents can be obtained from low grade coal or other low-cost, high-carbon content materials when and if the supply of natural gas is no longer adequate.



Thickness of the bright alloy plate is checked by dropping a metal-attacking solution on the sample. A technician stop-watches the progress of the acid through the plating and down to the uncoated metal.

Synthetic Tryptophane

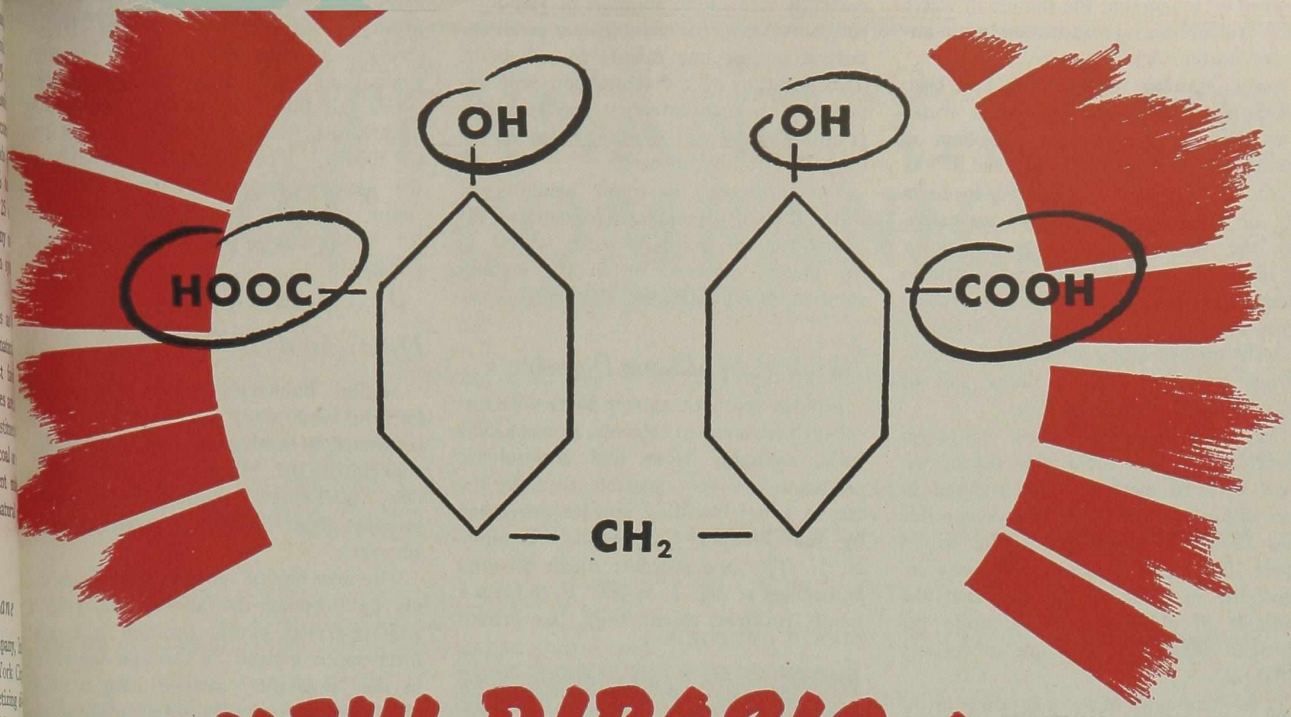
Winthrop Chemical Company, Inc., of 170 Varick Street, New York City, reports that it is now synthetizing *di*-tryptophane and is offering this amino-acid to research workers and manufacturing organizations at prices well below the ve average for the past ten years. *dl*-Tryptophane-Winthrop meets the following specifications: Melting point 285-6° (sealed capillary); ash negligible, moisture less than 0.5%; E 1%/1 cm. at 279 mu 265-270.

Surface Area of Solids

Newly developed gas adsorption methods that appear capable of giving reliable values for the surface area of either porous or non-porous finely divided or massive solids appear to add a valuable working tool to the list of those already available to chemists and physicists.

The first of these new methods makes use of curves representing the volume of nitrogen adsorbed by the surface of the porous or finely divided solid as a function of pressure at —195.8° C., the temperature at which liquid nitrogen boils under a pressure of one atmosphere. A way has been found to select the point on the adsorption curves corresponding to a single layer of adsorbed molecules. A simple multiplication of the number of adsorbed molecules by the cross-sectional area (16.2×10^{-16} square cms.) of the nitrogen molecule, as estimated from the density of liquid nitrogen, yields an absolute value for the surface area.

Harkins and Jura have developed an entirely different method of plotting the low temperature nitrogen adsorption curves that does not even require one to use an assumed value for the cross section of the nitrogen molecules. To begin with they measured the surface area of a finely divided non-porous sample of titanium dioxide by noting the heat



A NEW DIBASIC ACID

. . . M.D.A. (Methylene Disalicylic Acid)

. D. A. is a technical grade of methylene disalicylic id of special interest to chemists working with resins d drying oils for use in the manufacture of paints, rnishes, protective coatings, printing inks, linoleum d many other products. It consists of a mixture of mers, principally the para-para form. In addition her isomers as well as small amounts of low molelar weight polymers are probably present.

As indicated in the formula above, an interesting d significant property of methylene disalicylic acid ihydroxydiphenylmethane dicarboxylic acid) is the mbination of the reactive carboxylic acid groups th the phenolic groups in the same molecule.

By such a combination the versatility of the alkyd type resins may be combined with the chemical resistance of the phenolic types.

This has been shown by experiments in the Heyden laboratories. For example, it has been found that alkyd resins made with M. D. A. and a pentaerythritol alcohol overcome the poor alkali resistance of ordinary alkyds. When varnishes are formulated with these new alkyd resins the resulting products are improved rapid-drying protective coatings.

M. D. A. may be used with rosin and pentaerythritol alcohols to produce modified phenolic resins which can be cooked into varnishes by the usual methods to produce fast-drying paints and varnishes of improved chemical resistance.

Samples and further information available upon request.

FINE HEYDEN CHEMICALS

HEYDEN *Chemical Corporation*

393 SEVENTH AVE., NEW YORK 1 • 180 N. Wacker Drive, Chicago 6

Benzaldehyde • Benzoates • Benzoic Acid • Benzyl Chloride • Bromides • Chlorinated Aromatics • Medicinal Creosotes • Formates • Formaldehyde • Formic Acid
Glycerophosphates • Medicinal Guaiacols • Hexamethylenetetramine • Paraformaldehyde • Para-Hydroxybenzoates • Penicillin • Pentaerythritols • Salicylates

evolved on immersing the sample in water after it had been presaturated with adsorbed water vapor.

Assuming that the particles had been sufficiently coated with adsorbed water to cause them to evolve the same heat on immersion that would be evolved if the water coating were considered to be a film of ordinary water, they can calculate the surface area of the particles. By using this area they then were able to obtain from a single nitrogen adsorption curve the necessary constant for deducing directly surface areas of porous and non-porous materials from a linear plot of their nitrogen adsorption data.

On six non-porous solids compared, Harkins and Jura found that the agreement between method I and method II was within 1%. On about 86 porous solids they found the agreement to be within about 10%. This is considered to be remarkable in view of the fact that the methods of plotting and evaluating the nitrogen adsorption data are so entirely different.

A few examples of the magnitude of the surface areas of some common materials may be of interest. A one pound sample of soil has been found to have a surface area equivalent to about 10 acres of a flat non-porous surface. Some of the finely divided carbon blacks have an area ten times as great or about 100 acres per pound. On the other hand average cement samples have only about 0.1 acres per pound.

In a number of instances important correlations have already been noted between the surface area and the other properties of finely divided or porous solids but for the most part application to industrial and scientific problems is only beginning to be made.

Substances whose areas have so far been determined by one or the other of the two gas adsorption methods mentioned above include paint pigments, inorganic salts, clays, carbon blacks, soil, soil colloids, cement, cuprene, paper, metallic catalysts, bacteria, porous glass, glass beads, powdered glass, a variety of metal powders, and catalysts for both the cracking of petroleum and the preparation of butadiene from hydrocarbons. A low pressure modification has also been used in evaluating the roughness factor of samples of sheet steel, silver foil and other forms of bulk metal. It is believed that these new methods for measuring surface areas should find many applications in the science and technology of the future.

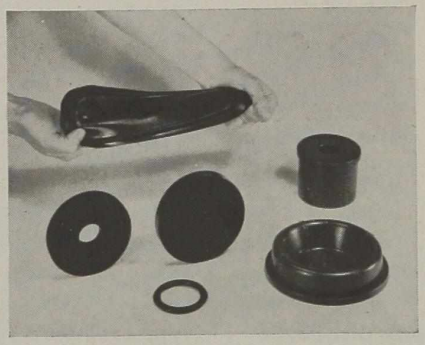
Etching of Plastics

Celanese Corporation of America this month was granted a new patent relating to the treatment of cellulose acetate or other cellulose ester plastic material, for the purpose of producing ornamental or other desired effects, by immersing said material in a dilute solution of s[illegible] acid, for example, of 25 to 75 per cent concentration, for one minute to one hour. The duration of the immersion will depend on the concentration and the temperature of the acid solution and upon the degree of etching desired.

The presence of small amounts of water-soluble plasticizers, solvents or diluents for the cellulose ester, either in the plastic material or in the etching solution, accelerates the etching process.

Thiokol Molding Powder

Molded synthetic rubber parts with excellent resistance to solvents, greases, oils, fuels, sunlight, ozone and atmospheric oxidation are now possible through the use of a new molding powder developed by the Thiokol Corporation, Trenton, N. J. The new powder, which becomes vulcanized at 300° F. to 360° F. to form a tough, resilient, elastic solid, has proved



itself an excellent material for compounds which are required to remain flexible at temperatures below —50° F. and remains serviceable to temperatures in excess of 220° F.

In general, the physical properties of parts molded from these powders can be arrived at from the table below which summarizes properties obtained from 610 molding powder:

Hardness (Shore Durometer)		60+5
Tensile Strength lbs./sq. in.		1000
Elongation at Break %		400
Brittle Point °F		—60°F
Maximum Service Temperature °F		250°
Resistance to Abrasion		Good
Resistance to Sunlight		Excellent
Resistance to Ultra Violet Light		do.
Resistance to Ozone		do.
Volume swell in:	Mineral Oil	2.5%
	Aromatic Gasoline[1]	16.0
	Gasoline	3.0
	Kerosene	2.5
	Turpentine	2.5
	Linseed Oil	1.0
	Ethyl Alcohol	5.0
	Acetone	37.0
	Carbon Tetrachloride	48.0

[1] Aromatic gasoline consisted of 60% aviation gasoline, 20% Toluol, 15% Xylol and 5% Benzol.

An excellent material for a wide range of industrial parts such as washers, valve seat discs, diaphragms, gaskets, grommets, etc., the new "Thiokol" molding powder can be compounded to obtain finished parts with a wide range of hardness.

In considering the properties molded from this powder, they should be thought of in terms of soft vulcanized rubber [illegible] s. For example, rigid plastics display tensile strengths of from 1000 to 10,000 lbs. with elongations up to 1%, while soft rubber goods fall into the tensile range of 200 to 3000 lbs. with elongations of from 100 to 1000%. The physical properties of the compounds shown are within the range normally considered satisfactory for most rubber mechanical goods applications.

Dust Analysis

Aiding industry's efforts to prevent harmful respiratory disease caused by the continued breathing of dust by workers, the Bureau of Mines today proposed a new "filter-paper" method for obtaining samples of air for dust analysis in health surveys.

The new device recovers dust from the air by drawing the atmosphere, with a hand-operated pump, through a special filter-paper instead of through liquid, as in the "impinger" method long used in obtaining dust samples for scientific study, according to a Bureau bulletin which describes both techniques and compares their effectiveness.

With the "filter-paper" method dust is collected from the air by filtration through pieces of special paper and gathers on the paper. Before it can be counted it must be removed, and this is accomplished by placing the filter papers in a dust-free liquid, such as ethyl alcohol, and shaking them vigorously. The dust leaves the paper readily. Lintless, high-wet-strength, hardened filter paper is used for fine precipitates.

Determinations were made by the Bureau on impinger and filter-paper samples of silica dust and coal dust and the results indicate clearly that the filter paper method has promise of securing results comparable to those of the impinger.

Being dry, the filter paper sample can be kept indefinitely before the dust particles are counted, but the impinger samples in water cannot be stored easily because of the danger of bacterial growth or solution of the dust.

A copy of the publication, Report of Investigations 3788, "Filter-Paper Method for Obtaining Dust Concentration Results Comparable to Impinger Results," may be obtained free by writing the Bureau of Mines, Department of the Interior, Washington 25, D. C.

Metal Recovery by Anion Exchange

A new process for recovering valuable and war essential metals has been announced recently by chemists of the Permutit Company of New York. Chromium, vanadium, molybdenum, gold, platinum, palladium, and other metals may be re-

moved from waste solutions by absorption on anion exchange resins. While primarily intended for the recovery of scarce and valuable metals now being lost in waste waters, the new method is also expected to be beneficial in reducing stream and harbor pollution in the vicinity of electro-plating and other metal working plants.

According to the authors, under special conditions anion-exchange resins will completely absorb certain metal salts from very dilute solutions. When complete absorption is no longer obtained, the resins are treated with appropriate chemical solutions to effect recovery of the metals in the form of solutions which may be twenty-five or thirty times as concentrated as the original waste liquors. The resins undergo no permanent change in the process and may be re-used indefinitely.

In contrast to many previously proposed processes for the recovery of metals of this group, the new anion-exchange process provides the recovered metal in the form of a salt which may be used directly in plating or other processes.

Because of the high prices they command, the precious metals, such as gold, platinum, and palladium, may be recovered economically by the simpler alternate process of burning the resin after saturation with the metal. Because the resins are themselves almost entirely free from ash-forming impurities, the residue from this process consists of practically pure metal.

Selective Adsorption by Activated Carbon

Research studies have revealed that the surface of carbon is covered with a multitude of adsorptive centers. These centers may be likened to tiny hooks that are able to lock up certain molecules from a solution. Many different types of surface locks are present and we can apply the familiar thought of a special key for each lock. Thus, one type of surface lock will hold molecules of phenol whereas an adjacent lock may hold alcohol molecules. This knowledge has been of great help in advancing these newer applications and has also resulted in developing new types of active carbons for special tasks.

New assistance has been provided by more recent studies which reveal methods of destroying undesired surface locks. Prolonged grinding or oxidizing chemicals, can cause carbons to lose certain undesired powers of attraction. Another method that gives promise is to employ types of solvents that block off or blanket undesired surface locks and leave free those that are needed. It is still too early to fully assess the value of these new discoveries but they will extend the use of active carbon for the preparation of many valuable new products and chemicals.

Diatomite Filter Aids

To help Pacific Northwest industries utilize more fully the extensive deposits of diatomite found in Washington, Oregon, Northern California, and Idaho, the Bureau of Mines has completed tests which reveal the usefulness of these formations as filter-aids in refining sugar and other products, the Bureau has announced.

Diatomite, composed of opaline silica shells of microscopic water plants, has many other industrial applications—concrete admixtures and fillers in rubber, paints, and plastics—but the Bureau's research emphasized its use as a filter-aid in improving the flow rate of liquids being processed and in removing impurities. A report, just made public, describes the Bureau's laboratory experiments on diatomite and explains that diatoms are so minute that 50,000,000 of their skeletons may be found in a cubic foot of diatomite.

Tests by the Bureau reveal that calcination (roasting) of the Pacific Northwest diatomites increased their efficiency, but none was as good as commercially used diatomites which had undergone special processing. This fact, however, does not mean that the Pacific Northwest diatomites cannot be used as commercial filter-aids, the report states, pointing out that "other methods of preparing the Pacific Northwest diatomites probably would give different results."

"Each diatomite to be used as a filter-aid should be tested to find the best size and the best calcination conditions to give a product having the required filter-aid characteristics," the survey concludes.

Testing procedures, equipment used, descriptions of the various diatomite deposits examined, and other details regarding the research are described in the report.

A copy of the publication, Bureau of Mines Bulletin No. 460, "Diatomites of the Pacific Northwest as Filter-Aids," may be purchased from the *Superintendent of Documents,* Government Printing Office, Washington 25, D. C., for 25 cents. The report is not for sale by the Bureau of Mines.

Wetting Agent

The Advance Solvents & Chemical Corporation, New York 16, New York, announces the immediate availability of Advawet 15, a sodium hydrocarbon sulfonate specially purified, containing no oil and only a trace of inorganic salts. It is a light brown paste, readily soluble in water and fairly soluble in acetone and toluene, forming aqueous solutions which foam readily and possess all characteristics that are desirable when low surface and interfacial tensions, rapid wetting time and quick penetration are desired.

Its suggested uses are in scouring of wool; in wetting back dried skins and crusted leather; in the washing of paper and board mill felts; de-inking of paper stock; in blotting papers and facial tissue; as a scouring and dyeing aid for jute, straw and hair; ingredient of fulling soap to aid rinsing; aid for fat liquoring of leather; solubilizing and dispersing agent for vegetable tanning materials; and as an agent to increase absorbency of paper towels.

Paris Green

A novel method of manufacturing Paris Green is described by Russian scientists (*Russian J. Appl. Chem.,* 13, 367).

The usual method consists of dissolving white arsenic in soda lye and mixing the solution obtained with acetic acid and copper sulfate:

$$3As_2O_3 + 4Na_2CO_3 + 4CuSO_4 + 2CH_3COOH \longrightarrow 3Cu(AsO_2)_2 . Cu(CH_3COO)_2 + 4Na_2SO_4 + 4CO_2 + H_2O.$$

This method wastes the whole of the soda employed, converting it to sodium sulfate which is lost in the filtrate.

The new method, which has successfully passed the pilot-plant stage, employs copper oxide directly:

$$4CuO + 3As_2O_3 + 2CH_3COOH \longrightarrow 3Cu(AsO_2)_2 . Cu(CH_3COO)_2$$

For this reaction to have a reasonable velocity, the amount of acetic acid must be twice the theoretical so that half of it remains in the filtrate. Sufficient concentrated acid is added to the filtrate to restore it to the original strength (8 per cent), whereupon it is used to treat another batch of copper oxide.

The purpose of this reaction would be defeated if the copper oxide were made by the interaction of copper sulfate and an alkali; but the oxide can be made readily by heating copper powder in air at a temperature below 300° C.

In practice, 236 parts of glacial acetic acid and 2800 parts of water are mixed in a pot provided with a reflux condenser; 314 parts of copper oxide is added and the mixture heated to boiling. Into the boiling liquid is introduced 586 parts of arsenic trioxide with continuous stirring. The mixture is boiled two hours, cooled one hour, and filtered. The filtrate contains some copper and arsenic which must be taken into account when used again.

Correction

In the announcement of a cork substitute, on page 764 of the November, 1944, issue, there appeared an error which might have caused confusion. In the second line from the bottom of the third column the word "pith" should be read for "pitch."

if you have any of these problems

The story of Porocel is the story of a high-grade activated bauxite of great versatility.

It's a story well worth reading right now if you or your company face any of these problems:

1. **Selectively adsorbing an impurity from a process liquid or gas.**
2. **Finding a rugged carrier having adsorptive properties for use as a support for a catalytic material.**
3. **Finding a high surface area catalyst for a specific reaction.**

Porocel has proved its versatility as an adsorbent in many processes in many fields. Its action is positive and predominantly selective.

Its affinity for adsorption of compounds is very responsive to differences in the molecular structure of the compounds — making it possible in many cases to adsorb an undesirable component from a mixture without substantially affecting the other components. This same property of positive selectivity makes Porocel useful as a catalyst carrier, since many catalysts must be intimately adsorbed to prevent catalyst loss and to present the greatest catalyst area to the inter-reacting phases. The high surface area of Porocel makes it a valuable catalyst in its own right in many applications without the addition of other catalytic materials.

Purification and Refining

Porocel is used for the removal of $AlCl_3$ and alkyl halides from processed hydrocarbon streams.

Porocel is extensively used for the percolation finishing of petroleum lubricants.

Porocel is far and above the best adsorbent medium for finish refining of petroleum waxes and petrolatums to the rigid specifications of odor, taste and color required in these materials.

Catalytic Reactions

Many chemical reactions are directly catalyzed by Porocel. The catalytic conversion of organic sulfur compounds to H_2S and the catalyzed reaction of H_2S and SO_2 are examples.

Catalyst Carrier

Porocel is an excellent carrier for metallic oxides and halides in processes where these compounds have catalytic behavior.

Our background of experience in the field of industrial adsorbents and catalysts and the facilities of our specialized testing and process development laboratories are at your disposal. We believe we can be helpful. Write Attapulgus Clay Company (Sales Agent), 260 S. Broad Street, Philadelphia 1, Pennsylvania.

POROCEL CORPORATION • BAUXITE ADSORBENTS AND CATALYSTS

POROCEL

NEW EQUIPMENT

Conveyor QC 512

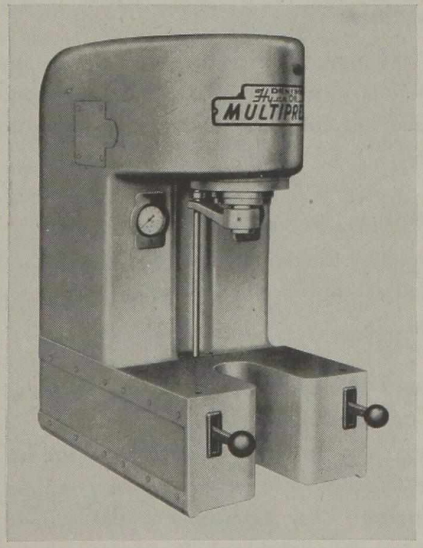
The Tote-All Conveyor, a lightweight, portable endless belt type conveyor, has been recently announced to industry.

Conveyor is available in two lengths—13 ft., 9 in. and 20 ft. Either model may be driven by an electric motor or a gasoline engine. It comes equipped with a 1½ HP gasoline engine, which is ideal for most conveying, or a 2.3 HP engine for heavy-duty work. The conveyor may be had without a power unit if the user has his own motor. All models may be had with a standard engine mounting or a high engine mounting for conveying bulky material. Engine mounting on models equipped with gasoline engine is adjustable to keep engine level regardless of angle of conveyor. Normal belt speed is 420 FPM. Variable speed drive pulley is available if desired.

Hydraulic Bench Press QC 513

Operations requiring anywhere from 300 to 8,000 pound pressures in single, or repeated up and down strokes, are performed by a new bench machine, just introduced by The Denison Engineering Company, Columbus, Ohio.

Called Multipress because it is basically an oil hydraulic press of many uses, it will deliver up to 4 tons downstroke pressure and up to 5000 pounds "pull up" pressure even though it is completely self-



contained in a streamlined housing measuring only 16″ x 26″ x 34″ and weighs only 745 lbs. In addition, it has been especially designed to utilize a wide variety of accessories and fixtures.

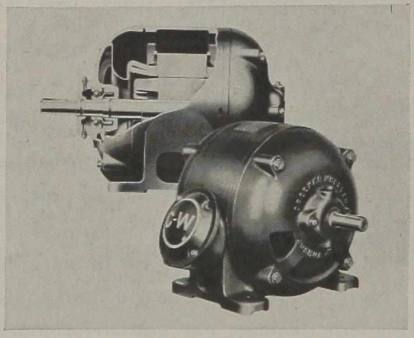
Depressing the control levers causes the ram to move downward. Releasing either lever stops the ram instantly. Releasing the other lever causes the ram to return to its upper limit, where it is positively held. The eye-level gauge indicates pressures. Dual controls require the use of both of the operator's hands, providing safety.

All working parts within the frame are of unit construction, readily accessible and removable for inspection.

Protected Motor QC 514

A new motor, combining the surplus capacity of the conventional open motor with protection against dripping liquid, falling metal chips and other foreign matter, has been developed by the Crocker-Wheeler Division of Joshua Hendy Iron Works at Ampere, New Jersey.

There are no openings in the frame or shields above the horizontal center line.



This, together with the shielded construction of the ventilating openings, makes Protected-Type Motors suitable for applications where other types of enclosures have been required in the past.

Centrifugal seals permit use of softer grease for better lubrication and longer bearing life. The Company's Alucast rotor construction, in which the bars, fans and end rings are cast in one operation from aluminum alloys, is employed.

Other features of these many-purpose motors include: heavy cast frame construction, coils protected by polyvinylacetal insulation, interchangeable front and rear shields, and specially designed guides for directing cooling air over all surfaces.

Mercury Detector QC 515

Mercury-vapor concentration in the atmosphere is instantly detected by a new electronic detector announced by the Special Products Division of the General Electric Company. The device is designed particularly for use in the glass, chemical, smelting, metal-mining, and electric ap-

...ere mer-
...cury-vapor concentrations must be kept below the toxic limit—1.2 parts mercury vapor in 100 million parts of air by volume, for continual breathing—to safeguard the health of employees. The detector will measure directly mercury-vapor concentrations as high as 1 part in 3 million parts of air by volume and as low as 1 part in 200 million parts, with an accuracy of approximately 5 per cent.

Operating on 115-volt, 60-cycle power supply, the detector draws air from the atmosphere at the rate of one-quarter to one-half a cubic foot per minute through

a cylindrical absorption chamber within the instrument. This chamber contains an ultra-violet lamp and a phototube. Normally, the lighted ultraviolet lamp permits normal current to flow through the phototube, but the presence of mercury-vapor in the air drawn into the absorption chamber intercepts and scatters the ultraviolet light, thus reducing the phototube current. By means of a bridge circuit, this drop in the phototube current is translated into an upscale reading on the indicating instrument of the detector.

Small, light in weight, and easily operated, the detector is housed in an attractive, portable steel case on the front of which are conveniently mounted a line voltmeter, a microammeter, the adjusting knobs of the rheostats, and the requisite switches.

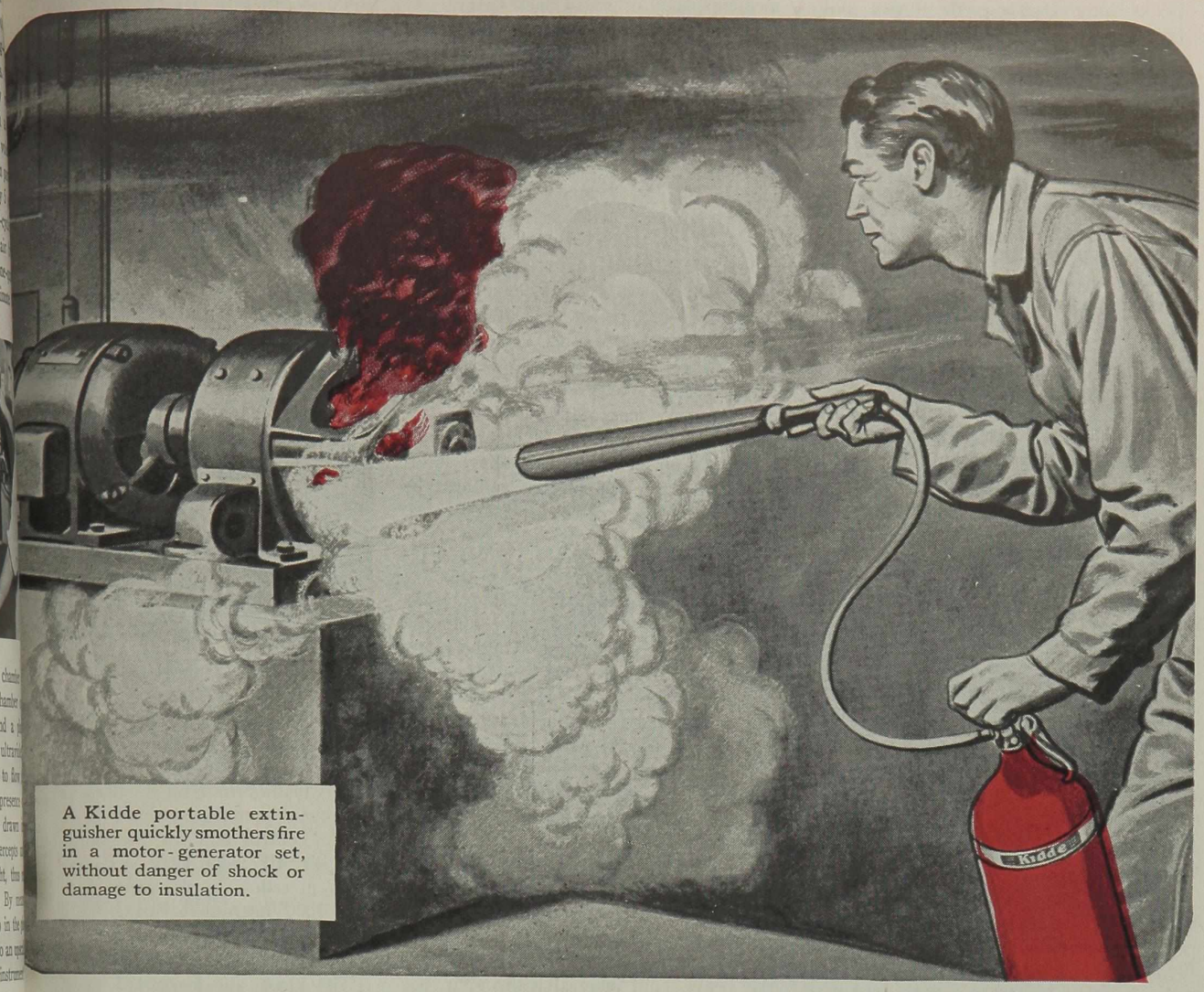
Fire Protection QC 516

For foam fire protection on modern oil storage tanks of the pressure type, the new "Evertite" Foamite Delivery Chamber makes for simple, effective installation, it is claimed by the manufacturer, American - LaFrance - Foamite Corporation, Elmira, N. Y.

The "Evertite" Delivery Chamber provides an easy means of applying a blanket of fire-smothering foam to burning oil surfaces, yet prevents release of tank pressure.

A glass diaphragm seals the inlet of the Firefoam passageway to the tank. This permits the top plate of the delivery chamber to be removed for painting or for diaphragm inspection, without releasing any tank vapors.

A newly designed Firefoam deflector,



A Kidde portable extinguisher quickly smothers fire in a motor-generator set, without danger of shock or damage to insulation.

KIDDE EQUIPMENT HITS THE HOT SPOTS to put tough fires out!

Even a small blaze in electrical equipment — or flammable liquids — may quickly flare into a serious fire...unless the *right* extinguisher gets to work fast.

Ordinary water-type extinguishers cannot stop these tough Class C and Class B fires. But a Kidde portable — approved by both Underwriters' and Factory Mutual Laboratories — chokes them off quickly and safely.

If a blaze breaks out in *electrical equipment,* non-conducting carbon dioxide keeps the operator safe from the danger of shock, while it swirls around corners and penetrates crevices to extinguish every flicker of flame. Dry and inert, the gas does not damage the equipment or rot the insulation.

When *liquids* catch fire, a cloud of carbon dioxide gas from the Kidde nozzle forms a thick blanket that smothers the flames . . . then evaporates to leave valuable materials uncontaminated.

Safe, clean, fast — Kidde extinguishing equipment is ready to take on the job of guarding *every* tough-fire area in your plant. Check the accompanying list of hazardous locations — then ask a Kidde representative to show you how best to protect them.

KIDDE KILLS TOUGH FIRES

MG Sets
Process Rooms
Ovens
Spreaders
Motors
Storage Rooms
Mixers
Coaters
Transformers
Dip Tanks
Agitators
Washing Trays
Control Panels

★

alter Kidde & Company, Inc. • 140 Cedar Street, New York 6, N. Y.

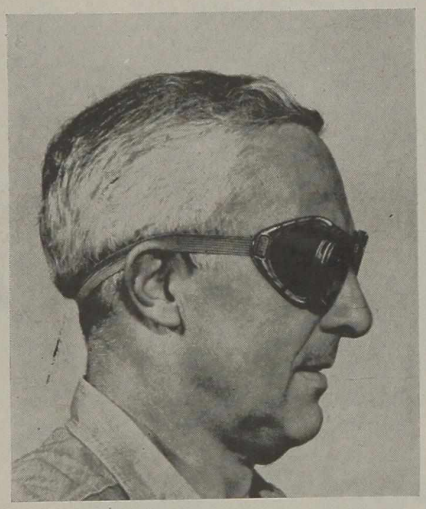
permanently attached to the throat, eliminates any special baffle installation. The Firefoam discharge is deflected with a rotary motion against tank shell and down to the oil surface without undue disturbance of the liquid, or foam breakdown.

Use of the "Evertite" Delivery Chamber avoids the dangerous practice of using ordinary pipe connections discharging directly into the tank near the roof. Such practice may result in the fire draft throwing a large proportion of the foam discharge outside the tank.

Safety Goggle QC 517

A new improved Duralite safety goggle is announced by American Optical Company, Southbridge, Mass.

Major improvement in the goggle is a newly designed eyecup which is considerably larger in area and more face conforming than the previous cup, thus



providing maximum eye protection, increased ventilation and greater comfort. Shaped separately to fit the contour of the right and left eye, the cups fit snugly against the face and protect the eyes from objects striking from the sides, top or bottom. Non-conductors of heat and electricity, the new cups provide wider angle of vision.

New nasal section and enlarged facial contact roll conform to the shape of the face instead of forcing the face to conform to the goggle. Smooth round edges of the eyecups fit snugly and stay in place comfortably.

In addition, air channels in the edge of the eyecups, plus extra side perforations, provide greatly increased ventilation. A natural draft is accordingly produced behind the lenses, reducing the possibility of fogging. Eyes stay cool behind such fog-free lenses with less threat of fatigue.

The new 301A Duralite goggle is supplied with either 50 mm. Super Armorplate lenses in white glass, or 50 mm. Super Armorplate lenses in Calobar medium, dark, or extra dark shades. If desired, 6-curve Super Armorplate lenses can also be furnished.

Industrial Pump QC 518

A heavy duty industrial pump, designed and made for heavy duty positive handling of liquids, is announced by Bump Pump Company. It has operating speeds that range from 0 to 400 RPM, and capacity of 100 gallons per 100 revolutions. Made with ball bearings in both face plate and rear gear case, this heavy duty industrial pump can be furnished with either flanged or threaded intake and discharge ports. Due to its heavy construction, maintenance costs are reduced to a minimum. The pump can be made of iron, bronze, nickel alloy, stainless steel, or other metals, and can be furnished in direct, v-belt or pulley drive.

Electric Hoist QC 519

American Engineering Company, makers of the AE Lo-Hed Hoists, announce their ¼-ton electric hoist. Unlike many hoists of its capacity, the Lo-Hed ¼-ton is built to big hoist specifications. Of heavier construction throughout, the Lo-Hed ½-ton is said to be able to handle more pounds per day than ordinary hoists.

The Lo-Hed ¼-ton hoist has a number of unusual heavy duty features for a hoist of its capacity. The motor, for example, is a heavy duty ¾ h.p. hoist and crane type motor with high starting torque. Gearing is heavy-duty spur type. The lowering brake is automatic, heavy-duty Weston screw-and-disc type. The electric brake, built integral with motor, has full load torque capacity. Even the push button control pendant and control cord are heavy duty, with the super-service cord reinforced by a steel pull cable. Chassis is heavy-gauge pressed steel.

The weight of the Lo-Hed ¼-ton hoist is an indication of its husky, dependable performance—195 lbs. for the bolt suspension type, 225 lbs. for the plain trolley type. The trolley is shockproof, specially designed to withstand the initial shock of electric hoisting and lowering.

Potentiometer Controller QC 520

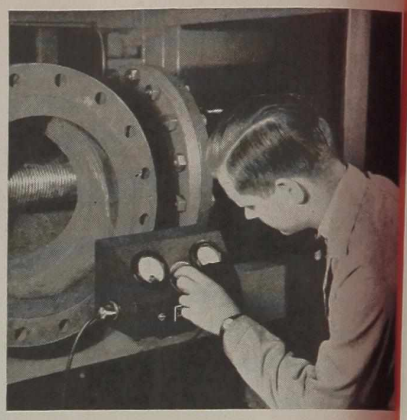
Time-program control is now available on the Bristol Company's new Model 431 Pyromaster potentiometer pyrometer, recently developed.

These time-program controllers automatically regulate temperature, not necessarily at a fixed point, but rather carry it through a predetermined series of changing values. Blank metal cams with time and temperature graduations printed on the cam face enable the user to cut his own cams with a pair of tin snips.

The controller can be any of the five air-operated types or several electric types of control manufactured by The Bristol Company, and in ranges up to 3000° F for thermocouple type controllers and up to 3600° F when used in connection with the company's compensated radiation unit.

Vacuum Gauge and Control QC 521

The Vacuum Engineering Division of National Research Corporation has developed and is now manufacturing a new all-metal thermocouple vacuum



gauge, together with its associated control unit.

The gauge features extremely rugged construction and is assembled in a metal envelope. Connection to the vacuum system is made through a standard ⅛" IP hexagonal shank pipe nipple.

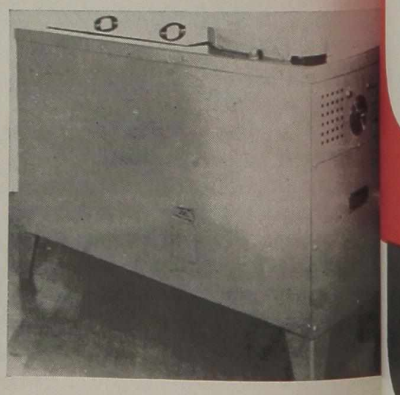
The control unit for the gauge operates directly from 110V A.C. and indicates pressures in the range between and 1000 microns accurately and continuously. The gauge output meter calibrated directly in microns.

The gauge and associated control unit provide a good method for locating leaks in the vacuum systems. For this purpose spray parts suspected of containing leaks with acetone or ether. If a leak is present a sudden increase in the apparent pressure reading will occur.

Plastic Coaters QC 52

Two new small plastic coaters have been designed by the Youngstown Mill Company, Sandusky, Ohio.

The increasing use of plastic protective coatings by companies of all sizes h



brought out the urgent need of suitable low-capacity heating and melting equi

ment. These new models were designed to take care of a company having small parts or tools to be coated prior to shipment; or for a company that wants to protect their own precision cutting tools and gauges while being stored prior to use.

These small units have all the features of the large units. Each one has a plastic pump arrangement which provides constant level in the dip tank and continual removal of surface film and bubbles caused in dipping. In addition, oil jackets the sides and bottom of each tank. Oil and plastic are thermostatically controlled so that the electric heaters are shut off when either reaches its ceiling temperature.

The accompanying photograph is typical of these new machines. Model 3-8 has a capacity to melt from 3 to 5 pounds of plastic per hour with a Dip Compartment 6" wide by 9" long and 6" deep. Model 3-5 is the same with dip tank 13" deep.

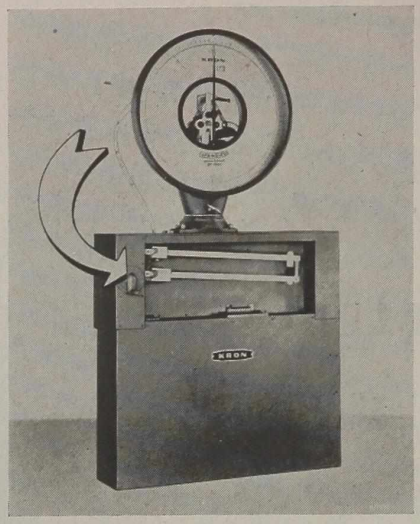
Model 5-8 will melt from 5 to 7 pounds of plastic per hour and has a Dip Compartment 9" wide by 12" long and 6" deep. Model 5-15 is the same with dip tank 13" deep.

High Capacity Scale QC 523

The Kron unit weight cabinet attachment is claimed to answer industrial requirements for a high gross weighing capacity scale with low and accurate "fractional" weight dial chart graduations. This scale is equipped with the standard Kron dial mechanism, swivel head, tare and capacity beams and drop weights to provide the greatest gross platform capacity of any scale of its type.

The unit weight increment principle around which this scale is designed is simple and fool-proof. By rotating the handle on the left of the cabinet front (see illustration), from 1 to 7 unit weight increments, each equivalent to the dial chart capacity, can be added to the lever system to increase the gross weighing capacity of the scale. The weight increments are indicated in a target on the dial chart as they are added to the lever system. Flexible cables connecting this target to the drop weight mechanism allow the dial head to swivel to any desired position.

The outstanding advantage of the Kron Unit Weight Cabinet Scale to users requiring a high gross weighing capacity combined with accurate "fractional" weight readings is the ease, simplicity



and precision with which the gross weighing capacity of this scale can be increased as much as nine times for heavy-duty service, while still retaining low dial chart graduations.

Face Shields QC 524

The new "Hundred" series of Face Shields, announced by the Boyer-Campbell Co., retains the characteristic of all B & C Face Shields of complete interchangeability of parts. There are "100," "200," "300," and "400" models, each of them being identified by a variance in design of the head gear. Then for each model of face shield, there is a choice of three different thicknesses and three different sizes of cellulose acetate general purpose windows, three different sizes of 24-mesh screen windows for heat protection and a fiber front for scarfing and welding. The complete interchangeability of a face shield for any industrial use with a minimum of stock.

Note that the back head band is worn low on the head and is completely adjustable for snug fitting to any size of

head in either the elastic head band (models 100 and 200) or the all-fiber head band (models 300 and 400) types. In this manner, the weight of these shields is evenly distributed over the entire head gear with the result that there is no sense of burden or unbalance, no matter how long it may be worn by the wearer. It can be said that it has a full-floating suspension.

Spat Provides Foot Protection QC 525

Ankle and foot protection against acids, alkalis, oils, solvents and greases

is provided by a new spat announced by the American Optical Company, Southbridge, Mass.

The spat is made from a coated fabric which gives the same protection as rubber but is much lighter in weight and extremely flexible.

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

CHEMICAL INDUSTRIES, 522 Fifth Ave., New York 18, N. Y. (2-5)

Please send me more detailed information on the following new equipment.

QC 512	QC 515	QC 518	QC 521	QC 524
QC 513	QC 516	QC 519	QC 522	QC 525
QC 514	QC 517	QC 520	QC 523	

Name ..... (Position) .....

Company .....

Street .....

City & State .....

PACKAGING & SHIPPING

by T. PAT CALLAHAN

Revised ICC Service Order 263 Effective January 22, 1945

ALL users of tank cars, both the shipper and consumer, must be concerned with the seriousness of the shortage of tank cars, and to this end the Interstate Commerce Commission has issued ICC Service Order 263 entitled "Demurrage Charges on Tank Cars."

T. Pat Callahan

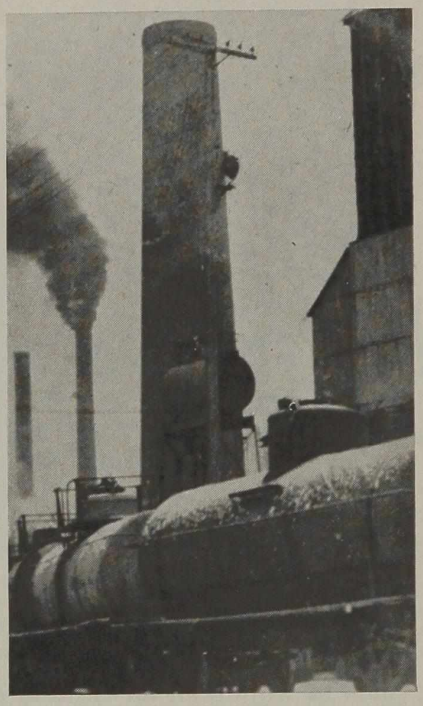
The tank cars involved in this revised order are tank cars under load and held for unloading bearing official designations as published in the Official Equipment Register, "TA" means an acid tank car; "TAI" means acid tank car insulated; "TM" means tank car miscellaneous; and "TMI" means tank car miscellaneous insulated.

This order reduces the free time which formerly had been in effect for tank car unloading from 48 hours to 24 hours. However, Paragraph (h) of the Order which has been amended, and which was valid at the same time the order went into effect, states that when lading is frozen or congealed so as to require heat, thawing or loosening, the free time to unload is extended 24 hours.

Briefly summarizing this order, except as otherwise provided, all cars of "TA", "TAI", "TM" and "TMI" designation shall go on demurrage 24 hours after the delivery of the tank car to the consignee providing the material is not of a congealed or frozen nature wherein the free time is extended to 48 hours. The amount of demurrage charges for the detention of tank cars shall be $11 per car per day or fraction thereof for each of the first five days, and $22 per car per day or fraction thereof for each of the succeeding days. Weather conditions, bunching, and other disabilities such as those set forth in Rule 8 of B. T. Jones' Tariff I. C. C. Rule 13 may increase the free time allowed.

We recommend to all users of tank cars that they procure and study revised Service Order 263 with corrected Amendment 1 in order to be guided in the handling of tank cars during this emergency.

This revised order expires, unless otherwise modified, changed, suspended, or annulled by the Commission, at 7:00 A. M., April 1, 1945.



Demurrage on tank cars has been increased in order to keep them from standing idle in plant yards.

Container Outlook

A very noticeable change in the future container procurement situation prompts us to review the immediate future as far as the various packages used by the chemical industry are concerned. For some time it appeared as if the War Production Board restrictions on the use of the various materials used for packaging chemicals would be relaxed, and in fact some of them were to such an extent that it appeared possible to consider the return to some normal packaging practices which had been upset during the past two years. Look, for example, at the situation on steel: the manufacture of steel drums and barrels looked very promising, and in many cases plans were already being formulated whereby many products which had to go away from steel were returning to this form of package. As stated, the last two months have shown a definite trend away from any re-

...teel, and while at this writing stocks of steel may be reasonably available, demands of the war agencies appear to be getting heavier. With the serious shortage of manpower in the fabrication of the containers, it seems practical to continue conservation and return of containers until conditions become more certain.

Deliveries of containers of all kinds will, we feel, become extended, and conservation will be the watchword. Wooden boxes, slack barrels, tight wooden barrels, corrugated and solid fibre boxes, fibre drums, metal cans, multiwall paper bags, glass bottles, together with steel drums, which make up the bulk of the materials used in packaging of chemicals, are all critical, either from the standpoint of raw materials or from the standpoint of manpower shortage for fabrication.

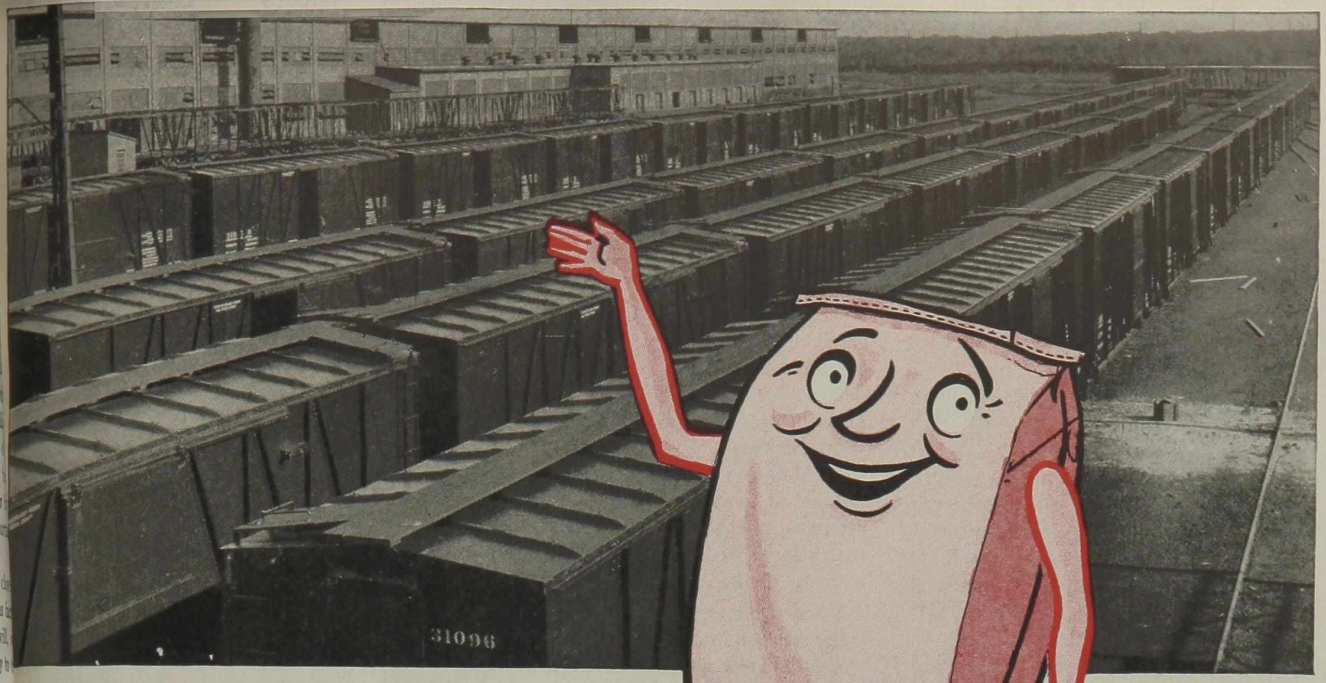
We strongly urge a very close check on all packages, as the various factors involved in their production will, we feel, definitely delay their delivery to the ultimate user. It is impossible to predict future procurement of chemical containers; but it will be very wise if stocks and future deliveries are checked regularly in order to avoid serious shortages which, at the present time, in a great many cases seem imminent.

Cleaning of Freight Cars

When a car has been used for the transportation of hazardous commodities and is unloaded by the consignee, particular care should be exercised to see that any contamination which might be caused by a leaking or broken package, or in cases where the material is shipped in bulk, is properly cleaned and put in condition so that any future loading which might be placed in the car will not become contaminated. There is definitely an obligation upon the consignee that this be done as it is obvious that special cars cannot be assigned for the varied commodities which will be shipped in the car when it is delivered to the next shipper.

In any case, if a leaking or damaged container is noted, the car should be swept clean of all material, and in cases where the material might be a poison, the car should be flushed out with water. When this is done, the consignee should take further precautions by placing placards on each side of the car instructing the carrier to inspect the car so that the carrier will be sure the car is sufficiently clean before furnishing it to another shipper.

It is also well to notify the carrier of any facts pertaining to the cleaning which the carrier should have in order that he may, from a safety standpoint, further place the car in a suitable condition. The cleaning of cars is a necessary safety precaution against injury or loss of life caused by reusing the cars which are con-



PAPER BAGS *that save* BOX CARS

PACKAGING in Multiwall Bags offers a space-saving advantage that adds up to box-car proportions. For example, one ton of a chemical, when packed in Multiwall Bags, will only occupy the approximate space of 1600 lbs. in barrels*. Or, stated another way, *Multiwalls permit a saving of up to 20 per cent storage or shipping space over certain types of metal or wooden containers.* Figure that saving in terms of freight cars or cargo vessels and you have one important reason why many manufacturers are turning to Multiwalls as the solution to more and more of their packaging problems.

SAVE LABOR, TOO

Multiwall Paper Bags are easier to load and unload...they save costly handling time. They will be designed to withstand specific climatic and transportation conditions in all parts of the world.

These bags are moisture resistant, too—a necessary protection for many products. And because they are siftproof, they eliminate siftage losses in transit, as well as messy storage problems.

Multiwall Paper Bags will be especially made to save time and money for your business. Write for full information today.

See how neatly and compactly Multiwall Paper Bags fit in a freight car. This kind of packing protects products and saves time as well as space.

St. Regis MULTIWALL PAPER BAGS

MULTIPLY PROTECTION • MULTIPLY SALEABILITY

ST. REGIS PAPER COMPANY

TAGGART CORPORATION

NEW YORK 17: 230 Park Ave. CHICAGO 1: 230 No. Michigan Ave.
BALTIMORE 2: 2601 O'Sullivan Bldg. SAN FRANCISCO 4: 1 Montgomery St.

IN CANADA.
St. Regis Paper Co. (Can.) Ltd.
Montreal, Quebec
Vancouver, British Columbia

Boston, Mass. Birmingham, Ala. Dallas, Tex. Denver, Colo. No. Kansas City, Mo. Los Angeles, Calif. New Orleans, La. Franklin, Va. Seattle, Wash. Nazareth, Pa. Toledo, Ohio

*Report on bulk packaging prepared by Chemical and Metallurgical Engineering.

taminated, and anything which may be done to eliminate any hazard will reflect to the credit of the shipper, consignee or carrier who may be faced with such a problem.

Specifications for Pressure Cylinders

We are continuing our discussion of ICC Specification containers, dealing this month with the ICC Specifications for compressed gas cylinders used for the transportation of all forms of dangerous gases.

The specifications for compressed gas cylinders are ICC 3A; ICC 3B; ICC 3BN; ICC 3C; 3D and 3E; ICC 4, 4A, 4B and 4C. Rigid compliance is required in all details concerning the inspection, construction, testing, rejection, marking and reporting by record to the Bureau of Explosives. Practically all materials shipped in cylinders have a potential hazard, and for this reason rigid enforcement of the above requirements is absolutely necessary in order to keep to a minimum accidents which occur in the transportation of compressed gases.

In order to explain how rigid these requirements are, certain inspections are mandatory; we quote from the ICC Regulations what is required by all manufacturers in the inspection of cylinders which may bear any of these specification numbers.

"Inspection by whom and where.—By competent and disinterested inspector acceptable to the Bureau of Explosives; chemical analyses and tests, as specified, to be made within limits of the United States. This requirement is necessary because of the present emergency and until further order of the Commission.

"(a) *Duties of inspector:*—Inspect all material and reject any not complying with requirements; for cylinders made by billet-piercing process, billets to be inspected after nick and cold break.

"(b) Verify chemical analysis of each heat of material by analysis or by obtaining certified analysis: Provided, That a certificate from the manufacturer thereof, giving sufficient data to indicate compliance with requirements is acceptable when verified by check analyses of samples taken from one cylinder out of each lot of 200 or less.

"(c) Verify compliance of cylinders with all requirements including markings; inspect inside before closing in both ends; verify heat treatment as proper; obtain samples for all tests and check chemical analyses; witness all tests; verify threads by gauge; report volumetric capacity and tare weight (see report form) and minimum thickness of wall noted.

"(d) Render complete report to purchaser, cylinder maker, and the Bureau of Explosives."

We shall not quote the various specifications dealing with wall thicknesses, heat treatment, etc., but we do quote a paragraph from the Regulations dealing with manufacture:

"Manufacture.—By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no defect acceptable that is likely to weaken the finished cylinder appreciably; reasonably smooth and uniform surface finish required. The internal surface of the bottoms of spun cylinders must be free from fissures or other defects, and if not originally free from such defects should be machined or otherwise treated to eliminate these defects. The thickness of the spun bottom is, under no condition, to be less than two times the minimum wall thickness of the cylindrical shell; such bottom thicknesses to be measured within an area bounded by a line representing the points of contact between the cylinder and floor when the cylinder is in a vertical position."

Very rigid tests, including the hydrostatic test, flattening test, physical test, elongation test and leakage test, must be complied with.

Markings consist of the ICC Specification number with the service pressure at which the cylinder has been tested. These must be stamped on the cylinder together with a symbol representing the name of the manufacturer. The symbol must be registered with the Bureau of Explosives.

Finally a completed form approved by the Interstate Commerce Commission must be filed by the inspector who oversees the testing of the cylinder; this report must be filed with the purchaser, the cylinder manufacturer, and the Bureau of Explosives.

In addition to compressed gases, flammable liquids, with some exceptions, may be packed in any prescribed cylinder which is permitted for any compressed gas with the exception of acetylene. Particularly is this true of flammable liquids with flash points of 20° F. or below. Certain flammable liquids which build up pressure may be shipped in compressed gas cylinders. The Regulation must be consulted, since it is necessary to know the Reid vapor pressure of any flammable liquid before the prescribed cylinder may be used.

The cylinders in the ICC 3 series, generally referred to as seamless steel cylinders (all cylinders in the ICC 3 series are seamless steel cylinders with the exception of the ICC 3BN which is a seamless nickel cylinder), are made to comply generally with the specifications in this series. They differ in modifications of material, sizes, or service pressure requirements.

The ICC Specification 4 series, embracing Specifications 4, 4A, 4B and 4C, refer to welded steel cylinders or welded and brazed steel cylinders. Many of the ICC 4 series cylinders are still in service, but the majority now being manufactured

As discussed previously, safety in the handling and transportation of materials shipped in pressure cylinders is dependent upon strict compliance in all details with the proved and tested regulations which apply to all shipments in this form of container. Unless cylinders meet all requirements of ICC Regulations regarding retesting, marking, labelling, etc., they should never be used. It is only through strict enforcement of all the regulations that the record of transportation and handling of dangerous gases has remained satisfactory.

Limitation Order L-197 Amended

Limitation Order L-197 was amended on January 18, 1945, making the following changes and additions:

Quotas established for 1945 will be computed on the consumption of steel used during the corresponding quarter of 1943. However, for the first quarter of 1945 additional steel over the quota established for the first quarter of 1943 may be used providing it does not exceed the quota allowed for the last quarter of 1944. This also includes any additional steel which was granted on appeals for the fourth quarter of 1944.

An important addition to this order reads as follows:

"Any person who wants to establish a quota or to obtain an adjustment of any quota provided for in this order, may file application for authorization on Form WPB-3770 in quadruplicate, with the War Production Board. Such applications will be considered on an equitable basis in view of the quantities of steel drums distributed to other persons in the industry. Authorizations will not be dependent upon whether the applicant used steel drums during any previous period."

There have been no changes in Schedule A and Schedule B over those in effect prior to the amendment.

Conservation Order M-81

Conservation Order M-81 was amended on January 1, 1945, to remove black plate cans from any control under this order. Any cans made from black plate may be used without regard to packing quotas. This amendment also places limitations upon cans made from tinplate or terneplate. It also places in Schedule A the only products which may be packed in tinplate and terneplate, except under certain limitations certain products may be packed in cans where only soldered parts are made from tinplate or waste.

As Schedule A lists a great many chemicals with packing quotas, can sizes, and weight of material which can be used in the construction of the cans, it is recommended that this amendment be consulted.

PLANT OPERATIONS NOTEBOOK

Handling Benzene With Safety

Benzene vapor can be handled safely in industrial plants by adding correct amounts of certain inert gases to the benzene, according to a Bureau of Mines publication. Carbon dioxide or nitrogen, or a mixture of the two, are the inert gases that may be used.

The report describes research in one of a series of extensive experiments conducted by the Bureau to determine the inflammability and explosibility of various industrial gases and dusts, Dr. R. R. Sayers, Director, explained.

Written by G. W. Jones, a senior chemist at the Bureau's Central Experiment Station, Pittsburgh, Pa., the report, "Prevention of Benzene-Air Explosions by Addition of Nitrogen and Carbon Dioxide," contains all the information necessary for calculating the explosibility of complex combustible gassy mixtures.

"By graphs and tables provided in the report, these inflammability limits may be determined and the laboratory worker also can figure the percentages of oxygen in the mixtures that must not be exceeded if the mixtures are to be kept non-inflammable," Jones stated. "This information is particularly important in safety work. By its application, combustible mixtures containing benzene can be removed safely from various containers or equipment, or the mixtures may be introduced into such equipment originally containing air, without creating inflammable atmospheres. This is possible if the proper volume of inert gases—nitrogen or carbon dioxide, or mixtures of the two—are present in the proper concentrations when the benzene is introduced."

Included in Jones' report are tables showing inflammability limits of other industrial gases: Coke oven gas, hydrogen-nitrogen and hydrogen-carbon dioxide mixtures, carbon monoxide-nitrogen and carbon monoxide-carbon dioxide mixtures, methane-nitrogen and methane-carbon dioxide mixtures, ethylene-nitrogen and ethylene-carbon dioxide mixtures, ethane-nitrogen and ethane-carbon dioxide mixtures. Also listed are the composition and limits of inflammability of such air-free gases as coke oven gas, coal gas, carbureted water gas, mixed natural and water gas, oil gas, water gas, producer gas, and blast furnace gas.

A copy of the publication, Report of Investigations 3787, "Prevention of Benzene-Air Explosions by Addition of Nitrogen and Carbon Dioxide," may be obtained free from the Bureau of Mines, Department of the Interior, Washington 25, D. C.

Capacity of Rectangular Tanks

This chart will be found useful for rectangular tank determinations. The dimensions of the tank, all in inches, are given in columns A, C, and D. Then, as will be noted, you can find the number of cubic feet in column E, the gallons in column F, the pounds of water in column G, and the tons of water in column H. As a typical example, let us say that the width of a given tank is 10 inches, the depth 5 inches, and the length 20 inches. How many pounds of water will the tank hold?

Find the 10 in column A and run a straight line over to the 5 in column C and locate the intersection with column B. Then from that point of intersection run over to the 20 in column D and C. It will be observed, now, that columns C and J are exactly alike so that perfectly horizontal lines can be drawn between those two columns. In this instance the intersection in column C happens to be through the 10. So, simply run a straight line through the 10 in column C and the 10 in column J as shown by the dotted line and you have a perfectly horizontal line which gives all of the answers immediately, as follows:

Column E shows that the tank has a volume of nearly 0.6 cu. ft.

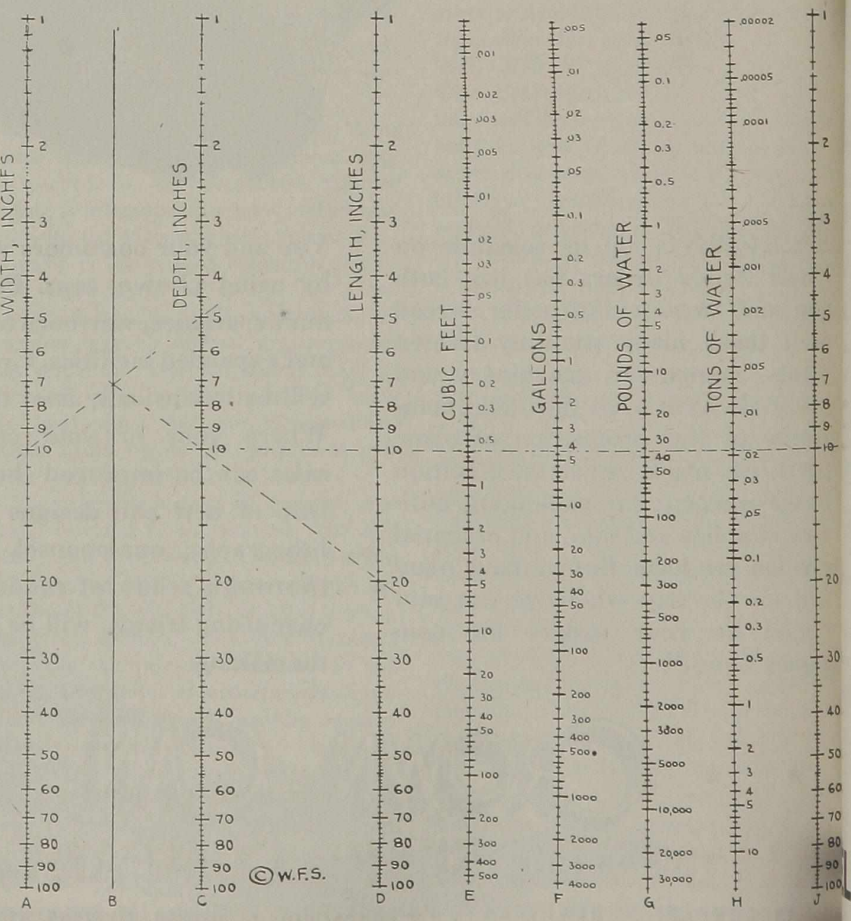
Column F shows that the number of gallons is about 4.3.

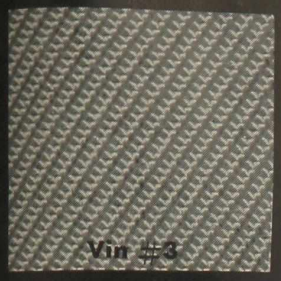
Column G shows that if the tank contains water the weight will be about 37 pounds.

Column H shows that the number of tons of water is approximately .018.

The chart has been made applicable to water because water is the most common liquid. If the tank is to be used for oil, the weight of the liquid would usually be less than that of water. If you know the density of the liquid, find the weight in pounds of water in column G, as above, and multiply that by the density of the liquid in the tank. Thus if the density of the oil is .9, we would have 37 pounds × .9 = 33.3 pounds of oil.

As will also be noted, the range of the chart is great enough to take care of most tanks, all dimensions varying from one to 100 inches.—W. F. SCHAPHORST





FOR FILTERING MINERAL ACIDS and ALKALIES

VINYON*

FIBER FILTER FABRICS

Longer life, higher efficiency and ultimate economy are characteristic of Vinyon Fiber filter fabrics. Perfected and developed through three years of field studies they are solving many problems in the filtration of mineral acid or alkali solutions.

Subject always to certain heat limitations Vinyon fiber fabrics are highly resistant to corrosive fluids.

Vinyon's economy is reflected in longer life for the filter septum and in minimum replacement shutdowns.

If you have a filter fabric problem with any of the processes or products listed below we will welcome your inquiry. The engineers on our staff are ever ready to discuss the possible application of Vinyon fabric to your particular industry and will be glad to make suggestions and help you in any way possible. When writing please include all information regarding your present filtration process. Address inquiries to 65 Worth Street, New York 13, N. Y.

* Reg. Trade Mark C. & C. C. C.

- Pigments and Dry Colors
- Dyes and Intermediates
- Salt Solutions
- Bleach Liquors
- Pharmaceuticals
- Mineral Acid Solutions
- Electroplating Processes
- Ceramics
- Metallurgical Processes
- Strong Alkali Solutions

BUY MORE WAR BONDS

WELLINGTON SEARS COMPANY, NEW YORK, N. Y.

LABORATORY NOTEBOOK

Inverted Triode Measures Minute Quantities

Grid currents as minute as one hundred thousandth of a billionth (10^{-14}) of an ampere can be measured with the inverted triode. In this tube the outer electrode, which is normally the plate in an ordinary vacuum tube, is used as the control grid. This inversion minimizes the space charge effect thereby making it possible to select a valve of grid bias that will result in zero grid current. Such sensitivity of measurement makes several operations practical that were previously considered very difficult or impossible. It is used to measure:

1. Hydrogen ion content of chemicals (pH).
2. Minute currents produced by photo tubes when subjected to starlight.
3. Ion current in mass spectrometer.
4. Alloying constituents of steel.
5. Minute quantities which previously required an electrometer or its equivalent.

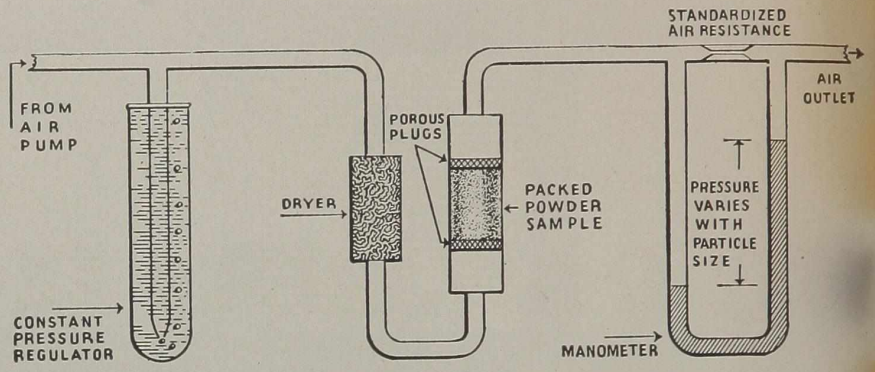
This three-electrode tube is designed to amplify currents and potentials which, when compared with valves used in common radio practice, are considered as infinitesimal quantities. With this tube, currents as low as 10^{-14} amperes can be measured and as low as 10^{-16} amperes can be indicated. Direct potentials can be measured to a sensitivity of 10^{-4} volts in circuits up to 10^{12} ohms in resistance.

The sensitivity of this tube is made possible by an extremely low grid current and a high grid-to-cathode resistance. Because of the small magnitude of the currents expected in the type of applications to which the tube is usually put, it is absolutely necessary that none of the minute quantities of current be absorbed in surface leakage. Therefore, every precaution has been taken so that unusually high resistance exists between each electrode.

New Instrument Measures Small Particles

The Sub-Sieve Sizer, a particle size instrument for measuring extremely fine powders, has recently been developed. Its operation is based on principles of resistance to air flow by packed particles. While the method is based on involved mathematical formulas, actual operation of the apparatus has been simplified and a calculator chart provided so that it is as easy to use as a balance.

The air permeability principle follows the rule that a current of air flows more readily through a bed of coarse powder than through an otherwise equal bed of fine powder. Air is forced by a pump through a series of chambers where the pressure is kept constant. It goes through



a dryer, and then through the sample, which is packed between porous plugs. The manometer shows the pressure which varies with particle size. By two simple expedients—use of the same sample weight in grams equal to the true density of the sample, and packing the sample to a known degree, variables are removed from the air permeability equation so that the laboratory worker need only set the calculator pointer at the liquid level in the manometer and read the particle size from the chart. The instrument does not differentiate between sizes of particles within the sample but provides an average measurement from the thousands of particles in the sample. The range is from 0.2 to 50 microns.

Among the industrial laboratories which will find the Sub-Sieve Sizer an asset to their routine tests are those controlling production of cements, pigments, pulverized coal, carbon black, cosmetics, powdered metals and insecticides.

Continuous Liquid Extractor

A worthwhile saving of man-hours in analytical work, may be gained by using the extractor in the accompanying figure. It replaces separatory funnels in the conventional method of extraction. This liquid-liquid extractor has the advantages of simple all-glass construction with ground joints and an inclined wire which may be moved up and down in its bearing.

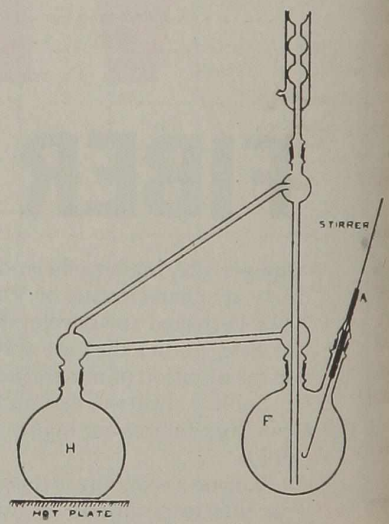
The apparatus may be used in the determination of total neutral oil in crude oil, extraction of neutral oil from soap stock and the extraction of neutral oil and fatty acid from acidified soap stock. It yields results comparable with those of the conventional method.

The aqueous phase containing the soap

ract-

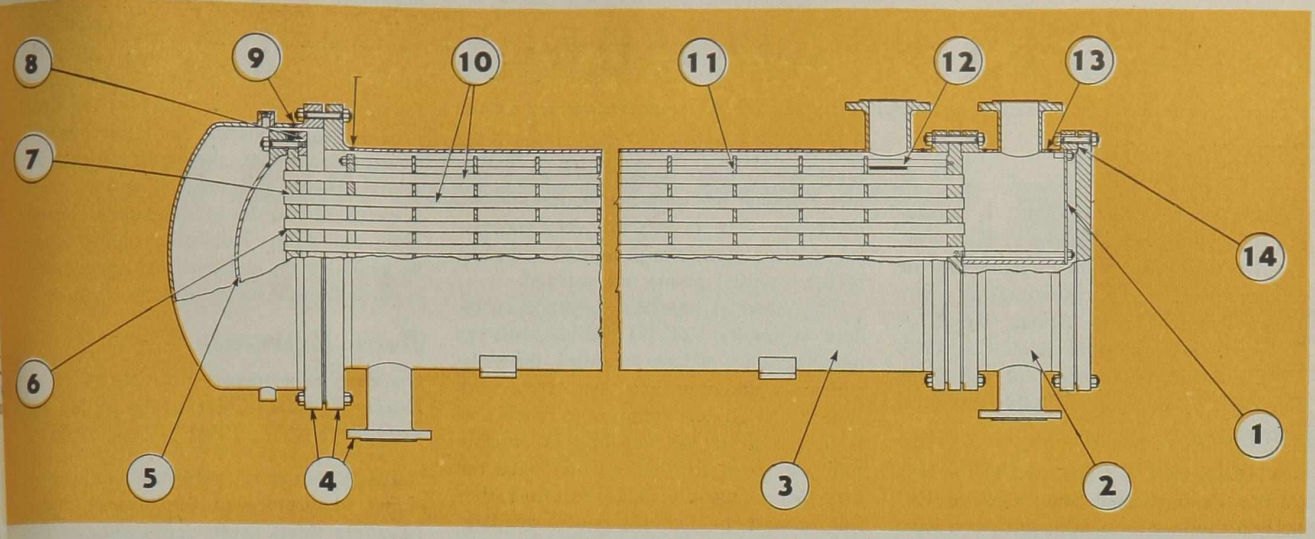
ing liquid is added until this flask is almost full, and about 100 ml. more are placed in flask *H*. The joints are lubricated with a glycerol-starch paste and the apparatus connected as shown. The stirrer is rotated rapidly to form an emulsion filling flask *F* almost to the top. Once this emulsion has been formed the stirrer may be stopped, as it is generally sufficiently stable to allow good extraction without further agitation. After completion of extraction, the emulsion may be broken by slow movement of the stirrer at the proper level. The loss of solvent through the bearing tube *A* is negligible, provided its diameter does not exceed that of the wire by more than 1 mm.

The end point of extraction may be ascertained by the color of the extract or by a spot test on paper. A drop of extract for the test may be easily obtained after a few minutes cooling by removing flask *H* and blowing gently at tube *A*.



During extraction the apparatus requires no supervision. The time necessary for completion varies with the rate of heating and the amount and nature of the material extracted. It rarely exceeds six hours.

Besides giving an appreciable saving of time this method, developed by Jorge Torok, eliminates the risk of loss during transfer between separatory funnels and reduces the amount of solvent to be recovered.



WHY G-R VANEFLO EXCHANGERS

Note these 14 advantageous features

1. Patented partition sealing plate eliminates staybolts and leaks between passes in heads.
2. Large variety of stationary head arrangements to meet conditions of service.
3. Shells strong, ductile, welding-quality steel plate.
4. Jigs and fixtures assure accurate positioning and alignment of welded nozzles and flanges.
5. Floating heads prevent temperature stresses.
6. Tube holes in tube sheets drilled and reamed for proper tube seating.
7. Patented Multi-groove tube joint assures maximum strength and lasting tightness.
8. Patented split-ring joint permits largest tube bundle for given size shell.
9. All welding by experienced men. Welding shop approved by leading insurance companies.
10. Triangular tube spacing for clean fluids; square pitch for cleaning lanes when required.
11. Variety of baffle designs for minimum pressure drop on any service.
12. Baffles opposite shell nozzles prevent dead spaces at ends of unit.
13. Stationary head channel extra heavy with ample reinforcement around nozzle openings.
14. Any type gasketed joint and gasket material may be supplied.

give best service wherever shell-and-tube heat transfer apparatus is required.

In the drawing above are pointed out 14 advantageous features . . . many of them exclusive . . . in G-R Vaneflo Heat Exchangers.

Some of these features assure **greatest effectiveness** . . . maximum heat transfer rates for allowable pressure drop. Others maintain **freedom from trouble** . . . absence of expansion and contraction strains or security against leakage between fluids or failure of joints. And others provide **convenience** . . . ready access for inspection and cleaning.

These are some of the reasons for the outstanding popularity of G-R Shell-and-Tube Heat Exchangers . . . designed for today's requirements and backed by three quarters of a century of experience in solving heat transfer problems of every kind in every industry. Write for Bulletin 915 describing G-R Vaneflo Exchangers in greater detail.

THE GRISCOM-RUSSELL CO.
285 Madison Avenue New York 17, N. Y.

GRISCOM-RUSSELL

Pioneers in Heat Transfer Apparatus

INDUSTRY'S BOOKSHELF

Metallurgy Texts

FERROUS METALLURGY. VOL. 1, INTRODUCTION TO FERROUS METALLURGY; VOL. 2, MANUFACTURE AND FABRICATION OF STEEL; VOL. 3, METALLOGRAPHY AND HEAT TREATMENT OF STEEL. By *E. J. Teichert.* McGraw-Hill Book Co., 1944. Vols. I and II, $4.00 each, Vol. III, $5.00. Reviewed by *S. Epstein,* Bethlehem Steel Company.

THESE BOOKS are used as the text in the Pennsylvania State College Extension Courses in metallurgy which have been organized in many cities throughout the State of Pennsylvania. In the past our colleges have been unable to supply the needs of the steel industry for metallurgical graduates, so that most of the college men in the industry have had engineering or chemical training rather than metallurgical. This may have been just as well, since the steel industry is so largely based on engineering and chemistry. However, many of these graduates often find themselves in jobs where they feel that a good grounding in metallurgy would help them do better work. This 3-year course in the metallurgy of iron and steel (there is also a 4th year of laboratory work) has, therefore, been provided, the classes meeting in the evening twice a week for two-hour periods. The instructors are usually experienced metallurgists employed in local steel mills. The steel industry has been very cooperative in arranging for inspection tours and in other ways. The classes have been given continuously for the past 10 years and have been highly successful; for example, the present enrollment in the city of Bethlehem, in which the reviewer resides, is over 200 men and women.

The books under review now used in metallurgical courses to fill this need have undergone repeated revisions in the past 10 years and now fulfill extremely well their intended purpose, that of covering in an elementary fashion, but clearly and in considerable detail, the chemical and physical metallurgy of the iron and steel industry. Volume I contains a brief but useful review of such general chemistry, physics, and ceramics as will be needed later and then proceeds with the metallurgy proper. In dealing with the manufacture of iron and steel, Vols. I and II describe the furnaces and mills and how they operate. The viewpoint is practical and the method may perhaps be termed operational—one is told what an open-hearth furnace, for example, looks like, all the essential parts, and exactly what each man of the crew must do to make a heat of steel. The metallurgical reactions are also explained, of course. The results are very successful; a clear picture is presented and most of the essential points are covered.

The material has been brought up-to-date, especially Vol. III dealing with the metallography of iron and steel, the principles of alloying, and heat treatment. Indeed this volume contains so much that is new, that it has not had the opportunity to crystallize as well as have the first two volumes. Vol. III is also rather full, almost to the point of crowding. However, here too the various topics are well chosen and arranged, and competently treated.

The three volumes cover such a wide range that some erroneous and inaccurate statements have crept in. There ought to be some provision whereby alert students and instructors may aid in having the proper corrections made in future editions. These books may be recommended as worthy texts on the subject, suitable for home study as well as in the class room.

Compilation on Resonance

THE THEORY OF RESONANCE by *George Willard Wheland.* John Wiley and Sons, Inc., N. Y., 1944; 316 pp., $4.50. Reviewed by *G. Albert Hill,* Wesleyan University.

RARELY, as a scientist, has this reviewer had a pleasanter task than the preparation of this review. It would be redundant to emphasize the importance of resonance to the modern organic chemist. No one ignorant of the subject can lay the least claim "to knowing his way around in the field." Wheland has done all organic chemists, "old-fashioned" structural chemists and modern "electronicers" alike, a great service by compiling this material, but more especially by his extraordinarily lucid presentation. As a pedagog, and hence as one who knows something of the difficulties involved in getting ideas across, the reviewer salutes the author for his skill and the consequent achievement. The Chemistry Department of the University of Chicago is to be congratulated on having on its staff so excellent a teacher as Professor Wheland. No rightminded organic Ph.D. candidate should approach his examinations without command of the resonance theory and its highly significant applications which this book makes available. Many of the difficulties besetting the synthesist become intelligible, and avoidable, by a study of this [illegible] organic chemistry, even at the introductory level, will be impressed with the amount of this material which readily and quite properly can be incorporated in their courses. Professor Wheland's comments in the book provide "springboards" for numerous new research problems. Ample documentation is presented as footnotes. The book-work is excellent and the proof-reading exceedingly well done. This little volume should be available to, and used by, anyone who regards himself as an organic chemist.

Basic Reference

ORGANIC SYNTHESES, Vol. 24, by *N. L. Drake,* Editor-in-Chief. John Wiley and Sons, Inc., N. Y., 1944; 119 pp., $2.00.

THIS annually published volume of signal importance to the organic chemist offers thirty-seven new syntheses this year: Acenaphthenequinone; Aminoacetal; 4-Amino-2, 6-Dimethylpyrimidine; *dl-a*-Amino-*a*-phenylpropionic Acid; 4-Amino-1,2,4-triazole; Benzoyl Cyanide; Benzoylformic Acid; *tert*-Butyl Acetate; *o*-Chlorobromobenzene; *w*-Chloroisonitrosoacetophenone; 2-Chlorolepidine; 1-Chloromethylnapthalene; Coumarilic Acid; Cyclopropanecarboxylic Acid; *nor*-Desoxycholic Acid; 3,12-Dacetoxy-*bisnor*-cholanyldiphenylethylene; *v*-Di-*n*-buty laminoprpoylamine; 26-Dichloroaniline and 2,6-Dibromoaniline; Diphenyldiazomethane; Ethyl Diazoacetate; Ethyl Hydrazinecarboxylate and Diaminobiuret; Ethyl N-Tricarboxylate; Glyoxal Bisulfite; 4(5)-Hydroxymethylimidazole Hydrochloride; 4-Methylcarbostyril; 4-Methylcoumarin; Methyl Pyruvate; *o*-Nitrobenzaldehyde; *p*-Nitrobenzyl Acetate; *p*-Nitrobenzyl Alcohol; Phenylmethylglycidic Ester; 1-Phenylnaphthalene; *a*-Phenylpropionaldehyde; Selenophenol; Sorbic Acid; Undecyl Isocyanate; Vinylacetic Acid; Subject Index for Volumes 20-24.

Other Publications

MOLDING TECHNIC FOR BAKELITE AND VINYLITE PLASTICS, authoritative text on plastics molding, has been published by Bakelite Corporation. This 224-page illustrated handbook discusses important phases of commercial molding processes and equipment. It contains comprehensive data for designer, engineer, molder, and users concerning fabrication and design of hot-set and cold-set molding materials. Chapters on cost accounting, molding plant layout, and nomenclature are of special interest. Numerous up-to-date tables, diagrams, and illustrations supplement the text. Copies can be secured by writing to the Bakelite Corporation, 300 Madison Avenue, N. Y. 17, N. Y. Price, $1.50.

THE OXY-ACETYLENE HANDBOOK, published by The Linde Air Products Company, fulfills a need for a complete, comprehensive, and authoritative textbook on basic oxy-acetylene welding and cutting procedures. This 600-page manual can be used as a guide for self-instruction or as a standard classroom textbook. It covers the entire range of the oxy-acetylene process, giving clear, easy-to-follow instructions for handling all the common commercial metals, together with simple explanations of the fundamental principles of the various methods of depositing and controlling molten metal. Considerable space is devoted to an explanation of the operating principles of oxy-acetylene equipment and instructions for its care and maintenance. The book can also serve as an authoritative reference book for plant management, engineers, designers, superintendents and foremen in shops where oxy-acetylene welding and cutting is used as a production or a maintenance tool. Price, $1.50.

You can use Versatile Sulfuryl Chloride in many Different Reactions

Sulfuryl Chloride is a versatile reagent valuable in the synthesis of organic chemicals. Reactions are simple, easily controlled, and yield is high.

Chlorination of Aromatics and Aliphatics

In the chlorination of aliphatic and aromatic compounds, Sulfuryl Chloride is firmly established. Among these reactions are those with sodium salts of organic acids to produce organic acid chlorides. It is used to chlorinate phenols and its derivatives, and while the products obtained are in general the same as with gaseous chlorine, with Sulfuryl Chloride the reaction is less vigorous and more easily controlled. It also chlorinates aromatic amines readily without the aid of catalysts.

With the use of aluminum chloride (also produced at Hooker) as catalyst, benzene and toluene may be chlorinated in stages. With naphthalene, sulfuryl chloride demonstrates its sensitivity to altering reaction conditions —as chlorination can be made to give 1-chloronaphthalene, 1, 4-dichloronaphthalene or 1, 2, 3, 4-tetrachloro-1, 2, 3, 4-tetrahydro naphthalene.

It has recently been discovered that chlorination of aliphatic hydrocarbons and their derivatives with sulfuryl chloride in the presence of small amounts of peroxide takes place at moderate temperatures. Generally speaking, the products of chlorinating various paraffin hydrocarbons and their halogen derivatives parallel those produced by the photo chemical reaction with gaseous chlorine.

Bulletin 328-A

Bulletin 330

Sulfonation of Aromatics and Aliphatics

But this versatile chemical is not satisfied with serving only in chlorinating reactions. Of almost equal importance is its use in sulfonation of both aromatic and aliphatic compounds. Recent reports indicate that by the addition of small quantities of aluminum chloride to a cooled reaction mixture of sulfuryl chloride and aromatic hydrocarbons, such as benzene, toluene, xylene and mesitylene, sulfonyl chloride derivatives could be obtained.

In the sulfonation of aliphatic compounds, it has been found that in the presence of light and a catalyst such as pyridine, sulfuryl chloride and paraffin hydrocarbons undergo a rapid, vigorous reaction with the formation of alkyl sulfonyl chlorides, with yields in some cases as high as 70%. Among the hydrocarbons thus sulfonated are cyclohexane, n-butane, ethylbenzene, and *tert*-butylbenzene.

Acylation

In many reactions Sulfuryl Chloride reacts as an acid chloride of sulfuric acid to form alkyl chlorsulfonates with many aliphatic alcohols. Aliphatic amines and aromatic amines may also be reacted with Sulfuryl Chloride to produce a number of interesting acylated products. Sulfuryl Chloride is capable of many other interesting reactions not described herein.

Literature on Sulfuryl Chloride Available

Hooker Bulletin 328A on chlorinating agents gives more complete information on sulfuryl chloride and other Hooker chlorinating agents. The Hooker Electrochemical Co. also has available Bulletin 330, reprint of an article "Sulfuryl Chloride in Organic Chemistry," which recently appeared in Industrial and Engineering Chemistry. Both are available when requested on your letterhead.

HOOKER ELECTROCHEMICAL COMPANY

3 Forty-Seventh St., Niagara Falls, N. Y.

New York, N. Y. • Tacoma, Wash.
Wilmington, Calif.

HOOKER CHEMICALS

CAUSTIC SODA **MURIATIC ACID**

CHLORINE **PARADICHLORBENZENE**

BOOKLETS & CATALOGS

Chemicals

A734. ANHYDROUS AMMONIA. The chemical and physical properties of anhydrous ammonia are listed with important industrial uses in a small size brochure. The Barrett Division, Allied Chemical & Dye Corp.

A735. BATTELLE MEMORIAL INSTITUTE. A non-technical account of the major activities of the Institute, illustrated with pictures of the staff, plant and equipment, shows how the will of the founder has been carried out to "serve mankind through the making of discoveries and inventions . . ." Batelle Memorial Institute.

A736. CHEMICALS LIST. Esters, synthetic waxes, emulsifying agents and a number of additional items are enumerated in a catalog from Glyco Products Co., Inc.

A737. CHLORINATING AGENTS. Summaries of the more important aspects of the use of chlorine and its derivatives in the production of organic compounds, have been studiously prepared and are presented with bibliographies, in technical bulletin No. 328 A, from the Hooker Electrochemical Co.

A738. CONTINUOUS PEROXIDE BLEACHING PROCESSES, for the textile industry, are enumerated in a profusely illustrated, 24-page, two-color booklet from E. I. du Pont de Nemours & Co., Inc.

A739. ETHYL CELLULOSE. Two technical booklets on ethyl cellulose, base of many plastics, flexible lacquers, adhesives, fabric coatings and electrical insulation, have recently been published. The 48-page booklet on "The Properties and Uses of Ethyl Cellulose" lists and describes the characteristics which have made this product important to industry. The first of the three divisions gives types and grades, general properties and a blending chart. It is followed by data on formulation and specific applications in various industries. The second booklet, entitled "Ethyl Cellulose Formulations with Resins and Plasticizers" has a more practical slant. It is intended to eliminate unnecessary research on the part of experienced formulators by providing a basis for formulation of ethyl cellulose lacquers, adhesives, plastics and hot-melt castings. Hercules Powder Co.

A740. GEON PLASTICS AND SYNTHETIC RUBBER. The combination of these compounds is discussed in an 8-page bulletin, which also gives uses, compounding techniques and mixing operations. B. F. Goodrich Co.

A741. NEW GLYCERINE BOOKLET. 1583 ways to use glycerine are listed in an attractive booklet printed in grey on bookstock. The categories number medicines, foods and beverages, photography, agriculture, cosmetics and coatings. Glycerine Producers Assn.

A742. NEW ORGANIC PRODUCTS. Summarizing available technical data relating to many new industrial products which include fungicides (the pyridylmercuric salts), and ultra-pure chemicals for phosphors, a new 16-page, carefully prepared booklet, has been published by the Mallinckrodt Chemical Works.

A743. PETROLEUM REFINING. A serious 14-page booklet giving information on catalytic cracking, alkylation, dehydrogenation and related subjects, has been prepared with diagrams and flow sheets. Universal Oil Products Co.

A744. PLASTIC COATING. Amercoat No. 23, available in five shades, flexible, non-flammable and resistant to bacteria is explained in full in a bulletin from the American Pipe and Construction Co.

A745. PLASTICS. Twenty Years of Plastic Surfacing titles a new booklet (9½ by 12), bound in a stiff blue cover by a white plastic spiral. The 44 pages, done in black and blue, are as simply arranged as a children's book and as well cartooned as The New Yorker. For instance, to illustrate the resistance to abrasion of surface coatings, made from vinyl chloride copolymers, we are delighted with a line drawing of a knight in full armor enjoying his shower. The book proves the importance and the extent of the use of plastics in industry. Roxalin Flexible Finishes, Inc.

A746. PLASTICS, BAKELITE AND VINYLITE, with descriptions of their variations, are presented in 24 bright pages, which are substantiated with photographs and charts. Bakelite Corp.

A747. PRICE LIST AND CATALOG. Essential oils, certified colors, flavoring materials, oleoresins and balsams are among some of the products listed in the November-December brochure. Magnus, Mabee & Reynard, Inc.

A748. REFRACTORIES made from flint and plastic clays from mines in Kentucky and Southern Ohio are presented in an 8-page folder, with information on insulating fire brick and high temperature bonding mortars. Harbison-Walker Refractories Co.

A749. REFRIGERATION WITH AMMONIA is the title of a new brochure which is divided into three parts: mechanical equipment, properties of ammonia and operating suggestions. Pennsylvania Salt Manufacturing Co.

A750. SALTS. The history of Searles Lake, California, and the development of the town of Trona, where potash salts, soda and bromine products, boron materials and lithium salts are produced, are narrated in a 31-page booklet from the American Potash & Chemical Corp.

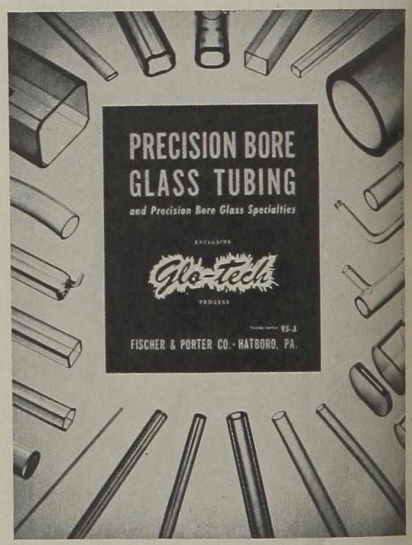
A751. WATER COOLERS are pictured in a brochure from Drayen-Hanson, Inc.

A752. WOOL SHRINKAGE CONTROL with Lanaset is the subject of technical bulletin No. 766, which discusses the properties and mill trial results of this melamine resin. Calco Chemical Division, American Cyanamid Co.

Equipment—Methods

F246. ARC WELDING FOR CAST IRON. Four ways to salvage, reclaim and conserve iron castings by electric arc welding, accompanied by micro-photographs of the deposits made by the various electrodes are presented in a 12-page illustrated booklet. C. E. Phillips & Co.

F247. BORE TUBING. Catalog 95-A tells the story of "glo-tech," a new technique for producing precision tubing, and shows many examples used in barometers, manometers, viscometers, absorption cells and other instruments.



F248. CLAMPS AND FITTINGS, bearing the name Punch-Lok, are outlined in a well diagrammed and generously tabled 7-page brochure, suitable for inclusion in a notebook. B. F. Goodrich Co.

F249. COOLER. Air-quenching inclined-grate cooler designed and built principally for the production of cement clinker of high glass content, with successful application to the cooling of ores, lime and dolomite, is fully outlined with photographs in a fourteen page bulletin (CO-3) from the Fuller Co.

F250. ELECTRIC FURNACES. Precision heat treating by means of electric furnaces of box, pit, car-bottom, roller-hearth, conveyor or elevator type is the theme of a generously illustrated 76-page

booklet ... veniently bound with a plastic spiral. General Electric.

F251. EQUIPMENT listed in a new 32-page, vest-pocket size booklet includes drills, reamers, axles, gears, fork trucks, and a recently developed Booster engine for 1½-ton trucks. Clard Equipment Co.

F252. FILTERS FOR REFINERIES. Continuous vacuum, continuous pressure and batch pressure filters are covered in a 12-page bulletin (405-R) from Oliver United Filters, Inc.

F253. HEATING UNITS. A brief leaflet summarizes the items, including autoclaves, hot plates, air heaters, furnaces and kettles which are listed in a larger catalog published by the same company. Harold E. Trent Co.

F254. HYDRAULIC EQUIPMENT for the process industries, comprising presses, pumps, accumulators, as well as forged steel fittings and valves, is displayed in an eight-page brochure. Watson-Stillman Company.

F255. LABORATORY EQUIPMENT. This large catalog, No. 44, of over 300 pages gives complete listings of glassware by Corning Glass Works and Kimble Glass Co., and chemical and scientific porcelain ware made by Coors Porcelain Works, as well as special instruments and utensils. The book is well indexed and clearly arranged, with illustrations, descriptions, and price charts for each item. Schaar & Co.

F256. MIXERS, which grind, disperse, dissolve (and some which change cans), are found with adequate definitions in a 12-page catalog, No. 62, from Abbé Engineering Co.

F257. NEW AUTOCLAVE CATALOG. A complete line of standard and specially designed high pressure autoclaves, made from forged steel, or non-corrosive commercial alloys, which withstand pressures up to 25,000 pounds per square inch, is displayed in a new bulletin, done in red and blue. Struthers Wells Corp.

F258. NEW DIP TANK CATALOGS. Two new 16-page catalogs containing complete specifications have been issued covering insulated tanks that are fueled by gas or electrically heated with thermostatic controls. Aeroil Burner Co., Inc.

F259. NEW DOOR for use on high pressure or vacuum processing equipment, which is "all welded" and quick opening, and is controlled either manually or hydraulically is explained in a 4-page brochure. Locking of the door is accomplished by a split ring, fitting in to a circular groove in the door frame. Struthers Wells Corporation.

F260. NEW PLASTIC COATER. Twenty-two different models of machines designed to melt ethyl cellulose compound and other plastic coatings used for protecting parts and tools for storage or shipment, or for permanent coatings, are presented in a recent bulletin from Youngstown Miller Co.

F261. PACKAGING. "The Palletized Load" is a serious booklet of 28 pages, which explains the economies in shipping space and handling costs gained by practicing the theory of designing shipping containers to fit the freight car instead of the merchandise to be packed. Robert Gair Co., Inc.

F262. POWDER MIXER. An 8-page bulletin in two colors tells, with the aid of photographs, the advantages of certain intimate blending systems for use with fine chemical, food and insecticide powders. Sprout, Waldron & Co.

F263. POWER PLANT OPERATION is the topic of a compact 36-page booklet entitled "Dividends for your Power Plant," which contains ten non-technical discussions by authorities on steam generation. Preferred Utilities Manufacturing Corp.

F264. PRECISION CLEANING MACHINES for ball bearings are described in a four page leaflet from the L & R Manufacturing Co.

F265. PROCESS EQUIPMENT, including forty different categories, ranging from the smallest agitator to huge process vessels, are listed with drawings and descriptions of operating principles in a combined catalog from Porter, Devine and Quimby.

F266. PULVERIZING MACHINERY. A new catalog covering the basic features and application of the Mikro-Pulverizer line for such diverse fields as chemical processes, pharmaceuticals, cosmetics, foods, plastics, sugar refining and dyes has been issued. The forty pages are filled with pictures and clearly arranged data. In the back are found two test grinding sheets with an offer for servicing. The book has a stiff cardboard cover and is bound with wire rings. Pulverizing Machinery Co.

F267. RECHARGEABLE STORAGE BATTERY for flashlights is thoroughly depicted in a 6-page catalog section (12030). B. F. Goodrich Co.

F268. SAFETY RULES for the operation of power industrial trucks are printed on a sturdy cardboard folder. Elwell-Parker Electric Co.

F269. SAND HARDNESS TESTER. Devices for determining the hardness of both molds and cores are listed in a leaflet from the Harry W. Dietert Co.

F270. TACHOMETERS, which are designed to show continuously the speed or fluctuation in speed of any rotating part, by revolutions per minute, are presented in a folder from Jones Motrola Co.

F271. THERMOCOUPLE DATA BOOK AND CATALOG, containing 40 pages, gives descripions of products, prices, and recommendations for using thermocouples, lead wire, protecting tubes, heads and insulators. Also included are millivolt tables, temperature conversion tables and a fraction-decimal equivalent chart. Wheelco Instruments Co.

F272. TUBING. A colorful 16-page booklet gives in detail, with diagrams, information on close tolerance, cold reduced seamless tubing. Rockrite tubing is made from a variety of materials: carbon, alloy and stainless steels, copper, brass, nickel and aluminum. Tube Reducing Corp.

F273. VACUUM PUMPS of the rotary-piston type, are the subject of a recent 12-page pamphlet containing valuable charts, graphs and pictures. Beach-Russ Co.

F274. WATER CONDITIONING. "Some Characteristics of Acid Regenerated Carbonaceous Zeolite" are discussed in a studious pamphlet of reprints from proceedings of the Fourth Annual Water Conference, Engineers Society of Western Pennsylvania. Cochrane Corp.

F275. WATER DE-GASSING EQUIPMENT for use in removing carbon dioxide in connection with iron removal plants, and with the degassification of hydrogen zeolite softened waters, is defined in a leaflet from the Cochrane Corporation.

F276. WATER PURIFICATION EQUIPMENT. A new bulletin describing the Dorrco Hydro-Treator, giving details of construction and operation, and containing several pages of graphs, tables and formulas useful to water technologists comes from the Dorr Co.

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

Chemical Industries, 522 Fifth Ave., New York 18, N. Y. (1-5)
I would like to receive the following free booklets or catalogs.

A734	A740	A746	A752	F251	F257	F263	F269
A735	A741	A747	F246	F252	F258	F264	F270
A736	A742	A748	F247	F253	F259	F265	F271
A737	A743	A749	F248	F254	F260	F266	F273
A738	A744	A750	F249	F255	F261	F267	F274
A739	A745	A751	F250	F256	F262	F268	F275
							F276

Name ..... (Position) .....

Company .....

Street .....

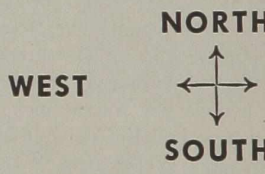
City & State .....

It pays to be a Bemis Multiwall paper bag Customer

EVEN though direct government purchases have taken a considerable part of our multiwall paper bag production this year, Bemis customers have not suffered . . . they have been supplied on the basis of past purchases, even in the face of the labor shortage and no increase in facilities.

Naturally, the demand for Multiwalls has been greater than the supply. Much as we regret inability to fill all orders, we have felt a responsibility to take care of our regular customers first. Fortunately, we've been able to do that—and right on schedule. If it's humanly possible, we'll keep on maintaining this service.

War or peace, we want our customers to feel that it pays to be Bemis customers.



A major reason we've been able t supply our Multiwall customers is th size and flexibility of our productio facilities.

Bemis Multiwall Plants at

PEORIA, ILL.
EAST PEPPERELL, MASS.
MOBILE, ALA.
SAN FRANCISCO, CALIF.
WILMINGTON, CALIF.
ST. HELENS, ORE.

These plants not only give us lar production, but also quick accessibili to all parts of the country.

BEMIS BRO. BAG CO.

Baltimore • Boston • Brooklyn • Buffalo • Charlotte • Chicago • Denver
Detroit • Houston • Indianapolis • Kansas City • Los Angeles • Louisville
Memphis • Minneapolis • New Orleans • New York City • Norfolk • Oklahoma City • Omaha • St. Louis • Salina • Salt Lake City • Seattle • Wichita

East Pepperell, Mass.

NEWS OF THE MONTH

Technical Associations Comply With ODT Convention Ban

"Meetings in Print", "Conventions at Home" are substituted to relieve overtaxed transportation, housing facilities. Committees of Army, Navy, WPB heads review permits.

MOVING speedily to cooperate with Justice Byrnes in his objectives to relieve overburdened transportation and hotel facilities and to conserve badly needed scarce materials and manpower, numerous technical societies in the chemical and allied industries have cancelled entirely or made substitute provisions for their meetings for the coming year.

Within a few days after the ODT request was made, several major technical associations had given swift support and impetus to the curtailing movement. The American Institute of Mining and Metallurgical Engineers, whose annual gatherings usually attract approximately 3,000 members has cancelled its anticipated February 19 to 23 meeting. The Executive Committee of the Technical Association of the Pulp and Paper Industry announced the cancellation of their February 19 to 22 meeting in New York with the decision that all papers scheduled for presentation would be published in the regular association media and distributed to the membership.

Another major cancellation was that of the National Association of Insecticide and Disinfectant Manufacturers' meeting scheduled for June 4 and 5. The American Gas Association has cancelled nine meetings. The American Medical Association, the New York State Pharmaceutical Association, the American Association of Textile Chemists and the Proprietary Association of America have all announced cancellations.

The Manufacturing Chemists' Association has decided against holding its annual meeting, and the American Society for Testing Materials is postponing its spring meeting, while revoking plans for Committee Week in Pittsburgh.

Of the chemical societies, the ACS Rubber Division has cancelled its April meeting, but the annual national meeting of the American Chemical Society scheduled for September in Chicago is still on the books and will be held there pending further developments as long as possible.

To date, plans for the annual Exposition of Chemical Industries, scheduled for December, have neither been confirmed nor withdrawn, nor has the location been designated.

It was the opinion of Dr. Gustav Egloff, president, that the American Institute of Chemists meeting will be held as planned on May 11 and 12 in Columbus, Ohio. The Chemical Market Research group was as yet undecided but felt that its meetings might continue because of its small membership which is confined largely to New York. The Drug, Chemical and Allied Trades Section of the New York Board of Trade, however, cancelled its annual dinner which was to be held at the Waldorf in New York on March 15.

The American Institute of Chemical Engineers has filed a request to hold its spring regional meeting as originally scheduled for May 1-3 at Houston, Texas.

The National Farm Chemurgic Council postponed its March meeting, but it has applied for permission to hold one later in the year. The Electrochemical Society has not cancelled its scheduled convention in Atlantic City pending a decision from Justice Byrnes.

The National Paint, Varnish and Lacquer Association is continuing its wartime policy of conducting its "Convention at Home."

Putting teeth into the request long urged by governmental transportation authorities are the new ODT regulations going into effect February 1st under which a committee has been set up to pass on requests from groups of more than 50 persons wishing to hold conventions that would tax transportation and housing facilities.

The War Committee on Conventions includes Colonel J. M. Johnson, head of ODT, as chairman; Robert P. Patterson, Undersecretary of War; Ralph A. Bard, Undersecretary of the Navy; and J. A. Krug, chairman of the War Production Board.

Convention application forms are obtainable from hotels, ODT and convention bureaus. They may be submitted by mail to Secretary Richard Clare, Room 7321, Interstate Commerce building, Washington 25, D. C., not less than 30 days in advance of the proposed meeting. Requests will not be acted upon for meetings that are more than six months away. Of the first 110 requests for permits received by the committee only 2 were granted, (the Red Cross, and a war bond campaign in North Carolina).

Opinions among technical societies varied from the whole-hearted expression of willingness to accede to the request voiced by A. B. Parsons of the American Institute of Mining and Metallurgical Engineers to the deliberate "we'll-wait-and-see" attitude of others.

WPB Considers New Peroxide Plant

The Chemicals Bureau of the War Production Board has under consideration a plan to construct a 25-volume hydrogen peroxide plant in the New York area to take care of essential civilian and indirect military needs for the chemical, it was learned here recently.

The greatly increased military requirements for hydrogen peroxide, has severely restricted the flow of the chemical into civilian products.

Two important obstacles in the path of this plan are the announced WPB policy to prohibit construction of new production facilities for civilian goods, and the fact that the plant would be located in a number one critical labor area where manpower would be a hindering factor to construction. Therefore, civilian needs for hydrogen peroxide will probably be unsatisfied until the military programs are met.

Construction Plans on U. S. Bruceton Research Laboratory Announced

Secretary of the Interior Harold L. Ickes has announced that the Hinman Brothers Construction Company of Pittsburgh has been awarded a contract for building an access road and grading the site for the new synthetic liquid fuels research and development laboratory to be erected at Bruceton, Pa., by the Bureau of Mines.

This firm's bid of $91,520 was the lowest of eight submitted, in amounts up to $149,000.

Equipment has been moved to the site and work began January 15.

The Bruceton research and development laboratory, which is not to be confused with the demonstration pilot plants that the Bureau will build later to demonstrate methods for producing gasoline and other products from coal and

oil shale, is a part of the five-year research program in synthetic liquid fuels recently authorized by Congress.

Actual construction of the laboratories is scheduled to begin about February 12, Secretary Ickes said. In order to have the buildings ready for occupancy late this year, the Bureau may let separate contracts for other construction and services to speed up the job. Equipment is being ordered and will be installed as rapidly as construction permits.

This laboratory, Secretary Ickes said, will be used to improve the processes for hydrogenation and gas synthesis employed in England, Germany, and other countries, so that the demonstration plants will incorporate the most up-to-date techniques available. Serving a dual purpose, the laboratory-research program is intended to eliminate the "bugs" from the methods and equipment and lower the costs of the demonstration plants and their products.

Chemical Plant Facilities Expanded

Estimates of the amount of chemical facilities to be constructed this year have undergone a sharp upward revision, it was learned.

WPB authorizations for new chemical plant construction to meet war needs are currently running at the rate of $15,000,000 to $20,000,000 per month. Whereas it was recently estimated that 1945 would witness about $150,000,000 of new chemical plant building, the latest forecast is for a total of nearer $200,000,000.

RFC Commitment Totals Disclosed

Since the start of the production program, the Defense Plants Corporation, according to Secretary of Commerce Jones, has made commitments totaling $119,000,000 for expansion of chemical production facilities. The commitments involve 161 projects.

In addition DSC has made commitments totaling $812,000,000 for ninety-seven aluminum facilities projects; $715,000,000 for fifty-seven synthetic rubber manufacturing projects; $453,000,000 for fifty-two magnesium projects; and $245,000,000 for thirty-eight aviation gasoline projects.

Wyeth Penicillin Plant Studied by Brazilian Chemists

Brazilian chemists and bacteriologists will study U. S. penicillin manufacturing methods at first hand preparatory to the establishment of a municipal penicillin laboratory in Rio de Janeiro, Brazil, Dr. Jesuino de Albuquerque, secretary of public health of the Federal District of Rio de Janeiro made known.

Dr. Albuquerque, who is here on a mission for President Vargas of Brazil and is investigating U. S. penicillin manufacturing methods at the request of Mayor Dodsworth of Rio, said the penicillin laboratories of Wyeth Incorporated at West Chester and Kimberton, Pa., have been selected for special study because, according to him, "from the standpoint of both facilities and processing, they provide the ideal pattern for us to adopt in Rio."

The Wyeth organization has made the facilities of its Philadelphia, West Chester and Kimberton laboratories available to the Brazilian scientists for their study.

Henriques Appointed Arnold, Hoffman Head

Arnold, Hoffman & Co., Inc., Providence, Rhode Island, announce the appointment of Jeffrey B. Henriques as vice president in charge of purchasing and sales for their new industrial chemical sales division. For the past twelve years, Mr. Henriques has been general purchasing agent for the United Merchants & Manufacturers Management Corporation and is widely known in the trade.

Chlorine Output Picture Unchanged

Approximately 340,000 tons of chlorine are expected to be produced in the first quarter of 1945, the War Production Board announced.

This approximates production for the fourth quarter of 1944, and the pattern of distribution will remain about the same, officials said. However, slightly more chlorine will be made available for direct war uses, and some increase will be made in allocations to the paper industry for the production of chemical pulp, the WPB added.

Use of Gov't-Owned Patents Urged

Enactment of legislation permitting the sale or issuance of exclusive licenses on government-owned patents to insure commercial development of inventions covered by government patents when such action is considered necessary in the public interest, has been recommended to Congress by the National Patent Planning Commission.

The recommendation is contained in the second report of the commission, which was forwarded to Congress January 10 by President Roosevelt. The commission also recommended establishment of a central control body to supervise general policies regarding the disposal of government-owned patents, and the policies of the various departments relating to inventions of their employees.

First Polymer Chemistry Education Division Founded

Organization of a separate division of polymer chemistry under the direction of Dr. Herman F. Mark, the noted international authority, who has been professor of organic chemistry for the past five years, has been announced at the Polytechnic Institute of Brooklyn following action by the corporation providing for the establishment of a highpolymer research bureau.

With this move, Polytechnic becomes the first educational institution in the United States to set up a complete division for polymer chemistry.

To meet the growing need in the field of plastics chemistry, the new highpolymer research bureau at the Polytechnic Institute, according to President Harry S. Rogers, was formed to set up a vigorous organization under strong leadership with the purpose of bringing the fundamental knowledge of the chemistry of plastics up to the present empirical knowledge of plastics technology. Advances in the technology of plastics have been so rapid that they have outrun advances in the the fundamental knowledge of polymer chemistry.

Louisville University Founds Research Institute

The board of trustees of the University of Louisville has established a non-profit corporation, The University of Louisville —Institute of Industrial Research.

The purpose of the Institute is to engage in engineering and scientific research for industrial and private clients on a contract basis.

The Institute is the outgrowth of the division of industrial research in the Speed Scientific School, which during the past few years has carried on limited contract research for industry.

The new organization, in addition to employment of a small permanent technical staff from different scientific and technical fields, will depend for its assistance in supervision on selected staff members of the engineering and scien-

tific faculty. The research work will be carried on by graduate fellows.

Officers of the new Institute are: chairman of the board of managers, Dr. E. W. Jacobsen, president, University of Louisville; president, F. L. Winklinson, Jr., dean, Speed Scientific School; director and vice-president, Dr. R. C. Ernst, professor, chemical engineering.

Mexico Grants New Chemical Industry Concessions

Concessions for the following new industries for Mexico have been granted by the Ministry of Finance.

Quimica Industrial Marineda, S. A., Gante, production of nitrate and arsenate of sodium, arsenate of copper, arsenate of lead, yellow sulphide of arensic, stearate of zinc, methylarsenate of sodium, and sulphate of monohydrated copper; Salico, S. A., Balderas, production of acetylsalicylic acid, phenol, salicylic acid, salicylates of sodium and methyl and acetic acid; Comercial del Oeste, S. A., Palma, preparation and treatment of bees' honey by physical and chemical means to make it absolutely pure, intended for export.

Explosives Production Stepped Up

The growing pressure for increased production of explosives is causing the reopening of plants hitherto shut down and the use of plants that were built for the Government but were never put into operation, the industry has disclosed.

The expansion of explosives production apparently is substantial although the specific increase in volume is, of course, unknown because of secrecy orders covering such operations.

It is learned, however, that the Pennsylvania Ordnance Works located north of Harrisburg will be opened shortly for the production of an unspecified explosive. The plant was built for the Government by the United States Rubber Co., and was completed almost a year ago, it is understood. It has remained idle since that time, because other capacity proved sufficient to meet Government demands. However, the development of a new type of explosive, whose description must be limited to the statement that it is not a high explosive of the TNT type, has resulted in the plans to open the Pennsylvania works.

Channel Black Output Increased

Plans are being formulated by the War Production Board to increase production of channel black, a type of carbon black, by 175,000,000 pounds a year in order to meet the needs of the expanded heavy tire program, WPB has announced. Production of channel black averaged 35,000,000 pounds per month in 1944.

No substantial increase will be possible, however, until the latter part of 1945 or early in 1946, since it will be necessary to construct new facilities. In the meantime, users of channel black may be required to change to other types of carbon black whenever possible.

Vanadium Source

That certain fractions of petroleum, especially asphalt, may become a valuable source of vanadium, is indicated in a paper presented before the Russian Academy of Sciences last May. Vanadium is an important component of alloy steels for the manufacture of instruments and for other special purposes.

A summary of the paper, which was presented by A. P. Vinogradov, has just reached this country and has been translated by J. G. Tolpin, editor of the U. O. P. Survey of Foreign Petroleum Literature. It discloses for the first time that a semi-commercial plant is producing ferrovanadium from asphalt derived from Ural crude, which may contain vanadium in quantities as high as 43 per cent of the ash. The full text of the Vinogradov paper will probably be published in the near future.

It is known that asphalt from certain American crudes, notably some produced in California and Oklahoma, contain considerable percentages of vanadium.

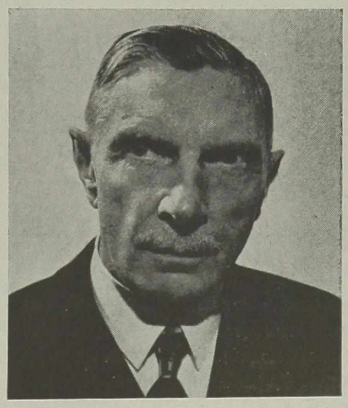
In 1940, the latest year for which figures are available, over 2,000,000 pounds of vanadium was produced in the United States, and more than 2,500,000 pounds was imported. Demand has greatly increased during the war.

Chemical Industry Safety Record Data Published

The National Safety Council has disclosed that 1943 frequency rate of serious injuries, deaths and permanent impairments, was less than the average of .82 for all industries. However, the rates for serious injuries in various types of chemical plants were far above average. Dye plants, for example, had a frequency rate of 2.22 for deaths and permanent impairments. Control over serious injuries, on the other hand, was particularly effective in hazardous plants, such as those engaged in manufacturing high explosives, black powder, and smokeless powder. The average rate of high explosives plants was only 0.47.

A summary of the circumstances and causes of about 500 deaths and permanent disabilities in the chemical industry disclosed that machinery, such as presses, rolls, mixers, and similar hazardous types was involved in the largest proportion of serious accidents—35 per cent. The in-

Callan, Crawford and Simon Unite



William Callan, (left) former vice president of The Borden Company and president of the Casein Company of America; Frank E. Crawford, (center) of Crawford, Keen & Cia, of Buenos Aires, and George Simon, (right) former vice president and treasurer of the Heyden Chemical Corporation, have joined in the formation of the partnership of Crawford, Callan & Company, export and import commission merchants and representatives of foreign and domestic shippers. Offices are at 350 Madison Avenue, New York City.

jured employees were usually engaged in oiling, cleaning, adjusting, repairing, and performing other than ordinary duties. Therefore, the elimination of the unsafe conditions of such equipment and thorough training in safe practices in performing these duties offer the greatest opportunity for reducing such injuries.

The causes of accidents involving machinery were principally the unsafe practice of cleaning, adjusting, or making repairs near moving parts, inadequate guarding, and inadequate maintenance shown by frequent injuries due to worn or broken parts.

Acids, alkalis, and other chemicals were involved in 11 per cent of all injuries and were the second largest source of injury. The proportion of injuries involving floors, ladders, platforms and similar surfaces, vehicles such as trucks and railroad cars, and pipe lines and other pressure apparatus was almost as large.

Monsanto Promotes Eynon

David L. Eynon, Jr., plant manager of the Longhorn Ordnance Works, has been promoted to the position of assistant to the general manager of Monsanto's organic chemicals division. Dr. Franklin D. Smith, from the staff of the divisional development department, has been named assistant director of development in the organic chemicals division.

COMPANIES

Houdry Runs Royalty Arrangement

A running royalty financial arrangement for licensees of Houdry catalytic cracking processes has been announced by the Houdry Process Corporation, Wilmington, Delaware. The plan is applicable to licensees for both fixed-bed and catalytic cracking processes, and is designed especially to aid the small refiners and assist them in sharing the ex-

panded ma[illegible] and specialty products. The company has also announced that the corporate title of the Catalytic Development Corporation of Marcus Hook, Pa., has been changed to Houdry Process Corporation of Pennsylvania.

Hercules Creates British Subsidiary

Hercules Powder Company is creating a subsidiary, Hercules Powder Company, Ltd., for the distribution of technical information on its chemical products in Great Britain and Eire. The company, which will have offices at 140 Park Lane, London, will be under the direction of Cornelius H. B. Rutteman, managing director.

Directors are Thomas H. Cooke, manager of Holden Vale Manufacturing Company, Haslingden, Lancashire, a partly owned subsidiary of Hercules; R. H. Oxley, manager of the London branch of the Bankers Trust Company of New York; Kenneth D. Cole, a member of the firm of Messrs. Linklaters & Paines, solicitors; and Cornelius H. B. Rutteman.

Hercules has been selling chemicals in Great Britain for 25 years, and throughout the period its technical representatives have been assisting distributors and customers in the utilization of these chemicals. Mr. Rutteman has been the company's resident representative in London since 1939.

Eimer and Amend Operate New Plant

Eimer and Amend has begun operation of its chemical manufacturing division in Edgewater, N. J., according to J. Stein, vice president and general manager.

The new plant, consisting of a laboratory building, processing plant and warehouse, increases capacity of production, and will be under the supervision of F. Anderson.

Dow Chemical Announces Earnings

The consolidated net income of The Dow Chemical Company and subsidiaries for the six months ended November 30, 1944, was $4,743,061.92 which, after providing for dividends on the preferred stock, was equivalent to $3.31 per share on the common stock outstanding. The net income was arrived at after providing $4,115,368.78 for the six months charge for amortization of completed facilities covered by certificates of necessity and $8,781,315.94 for Federal normal income taxes, surtaxes, and excess profits taxes computed upon the basis of estimated taxable income for the Company's fiscal year ending May 31, 1945. Dividends received for the period from an associated company approximated the estimated earnings.

Renegotiation of contracts for war materials under existing Federal Law may or may not affect the earnings.

American Cyanamid Builds Alum Plant

A new plant for the manufacture of commercial alum is being built by American Cyanamid and Chemical Corporation on a forty acre tract at Schenk, just outside Hamilton, Ohio.

The corporation operates seven other plants for the manufacture of alum. Principal uses of the product are in the paper industry and in water purification plants.

Company Notes

ARNOLD, HOFFMAN & Co., INC., has opened new offices on the 51st floor of the Empire State Building, New York, to accommodate both the present manufacturing sales division and the heavy chemical organization.

HEYDEN CHEMICAL CORPORATION and LEDERLE LABORATORIES, INC., are among the industrial contributors of supporting funds designated for penicillin research at the University of Wisconsin. Work will be divided among three departments, under seven members of the faculty.

DAVIDSON CHEMICAL CORPORATION has moved its Chicago office to 43 East Ohio Street, Chicago 11, Illinois, where M. H. Baker will function as field service representative for the industrial chemicals department.

ROHM & HAAS COMPANY of Philadelphia, has announced the removal of their New York office to new and larger quarters at 11 West 42nd Street.

ASSOCIATIONS

Compressed Gas Manufacturers Meet

The thirty-second annual meeting and wartime conference of the Compressed Gas Manufacturers Association, was held in New York, January 22-23.

Some of the speakers and their subjects included: "Use of Gases in the Heat Treatment of Metals," by Dr. H. L. Maxwell, metallurgist, E. I. du Pont de Nemours & Company; "A Metallurgist's Viewpoint of the Compressed Gas Container Problems," by C. E. MacQuigg,

an, Schoo... "Post-War Problems of the Gas Industry" ...
niversity; "Post-War Problems of the mpressed Gas Industry," by Dr. H. C. ttler, Canadian Industries, Ltd.; "Gas arfare," by Major General W. N. Por-, chief, Chemical Warfare Service; se of Compressed Gases by the Sea-s," by Captain C. T. Dickeman, USN, ector, Advance Base Dept., Navy De-tment; "The Packaging of Gases for litary Use," by Major F. R. Fethers-, Headquarters, Army Service Forces; ockets As Offensive Weapons of War-e," by Captain Gerald D. Linke, Bu-u of Ordnance, Navy Department.

astics Club Officers Elected

The Plastics Club of the United States ounces the election of the following ers for 1945: president, John Owen, g Paper Co.; vice president, Charles es, B. Altman Company; vice presi-t, J. Murray Beveridge, Mavco Sales. raim Freedman, R. H. Macy & Co., been elected to the board.

rograms for early 1945 include mer-ndising demonstrations and talks by . du Pont, the Plaskon Company, and Celanese Plastics Corp.

endelsohn Joins ax van Pels

Max van Pels, importer and ex-er of botanical drugs, gums and d raw materials, announced re-ly the addition of M. S. Mendel-to his staff. Mr. Mendelsohn been active in the field for more twenty years.

lk Sugar Institute cts Officers

the annual meeting and board of tors meeting respectively of Milk ar Institute, Inc., held December 21, in New York City, the following tors and officers were elected for the dar year 1945: directors, S. R. Ben-National Milk Sugar Co., New ; Samuel B. Gilpin, Smith, Kline & ch Labs., Philadelphia; E. F. Miller, onal Milk Sugar Co., New York; S. Van Bomel, Sheffield By-Products New York City; officers, president, H. S. Van Bomel, Sheffield By-Products Co., New York; vice-pres. Samuel B. Gilpin, Smith, Kline & French Labs., Philadelphia; treasurer, E. F. Miller, National Milk Sugar Co., New York; sec'y. & asst. treas., Robert T. Baldwin, New York.

Wormser Elected by Metal Powder Association

The board of directors of the Metal Powder Association have elected Felix Edgar Wormser acting secretary and treasurer and have moved the offices of the association to 420 Lexington Avenue, New York 17, N. Y.

PERSONNEL

Dow Adds to Branch Office Personnel

Announcement was made by Leo B. Grant, sales manager of the Magnesium Division of The Dow Chemical Company, of the appointment of Robert E. Bockrath as manager of the magnesium sales for the company's Houston, Texas office, in

the interest of the expanding activities of the magnesium division. Mr. Bockrath will operate under the jurisdiction of Arthur Smith, Jr., Southwestern sales manager of the magnesium division, who has headquarters in St. Louis.

Two additions to the staff of Dow's Houston office have been announced by Charles Reed, manager of the branch, who indicated the move was in line with a general program to expand service in this area.

Ralph W. Rowley, formerly with Cliffs-Dow Chemical Company at Marquette, Michigan, a subsidiary of Dow Chemical, will be in charge of heavy chemicals and pharmaceuticals.

W. L. Hendershot, the second new member of the staff, who has been connected with the Dowflake division of Dow at the home office in Midland, Michigan, will be in charge of office procedures.

Sherwin-Williams Personnel Changes Announced

The Sherwin-Williams Company, paint manufacturer, Cleveland, Ohio, announces that a change in the company's regulations makes the president chief executive of the board of directors to be filled or left vacant at the discretion of the board. Arthur W. Steudel, re-elected president of the company, assumes the chief executive office formerly held by the late George A. Martin as chairman of the board.

Michael J. Fortier has been made a member of the board of directors and vice-president in the capacity of executive assistant to the president. Mr. Fortier started with the company in 1931 as a sales representative in the New Orleans division, becoming manager in 1935. A few years ago, Mr. Fortier was made vice-president and general manager of The Acme White Lead & Color Works, Detroit, a Sherwin-Williams subsidiary. Mr. Fortier will make his headquarters in Cleveland, Ohio. Gordon H. Robertson, formerly general industrial sales manager at Sherwin-Williams, will take Mr. Fortier's position at the Acme company.

Gustave L. Hehl has been made general manager of industrial sales. Mr. Hehl's post as Eastern industrial sales manager will be taken over by Milton A. Kindig, with headquarters in Newark, N. J.

Monsanto Makes Personnel Changes

Monsanto Chemical Company's Organic Chemicals Division has announced the promotion of nine members of the sales staff. They are:

R. F. Caulk, to manager, flavors and condiments sales; I. J. Stanley, Jr., to manager, heavy chemicals sales; G. W. Buhrman, to assistant manager, heavy chemicals sales; A. P. Kroeger, to manager, intermediates chemicals sales; R. B. Semple, to manager, petroleum chemicals sales; C. W. Merrell, to manager, pharmaceuticals sales; C. H. Sommer, Jr., to manager, plasticizers and resins sales; H. C. Koehler, to manager, special products sales, and H. F. Shattuck, to assistant manager, sales development.

Appointment of William M. Russell as branch manager of its Organic Chemicals Division for the Detroit territory was also announced by Monsanto Chemical Company.

National Foam Promotes Fleming

Hart H. Fleming, a director o National Foam System, Inc., for 1 years, has assumed vice presidency the company which produces chemica and apparatus for extinguishing fir aboard combat vessels. He also co tinues as a director.

Universal Atlas Cement Makes Appointments

The appointment of D. I. Elder research consultant, Universal Atl Cement Company, at Buffington, Ind., a of Dr. W. C. Hansen as manager resear laboratories, at Buffington, has been a nounced by G. L. Lindsay, director tests and research, New York. Mr. Eld started with the company as a chemist 1925 at the Buffington plant, and has sin held the position of research chemist a research manager.

Dr. Hansen comes to the company fr the Portland Cement Association Chicago where he has been engaged the past six years in a research capaci Previously Dr. Hansen was connect with the Portland Cement Associatio Fellowship at the National Bureau Standards, Washington, D. C.

EARL W. HAUGH has been appoint general sales manager of the Heres

and Chemical Company, Manitowoc, Wisconsin, manufacturers of coatings, plastics and synthetic rubber.

Faith Joins Corn Products

Dr. W. L. Faith has left the War Production Board to join the Corn Products Refining Company, Argo, Illinois. He will head the development engineering group of that organization.

Dreyer Makes Major Personnel Changes

Among the personnel changes and promotions made recently in P. R. Dreyer, Inc., are the following: Howard A. Butler, president; Fred J. Beyer, executive vice-pres., former vice-pres.; Henry A. Wiedman, vice-president; Paul Schaupp, vice president and treasurer; James V. Demarest, secretary and chief chemist.

Minnesota Mining Sales Promotions Announced

Three promotions in the tape division of Minnesota Mining and Manufacturing Company have been announced by G. H. Halpin, vice-president and general sales manager.

Bernard W. Lueck, a sales engineer for the last several years, becomes products sales manager of industrial "Scotch" masking tape, sandblast stencil and "Scotch-Rap," with headquarters in St. Paul.

Robert L. Westbee, who became a member of the organization in 1933, has been named sales manager of electrical tape and electrical insulation products.

G. N. Del Porte, who has been working out of the St. Louis, Cincinnati and Chicago offices in the shoe tape line, is the new sales manager for that product, with headquarters in St. Paul.

Paul J. Pauls, Inc. Appoints Thuesen

Dagfin G. Thuesen has been name vice-president of the reorganize firm of Paul J. Pauls, Inc., Plai field, N. J., importers and exporte of chemicals, drugs, oils, resins a plastics. Mr. Thuesen, formerly co nected with Pierce & Stevens, In Buffalo, N. Y., has been actively e gaged in the chemical, pharmaceuti and organic coating materials indu tries since 1923. In his new assoc tion he will act as the firm's chemi consultant.

Personnel Notes

W. P. terHorst, formerly head of organic research department, general l oratories, U. S. Rubber Company, P saic, New Jersey, has joined the V ginia-Carolina Chemical Corporation manager of research and developm Mr. terHorst will make his headquart at the corporation's research laborato at Carteret, New Jersey.

J. M. Porter has been named chem engineer of the newly formed Jeffe Chemical Company, jointly owned by Texas Company and American Cya mid Company. Mr. Porter comes f the technical department of Amer Cyanamid.

John S. Coey has been promoted assistant to manager of the sales deve ment department of the Hooker Ele

chemical Company at Niagara Falls, N. Y.

JOHN H. ALLDERDICE, formerly with E. I. duPont de Nemours & Co., at the Wabash Ordnance Plant, is now in the research laboratory of The Bell Company, Inc., where he will head development activities in connection with The Bell Company's aviation and automotive chemical program.

ROBINSON ORD will serve as acting general manager of sales of Monsanto Chemical Company's organic chemicals division, pending the return of Fred C. Renner, who is now convalescing in Deaconess Hospital, St. Louis, Mo.

cilities for manufacture and distribution of corn products.

D. B. JOY, formerly Product Manager, has been appointed General Sales Manager for the Carbon Products of the National Carbon Company.

PETER J. GAYLOR has resigned from the Standard Oil Development Company to open law offices at 1121 Kinney Building, 790 Broad Street, Newark 2, N. J., where he will specialize in patent law, trade marks and copyrights.

HARRY W. BARR, JR., formerly with National Aniline Division of Allied Chemical and Dye Corp., FRED CHASE from Monsanto, and V. E. BROMAN of Penick and Ford, Ltd., Inc., have joined the staff of Ringwood Chemical Corporation (subsidiary of the Edwal Laboratories) in the capacity of production supervisors.

DAVID RICHARDSON has been appointed director of research and development in the Pittsburgh plant of Fisher Scientific Company. Mr. Richardson who formerly was employed by the American Cyanamid and Chemicals Corporation at their Stamford, Connecticut, Research Laboratories, succeeds William B. Warren, who recently resigned to enter a private business in Pasadena, California.

JOSEPH CAHILL, WILLIAM THEN and

Bennett Directs Textile Research

The Institute of Textile Technology in Charlottesville, Virginia, has appointed Dr. Willard H. Bennett of Columbus, Ohio, as director of applied research. Formerly director of research for the Electronic Research Corp., Dr. Bennett has recently returned from the Southwest Pacific war theater, where he served as research and development officer for the Signal Corps.

ALEXANDER GOBUS and CHARLES DAVID- have been elected vice presidents, re- ing Dr. E. I. Valyi and Fred J. as, at Sam Tour & Co., Inc.

CLIVE F. MARSHALL, for the past eleven s associated with Allied Mills, Inc., ago, Illinois, has been appointed executive of the Cereals, Feeds and icultural Chemicals Branch of the e of Price Administration's Food e Division.

OWARD G. WASCHER has been elected president of the Corn Products Re- g Company, where he will be prim- concerned with planning and re- h directed toward the rehabilitation, lopment and operation of foreign fa-

Frederick Arndt were each recently awarded a $500 Series G War Bond by Eimer and Amend, in honor of fifty years of service to the company.

Ewing Joins S. B. Penick & Co.

S. B. Penick & Company, has announced that James H. Ewing joined its staff as of January 1st. Mr. Ewing has been connected for many years in an executive capacity with the purchasing department of the Calco Chemical Division of American Cyanamid Company.

Dr. Bernard Agruss, a former associate of the American Smelting & Refining Company, and Dr. M. H. Chetrick from the Shell Oil Company, have joined the staff of Battelle Institute Columbus, Ohio, where they will be engaged in electrochemical and chemical research, respectively.

Robert L. Skov, who is in charge of the sale of industrial chemicals in Latin America for Hercules Powder Company, is making a six months trip to distributors of the company's products in thirteen countries, which include, Mexico, Venezuela, Peru, Chile, Brazil and Cuba.

Dr. J. A. McBride and C. M. Paisley have recently joined the chemical products department of the Phillips Petroleum Company, Bartlesville, Oklahoma. Dr. McBride, now in the product development division, was graduated from the University of Illinois in June 1944. Mr. Paisley was previously connected with the U. S. Department of Agriculture, Northern Regional Research Laboratory, Peoria, Illinois.

Mary A. Rolland, formerly of the War Production Board, where she was administrator on the allocation orders for benzaldehyde and diphenylamine in the Aromatics and Intermediates Branch, has joined the staff of General Drug Company, Aromatics Division.

Suits Officer of General Electric

Dr. C. G. Suits, assistant to the director of the research laboratory, has been elected a vice president of General Electric and in that capacity will be in charge of the company's research laboratory, it has been announced by President Charles E. Wilson.

Dr. Donald B. Keyes, director of the Office of Production Research and Development of the War Production Board has been elected to the Council of the American Chemical Society.

Correction

L. L. Hedgepeth, recently named MC committee chairman, is employed by the Pennsylvania Salt Manufacturing Company. It was erroneously stated on page 105 in the January issue that he is with the Pennsylvania Solvent Manufacturing Company.

OBITUARIES

Obituaries

Ralph S. Richardson, 51, vice president, Chemical Construction Corporation, 30 Rockefeller Plaza, New York, died of a heart attack December 12th, 1944.

Edward Dickinson Kingsley, well known as a chemical industrialist, died of natural causes at his New York residence on January 1st, at the age of 84.

Edwin C. Alford, treasurer of the Los Angeles Paint and Varnish Production Club, passed away December 12th, 1944 as a result of a riding accident.

Harry Phillips Trevithick, chi

chemist of the New York Produce Exchange, died in Manhattan on Jan. 17 while going from his office, 2 Broadway, to his home in Baldwin, L. I. His age was 58. Mr. Trevithick was past president of the American Association of Consulting Chemists and Chemical Engineers.

THOMAS W. BACCHUS, retired vice president and director of Hercules Powder Company, died early Saturday morning at the Delaware Hospital in Wilmington after an illness of several weeks. He was 82 years old.

NEWS OF SUPPLIERS

W. H. Funderburg, vice president in charge of sales, **CONTINENTAL CAN COMPANY, INC.**, announces the appointment of general sales managers to head the company's three geographical divisions resulting from a recent revision of sales territories.

Thomas C. Fogarty, formerly district sales manager, will head the new Eastern division. Reuben L. Perin, since 1942 general sales manager of the Pacific division, will head the new Central division. Frank E. Falk succeeds Mr. Perin as general sales manager of **CONTINENTAL'S** Pacific division.

Recently appointed to the post of sales manager of the **DUGAS ENGINEERING CORPORATION** is Clifford H. Wyman, formerly manager of the firm's district office in Chicago. In his new position, Mr. Wyman will be responsible for direction of the company's sale of Dugas Dry Chemical Fire Extinguishers.

Frank B. Jewett, Jr. and John M. Fox have been elected vice presidents of **NATIONAL RESEARCH CORPORATION**, it was announced. Mr. Jewett heads the newly-formed Vacuum Engineering Division, which is the design, construction and installation unit of the Corporation, while Mr. Fox is in charge of administration and sales.

Company Earnings

Freeport Sulphur Co.	9 mos. to Sept. 30	$1,049,000–	$774,000	$1,890,282–	$2,182,539
General Aniline & Film Corp. and Subsid. Co.'s	6 mos. to June 30	$7,144–	$4,628	$2,649–	$2,114
Hercules Powder Co., Inc.	9 mos. to Sept. 30	$8,755,469	.....	$3,527,948	.....
Interchemical Corp.	9 mos. to Sept. 30	.....	.....	$800,206–	$814,027
International Minerals & Chemical Corp.	Year to June 30	$680,000–	$1,300,000	$2,016,037–	$2,081,738
McKesson & Robbins, Inc. and Subsid. Co.'s	Year to June 30	$13,102,446	.....	$5,161,069	.....
Merck & Co., Inc. and Subsid. Co.'s	6 mos. to June 30	$3,393,947	.....	$1,337,585–	$2,106,126
Parke, Davis & Co. and Subsid. Co.'s	6 mos. to June 30	.....	.....	$3,702,324	.....
Penick & Ford Ltd., Inc. and Subsid. Co.'s	9 mos. to Sept. 30	$1,139,320–	$1,268,553	$808,001–	$812,580
Standard Oil Co. of Ohio	6 mos. to June 30	.....	.....	$2,536,333–	$2,338,730
Sterling Drug, Inc. and Subsid. Co.'s	6 mos. to June 30	.....	.....	$4,504,907–	$3,934,211
Union Carbide and Carbon Corp.	3 mos. to Sept. 30	$18,406,179	.....	$9,753,274	.....
United Carbon Co.	6 mos. to June 30	$668,200	.....	$984,594	.....
Virginia-Carolina Chemical Corp.	Year to June 30	.....	.....	$826,445–	$978,516

W. Gibson Carey, Jr., president of the YALE & TOWNE MANUFACTURING COMPANY, Chrysler Building, New York, has announced that the purchase of the scale business of the Kron Company of Bridgeport, Connecticut, has been consummated.

E. J. Zimmer, Jr. has just been appointed assistant to L. B. Keplinger, vice-president and director of sales for RHEEM MANUFACTURING COMPANY.

H. E. Beane, sales manager of THE BRISTOL COMPANY, Waterbury 91, Connecticut, announces the appointment of H. C. Clark as district manager of the Pittsburgh branch office. Mr. Clark goes to his new position in Pittsburgh from Buffalo where he has been Bristol's resident sales engineer for many years.

James V. Donohoe, formerly of the New York office of the MIXING EQUIPMENT COMPANY, has been promoted to assistant sales manager.

Appointments of district managers in Rochester, N. Y., Cincinnati, O., and Philadelphia, Pa., and of a service engineer for northern N. J., have been announced by H. K. PORTER COMPANY, INC., Pittsburgh, Pa., manufacturers of process equipment, pumps, locomotives and freight cars.

Charles J. Hardy, president of AMERICAN CAR AND FOUNDRY COMPANY, is relinquishing part of his duties as president of that enterprise and by unanimous vote has been made chairman of the board, which office is charged with the direction and control of the policies, finances, and activities of the company.

Paul B. Sagar has been appointed Eastern field engineer for GENERAL CONTROLS CO., Glendale, California. Working out of the Cleveland Factory Branch, 3224 Euclid Avenue, Mr. Sagar will devote the major part of his time collaborating with Eastern appliance manufacturers in working out problems of application and assisting them in test procedures at the AMERICAN GAS ASSOCIATION LABORATORY. This company also announces the appointment of James King as field sales engineer in GENERAL CONTROLS, INC., New York factory branch, 101 Park Avenue. Mr. King will serve users of automatic controls, particularly in industrial fields, throughout metropolitan New York.

Arthur Batts, president of THE CARBORUNDUM COMPANY, Niagara Falls, N. Y., announces the appointment of James E. McMullen as controller and Edward A. Montgomery as resident legal adviser. Both appointees will make their headquarters at the main office of the company at Niagara Falls.

DRESSER INDUSTRIES, INC., a $35,000,000 enterprise and one of the country's largest manufacturers of equipment for the oil, gas and industrial fields, will move its headquarters from Bradford, Pa., to Cleveland, O., H. N. Mallon, president, announces. Executive offices will be located there in the Terminal Tower.

A new industrial research and development organization, the YPRENE DEVELOPMENT CORPORATION of Newark, N. J., has been formed as a subsidiary of the Pyrene Manufacturing Company. also of Newark, makers of fire extinguishing equipment and automobile tire chains.

The officers of the new organization, drawn from the executives and directors of the parent company, are Charles G. Durfee, president, Edward J. Waring, vice-president, and Edward T. Clapp, secretary and treasurer.

THE BRISTOL COMPANY, Waterbury 91, Connecticut ,manufacturers of automatic control and recording instruments, has opened a new branch office in Houston, Texas, according to an announcement by H. E. Beane, Sales Manager of the company.

THE PRESSED STEEL TANK COMPANY, of Milwaukee, Wisconsin, has re-opened its branch offices in Chicago and Los Angeles. Kenneth Cole will be in charge at Chicago, and James Barr will be in charge in Los Angeles, at 727 West 7th Street.

Activities of the U. S. Conciliation Service

Situations Disposed of in the Chemical Industry

Type of Situation	Number 1944 Dec.	1944 Nov.	1943 Dec.
Total	68	75	59
Labor Disputes	55	—	52
Strikes and Lockouts	5	5	*
Threatened Strikes	6	4	—
Controversies	44	36	—
Other Situations	13	7	7
Arbitrations	3	4	—
Technical Services	2	1	—
Special Services	8	7	—
Disputes Certified to National War Labor Board	16	18	—

* Information unavailable.

Between the Lines

(*Continued from page 250*)

tions, and they will be in all likelihood lumped into a postwar Government pool from which they will be made available on lines now being shaped up.

Government Research Activities

Senator Kilgore has completed a check of seven Government departments and most of the independent offices concerned with research. It is possible here to give only an outline of the dimensions this Government activity has assumed, but the outline is significant.

The Agriculture Department has a Research Administration, for instance, that comprises eight bureaus and offices, including the Bureau of Agricultural and Industrial Chemistry. This last Bureau was created in 1938, and now has four regional research laboratories in its sphere alone. It includes in its equipment various pilot plants for semi-plant-scale process developments. Agriculture Department research personnel include an estimated 135 directors or supervisors, 2,611 professional research workers, 756 sub-professional research workers, 977 craftsmen of various categories, and more than 1,500 clerical and administrative workers. In addition, there are more than 1,000 temporary personnel in research activity. The average annual payroll is nearly $20,000,000. This enumeration suggests an interesting comparison with the research set-up of the average private industrial enterprise.

The Department also maintains a patent staff, apart from the research organization. No sums are paid or allowed for patent royalties, the work of the research staff being definitely dedicated to public use. However, no centralized unit determines the ultimate use of a research discovery or development; this is left to the bureau and division heads.

Consideration is being given at present to permitting employees certain foreign patent rights, and to retain at least commercial rights in their inventions. This suggestion is surrounded with various qualifications, but it is heard, nevertheless, and has interesting possibilities.

Approximately 1,000 patents have been issued on Agriculture Department inventions, with commercial rights retained by employee-patentees in about 100 instances, the others being assigned to the United States or dedicated to public use. Nonexclusive licenses are issued by the Department on patents not dedicated to the public, and such licenses are without fee, royalty, or other charge, but are revocable.

Bureau of Standards

The Department of Commerce has nearly 2,400 employees engaged in technical research, development, testing, etc., with an annual payroll of over $4,000,000, and a plant and equipment investment of about $10,000,000. The Bureau of Standards comes under this Department. The department holds 80 patents and licenses, but its handling of patents apparently is somewhat less rigorous than in the case of the Department of Agriculture. The Bureau of Standards is, of course, one of the most famous government research organizations in the world, and the catalogue of its work would fill volumes. Most of its projects are at present connected with military requirements. It has nine scientific and technical divisions, including one devoted to chemistry, and there are 70 sections in these 9 divisions, each section in reality a laboratory or workshop unit. The Bureau of Standards has just over 2,200 personnel and a current annual average payroll of nearly $4,000,000. A total of 59 patents developed within the Bureau are held by the Department of Commerce.

Under Commerce also are the Civil Aeronautics research activities, the Weather Bureau, and others. One of the most important of the latter is the National Inventors Council, which conducts no immediate departmental research, but assists in the development of promising inventions. Research and development work also is conducted by agencies of the Reconstruction Finance Corporation.

including Defense Plant Corporation, Metals Reserve and Rubber Reserve.

Defense Plant Corporation owns no patents, but has acquired numerous licenses and license rights, to an extent not presently ascertainable. These licenses are non-exclusive and are largely for use of patented processes, for the use of a particular plant or plants, and frequently represent processes that have been in use in industry.

Rubber Reserve's charter does not specifically authorize experimental work, but it is construed to be permitted under the general terms. All research and development work financed by Rubber Reserve Company has been made subject to agreements providing for the availability of the results of such research to the Government, and for availability of rights under inventions made in the course of such research.

This research covers the entire synthetic rubber field, including the processing and purification of raw materials, processing of synthetic rubbers from raw materials, and related matters such as catalyst technique, compounding, analytical procedures. Dealing as it does with a war-born field of production, there are in Rubber Reserve's domain many ramifications and intricacies involving research, patent development and patent use not found in peacetime agencies, or many other war agencies. This particular field involves complicated cross-licensing of patents and use of technical information on a scale not encountered in the previous war, and with potentialities that probably cannot be fully realized until the war ends. Rubber Reserve, however, owns no patents.

This does not scratch the surface of Government research activity, it is realized, but is sufficient to indicate something of the size of Government research effort, both normal and incident to the war. There is reason to suppose that much war research will be carried over into postwar activities in one way or another. In fact legislation is pending to persuade certain research experts to remain in Government service, and in other ways it has been indicated by those favoring expansion of this type of Government enterprise that retrenchment is far from their thoughts in the postwar years.

There is considerable emphasis in such quarters on the major role, both financial and technical, now played by the Government in all phases of research, and on the range of discoveries and industrial processes thus opened up. The interest of Senator Kilgore is manifest in a number of measures which he has pending or intends to re-introduce in this session of Congress, which are designed to tighten Government control over patent use generally, make more aggressive use of Government-owned patents, and open up, perhaps, a new field of subsidized or Government-sponsored activity based on its research efforts.

Penick Establishes Drug "Pilot Farm"

Centralization of experimental work in growing botanical drug plants is announced by S. B. Penick & Company with its establishment of a "pilot farm" in Pennsylvania. The project is described as unique in the field of botanical science.

"In other countries of the world, outside of the United States, pharmaceutical experimental stations, or drug plant experiment stations, have been organized quite frequently, particularly in Germany, Hungary and the Soviet Union," said a representative of the company.

"For several years Penick has cultivated large quantities of vital drug plants in several states, and while these projects have produced exceptional results under the pressure of war emergency, the long-range practicability of the work has not been given the study which the firm now expects to undertake through centralizing its experiments in one location where adequate laboratory and field equipment are available. The present facilities afford opportunities for drug manufacturers not available before in the United States.

"Although we have not changed our opinion that many drugs formerly imported will again be imported after the war, we expect the pilot plant farm to be of substantial service to users of botanical drugs and their derivatives," the representative said.

New Water-Resistant Adhesives for Army Packaging

Four newly improved water-resistant adhesives, designed for overseas packaging of military parts have been announced by Paisley Products, Inc., of Chicago and New York. Each adhesive has individual characteristics that make it best suited for a particular operation in the manufacture and final sealing of waterproof bags, case liners, and the gluing of V-board export box flaps. Developed to meet the water immersion tests of Army and Navy Packaging Specifications, they are currently being used by Army depots, arsenals, and war plants whose packaging must conform to such typical specifications as JAN-A-101, C.W.S. No. 197-54-398, U. S. A. No. 100-14A, etc. The adhesives are of the emulsion type, the adhesive and resin solids in the form of tiny particles or droplets being suspended in a water solution. In addition to the definite advantage of being non-inflammable and free from objectionable odors, the manufacturers claim that they permit fast sealing as they can be water diluted to spread freely and evenly without brush drag. When used on asphalt laminated and impregnated papers and V-board, the fast breaking emulsion quickly penetrates the paper fibres and releases the resin film as the water insoluble bonding agent. The final adhesive film, when completely dry, is resistant to extremes of heat, cold, humidity, and complete water immersion with a safe margin over the usual specication tests.

The manufacturers maintain an adhesive service department which can review war contract packaging operations and recommend the most practical and economical grade to suit the application method and packaging materials employed. An adhesive problem data sheet and technical service bulletins are available to war contractors upon request.

New Metal Cleaner Announced

Nielco 1926 is an alkali one-dip cleaner in powder form, readily soluble in tepid water and able to withstand constant boiling without losing any of its effectiveness. There are two formulas of this cleaner, one for soak tanks, known as Nielco 1926-T, and one for power washing machines and tumbler barrels, Nielco 1926. It contains no chemicals that are more harmful to the skin and clothing than any mild alkali cleaner and gives off no vapors at boiling temperatures that are detrimental to the health of the workmen.

This cleaner makes available to industry an alkali cleaner that will clean non-alclad ST and SO sheet aluminum in the minimum of time and in one operation, and one that is economical to use.

Anti-Corrosive Developed For Iron Castings

A protective coating to use on new iron castings and other new iron and steel surfaces to prevent rust before it starts, is called "Lionoil." Lionoil seals the surfaces of castings against cutting oil and compounds; provides easily cleaned surfaces for paint or enamel.

Lionoil is readily adapted to any method of application—brush, dip, spray, tumble, roller coat, centrifugal or flow coat. This material is a product of Berry Bros., Inc., 211 Leib Ave., Detroit 7, Mich.

Protective Coating for Plastic Surfaces

Protecto-Kote, a liquid coating used to guard plastic surfaces in airplanes during fabrication, is now being produced in quantity by The Reserve Research Co., 1637 Superior Ave., Cleveland 14, Ohio. Protecto-Kote has been approved by the Army Air Forces.

Protecto-Kote dries rapidly, forming a protective coating against scratching, abrasion, etc. It is impervious to grease, paints and paint solvents.

Tablet Purifies Water

A new water decontaminating tablet, containing a newly devised special formulation of succinchlorimide and called "S.C.I. Tablets," has been announced by the Lambert Pharmacal Company.

"The chemical, pharmaceutical and bacteriological studies on this product have been in progress for approximately two years and the results obtained represent a careful consideration of all the factors involved in practical application," the paper stated.

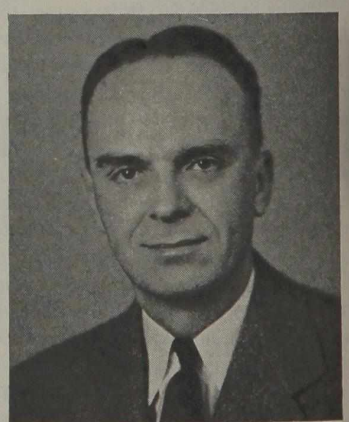
"After determining the parts per million of succinchlorimide which is germicidal in highly polluted water, extensive studies were made on the special tablet formulation of this compound designed for quick solution. These are 2-grain tablets which disintegrate and dissolve within two minutes at 76 degrees F., with only brief shaking. Each tablet contains 12 mgm. (10 per cent) of succinchlorimide."

Resin Binder for Inks Developed

Development of a new synthetic resin binder for the ink maker which gives a carefully balanced water tolerance and excellent stability on the press rolls to the steam set inks now widely used on paper bottles, folding box cartons and food wrappers, is announced by the Resinous Products & Chemical Company. Known as Amberol 820, this synthetic binder is a hard, high-melting resin which demonstrates infinite solubility in diethylene glycol, excellent humidity tolerance and high resistance to petroleum and hydrocarbons.

Steam set inks are a fundamentally different type in that they do not oxidize

Hartman and Kanning Join Arco



Appointment of Dr. Robert J. Hartman (left) as director of the industrial division, and Dr. Eugene W. Kanning as director of research, of the Arco Company, Cleveland, manufacturers of automotive, industrial and special infra-red reflecting paints, was announced by Howard E. Wise, president. Both have been associated with the Dow Chemical Company, Dr. Hartman as head of technical service and development work on paints, inks and rubbers, Dr. Kanning as a research chemist in charge of new product development for textile and leather development work.

or utilize a solvent which must be driven off. Their elimination of offset, lack of odor, extreme cleanliness and brilliance of color, excellent non-rub characteristics and unique sealing properties have led to the widespread use of this new kind of ink. Since many foods—butter, lard, bread and milk—show tendencies to pick up residual odors in printing inks, the lack of odor in steam-set ink is particularly important. These inks consist of pigment, a resin binder and an odorless, high boiling organic solvent. In order to function properly, the resin binder must be soluble in the solvent and a mixture of the solvent and a limited quantity of water, but insoluble in a mixture of the solvent and unlimited quantity of water. When a film of the varnish formed from this resin and solvent is subjected to an unlimited quantity of water, a thin hard film is formed over the underlying portion which is plastic and adheres to the paper. The formation of this hard surface prevents any offset or transfer of ink from the printed surface.

Wax Agency Established

The Ozokerite Mining Co. has named Charles S. Glickman exclusive sales agent for Utahwax in the United States and Canada. Mr. Glickman is undertaking some special studies on the wax in his newly completed research laboratories at 3862 Flatlands Ave., Brooklyn.

General Drug Promotes Wellenkamp

C. K. Wellenkamp, manager for fifteen years of the aromatics division of the General Drug Company, has been appointed vice president in charge of this division.

Plastic Sprayer Developed

The Wilco Company has developed a plastic sprayer competitive in price with pre-war metal sprayers and made of a non-toxic material which makes it a suitable dispenser for foods, medicaments, cosmetics and chemicals.

Fertilizer Effects Crop Nutrient Values

When nutrient values become commonly known, purchasers will not pay as much for food and feed grown on unfertilized soils, which return only 60 to 80 per cent as much value in growth and health, as they will pay for equal amounts of farm products grown on properly fertilized soils, predicted David D. Long, chief of feed and fertilizer research for International Minerals and Chemical Corporation, in a speech before the Chicago Agricultural Club.

Stressing the point that increased yields are only a small part of profitable farming, he said, "It is very probable that under post-war competitive farming conditions the farmer who makes those extra dollars which distinguish between profit and loss will be the one whose hay and feed grains have a higher nutritive value than the other farmer. The producer of canning crops who is able to sell his products will have products which carry better, hold up better and, when processed, will provide higher nutrient values."

He quoted the War Food Administration as estimating that it would take 16,560,000 tons of fertilizer for maximum crop production in the United States—approximately a third more than was produced in 1944 and about twice that produced in 1940. The fertilizer industry in

Prepared Monthly by U. S. Industrial Chemicals, Inc.

U.S.I. CHEMICAL NEWS

February ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1945

Millions of Yards of Treated Duck Produced for Army

Expanded Tentage Program Takes Large Quantities of U.S.I. Resin

Early in the war, the Army Quartermaster Corps adopted a new and greatly improved type of treated canvas which is now adding much to the protection of army personnel and equipment against the elements, as well as the enemy. The program of development and evaluation has been long and arduous, requiring the testing of innumerable samples by laboratory methods and by exposure for long periods to varying climatic conditions. The results have been remarkable, and the properties towards which the Quartermaster Corps aimed have, in a large measure, been achieved.

Canvas, treated by this new method, has been greatly improved in durability by reducing the deleterious effects of sun and moisture and by incorporation of mildew proofing agents. The canvas is also practically impervious to rain. These characteristics are highly desirable when we consider that our armies are stationed throughout the world, in all types of climate.

Fire Resistance

The new treatment also imparts resistance to fire. The fabric is not completely fire-proof, but the compound employed effectively retards free burning. Fire hazard is thereby minimized as a further protection to personnel and equipment.

Camouflaging of tentage and tarpaulins is also vital. This is done by incorporating durable, high-strength coloring pigments in the treating compound, and thus imparting the desired color to the treated fabric.

The army is, today, purchasing enormous quantities of cotton duck and other fabrics,

(*Continued on next page*)

Treated Sheep Skins Resemble Finest Furs

Using existing machinery common in the fur industry, lamb and sheep pelts may be treated so as to resemble beaver, nutria, seal, or other similar furs according to claims made in a recent patent.

Though variants of the process are given, essentially it consists of applying to the skin a solution of nitric acid and denatured alcohol. After drying, the skins are passed through an "electrifying" machine in which they are heated, brushed, and combed. The pelts emerge with straight, lustrous, yellow filaments which will not re-kink upon subsequent wetting.

The final step is dying to the color native to the fur to be imitated.

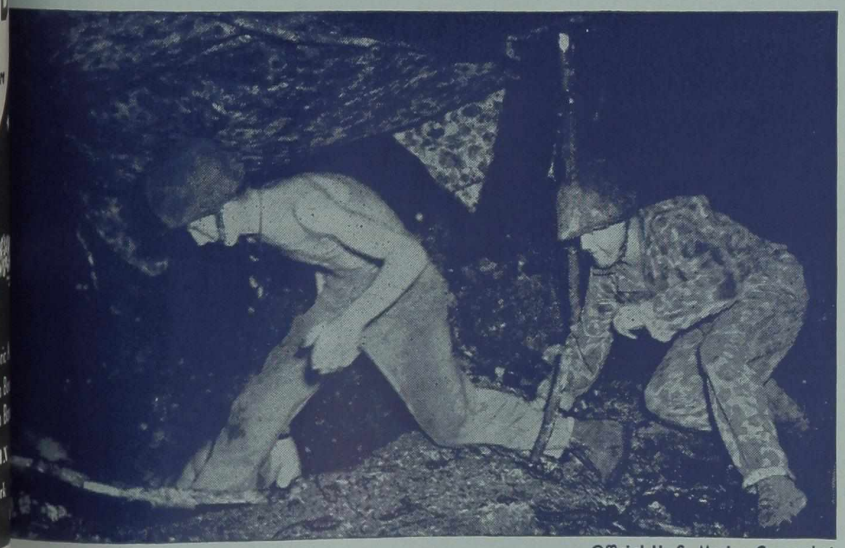
Insoluble Alkyd Fractions Produce Superior Films

The results of a series of tests seem to demonstrate that films formed from alcohol-insoluble fractions of alkyd resins dry more rapidly, are harder and at the same time less brittle than the original alkyds.

Lower alcohols, such as ethanol, were found to be superior as selective solvents. The two extraction methods described both depend upon agitation of the resin in a fluid state with alcohol, which extracts the undesirable fractions. In both, the desired fraction was contained in the residue after the extract-containing solvent had been removed by decanting or other method.

Insecticide Improvement

It is reported that insecticides high in hexachloro ethane, such as those used for killing moths and their larva, can be increased in effectiveness by the addition of small amounts of para-chloro bromo benzene, chloro napthalene or para-dichloro-benzene.



Official U. S. Marine Corps photo

...cking in... ...covered foxhole. Colored pigments incorporated with the resins and other camouflage which baffled Jap airmen.

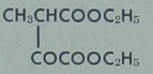
...gredients

Valuable Uses Seen For New Intermediate Developed by U.S.I.

Ethyl *a*-Oxalpropionate Offered for Organic Synthesis Research

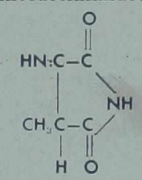
Ethyl alpha-oxalpropionate is a new U.S.I. product which affords another interesting example of the versatility of U.S.I.'s sodium ethoxide as a condensing agent. It is prepared by condensing diethyl oxalate with ethyl propionate in the presence of sodium ethoxide. It may also be synthesized from ethyl sodium oxalacetate and methyl iodide.

Alpha-oxalpropionate has the following physical characteristics: mol. wt., 202, sp. gr., 1.0977 @ 20°/20° C., refractive index, 1.433 @ 20° C., boiling point 108-109 @ 5.5 mm. Hg. abs. Color light yellow to colorless. It has the structural formula —



Like other new U.S.I.-developed Claisen condensation products, ethyl alpha-oxalpropionate appears to have many as yet unexplored uses as a starting material for organic synthesis. Some of these possibilities are suggested by the following reactions:

1. On distillation it loses carbon monoxide to give diethyl methylmalonate.
2. On heating with ammonia it forms alpha-methyl-beta-iminosuccinimide:



3. On boiling with alcoholic KOH it breaks down to propionic acid, oxalic acid, and alcohol.
4. On heating with ethyl iodide and sodium ethoxide it yields alpha-methyl-alpha-ethyl-oxalpropionic ester.

(*Continued on next page*)

B-Complex Vitamin Produced by Alcohol Crystallization

A recently granted patent covers new methods for producing dextro-pantothenic acid, part of the vitamin B complex, by resolving racemic pantothenic acid in to dextro pantothenic acid by fractional crystallization.

One method starts with d-l-barium pantothenate dissolved in ethanol. This solution is treated with an ethanol solution of quinine sulfate. The combined solution is freed from barium sulfate by centrifuging.

To remove the crystals of quinine salt of levo-pantotheic acid, they are precipitated by evaporating the solution and chilling. The mother liquors are then evaporated to dryness, and the residue dissolved in acetone, which separates the quinine salt, leaving dextro pantothenic acid.

The yield is about 23 per cent of the combined weight of the d-l-barium pantothenate and the quinine.

February ★ **U.S.I. CHEMICAL NEWS** ★ 1945

Wool-like Synthetic Made from Peanuts

Peanuts, already widely used as a source of oils for salad dressing, margarine and high-grade soap, now are used as the raw material for a new synthetic fibre. The fibre is described as being like wool in many respects, and superior in others. For instance, it will not shrink, and is immune to attack by moths.

The new fibre, named Ardil, was developed in Great Britain, and is waiting the end of the war for large production. It is a cream-colored, crimped, resilient fibre which is said to be soft and warm to the touch, and to absorb moisture as wool does.

Ardil, according to its inventor, is not intended as a substitute for wool, but as a complementary fibre, to be used in combination with other fibres to impart new qualities to fabrics. It is expected that, under quantity production, the new fibre will turn out to be less expensive than wool.

Deodorant Reported To Neutralize Acids

In a suggested formulation, acid secretions of the body react with hexamine to liberate formaldehyde, which is antiseptic and astringent. As the acid becomes neutralized, decomposition stops, thus avoiding irritation which would occur from the use of formalin alone. The formula comprises 3 parts hexamine, 40 parts denatured alcohol, and orange-flower water to make 100.

New Intermediate

(*Continued from preceding page*)

5. On heating with dilute H_2SO_4 it gives propionylformic acid (alpha-oxobutyric acid), alcohol, and CO_2.

6. On hydrogenation it gives diethyl alpha-hydroxy-beta-methyl-succinate, which upon further hydrogenation forms 3-methyl 1, 2-butanediol, 2-methyl 1, 4-butanediol, and alcohols and water.

7. In alcoholic solution it gives an intense red color with ferric chloride.

Limited quantities of ethyl oxalpropionate are available from U.S.I. for research.

Treated Duck

(*Continued from preceding page*)

treated by this new process, for tents, tarpaulins, gun covers, webbing, and for the production of many other articles.

The Quartermaster Corps has set rigid requirements which must be met by all goods supplied. The applicable specification, JQD 242, is essentially based on performance tests, although the use of certain ingredients in the treating compound is generally considered mandatory. The use of certain other ingredients which may present objections is forbidden.

Resin Used

The compounds used by various suppliers differ somewhat, but in general they are composed of combinations of chlorinated paraffin, a high-quality hard resin and a plasticizing resin pigmented with antimony oxide, calcium carbonate and coloring pigments. These ingredients are usually dispersed in a volatile solvent and the resultant compound is applied by knifing on both surfaces of the canvas, or by impregnating the fabric by immersion in a bath of the liquid compound.

U.S.I. resins are playing an important part in this tremendous program which is now taking essentially the entire capacity of duck manufacturers and is utilizing the facilities of many textile finishers.

This textile development is destined to play an important role in the post-war era and resin-treated fabrics of this, and similar types, will be widely used for the manufacture of tarpaulins, awnings, commercial tentage and similar items. The knowledge and experience gained in the flame-proofing of canvas will also be utilized in the production of flame-retardant decorative and other fabrics.

Unsaturated Triglycerides Separated by New Process

Unsaturated triglycerides alone have greater utility than the natural oils and fats in which they occur. Particularly is this true of the drying oils used in coatings.

A patent has been granted on a new and simplified process for separating the unsaturated triglycerides from the mixture of saturated and unsaturated ones.

Natural oil containing a mixture of saturated and unsaturated triglycerides is mixed with ethanol and then heated. Upon cooling, the solution separates into a solvent layer and a precipitate layer. The solvent layer contains the unsaturated triglycerides.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

Priority-free aluminum paint, which is said to be improved by increased pigment and solid content, and with a slower drying rate, is offered for exterior and interior use. One coat is said to cover metal, wood or concrete. **(No. 900)**

USI

A rust dissolver, claimed to have a great affinity for ferrous oxide, and none for unoxidized metal is on the market. The new product is slow drying, and thus has more prolonged rust-dissolving action. **(No. 901)**

USI

A vegetable-tannin replacement, completely soluble in either hot or cold water, is announced as being the first complete synthetic alternate for vegetable tannins. Leather produced with it is claimed to be the equal of natural tannin products. **(No. 902)**

USI

A photoelectric pH meter is described by its manufacturer as being valuable also as a colorimeter and turbidimeter. Meter is claimed to be accurate and to give direct readings. It is designed for operation with ordinary Pyrex test tubes. **(No. 903)**

USI

A plastic coating, which may be heat-cured to form an insoluble film, is the claim made for a new liquid resin. Among suggested uses are linings for metal food containers and as an exterior protective coating on black iron. **(No. 904)**

USI

Rubber-to-metal adhesion is said to be improved by a new priming compound. Among the uses suggested are as an ingredient in coatings and as a coating to impart acid and alkali-resistant qualities. **(No. 905)**

USI

Fluorine-resistant glass is announced. Corrosive hydrofluoric acid, that disintegrates ordinary glass, is said to have no effect on the new product. It can be drawn, sheeted, blown, ground and polished. **(No. 906)**

USI

A rate-of-flow meter, designed to operate by differential pressure and to give direct reading in gallons per minute, is announced. It is connected to the line by two tubes attached to two sides of an orifice plate. Meter can be calibrated to give full-scale reading on any differential pressure up to 10 lbs. per sq. in. **(No. 907)**

USI

A multi-purpose pump, designed to handle a wide variety of viscous materials, such as paint, lacquer, mastic caulking compounds, cement coatings, and fibrous insulating materials, is now in production. **(No. 908)**

USI

Synthetic resin seals, such as gaskets, washers and diaphragms, said to replace rubber, are being made to buyers' specifications. Among the qualities claimed are flexibility, elasticity, and resistance to abrasion and organic solvents. **(No. 909)**

USI

A slime-controlling fungicide, for use in paper manufacture, is described as being tasteless and odorless, but is offered with the warning that it needs careful handling and is not recommended for paper whose end use is food packaging. **(No. 910)**

creased pr... in 1940 to 11.5 million tons in 1943, and 1944 tonnage is estimated to be from 11.5 million to 12 million tons.

Leather Preservatives

A study has been made of the use of dubbing carrying preservatives for the protection of leather against molds and mildew, according to an abstract from the Journal of the American Leather Chemists' Association. By virtue of being a chrome retan leather of high grease content with, consequently, a lowered water absorption, army shoe upper leather is normally relatively resistant to mold growth. Moreover, grain-finished leather is usually more resistant than flesh-finished leather.

Para-nitro-phenol, para-chloro-meta-xylenol, penta-chloro-phenol and tetra-chloro-phenol have been shown to be very effective when used in dubbings. The following mixture is recommended:

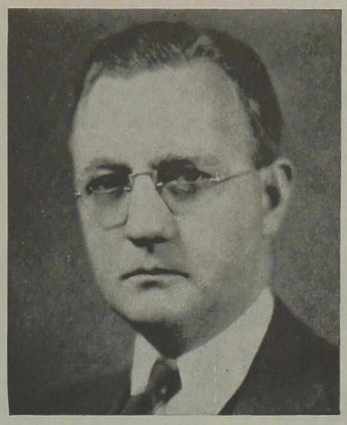
0.8 per cent para-nitro-phenol
0.8 per cent para-chloro-meta-xylenol
0.8 per cent tetra-chloro-phenol

This mixture has protected grain-out leather under our test conditions for longer than our nine-week test period, and also protected flesh-out leather under the same conditions for five weeks. Penta-chloro-phenol is recommended as a substitute if para-chloro-meta-xylenol is unavailable.

Hard-Water Detergent

A mixture of about equal weights of a soap and a water-soluble "alkali lignin" is used, which does not form insoluble calcium soaps when used in hard water. E. Schubert and H. Pierer, vested in the Alien Property Custodian. U. S. Patent No. 2,352,021.

Degener Heads Chicago Association



F. A. Degener of the Heyden Chemical Corporation, has been elected president of the Chicago Perfumery, Soap, and Extract Association. He succeeds Joseph A. Gauer, of Fritzche Brothers.

New Lubricant Marketed

The Hood Refining Company, 150 N. Hamilton Ave., Greensburg, Pa., is now manufacturing a new lubricant under the trade name of "Gibraltar Oil Concentrate." When added to or blended with any good grade of oil in the correct proportion, it produces a super-lubricant according to the manufacturer.

Gibraltar Oil Concentrate is recommended industrially for all types of internal combustion engines such as steam and gas engines, turbines, air compressors, truck engines, vacuum pumps, aviation oils, etc. It thoroughly mixes with any type of lubricating oil, will not settle out or segregate, and cannot be extracted by any filter.

Protective Coating for Zinc Alloy Castings

"Zinctone," a quick chemical process for brightening and improving the corrosion resistance of zinc-alloy die castings is a new development announced by Turco Products, Inc., of Los Angeles and Chicago. The Zinctone process seals the outer "skin" of the casting, helping to protect it from mechanical penetration and corrosive attack. At the same time Zinctone produces a smooth bright surface which compares favorably with the finish produced by mechanical polishing or buffing.

Chemical Specialties

(*Continued from page 297*)

Grease Stabilized Against Oxidation

Soluble soaps, often referred to as "soda soap bases," find extensive use in the production of general purpose greases as well as a variety of more specialized lubricants. They may be used in conjunction with insoluble metallic soaps, often classed as "lime soap bases." An example of such combined use is given in U. S. Patent 2,340,438, granted L. R. Strawn. This describes greases suitable for bearings under heavy loads and at high temperatures. One such grease may be made from about 84 per cent of a mineral lubricating oil like "300 pale oil," 2.5 per cent of a calcium soap, and about 13.0 per cent of a sodium soap. With this is combined from 0.05 to 2.5 per cent of an amino salicylic acid, which acts as a stabilizer against oxidation.

Included in the patent claims was another grease with the same characteristics consisting of a mineral oil lubricant, a soda soap and a small proportion of 5 amino salicylic acid as the anti-oxidation stabilizer.

"Non-Creeping" Liquid Marketed

A "non-creeping" liquid that quickly strips finishes from metal has been developed by Fidelity Chemical Products Corporation, Newark, N. J. The liquid was developed especially for rapid removal of insulating coatings from wires, and baked enamels from objects which cannot or should not be submerged.

New Liquid Soap

Clifton Chemical Co. has developed a concentrated liquid soap which differs from the usual product in that it has a molasses-like consistency combined with a syrup-like continuity. When diluted with water it is claimed to reduce the surface tension more than ordinary liquid soap.

It is buffered for minimum alkali content.

Metal Degreasing Solution

A non-toxic, non-corrosive solution known as Percyclodiene is now available for use in degreasing machines for war and essential civilian industries. Availability and supply are good. Degreasing machines are operated at from 180° F. to 250° F. The cleaning cycle ranges from about 2 to 5 minutes.

Since Percyclodiene is not a chlorinated product, its ease of handling and freedom from acidic attack to metals are desirable features. Flash point is 325° F.

Cyclodiene and Percyclodiene types of metal degreasers are designed for use in standard equipment, machines or tanks manufactured and sold by others. Additional information is available by addressing the Technical Processes Division of Colonial Alloys Company, Philadelphia 29, Penna.

Moisture and Fungus-Resistant Coatings for Equipment Developed

The industrial research division of Wipe-On Corp., 105 Hudson St., N. Y., has developed four moisture and fungus-resistant coatings. Two are of the varnish type, and two are of the lacquer type. Because some Government agencies and prime contractors specify one type of fungicide, and others another type, the Wipe-On Corp. provides a varnish containing each specific type of fungicide, and also a lacquer containing each type of fungicide.

Chemical Drug to Relieve Asthma

A new chemical compound effective in the relief of acute asthmatic attacks is described in a paper published in the Journal of Pharmacology and Experimental Therapeutics.

The compound, a colorless, odorless, crystalline powder with a bitter taste, is chemically described as 1-(3,4-dihydroxyphenyl)-2-amino-1-butanol and is called ethylnorsuprarenin. The authors have

1933, when it was found that the compound in doses of 0.4 mgm. per kilo intravenously, lowered the average blood pressure in anesthetized cats and speeded up the pulse.

In animals, ethylnorsuprarenin is only one-one hundred and twentieth as toxic as epinephrine, the paper concludes, and does not cause nervousness and jitters.

Decorative Finishes Developed

The manufacture of "Hammertone" finishes has been resumed by Maas & Waldstein Co., makers of industrial finishes, Newark, N. J. These finishes simulate hammered silver, copper, bronze, and other ornamental metals, and are for application on most metals or bakelite type (phenol formaldehyde) molded plastics.

Improved Wax Emulsion Sizes

Wax emulsions prepared by emulsifying mineral waxes with soaps are widely used as sizing compounds in the paper and textile industry. To overcome any tendency to corrode the metal containers and to give emulsions of improved stability, foam characteristics, and sizing efficiency, C. G. Landes, in U. S. Patent 2,340,846, recommends the use of soaps made from fatty acids containing not more than 14 carbon atoms, e.g. soaps made with lauric, myristic, caprylic, capric acids.

Soap in Production of Nonmetallic Electrical Resists

In the formation of nonmetallic electric resistances by pressure extrusion, the plasticity of the basic materials must be maintained and a suitable lubricant must be provided. This lubrication must be furnished by materials that will volatilize off in the firing operation. Pointing to the disadvantages of other previously used materials, K. Biefeld in U. S. Patent 2,340,506, recommends the use of soap as a lubricant and varnish as a binder.

An appropriate plasticized and lubricated mixture, according to the patent, consists of magnesium ferrite; together with up to 5 per cent of varnish as a binder, up to 5 per cent of soft soap as a lubricant, and up to about 10 per cent of iron oxide.

Antiseptic Detergent

A new antiseptic detergent of the class of a quaternary ammonium compound having the composition para-octylphenyl diethoxybenxyl dimethyl ammonium chloride called phemeride is described in *Lancet*, 1944, I, 49-51. It shows bacteriostatic activity against the common pathogens in vitro.

LEGAL ADVENTURES OF A CHEMIST

Wherein Chemist Smith, mythical chemist-manager of a small chemical manufacturing concern, records for any who may be interested an account of his many and varied adventures with the law

"The Case of the Disputed Insurance"

Chemist Smith was negotiating for the purchase of a competing chemical manufacturing plant.

"I'm pretty sure I'll buy, but I don't want to tie myself up right now, but what if you sell to somebody else before I make up my mind?" Smith demanded.

"I'll sign up a paper giving you an option to buy at the price we've agreed on at any time within the next 3 months," the anxious seller agreed. The option was signed, Smith took it across the street, and slapped it down on the insurance agent's desk.

"Can you insure the buildings on that property to protect me while the option's running?" Smith demanded.

And the agent frankly admitted that he did not know.

The law on this point is clear, and the American courts have ruled that the holder of an option to buy property at the actual market value has no insurable interest to protect, for, if the property burns he may buy other property of the same value for the same money, and has lost nothing by the fire.

On the other hand, if the option is for less than the actual value, then the holder may insure to the extent of any profit he might make by exercising his option.

See the case of Crossman vs. American Insurance Company, reported in L.R.A, 18F 390.

"The Case of the Seller's 'Puff'"

If Chemist Smith sells chemicals and makes a direct and definite statement in reference thereto at the time thereof, this statement will generally be construed as a warranty which will be binding on Smith. On the other hand, mere general statements commending the seller's goods are generally construed as "puffing" or mere "dealer's talk," and will not be construed as warranties. For instance, in one case where a seller stated that his goods would "sell like hotcakes," the Court held that this statement was not a warranty, so, if Smith says that his chemicals will "knock the eye out of anything else on the market at the same price," the buyer has no "come back" on Smith.

In a Utah case, however, Chemist Smith bought a new retort, the salesman stated that it would do whatever any other retort would do, but when tried out it would not do much of anything, and Smith sued for damages for breach of warranty.

"There was no warranty—what our salesman said was merely 'sales talk,'" the manufacturer contended.

"I didn't take it that way," Smith retorted, and the Utah Supreme Court ruled in his favor.

"We regard the statement that the retort would do what any other retort would do as amounting to an express warranty and not mere 'sales talk,' nor an expression of opinion," said the Court in the Summers case, 178 Pac. 916.

(*Continued on page 310*)

CHEMICAL ECONOMICS & STATISTICS

Record Minerals Output

Secretary of the Interior Harold L. Ickes announced yesterday that the United States and Alaska produced a record total of $8,543,000,000 in minerals in 1944 to shatter the previous high of $8,056,000,000 established in 1943.

Quoting information provided by the Economics and Statistics Branch of the Bureau of Mines, Secretary Ickes said the 1944 output represents a gain of 6 per cent over 1943, the first year that the "Arsenal of Democracy" passed the 8-billion-dollar mark. In 1942, another record year, output was $7,575,700,000.

The 1944 peak was 54 per cent higher than the World War I total of $5,540,-708,000, established in 1918, and represents the all-out efforts of the mineral industry to meet the exceedingly heavy demands of the armed forces for war equipment and materials.

"The attainment of the past 12 months is particularly noteworthy because of the fact that the Nation skimmed much of the 'cream' from its mineral resources during the First World War," Secretary Ickes said. "The new production record was made possible only by dint of great ingenuity on the part of the mineral industry, and to the discovery of large quantities of lower grade materials.

Of the estimated total of $8,543,000,000 in mineral output, mineral fuels contributed $5,254,000,000, compared with $4,589,000,000 in 1943 an increase of more than 14 per cent; metallic products reached $2,377,000,000, compared with $2,493,000,000 in 1943, a drop of nearly 5 per cent; and other nonmetallic minerals $912,000,000, compared with $974,-000,000 in 1943, a decline of about 6 per cent. Major factors contributing to the decline in metallic products and nonmetallics, other than fuels, were the reduced demand for certain metals, manpower shortages in many mineral-producing areas, and the continued slump in the building industry.

Declines rather than gains were commonly recorded in the metals group, significant ones including aluminum, bauxite, chromite, copper, ferro-alloys, gold, iron ore, lead, mercury, molybdenum, silver, tantalite-columbite, tungsten, vanadium, and zinc. Gains were registered for beryllium, cadmium, manganese ore, pig iron, nickel, and platinum.

All the fuels—anthracite, bituminous coal, coke, natural gas, natural gasoline and liquefied petroleum gases, and petroleum—registered gains.

Of the other nonmetallic minerals, asbestos, native asphalt, barite, boron minerals, emery, feldspar, fluorspar, lithium minerals, mica, mineral pigments, phosphate, potash, pyrites, salt, sodium salts, sulfur, and talc showed moderate to large increases. Decreases were shown by most abrasives, cement, clay products, graphite, kyanite, peat, sand and gravel, slate, and stone.

The year-end report on domestic mineral production, submitted by the Bureau of Mines to Secretary Ickes, follows:

Metallic Products

Light Metals.—Drastic curtailment of light metal production was necessitated in 1944 because of the changing pattern of munitions production and excessive original estimates of needs. Output of primary and secondary aluminum, plus Canadian imports, far outstripped requirements in 1944 so that over-all cutbacks aggregating about 54 per cent of total capacity were made during the year. As a result, output of primary aluminum fell from 920,179 short tons in 1943 to 777,700 tons, valued at $233,300,000, in 1944. Production and consumption of bauxite declined markedly in 1944, and late in the year production reached the lowest monthly rate in nearly two years. Ship-

Chemicals: U. S. Production, Consumption and Stocks
First Quarter, Second Quarter, July, August, September, Third Quarter 1944

Item	First Quarter	Second Quarter	July	August	September	Third Quarter
	1944					
Ammonium Sulphate[1] (Short Tons)						
Production	201,017	203,904	69,172	68,602	65,509	203,283
Consumption	473	4	2	5	4	11
Stocks	22,461	66,352	75,222	79,532	77,334	77,334
Borax, Refined ($Na_2B_4O_7.10H_2O$ content) (Short Tons)						
Production	52,134	52,495	16,810	17,086	16,800	50,696
Consumption						
Stocks	10,548	12,734	13,728	14,027	13,009	13,009
Cobalt, Compounds[2] (Pounds)						
Production	572,334	689,036	171,302	250,599	344,524	766,425
Consumption	9,958	4,215	894	7,740	56,900	65,534
Stocks	303,973	361,509	360,511	377,721	325,140	325,140
Cobalt Driers[3] (Pounds)						
Production	1,634,043	1,711,466	471,529	552,077	543,977	1,567,383
Consumption	200,455	25,845	12,644	10,868	9,078	32,590
Stocks	319,636	326,894	252,799	174,851	200,236	200,236
Copper Sulphate (25% copper content) (Short Tons)						
Production	24,694	25,728	8,283	7,392	7,772	23,447
Consumption	2,594	3,034	1,050	711	769	2,530
Stocks	12,396	6,858	4,839	4,788	7,580	7,580
Sulphur (Long Tons)						
Production	595,493	831,199	305,064	306,146	293,963	905,173
Consumption						
Stocks[4]	4,251,744	3,511,255	3,524,430	3,533,409	3,500,218	3,500,218
Zinc Oxide (lead free) (Short Tons)						
Production	39,174	38,933	13,096	13,014	11,899	38,009
Consumption						
Stocks	9,344	11,368	11,754	12,121	13,144	13,144
Zinc Oxide (leaded) (Short Tons)						
Production	14,965	15,003	5,548	5,595	6,203	17,346
Consumption						
Stocks	2,130	2,272	2,084	1,777	1,664	1,664
Zinc Chloride (dry weight) (Short Tons)						
Production	3,767	5,396	1,837	1,771	1,731	5,339
Consumption	1,877	3,576	1,148	1,114	1,208	3,470
Stocks	1,373	1,209	1,356	1,509	1,526	1,526
Zinc Ammonium Chloride (dry weight) (Short Tons)						
Production	2,041	2,309	730	649	921	2,300
Consumption						
Stocks	526	691	639	543	522	522
Zinc Sulphate (dry weight) (Short Tons)						
Production	4,634	2,289	730	676	662	2,068
Consumption						
Stocks	786	758	802	707	542	542
Zinc Chemicals Misc.[5] (Short Tons)						
Production	571	540	229	602	531	1,362
Consumption						
Stocks	198	239	269	257	303	303

[1] Does not include synthetic ammonium sulphate the production of which is reported to the Bureau of the Census. Data for synthetic ammonium sulphate cannot be published.

[2] Includes oxide, hydrate and salts. Cobalt content of production:

	Pounds
1st Qtr. (1944)	132,063
2nd Qtr. (1944)	140,704
July	40,964
August	60,399
September	73,618
3rd Qtr. (1944)	174,981

[3] Cobalt content of production:

1st Qtr. (1944)	94,071
2nd Qtr. (1944)	101,386
July	25,911
August	38,627
September	35,568
3rd Qtr. (1944)	100,106

[4] Stocks at mine, in transit, or at warehouse.

[5] Includes zinc carbonate, chromated zinc chloride, zinc cyanide, zinc peroxide, zinc sulfocarbolate, etc.

ments dropped from 7,496,250 short tons in 1943 to 3,334,800 tons, valued at $16,680,000, a decline of about 55 per cent. In line with reduced output of aluminum and bauxite, the production of alumina (from which the metal is made) also was greatly curtailed during the year, and over-all cutbacks totaled about 58 per cent of original installed capacity.

Decreased demand for magnesium and a growing stockpile of the metal forced production downward precipitously in the second half of 1944. By the end of the year output was reduced to about 15 per cent of the original rated capacity. An extremely large part of the cutback occurred in Government-owned plants, all but four of which ceased production. Output for the year was 170,000 short tons.

Iron and Steel.—Production of pig iron and steel advanced 1 per cent in 1944, but a decrease in demand for alloy steel resulted in a decline of 7 per cent in the quantity and 5 per cent in the value of all ferro-alloy shipments. Shipments of iron ore declined 3 per cent from 1943 to a total of 96,100,000 gross tons. Most of the decrease was in the Lake Superior District, where shipping quotas were lowered intentionally because of large stocks at blast furnaces.

Ferro-alloying Minerals.—Molybdenum shipments from domestic ores were about 70 per cent of the 1943 total, due to lower production of alloy steels and a lessened demand for molybdenum as a substitute metal. Vanadium output dropped about 40 per cent, following the cancellation of contracts for Government purchases. Chromite shipments slumped to less than 30 per cent of the 1943 total because of the improvement in the alloy situation and increased availability of chromite from foreign sources, and production of tungsten concentrates was down almost 8 per cent. On the other hand, the production and consumption of titanium reached new highs, and the output of manganese ore containing 35 per cent or more manganese was the largest since 1918, and 1944 was the second most productive year on record.

Gold and Silver.—War conditions continued to depress the gold and silver industries in 1944. The issuing of Governments grants for the limited production of gold under Order L-208 had little effect in increasing the output, and decreased base-metal production lowered the yield of gold and silver from this source. Production of gold in the United States (Alaska included) was estimated at 988,600 ounces, valued at $34,601,000, compared with 1,380,758 ounces in 1943, a decline of over 28 per cent in both quantity and value; silver output in 1944 totaled 34,873,000 ounces, valued at $24,798,700, compared with 40,794,568 ounces in 1943, a decline of nearly 15 per cent in both quantity and value.

Copper, Lead, and Zinc.—Production of copper declined 9 per cent in 1944 and

Chemicals: United States Production, Consumption, and Stocks, October, 1944

Statistics on the production, consumption and stocks of chemicals shown in the following table supplement the 1941-1943 figures released February 7, 1944, in "Facts for Industry," Series 6-1-1. Figures for earlier months, information on the number of plants manufacturing each chemical, and a discussion of the limitations of the data are given in the above mentioned publication. The production figures represent primary production and do not include purchased or transferred material. The consumption statistics are for consumption only in the plants where each chemical is produced. The stocks figures represent the quantities of each chemical on hand at the end of the month at producing locations only.

		October (Preliminary)			*September (Revised)*		
Chemical and Basis	*Units*	*Production*	*Consumption in producing plants*	*Stocks at producing plants, end of month*	*Production*	*Consumption in producing plants*	*Stocks at producing plants, end of month*
Acetylene:							
For use in chemical synthesis	M cu. ft.	(1)	(1)	(1)	307,553		
For commercial purposes	M cu ft.	(1)			131,276	72,124	11,397
Synthetic anhydrous ammonia (100% NH_3)	Short tons	49,113	32,136	4,802	45,292	29,851	2,764
Bleaching powder (35%-37% avail. Cl_2)	M pounds	2,702	....	864	2,528	....	1,038
Calcium acetate (80% Ca-$(C_2H_3O_2)_2$)	M pounds	1,069	(3)	241	966	(3)	233
Calcium arsenate (100% $Ca_3(AsO_4)_2$)	M pounds	608	(3)	13,075	1,130	(3)	13,955
Calcium carbide (100% CaC_2)	Short tons	(1)	(4)	(1)	62,591	(4)	31,078
Calcium hypochlorite (true) (70% avail. Cl_2)	M pounds	1,249	(3)	731	1,173	(3)	766
Calcium phosphate — monobasic (100% $CaH_4(PO_4)_2$	M pounds	4,713	(3)	5,010	5,139	(3)	6,282
Carbon dioxide:							
Liquid and gas (100% Co_2)	M pounds	(1)	(1)	(1)	31,822	2,771	2,168
Solid (dry ice) (100% Co_2)	M pounds	(1)	(1)	(1)	64,129	1,502	7,179
Chlorine	Short tons	103,517	56,694	4,966	102,190	54,972	5,025
Chrome green (C.P.)[2]	M pounds	624	88	951	577	103	991
Hydrochloric acid (100% HCl)	Short tons	34,454	19,750	3,261	32,131	18,399	3,162
Hydrogen	Millions of cubic feet	(1)	(1)	(1)	*2,085	1,724	(4)
Lead arsenate (acid and basic)	M pounds	(1)	(1)	(1)	5,753	81	11,191
Lead oxide — red (100% Pb_3O_4)	M pounds	8,770	590	4,159	8,625	404	4,917
Methanol (natural) (80% CH_3OH)	Gallons	382,462	(4)	263,766	333,781	(4)	200,619
Methanol (synthetic) (100% CH_3OH)	M gallons	5,671	(3)	1,851	5,435	(3)	1,926
Molybdate orange (C.P.)	Pounds	107,053	6,669	131,834	90,847	2,962	171,915
Nitric acid (100% HNO_3)	Short tons	41,955	37,037	5,795	39,349	35,316	5,905
Nitrous oxide (100% N_2O)	M gallons						
Oxygen	S.T.P.	(1)	....	(1)	9,963	....	3,508
Phosphoric acid (50% H_3PO_4)	M cu. ft.	(1)	(1)	(3)	1,567,831	33,244	(3)
Potassium bichromate and chromate (100%)	Short tons	52,371	48,020	12,899	*52,039	*46,769	*14,397
Potassium chloride (100% KCl)	M pounds	686	(3)	510	588	(3)	430
Potassium hydroxide (caustic potash) (100% KOH)	Short tons	(7)	(7)	(7)	(7)	(7)	(7)
Soda ash (commercial sodium carbonate):							
Ammonia soda process—Total wet and dry[5] (98%-100% Na_2CO_3)	Short tons	3,667	652	1,183	3,515	697	1,682
Finished light (98%-100% Na_2CO_3)[6]	Short tons	379,472	....	....	365,362	....	....
Finished dense (98%-100% Na_2CO_3)	Short tons	203,265	47,680	24,312	198,216	48,287	24,277
Natural[7]	Short tons	123,025	2,549	12,801	116,652	2,849	13,983
Sodium bicarbonate (refined) (100% $NaHCO_3$)	Short tons	(1)	(3)	(1)	14,503	(3)	3,774
Sodium bichromate and chromate (100%)[2]	Short tons	12,422	(3)	4,936	12,383	(3)	5,436
Sodium hydroxide, liquid:							
Electrolytic process (100% NaOH)	Short tons	6,862	(3)	828	6,289	(3)	1,106
Lime-soda process (100% NaOH)	Short tons	102,032	23,219	32,589	99,216	*18,444	*34,087
Sodium phosphate:							
Monobasic (100% NaH_2PO_4)	Short tons	56,618	(3)	14,250	56,023	(3)	15,734
Dibasic (100% Na_2HPO_4)	M pounds	(1)	(3)	(1)	2,717	(3)	945
Tribasic (100% Na_3PO_4)	Short tons	(1)	(3)	(1)	4,034	(3)	618
Sodium silicate (liquid and solid) (anhydrous)	Short tons	(1)	(1)	(1)	6,005	109	1,480
Sodium sulfate:							
Glauber's salt and crude salt cake[7]	Short tons	36,757	(4)	43,506	35,057	(4)	48,467
Anhydrous (refined) (100% Na_2SO_4)	Short tons	(1)	(1)	(1)	*65,185	5,385	*77,693
Sulfur dioxide (100% SO_2)	Short tons	(1)	(3)	(1)	5,331	(3)	8,161
Sulfuric acid:[7]							
Chamber process (100% H_2SO_4)	M pounds	(1)	(1)	(1)	*6,722	*3,107	2,419

Chemicals: United States Production, Consumption, and Stocks, October, 1944 (cont'd.)

Chemical and Basis	Units	October (Preliminary) Production	October (Preliminary) Consumption in producing plants	October (Preliminary) Stocks at producing plants, end of month	September (Revised) Production	September (Revised) Consumption in producing plants	September (Revised) Stocks at producing plants, end of month
Sulfuric acid:[7]							
Contact process (100% H_2SO_4)[8]	Short tons	285,278	....	213,457	253,506	....	204,393
Net contact process	Short tons	533,912	....	....	491,438	....	....
(100% H_2SO_4)[9]	Short tons	457,557	....	....	430,383	....	....
White lead (C.P.) basic lead carbonate	Short tons	7,493	3,065	3,521	6,728	2,891	3,489
White lead (C.P.) basic lead sulfate	Short tons	1,387	....	285	1,065	....	370
Zinc yellow (C.P.)	M pounds	2,469	295	990	2,528	271	932

[1] Not yet available.
[2] Revised figures for earlier months will be shown in a subsequent release of this series.
[3] Data cannot be published without disclosing the operations of individual establishments.
[4] Not available; see "Facts for Industry," Series 6-1-1.
[5] Total wet and dry production including quantities diverted for manufacture of caustic soda and sodium bicarbonate and quantities processed to finished light and finished dense soda ash. For detailed discussion of soda ash statistics, see "Facts for Industry," Series 6-1-1.
[6] Not including quantities converted to finished dense soda ash.
[7] Natural soda ash, Glauber's salt and sulfuric acid data collected in cooperation with the Bureau of Mines; potassium chloride data collected by the Bureau of Mines after May 1944.
[8] Includes sulfuric acid of oleum grades.
[9] Excludes spent acid. For detailed explanation, see "Facts for Industry," Series 6-1-1.
* Revised.

lead 4 per cent, despite the continued need for large supplies of copper and the "tight" situation of lead with respect to supply. The position of zinc was easier in 1944, and stocks gained throughout the year to reach a record high, even though output of the metal dropped 4 per cent from that in 1943. A shortage of labor was the main factor in the slump of all three metals. Smelter production of copper from domestic ores declined to about 990,000 tons valued at $234,000,000 (exclusive of premium payments to mines), compared with 1,092,939 tons valued at $257,934,000 in 1943. The output of refined lead from domestic ores in 1944 was estimated at 385,000 tons, valued at $49,280,000, and slab zinc at 568,000 tons, valued at $97,696,000. These values also are exclusive of premium payments.

Other Metals.—Mercury production in 1944 dropped about 27 per cent in quantity and 56 per cent in value, following a sharp decrease in demand late in 1943 and the withdrawal of Government purchasing. Antimony output at the mines was somewhat below the high point reached in 1943, since large reserve stocks and imports made increased production unnecessary. Output of arsenic, beryllium, and cadmium was up, but that of tantalite and columbite declined.

Mineral Fuels

Petroleum and Natural Gas.—New records were set in all branches of the petroleum and natural gas industries in 1944. The upward trends in military and war industry requirements during 1943 and 1944 more than offset the effects of rationing and curtailment of less-essential civilan uses.

The producton of crude petroleum in 1944, estimated at 1,678 million barrels, exceeded all previous records and represented a gain of more than 11 per cent over 1943. About 90 per cent of the total gain in production came from Texas and was supplemented by substantial increases in California and Louisiana. The estimated value of crude petroleum at the well was about $2,061,000,000—the largest increment in total value being due to the volume gain in production, but a further substantial increase resulted from Government payments to stimulate production from "stripper" wells in August and succeeding months. The average value per barrel rose from $1.21 in 1943 to about $1.23 in 1944. The most significant change in the demand for refined products in 1944 was the gain in the demand for motor fuel to an estimated total of 738 million barrels—exceeding the previous record established in 1941, by more than 6 per cent and representing a gain of 19 per cent compared with the total demand in 1943. Since civilian consumption continued at about the same rate as in 1943, the rise in demand reflected the rapid expansion in requirements of our armed forces and for export.

The marketed production of natural gas increased about 9 per cent in 1944 to an estimated total of 3,735 billion cubic feet compared with 3,415 billions in 1943. Less expansion in demand for industrial applications was indicated in 1944 than occurred in 1943. The total value of natural gas at points of consumption in 1944 was estimated at $820,000,000.

The natural gasoline industry increased its output of light products 13 per cent in 1944 to approximately 4,200 million gallons, of which 3,040 millions were natural gasoline and cycle products and 1,160 millions were liquefied petroleum gases. The value of all products at the plants was about $185,000,000.

Bituminous Coal.—The production of bituminous coal and lignite reached an all-time high in 1944 with an estimated output of 620,000,000 net tons, compared with the previous peak of 590,177,069 tons in 1943. This record performance was accomplished despite interruptions to output caused by labor shortages and difficulty in obtaining supplies and machinery.

Although production was the greatest on record it still was not sufficient to meet the demand created by the war program. By keeping a careful check on critical requirements and the diversion of and allocation of coal to important industries, the Solid Fuels Administration for War has endeavored to keep distress to a minimum.

Pennsylvania Anthracite. — Although production of Pennsylvania anthracite in 1944 increased to approximately 64,300,000 net tons, a gain of 6 per cent over 1943, the demand exceeded the output, and strict allocation was used to effect an equitable distribution of the available supplies. Shortages of other space-heating fuels, expanded purchasing power of domestic consumers, and the high rate of industrial activity were largely responsible for the continued heavy demand for anthracite. The scarcity of manpower limited production in 1944.

The 1944 production, the highest since 1930, had an estimated value at the mine of $359,000,000.

Coke and Byproducts.—The continued large requirements for metallurgical fuel by the iron and steel industry and the increased demands for solid fuels by other industrial consumers and the domestic coke trade resulted in the production of 73,700,000 net tons of byproduct and beehive coke, an increase of approximately 2,100,000 tons over the Nation's previous record production in 1943. The gain was due entirely to an increase of 2,900,000 tons in byproduct coke output, as beehive coke production declined 800,000 tons. Completion of new oven capacities accounted for the increased byproduct coke output, whereas the decline in beehive coke production was due principally to displacement of beehive-furnace coke by coke from the enlarged byproduct plants.

The estimated values of coke produced: Byproduct, $454,000,000; beehive, $47,000,000; total byproduct and beehive, $501,000,000. The combined value of the coke byproducts, including breeze, at the producing plants was $214,000,000.

Other Nonmetallic Minerals

The production value of nonmetallic minerals other than fuels in 1944 was approximately $912,000,000, which was 6 per cent lower than the $974,000,000 recorded in 1943. The decline, however, was not consistent throughout the industries. The output of products that have special military or essential civilian uses in general equalled or exceeded that of 1943, but building materials, which constitute the largest items, declined substantially. This was to be expected because war facilities were virtually completed whereas war housing and civilian construction remained at a low level.

Fertilizers.—The enormous demand for food to satisfy the needs of our civilian population, our armed forces at home and abroad, our allies, and the undernourished populations of liberated countries has placed so heavy a burden on agriculture that fertilizer sales have exceeded all previous records. Estimated sales of phosphate rock exceeding 5½ million long tons and of potash reaching 820,000 short tons (K_2O content) have set new marks for these industries. Nitrate plants were operating virtually at capacity to furnish essential ingredients of explosives and fertilizers. Agricultural limestone sales likewise were high.

Refractories.—The demand for dead-burned magnesite, dead-burned dolomite, fire clay, silica brick, and alumina and chrome refractories was strong because of the high level of activity of metallurgical furnaces, but the curtailment of magnesium metal requirements led to a corresponding reduction in output of crude magnesite and magnesium chloride. Crude magnesite production in 1944 was approximately 523,000 tons, compared with 754,832 in 1943.

Chemical Raw Materials.—The manufacture of synthetic rubber and other chemical uses stimulated an 8 per cent increase in sales value of salt. The quantity sold—more than 16 million tons—was nearly 6 per cent greater than in 1943. The chemical, and particularly the fertilizer industries, created an active demand which increased the sales of sulfur to 3½ million tons, 18 per cent higher than in 1943. Pyrite production increased about 6 per cent. Crude barite sales increased about 25 per cent, reaching 525,000 tons to satisfy the heavy demands for well-drilling muds, lithopone, and barium chemicals. Requirements for the glass, cleanser, and fertilizer trade as well as for export stimulated an increase in production of boron minerals to 330,000 tons, which was almost the level of 1937, the high record year. Bromine production reached an all-time high of about 103,000,000 pounds because of the demand for larger and larger quantities of anti-knock gasoline. The production of lithium minerals, which have important war uses, increased to about 14,600 tons, which was nearly 80 per cent greater than in 1943. The production of strontium minerals, on the other hand, dropped to only about 1,500 tons, which was one-fifth of the 1943 output. The decline is attributed to depletion of the higher-grade deposits and increasing competition of barite in well-drilling muds.

Other Nonmetals.—Continuing high demands for strategic mica and an increase in the Government price from $6 to $8 a pound resulted in a moderate advance in sales of the domestic product. Sales of scrap mica for grinding also increased. An advance was noted in production of natural and synthetic iron oxide pigments needed in large quantities for painting military establishments and equipment. The import situation with respect to graphite eased considerably during the year in consequence of which Government contracts to produce and stock domestic graphite were cancelled and production declined to about 4,000 tons compared with 9,597 in 1943. An increase of approximately 5 per cent in sales of feldspar to a total of about 325,000 long tons was due in part to expansion of glass manufacture to furnish containers and building materials that could be substituted for metals needed more urgently in making war munitions. Talc output (including pyrophyllite), which reached 415,000 tons, was a little higher than in 1943 owing primarily to increasing quantities employed as synthetic rubber filler.

Chemical Production Rises

The production of all chemicals rose slightly in November to an estimated index of 310 (1935-39 average 100). This represented an increase of 4 points over the preceding month, but a substantial decline from the 390 of November, 1943.

The industrial chemicals category remained constant, advancing from 395 in October to 397 in November. The November 1943 figure was 398.

These figures are adjusted for seasonal variation.

Synthetic Organic Chemicals: United States Production, Consumption, and Stocks, October 1944

(In pounds, except that creosote oil is expressed in gallons.)

Acetanilide (technical and U.S.P.):	
Production	[4]
Consumption	37,698
Stocks	318,541
Acetic acid (synthetic):[1]	
Production	23,856,623
Consumption	16,497,719
Stocks	7,838,126
Acetic acid (natural, including that from calcium acetate.):[2]	
Production	3,715,813
Consumption	[4]
Stocks	1,442,567
Acetic anhydride:[3]	
Production	
Consumption	Published
Stocks	Quarterly
Acetylsalicylic acid (Aspirin):	
Production	833,771
Consumption	[4]
Stocks	819,238
n-Butyl acetate:	
Production	4,950,839
Consumption	[4]
Stocks	2,824,731
Creosote oil, tar distillers:[5]	
Production	10,211,154
Consumption	495,452
Stocks	11,993,110
Creosote oil, byproduct:[6]	
Production	3,870,158
Consumption	45,059
Stocks	703,236
Cresols, meta-para:[7]	
Production	539,882
Consumption	[4]
Stocks	242,041
Cresols, ortho-meta-para:[7]	
Production	866,906
Consumption	
Stocks	[4]
Cresylic acid, crude:	
Production	1,988,290
Consumption	[4]
Stocks	977,348
Cresylic acid, refined:[7]	
Production	3,423,705
Consumption	[4]
Stocks	2,022,566
Diethyl ether (all grades):	
Production	9,553,380
Consumption	[4]
Stocks	2,930,568
Ethyl acetate (85 percent):	
Production	9,682,672
Consumption	1,275,214
Stocks	5,720,572
Lactic acid (edible):	
Production	436,735
Consumption	[4]
Stocks	[4]
Lactic acid (technical):	
Production	315,525
Consumption	15,577
Stocks	289,097
Methyl chloride (all grades):	
Production	2,535,883
Consumption	[4]
Stocks	593,251
Naphthalene, less than 79° C. (coke-oven operators):[8]	
Production	8,127,569
Consumption	
Stocks	2,550,640
Naphthalene, less than 79° C. (tar distillers):[9]	
Production[10]	17,759,552
Consumption	[4]
Stocks	6,980,727
Naphthalene, refined (79° C. and over):	
Production	5,907,481
Consumption	4,674,273
Stocks	1,462,074
Oxalic acid (technical):	
Production	1,565,560
Consumption	[4]
Stocks	427,520
Phenobarbital and sodium salts:	
Production	27,572
Consumption	[4]
Stocks	46,385
Phthalic anhydride:	
Production	10,792,415
Consumption	3,821,381
Stocks	3,781,565
Riboflavin (for human use):	
Production	[4]
Consumption	1,085
Stocks	37,179
Sulfa drugs (total):[11]	
Production	258,172
Consumption	53,435
Stocks	985,968

[1] Excludes statistics on recovered acetic acid, which are confidential.

[2] Natural acetic acid (produced by direct process from wood) and acetic acid distilled from calcium acetate. These statistics are collected and compiled by the U. S. Bureau of the Census.

[3] Represents all acetic anhydride, including that produced from acetic acid by the vapor-phase process.

[4] Confidential; publication would disclose operations of individual companies.

[5] Product of distillers who use purchased coal tar only.

[6] Product of byproduct coke-oven operators only. These statistics are collected and compiled by the Coal Economics Division, U. S. Bureau of Mines.

[7] Statistics represent total production, consumption, and stocks, including both data reported by coke-oven operators to the Coal Economics Division, Bureau of Mines, and data reported by distillers of purchased coal tar to the U. S. Tariff Commission. Data reported to the two agencies are combined to prevent the disclosure of the operations of individual companies.

[8] Includes only the production, consumption and stocks of coke-oven operators. Statistics combine the three grades (solidifying at less than 74° C., at 74° C. to less than 76° C., and at 76° C. to less than 79° C.) in order to prevent the disclosure of the operations of individual companies. These statistics are collected and compiled by the Coal Economics Division, Bureau of Mines.

[9] Includes only the production, consumption and stocks of distillers of purchased coal tar. Statistics combine the grades specified in footnote 8, in order to prevent the disclosure of the operations of individual companies.

[10] For the grade solidifying at less than 74° C., these statistics represent production for sale only; for the other two grades, they represent production both for consumption within the producing plant and for sale. Production for consumption of the grade solidifying at less than 74° C. is excluded in order to minimize duplication as this grade is frequently converted to grades of higher melting point.

[11] Includes acetylsulfathiazole produced both as a sulfa drug and as an intermediate, resulting in an appreciable duplication which is unavoidable.

Source: Statistics collected and compiled by the U. S. Tariff Commission, except where otherwise noted.

Legal Adventures

(*Continued from page 302*)

"Case of the Chattel Mortgage"

Chemist Smith had insured his chem cals in a certain warehouse, gave a cha tel mortgage thereon, did not notify t insurance company, the stock burned, a the company refused to pay.

"The policy says that it shall be vo if the stock should be covered by a cha tel mortgage," the company pointed o

"Yes, but the chattel mortgage ca for a rate of interest that is usurious a cording to our state law. That mak the mortgage void, and a void mortga can't make the policy void," Chem Smith's lawyer contended.

But the N. Y. Court of Appeals the Lipedes case found in 128 N.E. 16 ruled against this argument and Sm had to stand the loss.

"We may assume that the chattel mo gage is void as a matter of law. It m if enforcement is resisted, lack legal ficacy, but it exists as a fact and moral efficacy in point of fact. The rea for requiring knowledge or notice of chattel mortgage is the same as the rea for requiring knowledge of other in ance. The facts relating to both are portant to the insurance companies bearing on the risk assumed."

"The Case of the S. D. No

A South Dakota debtor had gi Chemist Smith a note for "chemicals ceived," the note called for "interest the rate of 6% per annum from dat paid when due; if not paid when due 8% from date."

"It isn't a note at all," the debtor c tended two months later. "Until it f due nobody knows whether it will be p at maturity or not, and if you don't kn that, you don't know what rate of in est to charge, and if you don't know w rate of interest to charge, you can't it calls for 'a sum certain,' and i doesn't call for a sum certain it ain note," the customer contended.

"Whenever you pay the note, any with a stub pen and a common sch education can figure up exactly wha will call for, and that's all the law quires," Smith retorted.

"According to the weight of author neither a proviso that a note bearing interest if paid at maturity shall b interest from date if it is not so paid, a proviso that it is to bear a higher r from date if not paid at maturity, o lower than that therein specified if p at maturity, renders it non-negotiab said the South Dakota Court in decid the case of Farm Mortgage & Loan vs. Martin, 214 N.W. 816, in favor Chemist Smith.

CANADIAN NEWS

by W. A. JORDAN

Chemical Exports Up in 1944

Canadian exports of chemicals for 1944 reached an all-time high of $100.7 million, up $14.4 million over 1943, according to a preliminary compilation prepared by the Bureau of Statistics. The major gain has been recorded in foreign sales of fertilizers, which advanced from $18.1 to $24.0 million. Acid exports declined from $2.5 to $2.3 million, and soda compounds were down $0.6 million at $4.3 million.

The Dominion's chemical exports have progressed steadily from the $23.7 million of 1939, to the $28.4, $38.5, $53.0 and $86.4 million of ensuing years, but a very heavy percentage of the increased foreign trade in chemicals must be regarded as abnormal, war-generated demand.

On the import side, Canada's chemical purchases for eleven months of 1944—most of which are from the U. S. A.—totalled $75 million versus $65 million in the corresponding period of 1943. Imports, by main groups, and in millions of dollars, were: Acids, $2.9; cellulose products, $4.5; drugs and medicines, $6.9; dyeing and tanning materials, $6.5; fertilizers, $4.0; paints and varnishes, $6.9; inorganic chemicals, $11.3.

Phosphate and Potash Deposits Discovered

Ontario Phosphate Industries Ltd., which was organized last August to take over holdings in Frontenac County, is conducting development work in an attempt to exploit an ore body revealed by diamond drilling. A shaft has been sunk to 170 feet and underground work carried out at the 150 foot level.

Although this property was worked on a small scale some years ago, and produced a limited tonnage from surface pits, no major work had been progressing until diamond drilling indicated the presence of a larger ore body. The extent of the body is yet unproved.

Phosphate is one of the Dominion's primary needs, for although a fair number of deposits have been worked from time to time in Quebec and Eastern Ontario, ore grade has been low, and mining costs too high to permit sound operations on any scale. As a consequence, Canada has to rely on the U. S. A. for imports of some 310,000 tons of phosphate per annum.

Similarly, Canada has been without known potash resources, and imports some 60,000 tons of this material annually from the United States. Although no potash deposits are being worked in Canada at present, it is reported that an interesting ore body has been discovered in western Canada which is, however, deep-lying, and at the moment still of unproved economic value.

New Executive Vice-President of Consolidated

R. E. Stavert of Montreal, has been appointed executive vice president of Consolidated Mining & Smelting Ltd., according to S. G. Blaylock, Consolidated chairman and president.

First Plant for Plasticized Resins

Canadian Resins and Chemicals, Ltd., Montreal, plans the immediate construction of a 150 x 280 ft. plant for the manufacture of plasticized vinyl resins, with primary emphasis to be placed on sheeted material. It is anticipated that this new unit, the first such large scale operation in Canada, will be in production by the latter months of this year.

Although Canadian Resins has operated a million dollar, 3,000,000 pound per year vinyl chloride-acetate copolymer producing plant for the past year and a half, the Dominion has not possessed any sizeable plasticization facilities. Hence an anomalous situation exists, wherein Canada exports substantial tonnages of the basic resin, and relies mainly on import purchases of the plasticized type.

Alcohol Production Survey

The Industrial Development Board of Newfoundland has recently completed a survey of the Newfoundland pulp and paper industry to determine the possibility of utilizing the waste sulfite liquor for the manufacture of alcohol. According to the Board's estimates, some 1,400,000 gallons of alcohol could be produced annually by the papermakers, and it is stated, unofficially, that one Newfoundland mill has the matter under consideration.

At present, the Ontario Paper Co. Ltd., Thorold, operates the only North American unit for producing industrial alcohol from sulfite waste, with a rated output of almost a million gallons of alcohol annually. To date, the bulk of this gallonage has been shipped by the Chemicals Controller to the American Rubber Pool, but recently Ontario Paper has entered the domestic alcohol market with the appointment of Apco Sales Ltd., solvent specialists, as Canadian distributors.

Synthetic Rubber Production

Output of synthetic rubber in Canada by the Crown-owned $51 million Polymer Corporation, Sarnia, Ontario, totalled 58 million pounds of Buna-S and 2 million pounds of butyl rubber during its first full operating year, according to official sources. At present, the plant is running at a production rate of 78 million pounds of Buna-S and 9 million pounds of butyl, and in May last reached a peak rate of 11 per cent above its rated capacity.

In peacetime the rated plant capacity in both Buna-S and butyl rubber would be sufficient to meet all Canadian requirements, even after allowing for postwar industry expansion and exports of finished rubber products, states Minister C. D. Howe. It has been established that the plant will remain the property of the Government in the postwar period, and will be operated as a Crown company.

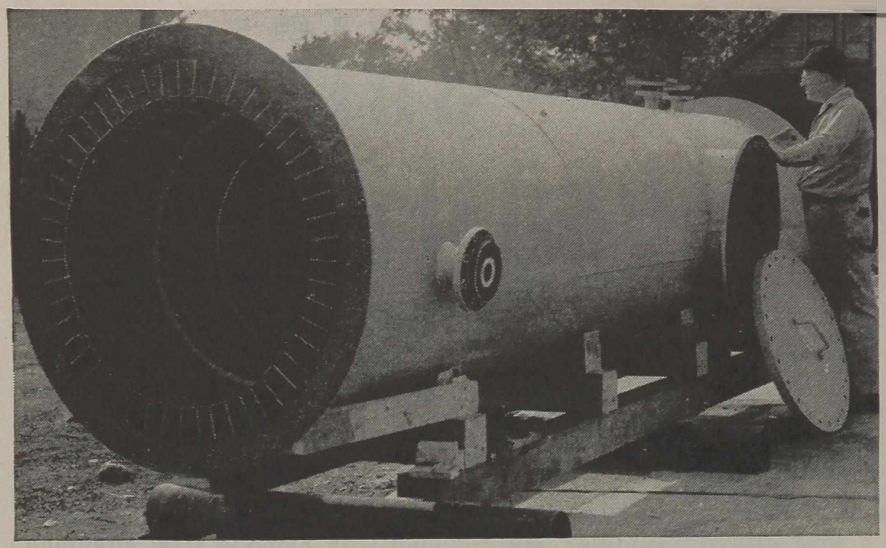
Kalamazoo Considering Chlorine Plant

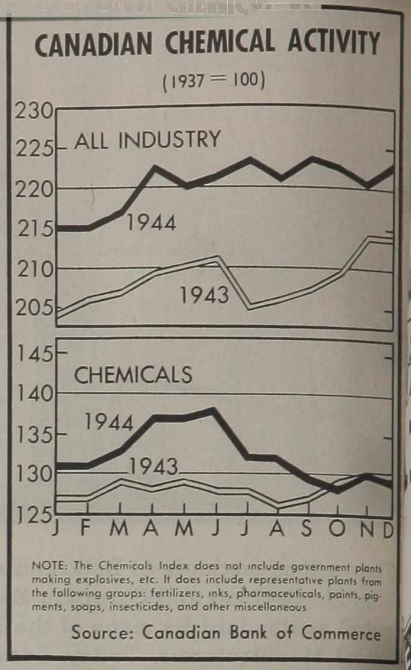
Kalamazoo Vegetable Parchment Co. which acquired the dormant Abitibi Espanola mill last year, is considering the installation of an electrolytic chlorine plant for the manufacture of chlorine and caustic soda for its own use, according to company officials. Such an installation would be a part of the company's overall plans for the development of the Espanola property as a bleached sulphate mill to supply pulp to the parent U. S. organization.

If the Kalamazoo plans crystallize, this would be the first such unit installed by a Canadian paper mill in recent years. At present, only two mills, out of a total of 105 pulp and paper establishments, engage in the manufacture of their chlorine-soda requirements.

Penicillin Production

Production of penicillin in Canadian plants has been so expanded that cur-





rently, for the first time, domestic output is sufficient to accommodate both the military and essential civilian needs of the Dominion. All producing units, that is, the two flask method plants owned by the government and operated by Connaught Laboratories and Ayerst, McKenna and Harrison Ltd. (American Home Products), and the deep tank producer owned and operated by Merck, are running more than one hundred per cent over rated capacities. Present indications are that Canadian penicillin will soon be exported in larger quantities to the fighting fronts to ease the burden which has been placed on United States suppliers.

Since last June, all Canadian produced penicillin has been channeled to the armed forces, with essential civilian needs met by imports allocated by the United States. A noteworthy feature has been the marked decline in penicillin prices which have been effected during the past year. Initially, the Canadian price was set at $6.50 per 100,000 units, which was later reduced to $4.50, and last November cut still further to the current $3.50. Spokesmen of the industry state that it is probable that further price reductions may be expected during the year, in the light of pared production costs.

New Mirbane Oil Plant

Naugatuck Chemicals Ltd. has recently brought into production a new unit at its Elmira plant for the manufacture of thiophene-free oil of mirbane. Hitherto Canada has been dependent on United States imports for its rather limited— 25,000 pounds per annum—mirbane needs.

Apart from meeting the demand of the domestic market for this chemical, Naugatuck is also engaged in surveying export possibilities.

MARKETS IN REVIEW

Price of Mercury Still Rising

More Construction Planned

Lead Curtailment Serious

Imports from Britain Increase

Non-Essential Plastics Dwindle Rapidly

Bromides, Butyl Alcohol Prices Down

Various Classifications Reviewed

THE QUICKSILVER market continued to be interesting as the price of the metal continued to rise towards its ceiling of $199 per flask. Its price has fluctuated wildly during the past year. Tumbling from the ceiling price, it fell below $100, and then climbed to its present level of $165 and higher.

This situation is difficult to understand in view of the huge stockpile, reported at well over 100,000 flasks—about 3 years' supply, held by the Metals Reserve Company; but there is little metal in the hands of suppliers. Production in 1944 was about 37,500 flasks, while consumption is estimated at 43,000.

A possible reason for the reluctance of the Government to release the stockpiled metal was revealed recently. The armed forces are using a new mercuric oxide dry cell to replace the conventional type; and while production is not known, it is thought to be large.

Mercurials have risen meanwhile in proportion to the amount of metal they contain. Manufacturers are in an uncomfortable position since they have to quote a fixed price for the finished product while the price of the raw material changes rapidly.

A stabilization of the price would be desirable to prevent the history of 1944 from repeating itself. Present indications are that the price will rise to the ceiling, unless a recession occurs for one or more of the following reasons: cutbacks in military needs; increased imports; opening up of domestic mines (unlikely with the present manpower situation); or the release of sizable quantities from the Government stores.

While the Government maintains a stringent control over maintenance, repair, and private construction, plans are under way to increase facilities for military chemical needs. A relaxation of construction prohibitions was expected before the military reversals last December, but since that time all approved building is definitely for war.

Construction increasing sulfuric acid capacity by 550,200 tons was recently approved by the War Production Board. In the following list (e) represents expansion of existing facilities and (n) indicates new plants:

	Tons
E. I. du Pont de Nemours & Co., East Chicago, Ind. (e)	36,000
E. I. du Pont de Nemours & Co., Penn's Grove, N. J. (n)	80,000
General Chemical Co., Calumet, Ill. (e)	40,000
General Chemical Co., Cleveland, Ohio (e)	50,000
General Chemical Co., Newell, Pa. (e)	50,000
General Chemical Co., St. Louis, Mo. (e)	35,000
Monsanto Chemical Co., St. Louis, Mo. (n)	72,000
National Lead Co., St. Louis, Mo. (n)	72,000
Stauffer Chemical Co., Hammond, Ind. (e)	43,200
Volunteer Ordnance Works, Chattanooga, Tenn. (n)	72,000

The increased need for ammonia will probably be met by increasing the capacity of Government-owned plants. There is apparently no intention of completing the Alabama Ordnance Plant at Silicauga, Ala., or the Cactus Ordnance Plant at Etter, Texas. Production would be increased at some or all of the plants now operated:

Buckeye Ordnance Plant, South Point, Ohio.
Defense Plant Corporation Plant, Lake Charles, La.
Dixie Ordnance Plant, Sterlington, La.
Jayhawk Ordnance Plant, Pittsburg, Kan.
Missouri Ordnance Plant, Louisiana, Mo.
Morgantown Ordnance Plant, Morgantown, W. Va.
Ohio River Ordnance Plant, Henderson, Ky.
Ozark Ordnance Plant, El Dorado, Ark.

Although many private plants are better situated in regard to the cost factors, *i.e.*, the cost of natural gas and the shipping of the liquefied ammonia, they are already producing at such a rate that a further increase would be difficult. The urgency for ammonia is so great that economic considerations will be neglected.

Synthetic rubber facilities will also be expanded. The following construction and purchases by the Defense Plant Corporation have been authorized:

Dayton Rubber Mfg. Co., Dayton, Ohio	$400,000
Firestone Tire & Rubber Co., Akron, Ohio	1,000,000
Firestone Tire & Rubber Co., Pottstown, Pa.	7,000,000
Firestone Tire & Rubber Co., Memphis, Tenn.	250,000
B. F. Goodrich Co., Tuscaloosa, Ala.	18,000,000
Goodyear Tire & Rubber Co., Akron, Ohio	500,000
Goodyear Tire & Rubber Co., Nashville, Tenn.	10,000,000

The order restricting the output of lead chemicals, M-384, will have its [illegible]pply of civilian paints. Manufacturers of white lead, for instance, are permitted to use only 8 per cent, in any quarter, of the amount used in the first six months of 1944. Small producers are helped by the provision that they may use 1,000 pounds or the stated percentage, whichever is greater. A sliding scale of percentages covers all varieties of products and uses.

Even the 8 per cent, mentioned above, set aside for civilian needs is being dipped into to provide in full the increased military requirements. In 1944 production was not great enough to keep pace with the demand, and the deficit was made up from the stockpile.

But paint manufacturers are not the only ones affected by the new order. Drug and cosmetic manufacturers will have less collapsible tubes for the packaging of dentifrices, shaving cream, and the like. Lead has been used as a substitute for tin. Also, makers of chemical process equipment are concerned over the fate of lead-lined kettles, pipes and fittings. Many of the operations which require lead equipment — sulfuric and phosphoric acid manufacture, oil refining, gas production, sulfonation, chlorination, and the handling of hydrofluoric acid— are essential to war production; and while most plants, particularly those constructed for the war, are in good condition, many of them are old and in need of repair.

Manufacturers of insecticides, optical glass, ceramic ware, and petroleum products are concerned about the possible effect of the new order, which still needs clarification in a great many details.

Statistics released by Great Britain, for the first time since 1940, on her chemical export trade are important not so much for their immediate influence as for their portent for the future of our world trade. The figures were reviewed in the Foreign Commerce Weekly, a publication of the U. S. Department of Commerce.

Exports to the United States in 1943 were 14 per cent of her total chemical exports as against 4 per cent in 1938.

"Countries of destination for the majority of the individual items included in the chemical group are not available, but the principal countries receiving items of this group showed marked changes from 1938—the United States, Argentina, and Brazil, all sharing to a much greater extent in 1943 than in the last prewar year.

"Argentina received 9 per cent of total British chemical exports in 1943 as against 3 per cent in 1938, and Brazil took 6 per cent of British exports in 1943 as against 2 per cent in 1938.

"Generally speaking, where quantity statistics on countries of destination are

available, wartime shipments to Empire markets were below the 1938 figures, and those to American republics, especially Argentina, were greater."

The plastics industry is feeling the increased demand for the hard-to-get chemicals needed for explosives, aviation fuel, and synthetic rubber. Acetic anhydride, ammonia, benzene, butyl alcohol, formaldehyde, and plasticizers such as phthalate and phosphate esters are among the chemicals extremely short in supply.

Acetate plastics have gone more and more into military items, leaving a smaller quantity for civilian items and less acetic anhydride for acetate rayon producers. The ammonia and formaldehyde shortages, as was stated above, stem from the urgent need for nitric acid in explosives. Phthalic esters have been going to the armed services for insect repellants, and benzene is being used for synthetic rubber and aviation gasoline.

Allocations to non-essential end uses are negligible, and most civilian supplies may soon disappear.

Significant decreases were announced during January for bromides and butyl alcohol. The price reduction for the latter was certainly not due to any easing of the supply, for it is tighter, if anything, than before; but the raw materials cost has been lowered and is reflected in a lower price of the alcohol and its esters. Tank-car lots of the alcohol were reduced from 19.3 cents to 18.8 cents per pound, and the acetate accordingly.

Potassium, sodium, and ammonium bromides were reduced from 27c, 27c and 31c to 25c, 25c, and 28c per pound respectively. Although the supply of bromides exceeds the demands, the cut is remarkable in view of the labor shortage and the higher cost of manufacturing.

Heavy Chemicals—Potassium chemicals are exceedingly tight and are being allocated; the permanganate is particularly scarce. Calcium chloride producers are behind on their deliveries, probably on account of the high seasonal demand for snow removal. Soda ash, the bicarbonate, and the silicate moved in good volume, but caustic soda is still hard to find, although the concentrated solutions are available. Shortages of lead and copper insecticides and fungicides reflect the lesser amount of scrap metal available.

Oxalic acid was scarce as were naphthenic and hydrofluoric acids, which were being bought by the Government. Sulfates were affected by the shortage of the acid.

Of interest are the facts that tungsten, molybdenum, and helium productions have increased greatly during the war. Tungsten, used in alloys and as filaments in electric lamps and electronic tubes, is being produced at 16 times the prewar rate. Molybdenum has shown a similar increase.

New uses for helium, chiefly in the welding of magnesium, have increased the sale of this gas to commercial distributors to more than a quarter of a million cubic feet a month during 1944. The Bureau of Mines is the sole producer, and in five plants it is now producing more than 25 times the prewar volume of the gas.

Fine Chemicals—Lactic acid and synthetic vitamins are in good supply, but sodium perborate, peroxide, saccharine, and thallium sulfate are scarce. Continued high production of sulfa drugs is assured by continued Government demands; the spot supply of sulfathiazole is reported to be low.

The market for Brazilian menthol continued quiet as buyers waited for the large supply to force the price still lower. The price trend for tartaric acid and tartrates was upwards.

Although purified bromine followed the alkali bromides in the downward revision of price, calcium, lithium, and magnesium bromides and bromoform were unaffected.

Paint, Coating Materials—Lead was not the only material paint manufacturers are, or will be, short of. Chrome pigments are tighter than they have been, and naval stores are in a precarious situation with regard to adequate supply. Toulene, xylene, and butyl alcohol and esters are among the solvents denied in full demand to paintmakers. Linseed oil is low, and quotas may have to be reduced; no easing is in prospect until late fall.

Other pigments besides lead were also hard to get. Yellow iron oxide is expected to be placed under allocation, and ultramarine blue is also critical.

Same easing—though not much—of the carbon black situation may occur when the Government fulfills its plan to increase production for synthetic rubber processing.

The oil situation may benefit by a long range plan of the Department of Agriculture to encourage growing of flaxseed, soybeans, cottonseed, etc. The present fats and oils situation is serious, not only in the paint industry, but to soap manufacturers and others as well; but any plan to increase production is attended by the danger of a surplus crisis after the war as serious as the present shortage crisis.

WAR REGULATIONS SUMMARY

ACRYLIC RESIN—All grades of cast sheet of acrylic monomer and acrylic resin have been placed under allocation control of Schedule 17, Order M-300.

ALKANOLAMINES — Allocation control transferred from Order M-275 to Schedule 83 of Order M-300.

COTTONSEED OIL—Cents per lb. ceiling prices have been fixed for semi-refined and refined imported cottonseed oil, which are generally similar to those already established for equivalent grades of domestic oil.

ETHYL ALCOHOL—Distributors of completely denatured proprietary solvents or pure alcohol whose requirements for resale are between 54 and 3,888 gallons per month are no longer required to file Form WPB-2947. This change is covered in an amendment to Schedule 71 of Order M-300.

GLYCOL ETHER—Small order exemption for monobutyl ether of ethylene glycol reduced from 4,000 to 400 lbs.

LEAD CHEMICALS — In view of the shortage of lead metal, WPB has issued Order M-384 restricting the amount of lead that may be used in the manufacture of specific lead chemicals. Production of basic carbonate of white lead per quarter is limited to not more than 15 per cent of production during the first six months of 1944. Leaded zinc oxide produced directly from the ore is not affected, but white lead used in production of leaded zinc oxide in any quarter is limited to 25 per cent of the total quantity used for that purpose in 1944. Use of white lead (basic carbonate or basic sulfate) in paints, varnish and lacquers for civilian uses in any calendar quarter is limited to 8 per cent of such use in the first six months of 1944 or 1,000 lbs., whichever is greater. Use of red lead, including paste red lead, for civilian purposes is limited to 30 per cent of such use in the first six months of 1944, or 1,000 lbs. The order also provides that lead used in insecticides per quarter shall not exceed 45 per cent of that used during the first six months of 1944, or 1,000 lbs.; Oil refining chemicals, 50 per cent or 1,000 lbs.; Rubber compounding chemicals, 50 per cent or 1,000 lbs.; Lead chrome pigments, unlimited.

MISCELLANEOUS CHEMICALS — In a move to simplify controls, WPB has amended Order M-340 (Miscellaneous Chemicals), eliminating allocation control of the chemicals governed by the order and adding five new chemicals to the order. The latter include dipentene, stabilized rosin, treated rosin, polymerized rosin, and metal resinate. Accordingly, Schedule 13 (Dipentene) of Order M-300 and Order M-335 (Stabilized Rosin) have been revoked. Allocation control of by-product phosphoric acid was transferred from M-340 to Schedule 81 of Order M-300.

PEROXYGEN CHEMICALS — Small order exemption reduced from 5 carboys (600 lbs.) to 1 carboy (120 lbs.).

PHTHALIC ANHYDRIDE—Except for 10 lb. exemption no phthalic anhydride can be sold without WPB authorization.

POLYISOBUTYLENE—Purchase and consumption of polyisobutylene (polybutene, vistanex, and synthetic 100) are prohibited for experimental purposes according to Direction 11 to Rubber Order R-1. Appeals may be made on Form WPB 2242.

POTASSIUM CARBONATE—Placed under allocation control of Schedule 85, Order M-300.

SODIUM PHOSPHATE—Order M-334 has been revoked and control of sodium phosphate transferred to Order M-300. Allocations controls were lifted from anhydrous trisodium phosphate, crystal disodium phosphate and crystal tetrasodium pyrophosphate. Sodium hexametaphosphate, sodium tetraphoshphate and sodium tripolyphosphate have been eliminated from the order.

CURRENT PRICES

Chemical prices quoted are of American manufacturers spot New York, immediate shipment, unless otherwise specif Products sold f.o.b. works are specified as such. Import ch icals are so designated.

Oils are quoted spot New York, ex-dock. Quotations f mills, or for spot goods at the Pacific Coast are so designa

Raw materials are quoted New York, f.o.b., or ex-d Materials sold f.o.b. works or delivered are so designated.

The current range is not "bid and asked," but are prices f different sellers, based on varying grades or quantities or b

Purchasing Power of the Dollar: 1926 Average—$1
Jan., '42, $0.980 Jan., '43, $0.910 Jan., '45, $0.

	Current Market		1944 Low	1944 High	1943 Low	1943 H
Acetaldehyde,99%,drs.wks. lb.	.11	.14	.11	.14	.11	
Acetic Anhydride, drs, ...lb.	.11½	.13	.11½	.13	.11½	
Acetone, tks, delv .....lb.	...	.07	...	.07	...	
ACIDS						
Acetic, 28%, bbls ....100 lbs.	3.38	3.63	3.38	3.63	3.38	3.
glacial, bbls. .....100 lbs.	9.15	9.40	9.15	9.40	9.15	9.
tks, wks. .....100 lbs.	6.93	7.25	6.93	7.25	...	6.
Acetylsalicylic, Standard USP .....lb.	.40	.54	.40	.54	.40	
Benzoic, tech, bbls. .....lb.	.43	.47	.39	.47	.39	
USP, bbls, 4,000 lbs. up lb.	...	.54	...	.54	...	
Boric, tech, bbls, c-l,....ton *a*	...	109.00	...	109.00	...	109.
Chlorosulfonic, drs, wks. ..lb.	.03	.04½	.03	.04½	.03	
Citric, crys, gran, bbls, lb. *b*	.20	.21	.20	.21	.20	
Cresylic 50%, 210-215° HB, drs, wks, frt equal gal.	.81	.83	.81	.83	.81	
Formic, Dom. cbys .....lb.	.10½	.11½	.10½	.11½	.10½	
Hydrofluoric, 30% rubber, dms. .....lb.	.08	.09	.08	.09	.08	
Lactic, 22%, lgt, bbls wks lb.	.039	.0415	.039	.0415	.039	
44%, light, bbls wks ...lb.	.073	.0755	.073	.0755	.073	
Maleic, Anhydride, drs....lb.	.25	.26	.25	.26	.25	
Muriatic, 18° cbys ...100 lb.	1.50	1.75	1.50	1.75	1.50	2.
20° cbys, c-l, wks ..100 lb.	...	1.75	...	1.75	...	1.
22° cbys, c-l, wks ..100 lb.	...	2.25	...	2.25	...	2.
Nitric,36°, cbys, wks 100 lbs. *c*	5.00	5.25	5.00	5.25	5.00	5.
38°, c-l, cbys, wks 100 lbs. *c*	...	5.50	...	5.50	...	5.
40°, c-l, cbys, wks 100 lbs. *c*	...	6.00	...	6.00	...	6.
42°, c-l, cbys, wks 100 lbs. *c*	...	6.50	...	6.50	...	6.
Oxalic, bbls, wks .....lb.	.11¼	.12½	.11¼	.12½	.11¼	
Phosphoric, 100 lb. cbys, USP .....lb.	.10½	.13	.10½	.13	.10½	
Salicylic, tech, bbls .....lb.	.26	.42	.26	.42	.26	
Sulfuric, 60°, tks, wks ..ton	...	13.00	...	13.00	...	13
66°, tks, wks .....ton	...	16.50	...	16.50	...	16
Fuming (Oleum) 20% tks. wks .....ton	...	19.50	...	19.50	...	19
Tartaric, USP, bbls .....lb.	...	.70½	...	.70½	...	
Alcohol, Amyl (from Pentane)						
tks, delv .....lb.	...	.131	...	.131	...	
Butyl, normal, syn, tks..lb.	...	.10¾	...	.10¾	.10¾	
Denatured, CD 14, c-l drs, ...gal. *d*	...	.57	...	.57	...	
Denatured, SD, No.1, tks. *d*	...	.50	...	.50	...	
Ethyl, 190 proof tks...gal.	...	17.60	...	17.60	...	17
Isobutyl, ref'd, drs ....lb.	...	.086	...	.086	...	
Isopropyl ref'd, 91%, dms .....gal.	.39	.66½	.39	.66½	.39	
Propyl, nor, drs, wks gal.	.67	.76	.67	.76	.67	
Alum, ammonia, lump, bbls, wks .....100 lb.	...	4.25	...	4.25	...	4.
Aluminum, 98-99% ..100 lb.	15.00	16.00	15.00	16.00	15.00	16.
Chloride anhyd bbls wks lb.	.09	.12	.08	.12	.08	
Hydrate, light .....lb.	.14½	.15	.14½	.15	.14½	
Sulfate, com'l. bgs, wks, c-l .....100 lb.	1.15	1.25	1.15	1.25	1.15	1
Sulfate, iron-free, bgs. wks .....100 lb.	1.85	2.10	1.85	2.50	1.75	2
Ammonia anhyd, cyl .....lb.	...	.14½	...	.14½	...	
Ammonium Carbonate, lumps, dms .....lb.	.08½	.09¼	.08½	.09¼	.08¼	
Chloride,whi,bbls,wks,100 lb.	4.45	5.15	4.45	5.15	4.45	5
Nitrate, tech. bags, wks..lb.	.0435	.0850	.0435	.0850	.0435	
Oxalate pure, grn. bbls..lb.	.27	.33	.27	.33	.27	
Perchlorate, kgs .....lb.	.55	.65	.55	.65	.55	
Phosphate, dibasic tech, bbls .....lb.	.07¼	.08½	.07¼	.08½	.07¼	
Stearate, anhyd, dms ...lb.	...	.34	...	.34	...	
Sulfate, dms, bulk.....ton	28.20	29.20	28.20	29.20	28.20	30
Amyl Acetate (from pentane) c-l, drs, delv .....lb.	...	.15½	...	.18½	...	
Aniline Oil, drs .....lb.	.11½	.12½	.11½	.12½	.11½	
Anthraquinone, sub, bbls..lb.	...	.70	...	.70	...	
Antimony Oxide, bgs .....lb.	.15	.15½	.15	.15½	.15	
Arsenic, whi, kgs—powd..lb.	.04	.04¾	04	.04¾	.04	

USP $25 higher; Prices are f.o.b. N. Y., Chicago, St. Louis, deli ½c higher than NYC prices; y Price given is per gal; c Yellow 25c per 100 lbs less in each case; *d* Prices given are Eastern sch *a* Powdered boric acid $5 a ton higher; *b* Powdered citric acid higher.

Current Prices

		Current Market	1944 Low	1944 High	1943 Low	1943 High
Barium Carbonate precip, wks bgs.	ton	60.00	75.00	55.00	75.00	55.00	65.00
Chloride, tech, cyst, bgs, zone 1	ton	73.00	78.00	73.00	90.00	77.00	90.00
Barytes, floated, bbls.	ton	...	36.00	...	36.00	...	36.00
Bauxite, bulk mines	ton	7.00	10.00	7.00	10.00	7.00	10.00
Benzaldehyde,tech,cbys,dms	lb.	.45	.55	.45	.55	.45	.55
Benzene (Benzol), 90%, Ind. 8000 gal tks, ft all'd	gal.	.	.15	...	.15	...	.15
Benzyl Chloride, cbys	lb.	.22	.24	.22	.28	.22	.25
Beta-Naphthol, tech, bbls, wks	ton	.23	.24	.23	.24	.23	.24
Bismuth metal, ton lots	lb.	...	1.25	...	1.25	...	1.25
Blanc Fixe, 66⅔% Pulp, bbls, wks	ton *h*	40.00	46.50	40.00	46.50	40.00	46.50
Bleaching Powder, wks, 100 lb.		2.50	3.60	2.50	3.60	2.50	3.60
Borax, tech, c-l, bgs	ton *i*	...	45.00	.	45.00	...	45.00
Bordeaux Mixture, drs	lb.	.11	.11½	.11	.11½	.11	11½
Bromine, cases	lb.	.23	.28	.23	.30	.25	.30
Butyl, acetate, norm drs,	lb.	.1895	.1945	.1755	.1945	.1575	1840
Cadmium Metal	lb.	.90	.95	.90	.95	.90	95
Calcium, Acetate, bgs. 100 lb.		3.00	4.00	3.00	4.00	3.00	4.00
Carbide, drs	ton	50.00	90.00	50.00	95.00	50.00	95.00
Carbonate, c-l bgs,	ton	18.00	25.00	18.00	25.00	18.00	22.00
Chloride, flake, bgs c-l	ton	18.50	35.00	18.50	35.00	18.50	35.00
Solid, 73-75% drs, c-l,	ton	18.00	31.50	18.00	31.50	18.00	31.50
Gluconate, U.S.P., drs.	lb.	.57	.58	.57	.58	.57	.58
Phosphate, tri, bbls, cl	lb.	...	.0635	.0635	.0785	.0635	.0785
Camphor, U.S.P., gran, powd, bbls	lb.	.69	.71	.68½	.71	.68½	.70½
Carbon Bisulfide, 55-gal drs	lb.	.05	.05¼	.05	.05¼	.05	.05¼
Dioxide, cyl	lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, Zone 1, 52½ gal. drms	lb.	.73	.80	.73	.80	.73	.80
Casein, Acid Precip, bgs, 100 or more	lb.	...	.22	...	.24	...	.24
Chlorine, cyls, lcl, wks, contract	lb.	...	.07¼	...	.07¼	...	.07¼
cyls, c-l, contract	lb.	...	.05¼	...	.05¼	...	.05¼
Liq, tk, wks, contract 100 lb.		...	1.75	...	1.75	...	1.75
Chloroform, tech, drs	lb.	.20	.23	.20	.23	.20	.23
Coal tar, bbls, crude	bbl.	8.25	8.75	8.25	8.75	8.25	8.75
Cobalt Acetate, bbl	lb.	...	.83¾	...	.83¾	...	.83¾
Oxide, black kgs	lb.	...	1.84	...	1.84	.	1.84
Copper, metal	100 lb.	12.00	12.50	12.00	12.50	12.00	12.50
Carbonate, 52-54%, bbls.	lb.	.19½	.20½	.19½	.20½	.19½	.20½
Sulfate, bgs, wks crypt.	100 lb.	5.00	5.50	5.00	5.50	5.00	5.50
Copperas, bulk, c-l, wks	ton	...	14.00	..	14.00	...	14.00
Cresol, USP, drs	lb.	.10¾	.11¾	.10¾	.11¾	.10¾	.11¾
Cyanamid, bgs	ton	1.52½	1.62½	1.52½	1.62½	1.52½	1.62½
Dibutylamine, c-l, drs, wks	lb.	...	.61	...	61	...	.61
Dibutylphthalate, drs	lb.	.2030	.2659	.1780	.2659	.2060	.2300
Diethylaniline, lb drs	lb.	...	.40	...	.40	.	.40
Diethyleneglycol,drs,lcl.wks	lb.	.14½	.15½	.14	.15½	.14	.15½
Dimethylaniline, dms.cl.,lcl	lb.	.23	.24	.23	.24	.23	.24
Dimethyl phthalate, drs	lb.	.1875	.1925	.1875	.1925	.1875	.2050
Dinitrobenzene, bbls	lb.	...	.18	...	.18	...	.18
Dinitrochlorobenzene, dms	lb.	...	.14	...	.14	...	.14
Dinitrophenol, bbls	lb.	...	.22	...	.22	...	.22
Dinitrotoluene, dms	lb.	...	.18	...	.18	...	.18
Diphenyl, bbls lcl. wks	lb.	.16	.20	.16	.20	.15	.20
Diphenylamine bbls	lb.	...	.25	...	.25	...	.25
Diphenylguanidine, drs	lb.	...	.35	...	.35	.35	.37
Ethyl Acetate, tks, frt all'd	lb.	.1070	.1175	.1070	.1175	.107	.110
Chloride, drs	lb.	.18	.20	.18	.20	.18	.20
Ethylene Dichloride, lcl. wks, E. Rockies, dms	lb.	...	.0891	...	.0891	...	.0842
Glycol, dms, cl.	lb.	...	.10	...	.10	...	.10
Fluorspar, No. 1, grd. 95-98% bulk, cl-mines	ton	...	37.00	...	37.00	...	37.00
Formaldehyde, c-l, bbls, kgs, wks	lb.	.0520	.0570	.0520	.0570	.0550	.0575
Furfural tech, dms, c-l,wks	lb.	...	.13	...	.13	...	.12½
Fusel Oil, refd, dms, dlvd	lb.	.18½	.19½	.18½	.19½	.18½	.19½
Glauber's Salt, Cryst,c.l.,bgs, bbls. wks	100 lb.	1.05	1.25	1.05	1.25	1.05	1.25
Glycerin dynamite, dms, c-l,	lb.	...	.14½	...	.14½	...	.18¾
Crude Saponification, 80% to refiners tks	lb.	...	.11¼	...	.11¼	...	.12¾

GUMS

Gum Arabic, amber sorts bgs	lb.	.12	.12½	.12	.14	.13½	.17½
Benzoin Sumatra, CS	lb.	.52	1.00	.52	1.00	.52	1.00
Copal, Congo	lb.	...	.55¾	...	.55¾	...	.55¾
Copal, East India, chips	lb.	...	.12	...	.12	...	.12
Macassar dust	lb.	...	.07⅜	...	.07⅜	.07⅜	.11¾
Copal Manila,		.13½	.15½	.13½	.15½	.13½	.15½
Copal Pontianak, bold c-l	lb.	...	.23⅜	...	.23⅜	...	.23⅜
Dexter	lb.	.11½	.12	.09½	.12	.09½	.12
Karaya, bbls, bxs, dms,	lb.	.15	.46	.15	.46	.14	.40

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

i Price given is per gal.

Current Prices

Gums
Salt Cake

	Current Market	1944 Low	1944 High	1943 Low	1943 High
Kauri, N Y					
Superior Pale XXX....lb.	...	.65¾	...	.65¾	...	.65¼
No. 3 .....lb.	...	.22	...	.23	...	.22
Sandarac, cs .....lb.	...	.99½	...	.99½	1.40	nom.
Tragacanth, No. 1, cases lb.	4.50	5.00	4.00	5.25	4.00	5.25
No. 3 .....lb.	2.75	3.00	1.10	3.50	1.10	1.20
Yacca, bgs .....lb.	...	.06	.06	.07¼	.06	.07¼
Hydrogen Peroxide, cbys ..lb.	.15½	.18½	.15½	.18½	.15½	.18½
Iodine, Resublimed, jars..lb.	2.00	2.10	2.00	2.10	2.00	2.10
Lead Acetate, cryst, bbls...lb.	...	.12½	...	.12½	...	.12½
Arsenate, bg, cl .....lb.	.11½	.12	.11½	.12	.11½	.12
Nitrate, bbls .....lb.	...	.12½	...	.12½	...	.12½
Red, dry, 95% Pb_3O_4, lcl lb.	.09¾	.10¾	.09	.11	.09	.11
97% Pb_3O_4 bbls delv..lb.	.09½	.11	.09¼	.11	.09¼	.11
98% Pb_3O_4, bbls delv..lb.	.09½	.10¾	.09½	.11¼	.09½	.11¼
White, bbls .....lb.	.08¼	.08¾	.08¼	.08¾	.08¼	.08¾
Basic sulfate, bbls, lcl lb.	.07½	.08	.07¼	.08	.07¼	.08
Lime, Chem., wks, bulk..ton	6.25	13.00	6.25	13.00	6.25	13.00
Hydrated, f.o.b. wks ..ton	8.50	16.00	8.50	16.00	8.50	16.00
Litharge, coml, delv, bbls lb.	.08	.09¾	.08	.09¾	.08	.09¾
Lithopone, ordi., bgs.....lb.	.04¼	.04¾	.04¼	.04¾	.04¼	.04¾
Magnesium Carb, tech, wks lb.	.06¼	.09¾	.06¼	.09¾	.06¼	.09¾
Chloride flake, bbls, wks c-l .....ton	...	32.00	...	32.00	...	32.00
Manganese, Chloride, Anhyd. bbls .....lb.	.15	.18	.15	.18	.14	nom.
Dioxide, Caucasian bgs, lcl .....ton	...	74.75	...	74.75	...	74.75
Methanol, pure, nat, drs gal *l*	.63	.76	.63	.76	.63	.76
Synth, drs cl.....gal. *m*	.31	.38	.31	.40½	.34½	.40½
Methyl Acetate, tech tks..lb.	.06	.07	.06	.07	.06	.07
C.P. 97-99%, tks, delv lb.	.09½	.10½	.09½	.10½	.09½	.10½
Chloride, cyl .....lb.	.32	.40	.32	.40	.31	.40
Ethyl Ketone,tks,frt all'd lb.	...	.08	...	.08	...	.08
Naphtha, Solvent, tks ...gal.	...	.27	...	.27	...	.27
Naphthalene, crude, 74°, wks tks .....lb.	...	.0275	...	.0275	...	.0275
Nickel Salt, bbls, NY.....lb.	.13	.13½	.13	.13½	.13	.13½
Nitre Cake, blk .....ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, drs, wks ...lb.	.08	.09	.08	.09	.08	.09
Orthonisidine, bbls .....lb.	...	.70	...	.70	...	.70
Orthochlorophenol, drs ...lb.	.25	.27	.25	.32	...	.32
Orthodichlorobenzene, drms lb.	.07	.08	.07	.08	.07	.08
Orthonitrochlorobenzene, wks .....lb.	.15	.18	.15	.18	.15	.18
Orthonitrotoluene, wks,dms lb.	...	.09	...	.09	...	.09
Paraldehyde, 98%, wks lcl. .....lb.	...	.12	...	.12	...	.12
Chlorophenol, drs .....lb.	...	.32	...	.32	...	.32
Dichlorobenzene, wks ..lb.	.11	.15	.11	.15	.11	.15
Formaldehyde, drs, wks.lb.	.21	.22	.23	.24	.23	.24
Nitroaniline, wks, kgs..lb.	.43	.45	.43	.45	.43	.45
Nitrochlorobenzene, wks lb.	...	.15	...	.15	...	.15
Toluenesulfonamide, bbls lb.	...	.70	...	.70	...	.70
Toluidine, bls, wks ....lb.	...	.48	...	.48	...	.48
Penicillin, hospitals, institutions, ampules per 100,000 units	2.40	2.60	2.40	4.50	...	...
For gov. purchases, ampules per 100,000 units	...	.85	...	1.90	...	...
Pentaerythritol, tech.. lb.	.29	.33	.29	.33	.29	.35

PETROLEUM SOLVENTS AND DILUENTS

Lacquer diluents, tks, East Coast .....gal.	...	11½	...	.11½	...	.11
Naphtha, V.M.P., East tks, wks .....gal.	...	.11	...	.11	...	.11
Rubber Solvents, East, tks, wks .....gal.	...	.11	...	.11	...	.11
Stoddard Solvents, East, tks, wks .....gal.	...	.10	...	.10	...	.09
Phenol, U.S.P., drs . . lb.	.10½	.11¼	.10½	.11¼	.10½	.13
Phthalic Anhydride, cl and lcl. wks . . . . . lb.	.13	.14	.13	.14	.13	.15
Potash, Caustic, wks, sol lb.	.06¼	.06¾	.06¼	.06¾	.06¼	.06
flake, 88-92% .....lb.	.07	.07½	.07	.07½	.07	.07
liquid, tks .....lb.	...	.02¾	...	.02¾	...	.02
dms, wks .....lb.	.03	.03½	.03	.03½	.03	.03
Potassium Bichromate csks .....lb.	.09⅝	.10	.09⅝	.10	.09⅝	.10
Carbonate, hydrated 83-85% calc .....lb.	.05½	.05¾	.05½	.05¾	.05½	.05
Chlorate crys, bgs, wks lb. .	.11	.13	.11	.13	.11	.13
Chloride, crys, tech, bgs, kgs .....lb.	.08	nom.	.08	nom.	.08	nom.
Cyanide, drs, wks .....lb.	...	.55	...	.55	...	.55
Iodide, bots., or cans...lb.	1.44	1.48	1.44	1.48	1.44	1.48
Muriate, dom, 60-62-63% K_2O bulk unit-ton...ton	...	.53½	...	.53½	.53½	.56
Permanganate, USP, wks dms .....lb.	.20½	.21	.20½	.21	.20½	.21
Sulfate, 90%, basis, bgs ton	...	36.25	...	36.25	...	36.25
Propane, group 3, tks... gal.	...	.03¾	...	.03¾	...	.03
Pyridine, ref., drms .....lb.	.45	.45	.45	.46	.45½	.46
R Salt, 250 lb bbls, wks lb.	...	.65	...	.65	...	.65
Resorcinol, tech.,drms, wks lb	.68	.75	.68	.75	.68	.75
Rochelle Salt, cryst .....lb	.43½	.47	.43½	.47	.43½	.47
Salt Cake, dom. blk wks .ton	...	15.00	...	15.00	...	15.00

l Producers of natural methanol divided into two groups and price vary for these two divisions; *m* Country is divided in 4 zones, price varying by zone.

* Spot price is ½c higher.

Current Prices

	Current Market		1944 Low	1944 High	1943 Low	1943 High
Saltpetre, grn, bbls	100 lb.	8.20 8.60	8.20	8.60	8.20	8.60
Shellac, Bone dry, bbls	lb.	.42½ .46	.42½	.46	.42½	.46
Silver Nitrate, 100 oz, bots	oz.	...	.32⅜	...	.32⅜	... .32⅜
Soda Ash, 58% dense, bgs, c-l, wks	100 lb.	... 1.15	...	1.15	...	1.15
58% light, bgs cl	100 lb.	1.05 1.13	1.05	1.13	...	1.13
Caustic, 76% flake drms, cl	100 lb.	... 2.70	...	2.70	...	2.70
76% solid, drms,cl	100 lb.	... 2.30	...	2.30	...	2.30
Liquid, 47-49%, sellers, tks	100 lb.	... 1.95	...	1.95	...	1.95
Sodium Acetate, anhyd. dms	lb.	.08½ .10	.05	.10	.05	.06
Benzoate, USP dms	lb.	.46 .52	.46	.52	.46	.52
Bicarb, tech., bgs., cl., works	100 lb.	1.55 1.90	1.55	2.05	...	...
Bichromate,cks,wks l.c.l.	lb.	.07½ .07¾	.07½	.07¾	...	.07¾
Bisfite powd, bbls, wks	100 lb.	3.00 3.60	3.00	3.60	3.00	3.60
35° bbls. wks	100 lb.	1.40 1.65	1.40	1.65	1.40	1.65
Chlorate, bgs, wks c.l.	lb.	... .06¼	...	.06¼	...	.06¼
Cyanide, 96-98%, wks	lb.	.14½ .15	.14½	.15	.14½	.15
Fluoride, 95%, bbls, wks	lb.	.07¼ .08¼	.07¼	.08¼	.07¼	.08¼
Hyposulfite, cryst, bgs, cl, wks	100 lb.	... 2.25	...	2.25	...	2.25
Metasilicate, gran, bbl, wks c-l	lb.	... 2.50	...	2.50	...	2.50
Nitrate, imp, bgs	ton	... 33.00	...	33.00	...	33.00
Nitrite, 96-98% dom, cl.	lb.	... .06¾	...	.06¾	...	.06¾
Phosphate, di wks	100 lb.	6.00 7.25	6.00	7.25	6.00	7.25
Tri-bgs, cryst, wks	100 lb.	2.70 3.40	2.70	3.40	2.70	3.45
Prussiate, yel, bbls, wks	lb.	... .11	.10	.11	.10	.11
Silicate, 52°,drs. wks	100 lb.	1.40 1.80	1.40	1.80	1.40	1.80
40°, drs, wks, c-l	100 lb.	... .80	...	.80	...	.80
Silicofluoride, bbls NY	lb.	.06½ .10	.06½	.12	.05	.12
Sulfate tech. Anhyd, bgs	100 lb.	1.70 1.90	1.70	1.90	1.70	1.90
Sulfide, cryst c-l, bbls, wks	100 lb.	... 2.40	...	2.40	...	2.40
Solid, bbls, wks	lb.	3.15 3.90	3.15	3.90	3.15	3.90
Arch, Corn, Pearl, bgs	100 lb.	... 4.08	...	4.08	...	3.47
Potato, bgs, cl	lb.	... .0637	...	.0637	...	.0637
Rice, bgs	lb.	no stocks	no stocks		.09½	.10¼
Sweet Potato, bgs	100 lb.	.09 .09¼	...	.07½	...	.07½
Sulfur, crude, mines	ton	... 16.00	...	16.00	...	16.00
Flour, USP, precp, bbls, kgs	lb.	.18 .30	.18	.30	.18	.30
Tall, bbls	100 lb.	2.40 2.90	2.40	2.90	2.40	2.90
Sulfur Dioxide, liquid, cyl	lb.	.07 .09	.07	.09	.07	.08
Tks, wks	lb.	... .04	.04	.06	.04	.06
Tc, crude, c-l, NY	ton	... 13.00	...	13.00	...	13.00
Tartar, Ref'd, c-l, NY	ton	13.00 21.00	13.00	21.00	13.00	21.00
Tin, crystals, bbls, wks	lb.	no stocks	no stocks		no stocks	
Tetal	lb.	... .52	...	.52	...	.52
Toluol, drs, wks	gal.	... .33	...	.34½	...	.33
Tks, frt all'd	gal.	... .28	...	.28	...	.28
Tributyl Phosphate, dms lcl, frt all'd	lb.	... .47	...	.47	...	.47
Trichlorethylene, dms, wks	lb.	.08 .09	.08	.09	.08	.09
Tricresyl phosphate	lb.	.24 .54½	.24	.54½	.24	.54½
Triethylene glycol, dms lcl	lb.	.18½ .19½	.18½	.26	...	.26
Triphenyl Phos, bbls	lb.	.31 .32	.31	.32	.31	.32
Tripoli, pure, cases	lb.	... .12	...	.12	...	.12
Tx, Bayberry, bgs	lb.	no stocks	.25	nom.	.25	.26
Tallow, bleached, cakes	lb.	... .60	...	.60	...	.60
Tallow, Candelilla, bgs crude	ton	.34½ .44½	.34½	.48	.38	.48
Tallow, Carnauba, No. 1, yellow, bgs, ton	lb.	... .83¾	...	.83¾	...	.83¼
Tallol, Indus. frt all'd, tks, wks	gal.	... .27	...	.27	...	.27
Tar, Chloride tech fused, wks	lb.	.05 .0535	.05	.0535	.05	.0535
Tarnoxide, Amer, bgs, wks	lb.	.07¼ .07½	.07	.07½	.07	.07½
Tartar, sulfate, crys, bgs,	100 lb.	3.40 4.15	3.40	4.35	3.60	4.35

Oils and Fats

Tallow, tks, futures	lb.	... .111	...	.111	...	.111
Tallor, No. 3, bbls	lb.	.13¾ .14¼	.13¾	.14¼	.13¾	.14¼
Tanbia Wood, drs, spot NY	lb.	39½ .40	.39½	.40	...	.39
Tanbnut, edible, drs NY	lb.	... .0985	...	.0985	...	.0985
Tar, Newfoundland, dms	gal.	.85 .88	.85	.90	...	.90
Tarsh, crude, tks, wks	lb.	... .12¾	...	.12¾	...	.12¾
Teed, Raw, dms, c-l	lb.	... .1510	.1550	.1560	...	.1530
Thaden, tks	gal.	... ...	...	.1225	...	.1225
Tight pressed, drs l.c.l.	lb.	... .1300	...	.1200	.1305	.1307
Tlinica, liquid, tks	lb.	... .21	.18½	.25	...	.25
Tn, No. 1 bbls, NY	lb.	.13¼ nom.	.13¾	nom.	.13¾	nom.
Tnut, Niger, dms	lb.	... .0865	...	.0865	...	.0865
Tnut, crude, tks, f.o.b. wks	lb.	... .13	...	.13	...	.18
Tolla, crude dms, NY	lb.	no stocks	...	.245	...	.245
Tseed, New Orleans, bulk	lb.	... .1156½	...	.1156½	...	.1150
Tdms	lb.	.12¾ .13¾	.12¾	.14¾	.13¼	.14¼
Tean, crude, tks, wks	lb.	... .1175	...	.1175	...	.1175
Tw, acidless, bbls	lb.	... .14¼	...	.14¼	...	.14¼
Tey Red, single, drs	lb.	.9½ .13½	.9½	.14½	.10	.14½

Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 2c; delphia deliveries f.o.b. N. Y., refined 6c higher in each case.

The Chemical MARKET PLACE

Classified Advertisements

Local Stocks
Chemicals • Equipment

Raw Materia
Specialties • Employme

CONNECTICUT

a-CHLOROMETHYL-NAPHTHALENE
a-NAPHTHALENEACETIC ACID
a-NAPHTHALENEACETAMIDE
METHYL-a-NAPHTHALENEACETATE
AVAILABLE IN QUANTITY
WESTVILLE LABORATORIES, INC.
13 Housatonic Ave.
DEPT. V DERBY, CONN.
PRODUCED BY
WESLAB

ILLINOIS

Now Available
CHEMICALLY PURE
METHYL METHACRYLATE
(Monomeric - Liquid)
$CH_2 = C(CH_3)—COOCH_3$

Boiling Point	100.5°C
Specific Gravity	0.950
Refractive Index	1.417
Viscosity at 25° C.	0.59
Color	Water-Clear

Samples Upon Request
PETERS CHEMICAL MFG. CO.
3623 Lake Street
MELROSE PARK, ILL.

CHEMICALS
"From an ounce to a carload"
SEND FOR OUR CATALOG
ARTHUR S. LaPINE & COMPANY
LABORATORY SUPPLIES AND REAGENTS
INDUSTRIAL CHEMICALS
121 WEST HUBBARD STREET
• CHICAGO 10, ILLINOIS •

MASSACHUSETTS

ALAN A. CLAFLIN
Manufacturers' Agent
DYESTUFFS and CHEMICALS
Specializing in
BENTONITE
AND
TALC
88 Broad Street Boston 10, Mass.
TELEPHONE Liberty 5944 - 5945

DOE & INGALLS, INC.
Chemicals and Solvents
Full List of Our Products, see Chemical Guide-Book
Everett Station, Boston EVErett 4610

E. & F. KING & Co., Inc.
Est. 1834
399-409 Atlantic Avenue Boston, Mass.
New England Sales Agent
HURON PORTLAND CEMENT CO.
Industrial Chemicals
(CO_2)
Solid Carbon Dioxide

INDUSTRIAL CHEMICALS
RAW MATERIALS
IRVING M. SOBIN CO., INC.
72-74 Granite Street
Boston, Mass.
Tel. South Boston 3973
IMPORTERS and EXPORTERS

NEW YORK

HORMONES
NATURAL ESTROGENS
(in oil or tablet base)
POTENCY ASSURED
QUALITY PROTECTED
PERFORMANCE GUARANTEED
Biologically assayed and standardized at 10,000 International Units of ESTRONE U. S. P.
HEMA DRUG CO., inc.
Manufacturers of rare chemicals
66-36 CLINTON AVE. MASPETH, NEW YORK
Tel. NEWTOWN 9-2110

RARE METALS
As—Ba—Be—B—Ce—Cs—Cb—Co—Di
—Ge—Be—In—Ir—La—Li—Mo—Os—
Pd—K—Re—Ru—Sr—Te—Ta—Tl—W
U—Y—Zr—Th—Also All Rare Gases
We will undertake the manufacture of
RARE CHEMICALS
Not usually found in current lists.
A. D. MACKAY, 198 BDWAY, New Yo

PULVERIZING OUTPUT UP 20-35%
with *Electronic*
FEEDER CONTROL
Write For Bulletin CJ
DRY MATERIAL AND LIQUID
LEVEL CONTROL
FOR BINS AND TANKS
Write For Bulletin NBL
MOSHER ELECTRONIC CONTROLS
130 West 42nd Street, New York 18

NEW JERSEY

FOR PROMPT SERVICE IN THE
NEW YORK AREA
SOLVENTS—ALCOHOLS
EXTENDERS
CHEMICAL SOLVENTS
Incorporated
60 PARK PLACE NEWARK 2, N.

Semi-Carbazide Hydrochlori
•
Hydrazine Sulphate
Commercial and C. P.
•
Hydrazine Hydrate
85% and 100%
FAIRMOUNT CHEMICAL CO., IN
Manufacturers of Fine Chemicals
600 Ferry St. Newark 5, N.

RHODE ISLAND

J. U. STARKWEATHER C
INCORPORATED
241 Allens Ave.
Providence, R. I.
INDUSTRIAL CHEMICALS
TEXTILE SPECIALTIE

GEORGE MANN & CO., INC.
FOX POINT BLVD.
PROVIDENCE 3, R. I.
PHONE — GASPEE 1466
TELETYPE PROV. 75
Branch Office
250 STUART STREET, BOSTON, MASS.
PHONE — HUBBARD 0661
INDUSTRIAL CHEMICALS
RED OIL
STEARIC ACID

PENNSYLVANIA

FOR ALL INDUSTRIAL USES
AFCO BRAND
CHEMICALS
SINCE 1855
Spot Stocks
Technical Service
ALEX C. FERGUSSON CO.
450 Chestnut St. PHILADELPHIA, PA.
and Allentown, Pa.
Lombard 2410-11-12

MACHINERY and EQUIPMENT FOR SALE

FOR SALE
1—Hardinge Conical Ball Mill
Box 1885
CHEMICAL INDUSTRIES

THE FOLLOWING EQUIPMENT OFFERED FOR
IMMEDIATE SALE!
EVERY MACHINE REBUILT AND GUARANTEED!
OFFERED SUBJECT PRIOR SALE
50 to 250 gallon glass lined Tanks with and without agitators, plain and jacketed.
3—Colton Pill Making Plants.
1—Colton and 3-S. and D. Single Punch Tablet Presses
1—Werner & Pfleiderer 50 gal. double arm Mixer, jacketed.
1—Lehman 300 gal. capacity steam jacketed heavy duty single arm Mixer with bottom outlet.
1—U. S. Colloid Mill.
1—Werner and Pfleiderer 300 gallon, double arm Mixer.
1—Rockwell 150 gallon steam jacketed Mixer.
1—Paragon 250 gallon steam jacketed Mixer.
1—New Era 200 gallon double arm Mixer.
1—Paul O. Abbe 4′ x 3½′ Pebble Mill, 180 gallon capacity Buhr stone lining.
1—Schutz O'Neil Limited Pulverizer, 18 to 20.
1—National Equipment Co. 6′ Chaser with rolls measuring 28″ in diameter x 16″ wide.
1—Schutz O'Neil No. 3 Sifter.
WIRE COLLECT FOR PRICES AND DETAILS!
UNION STANDARD EQUIPMENT COMPANY
318 Lafayette Street
New York 12, N. Y.

EXCELLENT MACHINERY
Ready To Go
1 Bird 48″ S.S. Extractor Exp. Pf. Motor
2 Buffalo 6′ Jack. Crystalizers
1 Oliver 8′ x 8′ Rotary Filter
1 Buffalo Vac. Drum Dryer 24″ x 20″
1 Truck Dryer 7′ x 6′ x 7′—4 Trucks
1 Rotary B Stokes Tablet Machine
1 Tolhurst 12″ Extractor M.D.
1 Sperry 42″ Wd. P. & F. Filter Press
2 W. & P. 50 Gal. Jack. Mixers B.D.
1 W. & P. 20 Gal. Jack. Mixer 10 HP Motor
1 W. & P. 2½ Gal. Mixer 1½ HP Motor
1 Day Kneader Mixer 1 Qt. ½ HP Motor
1 Pfaudler Closed Jack. Tank 500 Gals.
2 Horiz. Steel Tanks 15,000 Gallons
Did you get your copy of Bulletin "X" listing over 500 desirable pieces of machinery?
MACHINERY & EQUIPMENT CORPORATION (of N. Y.)
533 West Broadway, New York 12, N. Y.
Gramercy 5-6680

20—8000 gal. R. R. Tank Cars
2—2000 to 4000-gal. Emulsion Colloid Mills
6-100-150 & 200 H.P. Diesel Units
343 KW 3/60/2300 F. M. Diesel
Raymond No. 0 Automatic Pulverizer
5′ x 33′ Steam Jacketed Vacuum Dryer
8—3 x 4 and 4 x 7 Hummer Screens
3 x 30, 3½ x 24, 5¼ x 60, 6 x 40 and 6 x 59 Direct Heat Dryers
18 x 36 & 42 x 10 Acme Jaw Crushers
20-Ton Browning Loco Crane
24″ Blast Furnace with movable curb for Lead, Tin and similar metals
20 H P. Charlotte 1½ in. Colloid Mill
1 yd. P. & H. 50′ Boom Cat. Crane
STORAGE TANKS
14—10,000, 15,000, 20,000 and 26,000-gal. Cap. Horizontal and Vertical
4—2500 Bbl. & 5,000 Bbl. Vertical
5—Underwriter's Fire Pumps. 750 and 1,000 G.P.M., and 1,500 G.P.M.
R. C. STANHOPE, INC.
60 East 42nd St. New York, N. Y.

AVAILABLE
1—60 gal. Copper Vacuum Still.
2—(New) 24 x 48″ Vibrating Screens.
1—40″ Tolhurst copper basket Centrifugal.
2—18″ and 40″ American s.s. Centrifugals.
2—#600 De Laval Clarifiers.
8—3-roll Mills: 16 x 40, 12 x 30, 9 x 24, 5 x 12″.
1—24″ Mikro Pulverizer, belt drive.
2—4 x 6′ Atmospheric Drum Dryers.
4—Lead-lined Tanks, 400 and 1000-gal.
2—Triangle Fillers, Gluers, Sealers.
1—5 x 4′ Oliver wood drum Filter.
6—(New) 36″ Stoneware Vacuum Filters.
1—100 sq. ft. single effect Evaporator.
4—Water Stills: 10, 25, 100, 175 GPH.
4—Colloid Mills: 1, and 40 hp.
1—10 gal. Buflovac jac. Autoclave.
What equipment have you for sale?
LOEB EQUIPMENT SUPPLY CO.
920 North Marshfield Ave., Chicago 22, Ill.

SPECIALS!
1—Nash Type L7 Vacuum Pump, 700 cfm
1—Vallez 942 sq. ft. Rotary Filter
2—No. 5 Sweetland Filters
1—W. & P. Mixer, 100 gal. Jacketed
1—Day Premier Alum. Lined Mixer, 300 gal. Jktd.
1—W. & P. Mixer, 150 gal., stainless steel lined
1—W. & P. Mixer, 20 gal.
1—Shriver 36″ P. & F. Filter Press, 45 chambers
10—Centrifugals, 32″, 40″, 48″, belt, motor driven
3—650 gal. Steel Jacketed, Agitated Kettles
1—Solvent Still, 500 gal., column and condenser
1—Buflovak 24″ x 20″ Vacuum Drum Dryer
7—Rotary Dryers, 4′ x 30′, 6′ x 17′, 6′ x 42′
2—1750 gal. Lead Lined Pressure Tanks
2—Jacketed Steel Stills, 6′ x 5′
3—Oliver Rotary Filters, 5′ x 8′, 5′4″ x 6′, 8′ x 8′
Send for Complete Lists!
BRILL Equipment Co.
225 WEST 34th STREET, NEW YORK 1, N.Y.

AUTOCLAVES
1—42″ dia. x 24′-4″ Vertical, Forge Welded Steel, 600 lbs. Pressure—1300 gals.
1—4′ x 6′ Vertical, Iron Body, Steel Jacketed, 200 lbs. Pressure—600 gals.
1—6′ x 15′ Vertical Steel, Jacketed, 125 lbs. Pressure—3400 gals.
2—3′ x 16′ Horizontal, Steel, Jacketed, 300 lbs. Pressure—800 gals.
1—10′ x 25′ Vertical or Horizontal, Forge Welded Steel, Jacketed, 100 lbs. Pressure.

AGITATOR DRIVES
2—De Laval Type E Vertical Worm Gear, Ratio 70 to 1, 1200 R.P.M. Imput—10 H.P.
1—D.O. James—Size 1168 Vertical Worm Gear, Ratio 28.33 to 1, with base plate for 5 H.P. motor drive.
1—D.O. James—Size 1300 Vertical Worm Gear, Ratio 82 to 1, with base plate for 5 H.P. motor drive.
1—General Electric Vertical Gear Reduction Output Speed 5 R.P.M.—7½ H.P. G.E. Motor—Totally Enclosed—220 volts—3 phase—60 cycle.

CONDENSERS
1—Elliott Ehrhazt Iron Body Surface Condenser—two pass 245 sq. ft. Surface—½″ brass tubing and Tube sheet.
1—All copper condenser, Coil Type, 60 sq. ft. surface, removable from shell.

CRYSTALLIZERS
5—4′ x 24′ x 2′6″ Deep Stainless Clad Steel, Jacketed—1800 gals.

DRYERS
3—Barlett & Snow Vertical Steel, Jacketed, 10′ dia. x 4′ high, Agitators, Reducers, 2 H.P. Motors.

EVAPORATOR
1—Vertical Tube, Single Effect, Iron Body, 6 ft. dia. x 14 ft. 6 in. high, 1000 sq. ft. heating surface—steel tubes.

FRACTIONATING COLUMNS
1—24″ dia. Cast Iron—40 Sections, each 6″ high with dome and bottom sections—14 bubble caps per section.
1—18″ dia.—Cast Iron—with Dephlegmator—15 sections, each 6″ high—2 top & bottom sections each 18½″ high.

KETTLES
1—6′8″ dia. x 7′6″ deep iron body with steel jacket, turbine agitator, speed reducer and 15 H.P. splash proof motor, 2460 gals.
1—7′10″ dia. x 6′8″ deep steel body, with heating coils, two blade agitator, speed reducer and 15 H.P. splash proof motor, 2400 gals.
1—6′9″ dia. x 9′ deep iron body with heating coils, agitator and drive, 2500 gals.
1—8′ dia. x 10′ deep, iron body with heating coil, agitator & drive, 3000 gals.
2—4′ dia. x 4′6″ deep iron body, anchor agitator and newport drive, 400 gals.
1—4′ dia. x 4′ deep iron body, agitator & drive, 400 gals.
1—3′6″ dia. x 5′ deep, steel jacketed, lead lined with agitator, 350 gals.
1—4′6″ dia. x 3′ deep, steel jacketed, with agitator and drive, 350 gals.
1—3′6″ dia. x 5′ deep cast steel, jacketed, no drive or agitator, 350 gals.

PEBBLE MILL
1—6′ dia. x 5′ Abbe Eng. Co. Pebble Mill, Porcelain lined, complete with pebbles, chain drive, 20 H.P. motor, 220 Volt, 3 phase, 60 cycle and compensator.

PRESSURE TANKS
1—5′ dia. x 23′4½″ Forge Welded Steel, 300 lbs. W.P., 3300 gals. Suitable for storage of compressed gases.
1—6′6″ dia. x 6′ deep, steel, rivetted, 125 lbs. W.P., 1750 gals.
1—3′6″ dia. x 10′ high steel rivetted, 100 lbs. W.P., 750 gals.

PUMPS
3—Wilfley Model AB Centrifugal—7½ H.P. motor—one has stainless impeller & casing—2″ inlet, 1½″ discharge.
1—Gould Centrifugal—7½ H.P. Splash Proof Motor—3″ suction, 3″ discharge.
1—Duriron No. 102 Centrifugal with 5 H.P. Westinghouse totally enclosed fan cooled motor, 2″ suction—1½″ discharge.
1—Shriver Diaphragm 3A—lead liquid ends, 90 gals., motor drive.
1—Shriver Diaphragm 4A—Rubber lined, 125 gals., motor chain drive.
4—Vacuum single phase stokes—size 8″ x 6″, pulley drive.
1—Quimby 4 stage Centrifugal, 500 gals.—75 H.P. G.E. motor.
1—American Well 2 stage Centrifugal, 350 gal. 30 H.P.G.E. motor, Magnetic Starter.
2—Gould Triplex Plunger—size 8″ x 10″—400 gals. Pulley Drive.
1—Gould Triplex Plunger—size 3″ x 4″—25 gals. V Belt Drive.
1—Kinney Rotating Plunger—Type SD 534—3″ suction—3″ discharge, Pulley Drive.
1—Kinney Rotating Plunger—Type SD 424—2″ suction—2″ discharge, Gear Drive.
1—Quimby Screen Type—size 2″—5 G.P.M.—55′ head—motor drive.

ROTARY DRYER OR KILN
1—5′ dia. x 40′ long Horizontal Rotary Dryer, ½″ shell, complete with tires, ring gear, rollers gearing, base plates.

EMSCO EQUIPMENT COMPANY
Emil A. Schroth, Owner
49 HYATT AVE., NEWARK 5, N. J.
Phone Mitchell 2-3536

LIQUIDATION

MACHINERY & EQUIPMENT

of former

Central Sugar Company

Decatur, Indiana

1—Battery of 5—40″ steel basket, Western States 1600 RPM, belt driven CENTRIFUGALS, ball bearing, water-cooled heads; mixer with Stevens mingler coil, syrup troughs, all supporting framework, unloaders.
1—19,000 sq. ft., quadruple effect, horizontal, brass tube EVAPORATOR, with all piping, pumps, etc.
3—8 x 10 Wood Stave OLIVER FILTERS, complete with all pumps and accessories.
7—JUICE HEATERS 500 to 750 sq. ft. H. S.
MISCELLANEOUS: Pumps, Packaging Machinery, Coil and Calandria Pans.

PARTIAL LIST OF STOCK AT NEWARK SHOPS

2—Bufflovak 6′ dia. Jack. Vacuum CRYSTALLIZERS or VACUUM PAN DRYERS.
8—DRY POWDER MIXERS various sizes, to 3000 lbs.
2—W. & P. MIXERS sizes 21-X-BB, jacketed, 625 Gal.
5—RAYMOND PULVERIZERS; 4-Roll Low Side; No. 3 No. 1, No. 0000.
1—4′ x 6′ OLIVER CONTINUOUS FILTER; 2—8′ x 8′.
1—Day No. 30 Imperial Jack. MIXER, 75 Gal.
29—CENTRIFUGAL EXTRACTORS, 12″ to 72″ bronze and steel baskets, belt and motor drives.
2—8′ x 30″ Hardinge Conical Silex Lined PEBBLE MILLS, also 6′ x 36″.
5—ROTARY KILNS, 6′ x 60′, 8′ x 125′, 8′ x 135′.
10—Dopp C. I. jacketed KETTLES, 25 Gal. to 100 Gal.; 30-steel, cast iron, jack. up to 2000 gals.
3—ROLLER MILLS 6′6″ x 14″, 12 x 30, 16 x 40, water cooled.
1—Pneumatic Scale Co. Auto. 6 head CAPPER & CAP FEEDER, M.D.
3—40 Gal. DAY PONY MIXERS.
1—450 Gal. GLASS LINED jack., agit. KETTLE; 2—150 Gal. Jack. Agit.; 2—200 Gal. Jack.
1—Filler Machine Co. 8-spout piston FILLER
1—WORLD High Speed straightaway LABELER.

2—4-Roll RAYMOND HIGH SIDE MILLS, equipped for vacuum air separation—one with latest "whizzer" separator, with double cone vacuum separator. Each including exhauster, cyclone collector and inter-connecting piping.

1—No. 12 SWEETLAND FILTER with 36 monel leaves, 250 mesh, grooved.

SPECIAL OFFERING

1—Buffalo 48 x 40″ VACUUM DRUM DRYER, with bronze chromium plated drum, Vacuum pump. Barometric condenser, Vacuum receiver, etc.

All items motor driven, still set up in operating condition.

Consolidated Products Co., Inc.

14-18 Park Row **New York 7, N. Y.**

We Buy and Sell from a Single Item to a Complete Plant

IN STOCK!

DISTILLING COLUMNS:

18″ DIA. WATER SCRUBBING COL. Lead-Lined—Excellent condition. Drwg. avail.
48″ DIA. C.I. RECTIFYING COLUMNS. Containing 24 Bubble Cap Type Plates, 6 caps per plate. Complete with coolers.
78″ DIA. C.I. RECTIFYING COLUMNS. 30 Bubble Cap Type Plates with 12 caps per plate. Complete with coolers.
45″ DIA. STAINLESS STEEL COLUMN containing 26 Bubble Cap Type Plates—saw little service. Drawings available.
8′4″ to 10′0″ STEEL COLUMN containing 19—8′4″ dia. and 9—10′0″ dia. Bubble Cap Type Plates. Drawings available.
48″ DIA. EVERDUR COLUMN—Bubble Cap Type Plates. An exceptional value.
TANKS, COPPER, STEEL, BRASS, ALUMINUM, STAINLESS—Large Stock.
AMMONIA COOLERS.
HAMMER MILL: Williams, Cap. 1,000 to 1,200 lbs. corn per hour.
3 JEFFREY SWING HAMMER SHREDDERS—Type E—Size 42″x36″. Compl. with Westinghouse 100 H.P. motor, etc.
PUMPS—CENTRIFUGAL AND STEAM, all sizes. Bronze or iron.
TUBING & PIPE—Stainless, brass, aluminum, copper.
YEAST CULTURE MACHINE—All copper.
ACE OIL BURNER—excellent condition.
LAWRENCE TRIPLE EFFECT EVAPORATOR. Complete in one body.
9—COIL-TYPE VACUUM PANS: (Complete with Condensers, Catch-alls, etc.)
2—WORTHINGTON CONDENSERS, 1,150 sq. ft. surface, each—complete with simplex pumps. Others from 100 to 1000 sq. ft. of surface.

SPECIAL . . . COCHRANE SURFACE TYPE DEAERATOR HEATER. Designed for 40 lb. Working Press. Will sell at fraction of original cost.

CLOSE-OUT—VALVES—All Sizes
WE BUY SURPLUS EQUIPMENT
A Single Item or a Complete Plant
Write for Complete List

ORELAND EQUIPMENT CO.

P. O. BOX "E", ORELAND, PENNA.

FOR SALE

1—Gayco 8′ High Production Air Separator and Sifter.

BOX 1957

Machinery For Sale

1—Dorr Filter, Type BM—8′ diameter x 12′ long—Rotating Continuous Operation.
2—Patterson Jacketed Mixers, 4′ x 4′6″ x 20′ long.
2—I-R Turbine Blowers—4000 CFM.
2—Jacketed Steel Tanks, 4′ x 8′.
1—Horizontal Jacketed Mixer, 7′ diameter x 10′ long.
1—20″ C. I. 20 section Column.
1—Heat Exchanger—high Chrome Iron—24″ x 10′.
2—W. & P. 50 gallon Jacketed Mixers.
1—Stokes 3′ x 3′ x 8′ Jacketed Mixer.
2—Jewel 250 G.P.H. Water Stills.
Also:—Cast Iron Filter Presses—Pumps—Air and Ammonia Compressors — Dough Mixers—New Stainless Steel Tanks.

Write For Latest Stock List

PERRY EQUIPMENT AND SUPPLY COMPANY

1515 W. Thompson St. Phila. 21, Penna.

FOR SALE

1—Kent 3-Roll, 12 x 30 Horizontal Roller Mill, with water-cooled rollers.
1—J. H. Day 3-roll 16 x 40 Roller Mill, water-cooled steel rollers, equipped with roller bearings and silent chain motor drive.
1—Baker Perkins 60 gallon, Double Arm Mixer with fish tail blades.

BOX 1960

Pfaudler glass enameled and plated bolted type steel tanks, welded brewery sinks, wood and steel tanks of all sizes, steel buildings, new and guaranteed used steel pipe, valves and fittings.

JOS. GREENSPON'S SON PIPE CORP.

National Stock Yds., Ill.

FOR SALE

Nitric Acid Recovery Plant, New Jersey; some minor repairs necessary, but materials readily available. Reasonable price for immediate sale. Inspection by appointment.

Box 1980

FOR SALE — Owing to other interests, client offers for sale small machinery manufacturing business established twenty years; business in sound condition and offers excellent present and post war possibilities. Box 1983.

WANTED TO BUY

AVAILABLE FOR IMMEDIATE PURCHASE

4—Tablet Coating Pans—42″ dia. hammered copper, equipped with heating coils—including chain drive and clutch and electric motors . . $800.00 ea.

BOX 1974

BUSINESS OPPORTUNITIES

GREAT BRITAIN

Technical Director of large British Paint and Chemical Manufacturer producing all types of Paint, Varnish, Synthetic Resins and Synthetic Drying Oils, and raw materials for the Plastics industry, is now in the U. S. A. and would be happy to receive proposals from U. S. Manufacturers wishing to negotiate licenses for developing new products in British Empire. Please address all replies in triplicate to Box 1973.

HELP WANTED

CHEMISTS — ENGINEERS — PHYSICISTS

Men interested in careers in industrial research are urged to write us giving details of training and experience. Essential work with promising postwar future offering opportunities for professional growth.

BATTELLE MEMORIAL INSTITUTE
Columbus 1, Ohio

TECHNICAL REPRESENTATIVE
Excellent opportunity for advancement to head of technical service department handling resinous and protein products. Sales or technical sales experience and chemical background essential, knowledge of leather, paper and textile fields desirable. Write for an interview, giving age, experience, draft status, salary requirements and enclosing recent photograph.
Casein Company of America
(Division of The Borden Company)
Dept. JFC Bainbridge, N. Y.

WANTED—Chemist, for research and production on pigments. Staten Island location. Permanent position for right man. State education, experience and salary desired.
Box No. 1978

CONTROL CHEMIST—ORGANIC
Experienced young man wanted for raw material and finished product control, testing, etc., in plant manufacturing nationally-advertised industrial cleaning chemicals. Essential industry; unlimited opportunity now and post-war. When writing, state details of education, experience, and salary requirements. Box 1977.

Experienced writer, capable of producing bulletins and articles from technical data as well as to write trade journal advertising copy for chemicals and other petroleum by-products. Hiring will be in compliance with War Manpower Priority Referral Program. PHILLIPS PETROLEUM COMPANY, Chemical Products Department, Bartlesville, Oklahoma.

Sales Manager wanted for fine and industrial chemicals by well known chemical distributor. Write full details of education, salary desired, experience, draft status, etc. Our employees know of this advertisement.
Address Box 1979

SITUATIONS WANTED

EXPORT MANAGER
with broad experience in chemical & pharmaceuticals, skilled organizer, linguist, now with large concern, desires connection manufacturer to establish or promote foreign trade. Either within your organization or for own account. Box 1981.

WANT A SALESMAN?
Graduate experienced chemist, 28, wishes to associate self with chemical concern in selling capacity. Draft exempt.
Versatile, appealing personality, progressive intellectually, and often ingenuous.
One of a family of salesmen: father, brother, & uncles.
National Service Act inhibits immediate association.
This advertisement is a feeler.
Box 1982

PROFESSIONAL DIRECTORY

MOLNAR LABORATORIES
Analytical and Consulting Chemists
Phenol Coefficient Tests
Hormone Assays
PENICILLIN ASSAYS
Investigation, Control and Development of Pharmaceutical Products
211 East 19th St., N. Y. Gramercy 5-1030

Harold A. Levey Laboratories
Chemical & Engineering
Development & Research
We transform an idea into a going business. Advertised products reproduced and new products and processes developed.
8127-33 Oleander St., New Orleans 18, La.

JOSEPH A. WYLER
Consulting Chemist and Chemical Engineer
Every Form of Chemical Service
Research
Products
Processes
Organic Synthesis
Registered Patent Attorney
Address: 212 N. St. George St.
Allentown, Pa.

SPECIAL MACHINERY

Industrial Services Associates

Consulting Engineers

120 Liberty St., New York City

DR. HENRY W. LOHSE

Research, Development and Surveys

Chemical Conversions
Synthetic and Catalytic Processes

Room 523, 67 Yonge St., Toronto, Ontario
Telephone: Elgin 4797

RALPH L. EVANS ASSOCIATES

70 Chemists and Engineers
Fully Equipped
Laboratory and Pilot Plant

Organic and Inorganic Chemicals
Condensation Products
Continuous Processes
High Pressure
Raw Material Substitution

250 E. 43rd Street, New York 17, N. Y.
Tel. MUrray Hill 3-0072

PATENTS

CALL OR WRITE PATENT YOUR IDEAS
1 2 3 4 IDEAS 1234 BROADWAY
FREE CONSULTATION LITERATURE
REGISTER YOUR TRADE MARKS
Submit the NAME you wish to Register
Send a Sketch or Model of your invention for
CONFIDENTIAL ADVICE
Z. H. POLACHEK
1234 BROADWAY · NEW YORK · AT 31 ST.
Phone LOngacre 5-3098
PATENT ATTORNEY — PROF. ENGINEER

ASSOCIATION OF CONSULTING CHEMISTS AND CHEMICAL ENGINEERS, INC.

50 East 41st Street
Room 82
New York 17, N. Y.
LExington 2-1130

A Clearing House *for Consultants*

When in need of a consultant *address the Association*

No charge for this service.

The membership, located from coast to coast, comprises specialists in all fields.

INDEX of ADVERTISERS

INDEX *of* ADVERTISERS

"WE"-EDITORIALLY SPEAKING

THE WORD "research," we note, has become a magical abracadabra in the American vocabulary. Manufacturers of everything from bobby pins to locomotives advertise loudly that research is bringing the more abundant life to their customers.

Our staff statistician delved into a recent issue of *Time* and came up with the informative tidbit that 11 out of the 84 advertisers used the word "research" in their copy. Of the five strictly chemical companies, however, only one was unkind enough to pile a burden of glowing rhetoric on the shoulders of that already overworked word.

Yes, it is certainly overworked; but stranger than the weirdest fiction of the ad-writers' imaginations—and their wildest debauches are their descriptions of the wholesale swoonings reported to follow in the wake of new perfumes—is the fact that most of the sensible claims made for the benefits of research are undeniably and happily true. Long may it prosper!

HOW BIG is a cracking plant? Sun Oil Company's new thermo for catalytic cracking plant at Marcus Hook, Pa., required almost 50 miles of pipes and tubes ranging up to 42 inches in diameter; 1,860 tons of structural steel and another 970 tons in equipment; 2,825 valves; and 2,700 flanges. Circulating 990,000 gallons of water and 200 tons of catalyst an hour, the two units have a charging capacity of 20,000 barrels a day.

ACCORDING TO Dr. S. A. Rohwer, of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, the amount of nicotine available for use as an insecticide this year will be far below the demand.

It isn't enough that the citizenry of the land should be wailing for a puff of the divine weed; now it's the bugs yet.

OUR NEXT-DOOR neighbor, Canada, is fearful lest her bright young men find the lure of American industry too pleasant to resist.

"With the superb laboratories and research equipment, the excellent incomes, with which American industry generally supplies its research departments, it will be little wonder if many young Canadians find U. S. opportunities attractive," we read in the Canadian *Financial Post*.

THEY ARE SMART out in Illinois. To get around the steel shortage they made their license plates out of soy beans. But they weren't smart enough to carry out a research (*vide supra*) program on the epicurean appetites of dogs, who, it appears, are fonder of Soybean Plastics a la License Plate than anything.

And a spokesman for porcupines as-

Fifteen Years Ago

From Our Files of February, 1930

Senate lobby investigating committee during past month receives a deposition by Francis P. Garvan, head of the Chemical Foundation, Inc., charging German influence in formation of tariff schedules on importation of chemicals; and queries Eugene R. Pickrell on his lobbying activities, eliciting only emphatic denials that he is in any way connected with the I. G. Farbenindustrie. The latter declared that he was employed by Herman A. Metz, president, General Dyestuffs Corp., New York, and that his interests were to prevent increased chemical duties and to oppose retention of American selling price basis for tariff on dyes.

Dr. Herbert H. Dow, president, Dow Chemical Co., received the Perkin Medal for 1930, January 10, at the Chemists' Club, New York.

John Lucas & Co., Inc., Philadelphia, merges with Sherwin-Williams Co., following negotiations between Ernest T. Trigg, president, of the former company, and George A. Martin, president, Sherwin-Williams Co.

Marley Chemical Co., New York, solvents, purchases stock of Henry Miner & Son, Inc., West Orange, N. J., following a decision of the latter company to wind up its affairs.

Curtin-Howe Corp., United Chemicals subsidiary, licenses American Smelting & Refining Co. as general agent for manufacture and sale of ZMA, wood preservative, in Mexico.

...re swell for that mid-afternoon hungry feeling.

Our plastics research will have to go a step further. In addition to flexibility, hardness, solvent resistance, etc., we should find an item like this listed: *Palatability:* 0.01 (Raw beef = 100).

WE GOT some idea the other day of the engineering problems encountered in the production of synthetic rubber. About 20 pounds of steam are required for distillation purposes to produce one pound of butadiene from alcohol. For that same pound it is necessary to pump 1,200 pounds of water for cooling and to treat chemically 35 pounds of water for boiler use.

SALT is now being mixed with coal to keep the small lumps of coal from freezing together into a solid block while in transit. We shall spare the reader, suffering from coal shortages, any remarks about putting salt on a bird's tail to make it come home to roost.

THOSE OF US who are familiar with half a dozen synthetic rubbers at the most don't realize what tremendous research has been done in that field. Dr. Gustav Egloff, speaking before the Reconversion Congress of American Industry, pointed out that fully 25,000 different types of synthetic rubber have been evolved by research organizations. Only a few, of course, are of major importance, but many others will be produced in small quantities for specialized uses. One company that has produced 12,000 types has earmarked 200 of them for specific postwar uses.

READING ABOUT the new office-to-auto radio, for which a frequency band has been assigned by the Federal Communications Commission, we paused for ten seconds of silence in sympathy for the chemical engineer.

As far back in history as valves have leaked, or temperatures got too high, or too low, the engineer has been routed out of bed to set things right.

Now he will be driving along a serene country road on a bright Sunday afternoon, peace in his soul and a song in his heart when all of a sudden his loud speaker will bark, "Smith, the No. 3 kettle looks funny. You better come right away."

PART 2: PATENTS AND TRADEMARKS

Abstracts of U. S. Chemical Patents

A Complete Checklist Covering Chemical Products and Processes

Printed copies of patents are available from the Patent Office at 10 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

From Official Gazette—Vol. 568, No. 4, Vol. 569, Nos. 1-3 (Nov. 28-Dec. 19)—p. 549

*Industrial Chemicals, Organic

Method of molding which comprises fusing a polymer selected from polymeric vinylidene chloride and its normally crystalline co-polymers. No. 2,361,900. Robert Lowry and Robert Reinhardt to The Dow Chemical Co.

Manufacture of vinyl and ethylidene esters wherein acetylene is reacted with a carboxylic acid in presence of cacodyl oxide. No. 2,361,994. Frank Cockerille to E. I. du Pont de Nemours & Co.

Production of hydrocarbons by reacting carbon monoxide and hydrogen, which comprises introducing reactants into medium prepared by dissolving in a hydrocarbon fraction boiling above reaction temperature a salt of metal selected from nickel, cobalt, and iron catalytically active in process. No. 2,361,997. Henry Dreyfus to Celanese Corp. of America.

Improving water resistant characteristics of plasticized polyvinyl alcohol by incorporating in water insoluble secondary aromatic amine, and a chloride of an amphoteric metal. No. 2,362,026. James Quist to United States Rubber Co.

Production of thionyl chloride, hydrogen chloride and sulphur dioxide. No. 2,362,057. John Edwards to Hooker Electrochemical Co.

Disposal of aqueous waste liquor obtained in manufacture of nitrotoluene. No. 2,362,066. Ralph Hales, Ernest Almy, Aubrey Young and Carl Pratt to Atlas Powder Co.

Producing isocytosine which comprises mixing an alkali metal formylacetic ester, a guanidine salt and an alkali metal hydroxide together. No. 2,362,070. Martin Hultquist to American Cyanamid Co.

Polymeric-l-chloro-l-fluoro-ethylene. No. 2,362,094. Mary Renoll to Monsanto Chemical Co.

Preparing butadiene from n-butane. No. 2,362,218. Walter Schulze and John Hillyer to Phillips Petroleum Co.

Production of alkyl sulphides. No. 2,362,219. Walter Schulze and Lloyd Morris to Phillips Petroleum Co.

Recovering cyclopentadiene contained in benzol forerunnings substantially free from benzene. No. 2,362,227. Joseph Wells and Philip Wilson, Jr., to Carnegie-Illinois Steel Corp.

Ore concentrating process utilizing differential surface wettability principles of separating acidic ore materials from other ore constituents. No. 2,362,276. David Jayne, Jr., and Harold Day and Stephen Erickson to American Cyanamid Co.

Catalyst for polymerization of olefins comprising mixture of metal pyrophosphate capable of reduction to a polymerization catalyst and a metal phosphate not capable of ready reduction to a polymerization catalyst. No. 2,362,311. Louis Rubin to The Polymerization Process Corp.

Aromatic glyceryl esters of alpha-hydroxyisobutyric acids. No. 2,362,326. Jack Thurston and John Grim to American Cyanamid Co.

Compacting a finely divided fluorite compound in absence of binders and water, under conditions of temperature and pressure to cause plastic flow. No. 2,362,430. Martin Buerger to Arthur D. Little, Inc.

Normally non-volatile hydrocarbon product containing P_4S_3 to stabilize against oxidation, and including also an amino diphenyl methane derivative. No. 2,363,001. Everett Hughes to The Standard Oil Co.

Alkylating a metallo derivative of a mono-substituted malonic ester selected from alkali metal, alkaline earth metal and aluminum derivatives. No. 2,363,003. David Jones to Mallinckrodt Chemical Works.

Preserving valuable elements of organic materials in dry storage. No. 2,363,037. Gerald Arnold.

Dyes of 1,9-isothiazoleanthrone compounds. No. 2,363,042. Edwin Buxbaum to E. I. du Pont de Nemours & Co.

Polymerized terpinyl methacrylate. No. 2,363,044. Albert Clifford to Wingfoot Corp.

Certain water-soluble high molal oxyalkylated esters. No. 2,363,045. Melvin De Groote and Bernhard Keiser to Petrolite Corp. Ltd.

Certain water-soluble high molal oxyalkylated esters. No. 2,363,046. Melvin De Groote and Bernhard Keiser to Petrolite Corp. Ltd.

Certain water-soluble high molal oxyalkylated esters and method of making same. No. 2,363,047. Melvin De Groote and Bernhard Keiser to Petrolite Corp. Ltd.

Certain water-soluble high molal oxyalkylated esters and method of making same. No. 2,363,048. Melvin De Groote and Bernhard Keiser to Petrolite Corp. Ltd.

Certain water-soluble high molal oxalkylated esters and method of making same. No. 2,363,049. Melvin De Groote and Bernhard Keiser to Petrolite Corp. Ltd.

Alkylation of hydrocarbons in presence of catalyst composition prepared from HF, H_2O, and BF_3. No. 2,363,116. Frank Bruner to The Texas Co.

Treating mixture containing piperidine and pyridine. No. 2,363,157. Henry Stasse to Allied Chemical & Dye Corp.

Separating piperidine from pyridine. No. 2,363,158. Henry Stasse to Allied Chemical & Dye Corp.

Purification of piperidine. No. 2,363,159. Karl Engel to Allied Chemical & Dye Corp.

Changing carbon-hydrogen ratio of a hydrocarbon which comprises bringing hydrocarbon into contact with a catalyst having as active ingredient thereof chromic oxide. No. 2,363,187. Edwin Layng to Process Management Co. Inc.

Alkylating an isoparaffin with an olefin in presence of a catalyst prepared by adding boron fluoride to phosphoric acid. No. 2,363,222. Fred Beyerstedt to Standard Oil Development Co.

Separation of crystalline hydro rosin acids from a rosin which has been partially saturated with hydrogen to extent of at least 25% of double bonds. No. 2,363,252. William Kirkpatrick to Hercules Powder Co.

Alkylating isoparaffins with olefins, which comprises contacting same in presence of an aluminum chloride catalyst dissolved in low molecular weight halogenated hydrocarbon solvent. No. 2,363,264. Raphael Rosen to Standard Oil Development Co.

Preparing vinyl acrylate which comprises reacting on acrylic acid with acetylene in presence of a mercuric salt and hydroquinone. No. 2,363,286. Walter Bauer and Carl Kautter to Rohm & Haas Co.

Making moistureproof sheet material which comprises preparing molten composition by combining a wax and a hydrocarbon polymer of those produced by hydrogenating raw rubber and polymerizing isobutylene thereafter combining material so produced with cyclized rubber, and coating a flexible cellulosic base with said molten composition. No. 2,363,289. Frank David Bergstein.

Synthetic compositions produced by acetalizing and/or ketalizing hydrolyzed copolymers of vinyl organic esters and polyvinyl aryl compounds. No. 2,363,297. Gaetano D'Alelio to General Electric Co.

Apparatus for fractionating high pressure hydrocarbon gases. No. 2,363,317. John Hall, one-half to Danciger Oil & Refineries, Inc.

Making a thread comprising subjecting surfaces of a tape made from a polyvinyl alcohol to a steam bath to render surfaces of tape tacky. No. 2,363,457. Sterling Alderfer, one-half to Edward Andrews.

*Leather

Treating hide to recover hair which comprises subjecting said hide to action of lining of an animal stomach. No. 2,362,540. Victor Conquest and Havard Keil to Armour & Co.

*Medicinals

Preparation for cleaning removable dentures, consisting of lather producing detergent and including polishing agent, suitable acid, and sodium bicarbonate. No. 2,362,487. Joseph Anthony Hopkins.

Therapeutic substances. No. 2,362,508. Joseph Stevens and Ralph Beutel to Merck & Co. Inc.

Metamethoxybenzylmethylcarbinamines and medicinal preparations comprising same. No. 2,361,372. Gordon Alles.

Metahydroxybenzylmethylcarbinamines and medicinal preparations comprising same. No. 2,361,373. Gordon Alles.

Cosmetic or pharmaceutical product comprising an oily substance, water, and, as water-retention promoting ingredient, the isolated beeswax distillate. No. 2,361,477. William Humes to National Research Corp.

Therapeutic agent, a stabilized solution of metallic salt of an amide substituted derivative of p-amino benzene sulfonic acid containing normal sulphite ions as stabilizer. No. 2,361,624. William Hamilton and Melvin George, Jr., and Eli Simon, to Frederick Turnbull.

Ointments and creams, comprising substance selected from sulfated hydrogenated castor oil and phosphated hydrogenated castor oil and unctuous substance selected from animal, vegetable and mineral oils, fats, fatty alcohols, fatty alcohol esters and waxes. No. 2,361,756. George Fiero.

2-(P-amino-benzene-sulphonamido)-5-methyl thiazole. No. 2,362,087. George Newbery to May & Baker Ltd.

Obtaining follicle-stimulating fraction from pituitary gland. No. 2,362,143. William McShan and Roland Meyer to Wisconsin Alumni Research Foundation.

Sulphonamide derivatives of 2-aminooxazole and processes for their production. No. 2,362,336. George Anderson to American Cyanamid Co.

Anesthetic compound, beta-alkyl amino beta, beta-dimethyl ethyl amino benzoate. No. 2,363,081. William Ringk to Novocol Chemical Mfg. Co.

Anesthetic compound, beta-alkyl amino beta substituted ethyl amino benzoate. No. 2,363,082. William Ringk to Novocol Chemical Mfg. Co. Inc.

Anesthetic compound, beta-alkyl amino beta-methyl ethyl amino benzoate. No. 2,363,083. William Ringk to Novocol Chemical Mfg. Co. Inc.

Dry, stable laxative composition comprising member selected from fumarates of non-toxic alkali and alkaline earth metals and magnesium fumaric acid and a non-toxic soluble carbonte. No. 2,363,108. Jasper Kane and William Staebner to Charles Pfizer & Co.

Fermentation process for the production of riboflavin (vitamin B_2). No. 2,363,227. Paul Burkholder to Research Corp.

*Metals, Alloys

Apparatus for production of metallic magnesium by thermal reduction of magnesia. No. 2,362,440. MacNeil Hertel to Dominion Magnesium Ltd.

In high vacuum thermionic tube, a getter element consisting of self-supporting, sintered, porous body including a refractory metal from Fourth and Fifth Groups of Periodic Table. No. 2,362,468. Richard Clark, to Fansteel Metallurgical Corp.

Selenium rectifier and method of making it. No. 2,362,545. William Ellis and Alexander Souden to Bell Telephone Laboratories, Inc.

Producing fine ferrous metal powder capable of producing articles having high physical properties of steel when subjected to powder metallurgical steps of compression and heating. No. 2,362,772. Ivar Rennerfelt.

Making articles having fine bore therein of a high-melting-point metallic alloy which is castable but too hard for drilling. No. 2,362,875. Eric Zahn to Austenal Laboratories, Inc.

Composite metal solder composed of a plurality of separate metal constituents. No. 2,362,893. George Durst to Metals & Controls Corp.

*Continued from last month, Vol. 567, No. 1—Vol. 568, Nos. 1, 2, 3.

From Official Gazette—Vol. 568, No. 4, Vol. 569, Nos. 1-3 (Nov. 28-Dec. 19)—p. 550

Producing compacted articles from stainless steel powder. No. 2,361,-443. John Wulff.

Luminescent material, a phosphor comprising a matrix of cadmium-beryllium tungstate activated with bismuth and samarium as cooperating activators. No. 2,361,467. Harry Fernberger to General Electric Co.

Platinum-nickel alloy for metallic feeder for molten glass. No. 2,361,-578. Michel Vilensky to Owens-Illinois Glass Co.

Steel wool containing carbon and manganese, molybdenum or chromium, the balance being all iron. No. 2,361,672. Louis Winkler to Bethlehem Steel Co.

Repairing cracks in metal walls by hot welding stitched screws. No. 2,361,701. Charles Michaels.

Nickel electrodeposition bath comprising aqueous acid solution of a nickel salt selected from nickel chloride, and nickel sulphate, and also containing as a nickel brightening agent a pyrimidine compound. No. 2,361,720. William ter Horst to United States Rubber Co.

Preparing substantially pure manganese. No. 2,361,925. Herman Brassert and James Hartley to Minerals & Metals Corp.

Metal-clading a metal surface. No. 2,361,962. Bela Ronay.

Preparing selenium rectifier elements. No. 2,361,969. Otto Saslaw to Federal Telephone and Radio Corp.

Electric contact containing 0.85 to 2.05% copper, balance silver. No. 2,362,005. Vernon Heil to P. R. Mallory & Co. Inc.

Making a sintered copper-chromium metal composition which comprises forming mixture containing copper, chromium, phosphorus and a metal hydride. No. 2,362,007. Franz Hensel and Earl Larsen to P. R. Mallory & Co. Inc.

Hot worked and heat treated alloy steel article containing carbon, molydbenum, silicon, titanium, and iron, and characterized by high surface hardness. No. 2,362,046. Frederick Bonte to The Timken Roller Bearing Co.

Removing excessive amounts of silicon from aluminum alloys containing same and simultaneously forming an aluminum-magnesium alloy. No. 2,362,147. Lucio Mondolfo.

Producing diammonium monoalkali metal ferricyanide. No. 2,362,183. Robert Barnes and Leonard Moore to American Cyanamid Co.

Obtaining copper sulfide and a zinc salt from a zinc-copper alloy. No. 2,362,202. John Hay to The Harshaw Chemical Co.

Recovery from their ores of oxide minerals capable of being sulphidized by contact with sulphur. No. 2,362,216. Howard Reed.

Forming a copper contact on surface of copper oxide portion of a copper oxide-copper rectifier by electrolytically reducing surface portion of the oxide to copper. No. 2,362,228. Edgar Wright to Bell Telephone Laboratories, Inc.

Applying to metal a uniform, resinous, non-waxlike, protective coating of at least four mils which comprises heating a resinous coating composition containing polymeric vinyl halides, polymeric vinyl esters, or polymeric esters. No. 2,362,397. William Pearce to The Resinous Products & Chemical Co.

Flotation process for concentration of ores, which comprises conducting flotation in presence of an aliphatic polyhydroxy substance. No. 2,362,432. Frank Cahn to The Emulsol Corp.

Separation of lactogenic and corticotropic hormones from pituitary gland material. No. 2,362,993. Gerhard Fleischer and Erwin Schwenk to Schering Corp.

Treatment of magnesite ores, in which magnesite ore pulp containing collector reagent of soap-like character is subjected to froth flotation treatment for recovery of magnesite constituents. No. 2,363,029. Arthur Weinig to Basic Magnesium, Inc.

Concentrating magnesite ores by flotation, which comprises introducing into magnesite ore pulp, a reagent mixture including naphthenic acid and a hydrogel-forming salt selected from ferric and aluminum salts. No. 2,363,030. Arthur Weinig to Basic Magnesium, Inc.

Treating magnesite ores by froth flotation, which comprises aerating pulp in presence of reagent composition containing aluminum sulfate, tetrasodium pyrophosphate, starch and a non-benzenoid cyclic carboxylic acid derived from petroleum. No. 2,363,031. Arthur Weinig to Basic Magnesium, Inc.

Magnesite ore treatment. No. 2,363,104. Arthur Weinig to Basic Magnesium, Inc.

Purifying metallic tin containing iron as impurity. No. 2,363,127. Ritson Graves to The American Metal Co. Ltd.

Treating lateritic oxidic iron ore having natural content of nickel values and chromite to recover selectively in purified form its ferruginous constituents. No. 2,363,315. John Grothe to The Dorr Co.

Reinforcing a mold member, plating a thin film of chromium on facing edge of the mold, allowing chromium to become oxidized, applying to back of mold a metal in a finely divided state, and impregnating finely divided metal with a metal having a lower melting point and being capable of wetting finely divided metal and mold. No. 2,363,337. James Kelly to Westinghouse Electric & Manufacturing Co.

Beautifying and protecting surfaces of aluminum and aluminum alloys by electro chemical process which comprises; subjecting body to a solution of water and hydrofluosilicic acid and under electrical pressure of about 6 to 40 volts to provide surface finish emanating iridescent colors. No. 2,363,339. George Kraft and Nathan Solomon.

Producing in ungerminated condition solution-heat-treated articles formed of a heat-treated magnesium-base alloy characterized by a tendency to undergo germination on prolonged heating. No. 2,363,394. Robert Busk to The Dow Chemical Co.

Paint, Pigments

Paint composition which comprises emulsion of a vegetable oil and water and containing magnesium carbonate. No. 2,362,635. Leslie James Howlett.

Preparing paints, enamels and like containing pigment which forms soft, readily redispersible sediment on standing. No. 2,362,876. Ladislaus Balassa to E. I. du Pont de Nemours & Co.

Milled ground coat viterous enamel adapted to be fired onto iron base and characterized by increased firing range as compared to normal ground coat enamels. No. 2,361,376. Lyman Athy and Paul Stufft to Pemco Corporation.

Azo pigments. No. 2,361,566. William Reynolds to Interchemical Corp.

Azo pigment. No. 2,361,567. William Reynolds to Interchemical Corp.

Azo pigment. No. 2,361,568. William Reynolds to Interchemical Corp.

Azo pigment. No. 2,361,569. William Reynolds to Interchemical Corp.

Preparing urea-formaldehyde lacquers of low viscosity. No. 2,361,715. Robert Swain and Pierrepont Adams to American Cyanamid Co.

Titanium oxide-calcium carbonate composite pigment, free from soluble salts and the calcium carbonate content thereof consisting of small, discrete calcite crystals. No. 2,361,986. James Booge to E. I. du Pont de Nemours & Co.

Producing titanium oxide pigment possessing essential tinting strength and hiding power without calcination treatment. No. 2,361,987. James Booge and Leland Stewart to E. I. du Pont de Nemours & Co.

Recovery bile pigment from a natural complex containing same. No. 2,363,471. Jules Porsche and Robert Sifferd to Armour & Co.

Paper and Pulp

Making aluminum coated paper product simulating aluminum foil. No. 2,362,884. John Clark to S. D. Warren Co.

Manufacture of pulp from wood chips, comprising soaking said chips in solution of urea or thiourea, and urea and thiourea combined. No. 2,361,639. William Loughborough to Henry A. Wallace, Secretary of Agriculture of the United States of America.

Adhesively uniting wax coated paper. No. 2,362,373. Harold Hallman.

Preparing safety paper comprising treating paper with solution of a light stable colorless organic compound having at least one six membered unsaturated heterocyclic ring. No. 2,363,330. Donald Jackson and John Parsons to Hammermill Paper Co.

Water-laid felted water-resistant sheet fiber board useful in manufacture of heel bases comprising bituminous pitch type base and fibrous material comprising cellulosic and leather fibers. No. 2,363,439. Herman Richter to George O. Jenkins Co.

Petroleum Chemicals

Antioxidant containing a branched chain aliphatic ether of a petroleum phenol. No. 2,362,516. Jones Wasson and Warren Smith to Standard Oil Development Co.

Liquefied petroleum gas dispensing system. No. 2,362,724. Thomas Shea to Phillips Petroleum Co.

Conversion of a hydrocarbon oil into lower boiling products including gasoline. No. 2,362,795. Wayne Benedict to Universal Oil Products Co.

Isomerizing paraffin hydrocarbons containing at least 4 carbon atoms per molecule. No. 2,361,452. Cecil Brown to Standard Oil Development Co.

Neutralizing hydrocarbon oil which has been subjected to sulphuric acid treatment, which consists in mixing with aqueous solution of an alkali metal silicate. No. 2,361,455. Vladimir Chechot to The Atlantic Refining Co.

Two-stage alkylation process, including an olefin absorption stage and an alkylation stage. No. 2,361,465. Bryson Filbert to Standard Oil Development Co.

Separating at least two hydrocarbons of closely related properties from a complex mixture. No. 2,361,493. John Patterson to Standard Oil Development Co.

Reacting paraffin containing at least four carbon atoms per molecule under isomerization conditions with aluminum halide promoted with halide of a polyvalent element. No. 2,361,508. Eldon Stahly and Kenneth Laughlin to Standard Oil Development Co.

Nonscuffing film-forming wax composition comprising a paraffin wax and a single wax-like addition agent. No. 2,361,582. Elmer Adams and Frederick MacLaren to Standard Oil Co.

Catalytic conversion of hydrocarbons in which catalyst is periodically regenerated by combustion of carbon deposited thereon. No. 2,361,-584. John Allen to Phillips Petroleum Co.

Simultaneously producing isobutane and a motor fuel fraction having a higher antiknock value from a lower antiknock naphtha rich in normal paraffin hydrocarbons. No. 2,361,611. Edmond d'Ouville and Bernard Evering to Standard Oil Co.

Effecting shifting of double bond in a low-boiling aliphatic olefin. No. 2,361,613. Harry Drennan to Phillips Petroleum Co.

Catalytic production of isoparaffin from corresponding normal paraffin. No. 2,361,755. Eric Fawcett and Eric Narracott to Anglo-Iranian Oil Co. Ltd.

Production of highly hydroxylated blown fatty materials, which comprises blowing an unsaturated fatty material with an oxygen-containing gas. No. 2,361,793. Ralph Porter and Jacob Wolfson to National Oil Products Co.

Conversion of hydrocarbon oils. No. 2,361,891. Kenneth Watson to Universal Oil Products Co.

In catalytic process of hydrocarbon conversion introducing a powdered catalyst having property of repressing formation of volatile hydrocarbons such as butanes and butylenes and introducing another powdered catalyst having property of producing large amounts of same volatile hydrocarbons and so controlling product distribution. No. 2,361,978. John Swearingen to Standard Oil Co.

Dehydration of normally gaseous hydrocarbons. No. 2,362,093. Robert Pyzel and Clarence Gerhold to Universal Oil Products Co.

Converting hydrocarbon charging stock for producing substantial yields of high quality motor fuel by endothermic reaction. No. 2,362,113. Morris Carpenter to Standard Oil Co.

Preparing hydrocarbon product containing major proportion of triisobutylene. No. 2,363,221. Lewis Bannon to Standard Oil Development Co.

Inducing toxicity into a petroleum derived material characterized by substantial content of cyclic structures. No. 2,363,238. Jacquelin Harvey, Jr., and Robert White, Jr., and Joseph Vaughan, one-half to said Harvey, Jr. and one-half to Southern Wood Preserving Co.

Inducing toxicity into a petroleum derived material. No. 2,363,239. Jacquelin Harvey, Jr., and Robert White, Jr., and Joseph Vaughan, one-half to said Harvey, Jr. and one-half to Southern Wood Preserving Co.

Induction of toxicity into mixture of petroleum fractions boiling above 270° C., characterized by inherent but inhibited toxicity and substantial percentage of materials of ring structure content. No. 2,363,240. Jacquelin Harvey, Jr. and Robert White, Jr. and Joseph Vaughan, one-half to said Harvey, Jr. and one-half to Southern Wood Preserving Co.

Induction of toxicity into a mixture of petroleum fractions boiling above 270° C. No. 2,363,241. Jacquelin Harvey, Jr. and Robert White, Jr. and Joseph Vaughan, one-half to said Harvey, Jr. and one-half to Southern Wood Preserving Co.

Inducing toxicity into high boiling mixing of petroleum fractions characterized by percentage of materials of cyclic structure content. No. 2,363,242. Jacquelin Harvey, Jr. and Robert White, Jr. and Joseph

---

* *Continued from last month, Vol. 567, No. 1—Vol. 568, Nos. 1, 2, 3.*

From Official Gazette—Vol. 568, No. 4, Vol. 569, Nos. 1-3 (Nov. 28-Dec. 19)—p. 551

Vaughan, one-half to said Harvey, Jr. and one-half to Southern Wood Preserving Co.

Inducing toxicity into a petroleum derived material. No. 2,363,243. Jacquelin Harvey, Jr. and Robert White, Jr. and Joseph Vaughan, one-half to said Harvey, Jr. and one-half to Southern Wood Preserving Co.

Induction of toxicity into a mixture of petroleum fractions boiling above 270° C. No. 2,363,245. Jacquelin Harvey, Jr. and Robert White, Jr. and Joseph Vaughan, one-half to said Harvey, Jr. and one-half to Southern Wood Preserving Co.

Producing very aromatic product from petroleum. No. 2,363,263. Raphael Rosen to Standard Oil Development Co.

In endothermic catalytic conversion of hydrocarbons in which finely divided catalytic material is contacted with reactants in a reaction zone, and then contacted at higher temperatures with oxygen-containing gases in exothermic regeneration zone, the method of transferring heat from regeneration zone to reaction zone. No. 2,363,274. I. Louis Wolk and John Upham to Phillips Petroleum Co.

Separating normally gaseous olefins from normally gaseous paraffins in a hydrocarbon mixture containing same, which comprises treating with hydroxyethyl ethylene diamine. No. 2,363,298. Armand de Rosset to Universal Oil Products Co.

Production of motor fuel constituents comprising branched chain saturated hydrocarbons boiling within motor fuel range. No. 2,363,300. Albert Dunstan and Stanley Birch to Anglo-Iranian Oil Co. Ltd.

Production of motor fuel which comprises condensing isoparaffin with olefin in presence of concentrated sulfuric acid. No. 2,363,301. Albert Dunstan and Stanley Birch to Anglo-Iranian Oil Co. Ltd.

Separation of an unsaturated hydrocarbon from a hydrocarbon mixture which comprises contacting with a separating agent comprising a silver salt solution in an acid of phosphorus. No. 2,363,309. Bernard Friedman and Russell Stedman to Universal Oil Products Co.

Making motor fuel. No. 2,363,331. Joseph James to Clarence Byrnes, as trustee.

*Petroleum Refining

Treating drilling fluid. No. 2,362,805. Richard Doan to Phillips Petroleum Co.

Producing aviation gasoline constituents by operations including alkylation and isomerization in presence of aluminum chloride catalyst. No. 2,361,368. Bernard Evering and Edmond d'Ouville to Standard Oil Co.

Desulphurizing hydrocarbon distillates. No. 2,361,651. Wayne Proell and Frank Ovitz to Standard Oil Co.

Combination thermal and catalytic cracking of hydrocarbon oils. No. 2,361,671. Howard Wilson to The Texas Co.

Mud-laden drilling fluid containing small percentages of sodium tetraphosphate. No. 2,361,760. Allen Garrison to The Texas Co.

Continuous duosol extraction process for separating a hydrocarbon oil into portions of different properties. No. 2,361,780. Harold Lewis to Shell Development Co.

Reducing viscosity of petroleum residuum oil. No. 2,362,270. Charles Hemminger to Standard Oil Development Co.

Removing sulphur from sulphur-bearing hydrocarbons. No. 2,362,296. Eger Murphree and Charles Tyson, Donald Campbell and Homer Martin to Standard Oil Development Co.

Catalytically cracking hydrocarbon oils which comprises effecting cracking of recycle oil in presence of freshly regenerated catalyst. No. 2,363,025. Charles Thomas to Universal Oil Products Co.

Recovering heavier, liquefiable hydrocarbons from a hydrocarbon mixture flowed at high temperature and pressure from well tapping a distillate reservoir. No. 2,363,207. William Stratford to The Texas Co.

In cracking hydrocarbon oils to produce motor fuel by passing oil at cracking temperature in contact with a synthetic cracking catalyst, the steps of preparing said catalyst. No. 2,363,231. Gerald Connolly to Standard Oil Development Co.

*Photographic Chemicals

Process of color photography utilizing immobile 2-substituted-1-naphthylamines. No. 2,362,519. David Woodward to E. I. du Pont de Nemours & Co.

Fabricating vessel in which photographic emulsions are heated and agitated which comprises bonding sheets of rolled nickel and silver by hot working. No. 2,362,544. Arvid Eckberg to Eastman Kodak Co.

Producing a natural-color image in a multi-layer photographic material. No. 2,362,599. Paul Vittum to Eastman Kodak Co.

Producing photographic dyestuff image in a layer comprising a silver image and a diazotizable amine. No. 2,361,541. Bela Gaspar to Chromogen, Inc.

Photographic silver halide emulsion spectrally sensitized with cyanine and merocyanine dyes, containing, as a supersensitizer, a substance selected from esters of azine carboxylic acids and esters of 1-benzazine carboxylic acids. No. 2,361,928. Burt Carroll and John Spence to Eastman Kodak Co.

Photographic material comprising light-sensitive silver salt dispersed in a binding agent, formed of water-insoluble film-forming substance which is soluble in organic solvents. No. 2,361,936. Bela Gaspar to Chromogen, Inc.

*Resins, Plastics

Preparation of a lactic acid-modified polyglycolide resin which consists of reacting mixture containing glycolic acid, water and lactic acid. No. 2,362,511. Wilber Teeters to E. I. du Pont de Nemours & Co.

Producing resinous material which comprises heating reaction mixture

*Continued from last month, Vol. 567, No. 1—Vol. 568, Nos. 1, 2, 3.

From Official Gazette—Vol. 568, No. 4, Vol. 569, Nos. 1-3 (Nov. 28-Dec. 19)—p. 552

consisting of a rosin ester, an alkaline earth metal, and an inert solvent. No. 2,362,888. Richard Cox to Hercules Powder Co.

Mastic tile comprising binder selected from asphalts and coumarone-indene resins, asbestos fiber, and plasticizer for binder in amount contributing toughening effect. No. 2,362,934. Raymond Schlaanstine to Hercules Powder Co.

Plastic composition comprising a polyvinyl acetal resin and rubber. No. 2,362,961. William Welch to Monsanto Chemical Co.

Making light weight structural members composed in part phenol-formaldehyde thermo-setting resin condensation product which comprises imbedding starch granules. No. 2,361,438. Philip Turner.

Uniting fibrous materials of non-mineral origin by means of thermoplastic adhesive comprising a polyvinyl acetal resin to which has been added an inert inorganic pigment which reduces cold flow. No. 2,361,527. Frederick Bacon to Monsanto Chemical Co.

Stabilizing resin-forming material containing aromatic olefine material. No. 2,361,538. Raymond Franz to The United Gas Improvement Co.

Heat-hardenable oil-containing phenolic resins. No. 2,362,018. Arthur Mazzucchelli to Bakelite Corp.

Volume stabilized acid absorbing resins made from methylol-forming phenol, formaldehyde, and a nonaromatic amine. No. 2,362,086. Robert Myers and John Eastes to The Resinous Products & Chemical Co.

Preparing aqueous phenolic resin solutions which comprises reacting formaldehyde with a tar acid. No. 2,362,274. Dee Hurst to Allied Chemical & Dye Corp.

*Rubber

Antioxidant for rubber. No. 2,362,479. Carlin Gibbs to The B. F. Goodrich Co.

Compositions of rubber and acid-gelled solution of shellac in a glycol. No. 2,362,538. Solomon Caplan to Harvel Research Corp.

Preserving organic substances as rubber which tend to deteriorate by absorption of oxygen from air. No. 2,361,543. Edwin Hart and Robert Armstrong to United States Rubber Co.

Shoe filler comprising particles of shredded sponge rubber mixed with resinous binder and an oil. No. 2,362,378. Ralph Holbrook and Willis Hooker to The Sponge Rubber Products Co.

Making cellular rubber which comprises, introducing into mold a charge of pellets formed of milled vulcanizable rubber containing a blowing agent and each pellet having a sealed hollow chamber containing trapped gas. No. 2,363,051. Lucian Dosmann to United States Rubber Co.

*Textiles

Producing synthetic pubescent yarn simulating spun yarn which comprises cutting strand of preformed synthetic continuous filaments into staple fibers by passing strand through arc formed between two electrodes. No. 2,362,572. William McLain to Eastman Kodak Co.

Textile moth proofed by impregnation with a substituted carbamyl compound. No. 2,362,768. Willard Morgan and Earle McLeod to Arnold, Hoffman & Co. Inc.

Improving fastness to washing of cellulosic textile materials dyed with direct cotton dyestuffs and imparting soft silky handle thereto, by treating dyed material with solution containing watersoluble condensate of formaldehyde with substance selected from an arylguanidine, etc. No. 2,362,915. James MacGregor to Courtaulds Ltd.

Subjecting fabric of filaments of normally crystalline vinylidene chloride polymers oriented along filament axis to heated fluid. No. 2,361,371. Alden Hanson to The Dow Chemical Co.

Reducing felting and shrinking tendensies of wool which comprises impregnating clean wool with an aqueous dispersion of an unpolymerized, alkylated methylol-melamine condensation product. No. 22,566. Edwin Johnstone, Jr. and William van Loo, Jr., to American Cyanamid Co.

*Water, Sewage and Sanitation

Water softening reagent, insoluble in neutral alkaline and acid solutions resulting from sulfonation by means of concentrated sulfuric acid of ground monohydric phenol-formaldehyde resin. No. 2,361,754. Rolland McFarland, Jr.

Clarifying water which comprises, preparing a sol of sodium bentonite, incorporating said sol in water to be clarified. No. 2,362,022. Hubert Olin.

Reagent for softening water and the flocculation of suspended solids therein. No. 2,362,409. John Samuel to Unifloc Reagents Ltd.

Two-step method of converting sea water into drinking water consisting in agitating oxide and then, after filtering adding uric acid. No. 2,363,020. Clair Raymond Spealman.

Zeolite water treatment apparatus. No. 2,363,167. Lee Daniels.

Activated sludge process for treating sewage wherein raw sewage is subjected to sedimentation of solids aeration, and finally sedimentation of solids from aerated mixed liquor. No. 2,363,176. Johanna Gunz to Infilco Inc.

Agricultural Chemicals

Producing a protein-formaldehyde solution characterized by its retarded gelling. No. 2,363,794. Percy Julian, Elmer Oberg and Bernard Malter to The Glidden Co.

Modified soybean protein fiber, consisting of soybean protein and a copolymer consisting of pseudothiohydantoin-zein, cresylic acid and formaldehyde. No. 2,364,035. Oskar Huppert.

Extending dormant period of trees, normally blossoming and foliating at such time as to be injured by frost and killing temperatures by applying spray comprising phenoxyacetic acid. No. 2,364,054. George Avery, Jr., to The Dow Chemical Co.

Treating crude kiln pine tar in production of a water-free refined product. No. 2,364,104. Wiley Smith to Claude R. Wickard, as Secretary of Agriculture of the U. S. of America.

Producing fertilizer compositions, which comprises the intermixture of potassium chloride and ammonium sulphate. No. 2,364,524. Walton Graham to Potash Co. of America.

Cellulose

Preparing methyl cellulose in compact form directly and readily soluble in sheet form in cold water. No. 2,364,028. Floyd Peterson to The Dow Chemical Co.

Colorless, transparent regenerated cellulosic sheet wrapping material having associated therewith p:p'bis-(p-aminobenzamido-) benzamido-1stilbene-di-alkali metal sulfonate. No. 2,364,112. Bliss Van Every to E. I. du Pont de Nemours & Co.

In producing regenerated cellulose structures by spinning, under high tension, of viscose in a sulfuric acid spinning bath the step which comprises incorporating in said bath ferrous sulfate together with zinc sulfate. No. 2,364,273. Norman Cox to E. I. du Pont de Nemours & Co.

Production of alkali metal cellulose xanthate which comprises mixing alkali metal cellulose with liquid carbon bisulfide. No. 2,364,392. William Schmitz, Jr. to E. I. du Pont de Nemours & Co.

Spinning regenerated cellulose filaments which comprises extruding viscose through a spinneret into an acid bath which contains heavy metal cations and anions which are capable of combining to form insoluble metal salt. No. 2,364,407. Isaac Walker to E. I. du Pont de Nemours & Co.

Producing cellulose flour comprising impregnating cellulose fragments with 5 per cent by weight of urea, drying, and grinding. No. 2,364,721. Andrew Kassay, Emil Balz, and William Williams to Libbey-Owens-Ford Glass Co.

Regenerated cellulose which has been oxidized to point of being soluble in aqueous alkaline solutions. No. 2,365,455. Ralph Cornwell to Sylvania Industrial Corp.

Expander for storage plates of the lead acid type comprising finely-divided treated natural lignocellulose. No. 2,365,600. Arlie Schorger to National Lead Co.

Making expander for storage battery plates of lead-acid type which comprises mixing finely-divided natural lignocellulose in water containing an acid cellulose hydrolyzing agent. No. 2,365,604. Alexander Stewart and Eugene Willihnganz to National Lead Co.

Cellulose mixed ester molding composition prepared by colloiding a cellulose mixed ester having tendency to discolor at molding temperatures with a plasticizer therefor and adding an acid. No. 2,365,652. Raphael Stern to Hercules Powder Co.

Ceramics

Non-vitrified refractory brick composed of a burned shaped mass of pyrophylite and refractory clay bonding agent. No. 2,363,522. Arthur Greaves-Walker and Robert Stone, one-sixth to Arthur Foster and one-sixth to Oscar Codier; two-sixth to said Greaves-Walker and two-sixth to said Stone.

Improving adsorptive and bleaching efficiency of Georgia-Florida type fuller's earth, which comprises impregnating with water-soluble alkaline agent. No. 2,363,876. William La Lande, Jr. to Attapulgus Clay Co.

Refractory of magnesia clinker and a low melting silicate and material consisting of fluorspar. No. 2,364,002. Robert Schoenlaub to Basic Refractories, Inc.

Forming a porous, self-insulated refractory article, comprising casting slip of refractory batch material of alumina-silica type in a porous mold, generating gas in slip to form pores in interior of cast article. No. 2,364,317. Reinhold Schaefer to Hartford-Empire Co.

Grinding cement clinker, in presence of an aliphatic compound consisting of carbon hydrogen, hydroxyl group and one member of sulfate, sulfonic acid, sulfonate, halogen, nitro, nitroso and hydroxyl groups. No. 2,364,555. Edward Scripture, Jr.

Chemical Specialties

Nonaqueous drilling fluid comprising mineral oil base, a finely powdered weighting material, and a finely divided sedimentation inhibitor for said weighting material selected from preferentially water-wettable siliceous materials and capable of imparting thioxotropic properties to said fluid. No. 2,363,499. William Campbell, Jr., to Standard Oil Co. of California.

Compounded oil comprising a hydrocarbon oil and, sufficient to stabilize the oil, an oil-soluble polyvalent metal alkyl carboxylate. No. 2,363,510. Bruce Farrington and James Clayton and Dorr Etzler to Standard Oil Co. of California.

Compounded oil comprising hydrocarbon oil and not less than about 0.1% by weight of a polyvalent metal alkyl carboxylate. No. 2,363,511. Bruce Farrington and James Clayton and Dorr Etzler to Standard Oil Co. of California.

Compounded oil comprising hydrocarbon oil and about .1% by weight of a metal alkyl carboxylate. No. 2,363,512. Bruce Farrington and James Clayton and Dorr Etzler to Standard Oil Co. of California.

Lubricating composition comprising a hydrocarbon oil and about .1% by weight of a metal salt of an alkyl carboxylic acid and an ester of an hydroxy substituted aliphatic carboxylic acid. No. 2,363,513. Bruce Farrington and James Clayton and Dorr Etzler to Standard Oil Co. of California.

Liquid hydrocarbon oil of lubricating class, normally tending to deteriorate at operating temperatures encountered in internal combustion engines, containing dissolved in oil sufficient to retard said deterioration, a metal salt of an aliphatic carboxylic acid. No. 2,363,514. Bruce Farrington and James Clayton and Dorr Etzler to Standard Oil Co. of California.

Liquid hydrocarbon oil of lubricating class, normally tending to deteriorate at operating temperatures encountered in internal combustion engines, containing sufficient to retard said deterioration, a metal salt of an aliphatic polycarboxylic acid. No. 2,363,515. Bruce Farrington and James Clayton and Dorr Etzler to Standard Oil Co. of California.

Liquid hydrocarbon lubricating oil normally tending deteriorate and to form carbonaceous deposits on pistons in internal combustion engines, containing a metal salt of an alkylated phenol, and to inhibit tendency of said salt of phenol to corrode alloy bearings of copper-lead and cadmium-silver types, a metal salt of an alpihatic polycarboxylic acid. No. 2,363,516. Bruce Farrington and James Clayton and Dorr Etzler to Standard Oil Co. of California.

Compacted packing and lubricating mass composed of a uniform mixture comprising asbestos fibers and particles of graphite of colloidal dimension, said mass characterized by being inert to oxidizing and nitrating action. No. 2,363,597. Charles Jones to Hercules Powder Co.

Recovering hair from hides comprising subjecting said hides to treatment with papain in presence of water. No. 2,363,646. Victor Conquest and Havard Keil to Armour & Co.

Producing and maintaining a tempering atmosphere for leather. No. 2,363,715. Adoniram Wells to B. B. Chemical Co.

Corrosion-preventive composition comprising a stable, neutral vehicle containing finely dispersed a corrosion inhibiting amount, of a free dicarboxylic acid being the hydrolyzed condensation product between maleic acid anhydride and a polyolefinic hydrocarbon carboxylic acid. No. 2,-

* Continued from last month, Vol. 567, No. 1—Vol. 568, Nos. 1, 2, 3.

From Official Gazette—Vol. 568, No. 4, Vol 569, Nos. 1-3 (Nov. 28-Dec. 19) p. 553

363,792. Edward Jahn to Shell Development Co.

Packing compound for stuffing boxes comprising flat pieces of fresh untanned pork rind loaded with powdered graphite and tallow. No. 2,363,803. George Randolph.

Demulsifying agent for water-in-oil emulsions containing as essential ingredient a petroleum sulfonic body, and including a thinning amount of a substance selected from pyridine and quinoline. No. 2,363,838. Boris de Mering.

Weatherproof snail bait comprising finely divided metaldehyde distributed in paraffin wax. No. 2,363,852. John Beekler.

Extreme pressure agent containing active halogen and sulfur in amounts sufficient to impart load-bearing characteristics and normally tending during storage to undergo degradation to which has been added to stabilize against such degradation a compound. No. 2,363,880. Eugene Lieber and Aloysius Cashman to Standard Oil Development Co.

Lubricant comprising hydrocarbon oil and to impart antioxidant properties to said oil, an oil-miscible metal xanthate of an oil-soluble sulfurized phenolic composition derived from oils extracted from Anacardium genus. No. 2,363,884. Rush McCleary and John Morris to The Texas Co.

Lubricant comprising a hydrocarbon oil and to impart oxidation-resistant properties an oil-soluble metal derivative of cashew nut shell oil. No. 2,363,896. John Patterson to The Texas Co.

Making hydrocarbon drying oils which comprises polymerizing an alkyl acetylene in liquid phase in presence of a Friedel-Crafts type catalyst. No. 2,363,910. Miller Swaney to Standard Oil Development Co.

Conditioning an aqueous bath having present ingredients inducing foaming therein, comprising introducing an anti-foam agent. No. 2,363,-921. Wayne Denman to Dearborn Chemical Co.

Anti-foam composition for treating an aqueous bath to inhibit foaming, comprising an aliphatic ketone. No. 2,363,922. Wayne Denman to Dearborn Chemical Co.

Conditioning an aqueous bath having ingredients present inducing foaming, comprising introducing an anti-foam agent, a mixture of saturated and unsaturated aliphatic amines of high molecular weight. No. 2,-363,923. Wayne Denman to Dearborn Chemical Co.

Stable anti-foam composition for treating aqueous bath to inhibit foaming, comprising a set water-soluble continuous phase having colloidally dispersed therethrough particles of an anti-foam agent in a finely divided non-coalesced state. No. 2,363,924. Wayne Denman to Dearborn Chemical Co.

Insecticidal composition comprising a carrier and a carboxylic acid ester of an unsaturated alicarbocylic ketol. No. 2,363,928. Seaver Ballard and Vernon Haury to Shell Development Co.

Gasoline insoluble lubricant consisting of a mixture of stearamide and a glycol-monophthalate-monoamino stearate. No. 2,363,984. John Morgan and Russell Lowe to Cities Service Oil Co.

Mineral oil composition comprising a viscous mineral oil fraction and to inhibit deleterious effects of oxidation upon the oil, polymer selected from courmarone, indene, and mixtures of coumarone and indene. No. 2,364,030. George Snyder and Everett Fuller to Socony-Vacuum Oil Co. Inc.

Preparing a cyclic ketone material having odoriferous properties, from musk glands of the muskrat. No. 2,364,041. Philip Stevens and Julius Erickson to Burton T. Bush, Inc.

Disinfectant compounds. No. 2,364,075. Madison Hunt and James Kirby and John Lontz to E. I. du Pont de Nemours & Co.

Pulverizing material. No. 2,364,101. Adolph Schurman.

Bonded silicon carbide article consisting of silicon carbide grain together with a refractory clay and containing as a bond a metal alloy selected from manganese alloys and silicon alloys. No. 2,364,108. John Swentzel to The Carborundum Co.

Lubricating oil containing dimorpholine monosulfide. No. 2,364,122. Alfred Bayes to Carbide & Carbon Chemicals Corp.

Plastic lubricating composition maintaining stiff consistency over a wide range of atmospheric temperatures, and having a melting point exceeding that of petrolatum, comprising a normally liquid lubricating oil and a mixture of aluminum di-stearate and aluminum tri-stearate. No. 2,364,151. Paul McCarthy and Henry Ambrose to Gulf Research & Development Co.

Paraffin solvent comprising kerosene and bentonite. No. 2,364,281. William Ellinger.

Modified lubricating oil comprising a hydrocarbon oil subject to deterioration and a polyvalent metal salt of a sulfur containing substituted acid of phosphorus having an organic substituent therein, to inhibit deterioration. No. 2,364,283. Herbert Freuler to Union Oil Co. of California.

Modified lubricating oil comprising a hydrocarbon oil subject to deterioration and an alkaline earth metal salt of a sulfur-containing substituted acid of phosphorus having an organic substituent therein, to inhibit deterioration. No. 2,364,284. Herbert Freuler to Union Oil Co. of California.

Active insulating composition comprising a paste and a strong lightweight and fireproof mortar body, said paste consisting of ammonium stearate, corn starch, and ammonium alum sulphate, said mortar body consisting of Portland cement, and a vermiculite aggregate. No. 2,-364,344. Robert Connell and Samuel Wilson.

Putty for planographic printing comprising a developable color composition and a hydrophilic carbohydrate gum. No. 2,364,359. Roy Kienle and Chester Amick and Clarence Kerns to American Cyanamid Co.

Treating solution for fibrous materials, comprising: a heavy metal soap of a soap-forming organic acid; water; ammonia to produce solution of soap, and an alkylolamine to delay precipitation of soap. No. 2,364,-391. Harold Schiller to Socony-Vacuum Oil Co. Inc.

Controlling water loss by filtration, as well as viscosity, of a drilling fluid having a brine base, which comprises adding to drilling fluid gelatinized starch to reduce water loss by filtration and a natural gum capable of dispersion in water. No. 2,364,434. James Foster to Standard Oil Development Co.

Halogenating abietic acid and condensing with a condensible aromatic compound selected from aromatic hydrocarbons and oxygen and nitrogen derivatives thereof, etc., to obtain distillation residue having pour-depressing properties. No. 2,364,454. Eugene Lieber and Harry Rice to Standard Oil Development Co.

Cleaning compound having dust collecting and dirt absorbing properties comprising diglycol stearate, water, Stoddard solvent, carbon tetrachloride and naphtha, deodorized hydrocarbon solvent having a boiling range from 379° F. to 468° F., soap and wood flour. No. 2,364,608. George Edwards to Benjamin Hulsh.

Lubricating oil having a viscosity index of over 90. No. 2,364,622. Lloyd Davis, Bert Lincoln and Gordon Byrkit to The Lubri-Zol Development Corp.

Detergent composition consisting of a neutral water-soluble salt of an alkyl aryl sulfonic acid and a water-soluble sulfate selected from alkali metal and alkaline earth metal sulfates. No. 2,364,767. Paul Zizinia and Thomas McKenna to Allied Chemical & Dye Corp.

Concentrating finely-divided oxidized-iron ores in which gangue is quartz, by treating pulp with anionic collecting agent selected from higher fatty acids and resin acids and their soaps and with cooperating agents consisting of lime and solution of gelatinized starch. No. 2,364,777. Earl Brown and Francis Tartaron to Minerals Separation North American Corp.

Concentrating finely-divided oxidized-iron ores in which gangue is quartz, which consists in treating pulp with anionic collecting agent selected from higher fatty acids and resin acids and with cooperating agents consisting of lime and solution of acid-treated starch. No. 2,364,778. Earl Brown and Francis Tartaron to Minerals Separation North American Corp.

Manufacture of a poly-component sulphonate product by sulphonation of alkyl-aromatic condensation product which contains a mixture of alkyl-aromatic compounds and has been obtained by chlorinating liquid petroleum distillate. No. 2,364,782. Lawrence Flett to Allied Chemical & Dye Corp.

Concentration of slurries. No. 2,364,799. Herman Laughlin and Gerald Risser to E. I. du Pont de Nemours & Co.

Treating coal having non-clinkering ash at 2800° F. to render ash clinkering below said temperature. No. 2,364,828. Edward Swartzman to His Majesty the King in the right of Canada, as represented by the Minister of Mines and Resources.

Lubricating oil composition comprising a mineral lubricating oil and an oil soluble sulfurized rubber polymer containing combined chlorine. No. 2,364,830. Charles Towne to The Texas Co.

Composite pressure-sensitive adhesive sheet structure adapted to be packaged in superimposed layer form, comprising a flexible backing, a coating of normally tacky pressure-sensitive adhesive on one side of said backing and a coating of material repellent to said adhesive on opposite side of said backing. No. 2,364,875. Gustave Schieman to International Plastic Corp.

Complete combustion of a combustible gas which comprises mixing gas with excess of oxygen, confining mixture in closed chamber and subjecting mixture to action of a short wave radio-frequency current. No. 2,364,940. Clarence Bies to Standard Oil Development Co.

Lubricant comprising mineral oil base stock and the barium salt of oleyl ester of carbonic acid. No. 2,365,011. Raphael Rosen to Standard Oil Development Co.

Preparing aluminum base lubricating grease which comprises mixing a viscous hydrocarbon oil, an aluminum soap of a saturated fatty acid, an unsubstituted carboxylic acid compound of class consisting of unsaturated fatty acids and naphthenic acids and their aluminum derivatives as a crystallization inhibitor compound for said soap in mineral oil. No. 2,365,037. John Zimmer and Arnold Morway to Standard Oil Development Co.

Insecticidal composition to inhibit feeding of chewing insects containing compound selected from phenyl xenyl ether and its halogenated derivatives and a carrier therefor. No. 2,365,047. Euclid Bousquet and Hubert Guy to E. I. du Pont de Nemours & Co.

Chlorinating oils to increase their lubricating efficiency which consists in passing chlorine into mineral oil and treating chlorinated oil by heating with an alkali solution to neutralize and stabilize oil. No. 2,365,053. Leonard Churchill, John Schott, and Stanley Waugh, three-fourths to Tide Water Associated Oil Co.

Preparation of carbon electrodes, which comprises mixing together calcined petroleum coke and coal-tar pitch. No. 2,365,055. Edward Cole to The Dow Chemical Co.

Amine salt having insecticidal and fungicidal properties. No. 2,365,056. Gerald Coleman and Gerald Griess to The Dow Chemical Co.

Fungicidal materials. No. 2,365,057. Gerald Coleman and Gerald Griess to The Dow Chemical Co.

Washing composition, comprising an alkali-metal trimetaphosphate and an alkali, when dissolved in water, the alkali-metal trimetaphosphate is converted into alkali-metal tripolyphosphate. No. 2,365,190. George Hatch.

Lubricant, comprising a mineral oil and sodium lauryl sulphate and reaction product of phosphorus pentasulphide on degras. No. 2,365,209. John Musselman to The Standard Oil Co.

Non-caking detergent powder composition comprising sodium metasilicate, sodium carbonate, sodium bicarbonate, an organic wetting agent and tetrasodium pyrophosphate. No. 2,365,215. John Cecil Rhodes.

Controlling larvae which breed in animal droppings comprising adding to feed of animal, zinc oxide. No. 2,365,245. Wesley Bruce dedicated to the free use of the People of the United States.

Stabilizing agent for hydrocarbon compositions and the like, the phosphorus bearing product produced by reaction of PCl_3 with an ester of lactic acid. No. 2,365,291. Carl Prutton, Albert Smith and Delton Frey to The Lubri-Zol Corp.

Graining ink comprising a vehicle, pigment finely dispersed therein and a hydrocarbon solvent. No. 2,365,363. Raymond Swain to Interchemical Corp.

Drilling mud containing positively charged suspended mineral particles to which positive charge imparted by soluble salts of metals, selected from aluminum, thorium, carium and lanthanum. No. 2,365,383. Donald Bond to The Pure Oil Co.

Well drilling mud comprising aqueous dispersion of clay and slowly soluble phosphate glass containing the oxides of Ca, Sr, Ba, Mg and Zn and of the alkali-metals. No. 2,365,489. Everett Partridge to Hall Laboratories, Inc.

Producing a tanning agent which comprises condensing a sulfite waste liquor with an aldehyde and an aromatic poly-sulfamide. No. 2,365,-599. Erik Schirm.

Preparing foam-forming material comprising dissolving a proteinaceous material in boiling water, adding a water-soluble nitrite, cooling, and adding a saponaceous material. No. 2,365,619. Thomas Bagley and David Levin to R. M. Hollingshead Corp.

Coatings

Coating wood surfaces which comprises heating surface and applying thereto while hot an enamel composition containing a film-forming agent dispersed in a solvent. No. 2,363,658. Gerard Decker, 3rd to E. I. du Pont de Nemours & Co.

Coating composition comprising a vinyl resin part of which is a vinyl halide resin and a soluble condensation product of urea, and amino triazines, with formaldehyde and a monohydric alcohol. No. 2,364,172. Harry Stauffer to E. I. du Pont de Nemours & Co.

Magnetic sheet like material having coating consisting of bentonite, vermiculite and magnesium oxide. No. 2,364,436. Wayne Frisch and Charles Crew to General Electric Co.

From Official Gazette—Vol. 566, Nos. 1-4 (Sept. 5-26) p. 532

Protecting underwater metal surfaces against marine growth which comprises coating surface with asphaltic material, allowing asphaltic material to harden and then applying coating of antifouling paint. No. 2,364,460. George McLean to Union Oil Co. of California.

Making chemically resistant coating films and massive bodies comprising chlorinated rubber and a polymerization product of an ester of methyl, ethyl, propyl, etc., and esters of methacrylic and acrylic acid. No. 2,364,589. James Raynolds and Milton Radcliffe to The Raolin Corp.

Formation of coatings from aqueous zein dispersions in which an alkali and a sulfonated vegetable oil are used as dispersing agents which comprises incorporating in dispersion a substance to increase water resistance of coating and reduce curing time thereof, of acetates and formates of aluminum, etc. No. 2,364,792. Alert James to Corn Products Refining Co.

Protecting aluminum or aluminum alloy article against corrosion comprising immersing article in a bath consisting of sodium aluminate, sodium silicate and caustic soda and then passing an electric current having initial potential greater than 30 volts. No. 2,364,964. Jean Frasch.

Producing a black surface on copper or copper alloy articles which comprises immersing surface in a hot aqueous solution consisting of alkali selected from sodium hydroxide and potassium hydroxide and a chlorite selected from sodium chlorite and potassium chlorite. No. 2,364,993. Walter Meyer.

Preparing paper coating compositions comprising aqueous suspension of mineral pigment and adhesive derived from rice. No. 2,365,097. Harold Murdock to The Champion Paper & Fibre Co.

Apparatus for applying coatings. No. 2,365,259. William Fischer to Process Engineering Corp.

Producing material having anti-fogging and antistatic properties, which comprises treating surface of non-fibrous derivative of cellulose esters and cellulose ethers with solution of a surface active substance, selected from fatty alcohol sulfates, sulfated fatty acid esters, etc. No. 2,365,297. Ernest Schweizer to Celanese Corp. of America.

Apparatus for heating coating material. No. 2,365,336. Morton Dorfan to Koppers Co. Inc.

Protectively coating a metal surface comprising coating with a water slurry of finely divided alkaline earth carbonate free of bituminous material but containing bentonite as a binder and rosin as a bonding agent to produce a primer coat, and then bonding coating to metal by introducing fluid bituminous material into and through pores. No. 2,365,427. William Moore to American Cast Iron Pipe Co.

Dyes, Stains

Coloring textile material, which comprises developing on fiber an azo coloring matter of phthalocyanine series by coupling on fiber an azotized polyamino-phthalocyanine to a coupling component. No. 2,363,537. James Libby, Jr. to E. I. du Pont de Nemours & Co.

In process of padding textile material with polydiazonium compounds of the phthalocyanine series and stabilized forms of said polydiazonium compounds, the improvement which consists of pretreating fabric with a reagent selected from molybdic acid, tungstic acid, vanadic acid, etc. No. 2,363,904. Chiles Sparks and Joseph Laucius to E. I. du Pont de Nemours & Co.

Azo pigments of the phthalocyanine series. No. 2,363,905. James Libby, Jr. and Harold Woodward to E. I. du Pont de Nemours & Co.

Azo pigments of the phthalocyanine series. No. 2,363,906. Swanie Rossander, James Libby, Jr. and Harold Woodward to E. I. du Pont de Nemours & Co.

Anthraquinone dye compounds. No. 2,364,349. Joseph Dickey to Eastman Kodak Co.

Quinazoline azo compounds. No. 2,364,351. Joseph Dickey to Eastman Kodak Co.

Azo compounds. No. 2,364,355. Gordon Frame and Charles Allen to Eastman Kodak Co.

Dyes of anthraquinone acid wool series which dye wool in blue shades, being compounds of 1-amino-4-phenylamino-2-anthraquinone sulfonic acid alkali metal salts, etc., which carry as substituent in phenyl group the radical—CH_2CN. No. 2,364,473. Melvin Perkins and David Klein to E. I. du Pont de Nemours & Co.

Increasing fastness properties of dyeings and prints, obtained by means of a water-soluble dyestuff and aftertreatment with cation-active high molecular basic organic compound, consisting in combining aftertreatment with solution of a copper compound. No. 2,364,725. Albert Landolt and Andreas Ruperti to Society of Chemical Industry in Basle.

Increasing fastness properties of dyeings and prints, obtained by means of a water-soluble dyestuff and aftertreatment with a high-molecular organic compound, produced by condensation of formaldehyde, consisting in combining aftertreatment with solution of a copper compound. No. 2,364,726. Albert Landolt and Andreas Ruperti to Ciba Products Corp.

Insoluble azo dyes. No. 2,365,265. Peter Gross to E. I. du Pont de Nemours & Co.

N-substituted aminonaphthol dye intermediates. No. 2,365,345. James Kirby and David Woodward to E. I. du Pont de Nemours & Co.

Preparing crystalline sulfate of a water-insoluble phthalocyanine compound. No. 2,365,464. Peter Gross to E. I. du Pont de Nemours & Co.

Equipment

Producing selenium rectifiers. No. 2,363,555. Otto Saslaw to Federal Telephone & Radio Corp.

Method of and means for stirring or circulating molten or liquid materials or mediums. No. 2,363,582. Jack Gerber and William Redfern.

Liquid measurer comprising a container having an open end. No. 2,363,602. Maurice Lichten.

Portable apparatus for separation of constituents of gaseous mixtures by liquefaction. No. 2,363,657. Wolcott Dennis to Air Reduction Co. Inc.

Distillation apparatus for production of rosin and turpentine. No. 2,363,692. Jesse Reed to Claude R. Wickard, Secretary of Agriculture of the U. S. of America.

Continuous nitration apparatus. No. 2,363,834. Willard Crater to Hercules Powder Co.

Apparatus for preparing dispersions in liquids. No. 2,363,937. David Brandt and Samuel Wynn to Cities Service Oil Co.

Apparatus for dispensing a liquefied gas. No. 2,363,960. Odd Hansen to The Linde Air Products Co.

Container for corrosive substances comprising an outer case of wood and two inner linings of glass, space between two linings being filled with an asphaltic composition, which tends to produce foam. No. 2,364,014. George West to Pittsburgh Plate Glass Co.

Device for removing floatable material from surface of a liquid comprising a skimming blade. No. 2,364,022. Herbert Gillard to Infilco, Inc.

Liquid distributing means, which comprises a liquid receiving surface sufficiently rough to provide capillary thinning and spread and flow of liquid, and extension strips. No. 2,364,058. Robert Burk and Martval Hartig to The Standard Oil Co.

Electrical apparatus for treating emulsions of water in oil. No. 2,364,118. Halley Wolfe to Petrolite Corp. Ltd.

Heat exchange apparatus. No. 2,364,130. Gilbert Clancy to Drayer & Hanson, Inc.

Apparatus for producing artificial fog or smoke. No. 2,364,199. Thomas Derr to American Steam Automobile Co.

Apparatus for gauging depth of liquid in a tank. No. 2,364,346. Marion Dice to Socony-Vacuum Oil Co. Inc.

High vacuum centrifugal distillation apparatus comprising vaporizing and condensing surfaces adapted to be rotated as a unit. No. 2,364,360. Kenneth Hickman to Distillation Products, Inc.

Apparatus for fractional removal of liquid from a suspension of solids in liquids. No. 2,364,366. Carl Jahreis to John L. Hutton, as T. Shriver & Co.

Processing a carbon electrode comprising immersing electrode in a liquid gas until boiling ceases. No. 2,364,536. Henry Kent to General Electric X-Ray Corp.

Prefabricated water sealing sheet comprising a flexible open mesh material and a continuous layer of a cohesive gel forming clay compressed in interstices. No. 2,364,621. Roy Cross, Walter Phillips and Walter Cross, Jr., to Kansas City Testing Laboratory.

Mold equipment for molding of plastics and like wherein very smooth surfaces are desired. No. 2,364,745. Rex Moule to General Motors Corp.

Spectrophotometer attachment for rejecting specular reflection. No. 2,364,825. William Shurcliff to American Cyanamid Co.

Thermometer. No. 2,364,841. Samuel Eskin to American Thermometer Co.

Extraction column for liquid-liquid extraction. No. 2,364,892. Joseph Elgin to Research Corp.

Fluid flow meter. No. 2,364,930. Jacob Turner to Manning, Maxwell & Moore, Inc.

Breaking in spark-ignition engines, comprising operating an engine with a gasoline containing iron carbonyl. No. 2,364,990. William Malott to Shell Development Co.

Removal of intermediate fractions in separation of liquids of different boiling points from mixtures thereof by fractional distillation by a batch process in a batch still. No. 2,365,050. William Chadder to Woodall-Duckman Ltd.

Separation of liquids of different boiling points from a mixture thereof by fractional distillation by a batch process in a batch still having a plate-type fractionating column. No. 2,365,051. William Chadder to Woodall-Duckman Ltd.

Exchanger cell for conducting ionic exchange operations. No. 2,365,221. Ralph Shafor to The Dorr Co. Inc.

Electrical contact for making and breaking electric current, comprising compressed sintered powder mixture of silver and carbonyl iron. No. 2,365,249. Gregory Comstock, two-thirds to Baker & Co. Inc., and one-third to The American Platinum Works.

Separation of emulsions and colloidal solutions. No. 2,365,256. Johan Edvarsson to Aktiebolaget Separator.

Pump for pumping water, oil, or other liquids from wells and the like. No. 2,365,281. Leopold Le Fevre.

Water treating apparatus. No. 2,365,293. Merrill Robinson to Worthington Pump & Machinery Corp.

In proportioning apparatus, a chemical reagent containing tank, means for dispensing reagent from tank, a meter for measuring raw water, etc. No. 2,365,298. Joseph Sebald and Merrill Robinson and Harry Wood to Worthington Pump & Machinery Corp.

Boiler adapted for direct connection with a kiln or furnace, for utilizing waste heat gases. No. 2,365,305. Carl Stromquist.

Apparatus for determining flow characteristics of liquid and plastic materials. No. 2,365,339. Henry Green to Interchemical Corp.

Apparatus for taper grinding brushes bristled with artificial filaments. No. 2,365,396. Francis Cunningham to E. I. du Pont de Nemours & Co.

Dialysis apparatus. No. 2,365,457. Friedrich Daniel to Hornkem Corp.

Separation of fine particles from gases by the aid of a washing liquid. No. 2,365,483. Walter Mode to Traughber Engineering Co.

Bimetallic thermometer. No. 2,365,487. Royal Murray to Weston Electrical Instrument Corp.

Instrument for measuring absorbed moisture content of a sample of resilient hygroscopic fibrous substance. No. 2,365,496. Charles Shaw to United States of America, as represented by the Secretary of Agriculture.

Preventing scaling on tubes in reboilers during heating of volatile hydrocarbon liquids containing dissolved aluminum chloride which comprises introducing into reboiler a higher boiling hydrocarbon liquid which will retain aluminum chloride in solution. No. 2,365,543. Clarence Gerhold to Universal Oil Products Co.

Determining concentration of an element in a mass while mass is subjected to change in concentration of element, which comprises determining relationship between radioactivity of mass and concentration of element and subsequently measuring radioactivity of mass. No. 2,365,553. Jerald Hill to Westinghouse Electric & Manufacturing Co.

Apparatus for removal of water or liquors from soaked masses of fibrous materials. No. 2,365,658. Fritz Schumacher to American Voith Contact Co. Inc.

Explosives

Manufacture of nondetonating fuses using a non-volatile non-detonating binding agent comprising a gelatinized polynitrate, characterized by colloidal properties, of an organic polyhydroxy compound. No. 2,363,569. Walter Caldwell and Albert White to Imperial Chemical Industries Ltd.

Additional patents on explosives, foods, fine chemicals, industrial chemicals—inorganic, industrial chemicals—organic, medicinals, metals and alloys, paints and pigments, paper and pulp, petroleum and refinery, photographic chemicals, resins and plastics, rubber, textiles, and water sewage and sanitation from the above volumes will be given next month.

Abstracts of Foreign Patents

Collected from Original Sources and Edited

Those interested in obtaining further information concerning the patents reported below should communicate with the Patent Department, CHEMICAL INDUSTRIES. Photostated copies of Canadian patents are available from the Commissioner of Patents, Ottawa, Canada.

CANADIAN PATENTS

Granted and Published Oct. 24, 1944.

Process for the production of water-gas by introduction of powdered coal into a gasification chamber and counter-current treatment with steam. No. 423,352. Henry Dreyfus.

Ore classifier of the free settling type. No. 423,367. Charles Gordon.

Method of manufacturing a "waisted" bolt by swaging and cold rolling thread thereon. No. 423,372. Archibald Park Newall.

Sleeve device for treating wounds or burns, composed of transparent, flexible material, fluid-tight, with fluid carrying conduits. No. 423,376. William Stannard.

Method of producing hydrogen and carbon monoxide mixtures (water gas) by injecting powdered coal and steam into a furnace tangentially to form a vortex, and heating same. No. 423,377. Edward Eric Stimson.

Oxidizing jet apparatus for desurfacing metals. No. 423,389. The British Oxygen Co. Ltd. (Sidney Sprague Watts)

Removal of cations from liquids by percolating same through insoluble, infusible resins, as described, and including maleic anhydride and styrene compounds. No. 423,401. Canadian General Electric Co. Ltd. G. F. D'Alelio)

Method of recovering oils from fish and fish livers utilizing preservation in an aqueous solution of an ammonium buffer salt of a weak acid and ammonium hydroxide. No. 423,414. Gorton-Pew Fisheries Co. Ltd. (Herbert Hempel)

Apparatus for indicating temperature rise due to faulty operation in a machine part, composed of temperature conducting liquid and thermosensitive metals to activate warning signal. No. 423,431. D. Napier & Son Ltd. (Frank Raymond Faber Ramsay)

Process of treating wool with aliphatic alcohol (3 to 8 carbon atoms) solution of caustic soda or caustic potash so as to reduce tendency of wool to felt. No. 423,449. Tootal Broadhurst Lee Co. Ltd. (Archibald John Hall, Frederick Charles Wood)

Manufacture of resinous product by temperature-controlled reaction of styrene and maleic anhydride. No. 423,452. The United Gas Improvement Co. (Howard Leon Gerhart)

Granted and Published Oct. 31, 1944.

Loom design, with stationary weft supply. No. 423,482. Charles Clutsom.

Process for the production of cellulose ethers, by impregnation of cellulose with an alcohol-caustic soda solution, which is relatively water-free, then immersing the impregnated cellulose in an organic azeotroping liquid comprising toluene, heating to remove alcohol by azeotropic process, and etherifying the alkali cellulose. No. 423,485. Henry Dreyfus.

Control device design for hydraulic operating mechanisms. No. 423,486. Stanley Howard Edge.

Hair dyeing pre-treatment to render same receptive to non-toxic organic dyes which comprises treatment with composition of salt of an ester of a fatty acid and an alcohol containing primary amino group. No. 423,498. John W. Orelup.

Prefabricated composite building unit composed of gypsum, paper, and bituminous felt. No. 423,500. Joseph Francis Strable.

Spinneret for the production of synthetic fibres and filaments consisting of stated alloy of platinum, rhodium, and ruthenium. No. 423,509. Baker & Co. Inc. (Harold Whitehead)

Method of recovering lithium from lithium-containing mineral which comprises lixiviating with aqueous solution of neutral metal salt, containing substance producing alkaline reaction, and recovering lithium hydroxide. No. 423,511. Bolidens Gruvaktiebolag (Axel Rudolf Lindblad, Sven Johan Wallden, Karl Arne Sivander)

As a composition of matter, vinyl halides plasticized with polycarboxylic ester of nuclearly halogenated benzyl alcohol. No. 423,515. Canadian General Electric Co. Ltd. (G. F. D' Alelio)

Condensation product of an aminotriazole, and aldehyde, and halogenated amide. No. 423,518. Canadian General Electric Co. Ltd. (G. F. D'Alelio)

Resin product of reaction of condensation product of urea, formaldehyde, and alpha beta-bis-(4, 6-diamino pyrimydyl-2 thio acetamido) ethane, and a chlorinated acetamide. No. 423,519. Canadian General Electric Co. Ltd. (G. F. D'Alelio)

Grease-proofing paper by treating at least one surface with aqueous solution of aluminum cellulose glycollate and ammonia, and drying. No. 423,529. The Dow Chemical Co. (Richard D. Freeman, Floyd C. Peterson, G. K. Greminger)

Method of producing cast, hard, ferrous alloys by addition of carbon boride during the melting process. No. 423,532. The Francois Cementation Co. Ltd. (Thomas Lazenby)

Electrodepositing ductile, thick, coatings of palladium, by utilizing bath containing at least 25 to 50 grams of palladium as chloride per liter, plus hydrochloric acid, and ammonium chloride content in controlled amounts. No. 423,539. The International Nickel Co. of Canada Ltd. E. M. Wise, Raymond F. Vines)

Process for increasing the wetting out power of alkaline lyes by addition thereto of ethylbutyloxyethoxyacetic acid, or salt of amyl-2- oxyethoxyacetic, acid. No. 423,554. Sandoz Ltd. (Alfred Rheiner, Kurt Hofer)

Self-locking and self-closing valve design. No. 423,555. Saunders Valve Co. Ltd. (Frank Sutton)

Continuous-flow, glass melting, electric furnace design, employing a plurality of electrodes. No. 423,565. Pilkington Brothers Ltd., assignee of Societe Anonyme des Manufactures des Glaces & Produits Chimiques de Saint-Gobain. (Edouard Virgile Borel)

Method of flocculating organic materials in aqueous suspension by use of agent such as calcium sulphate and ferric or aluminum chloride. No. 423,573. Unifloc Reagents Ltd. (John Oswald Samuel)

Granted and Published Nov. 7, 1944.

Process for imparting to wool a silk-like gloss, by treatment with non-aqueous anti-felting agent and then treating with solution of papain. No. 423,588. Henry Phillips, William Robert Middlebrook, Alfred Edward Higgins.

Process for the production of sulphur-containing cellulose derivatives by reacting unsaturated organic derivatives of cellulose from the group consisting of organic esters with a bisulphide. No. 423,605. Henry Dreyfus.

Method and apparatus for making strips of combustible filling material for flash lamps. No. 423,633. Canadian General Electric Co. Ltd. (Francis J. Rippl, Elmer B. Isaac)

Resinous reaction product of an aldehyde and a diamino s-triazyl hydroxy-carbocyclic-carbamyl-methyl sulphide. No. 423,634. Canadian General Electric Co. Ltd. (G. F. D'Alelio)

Resinous composition comprising the reaction product of an aldehyde and a diamino pyrimidyl hydroxytolyl-carbamyl-methyl sulphide. No. 423,635. Canadian General Electric Co. Ltd. (G. F. D'Alelio)

Device for compensating the tension in a running thread. No. 423,646. Courtaulds Ltd. (Fred Wholton)

Improving the flex-cracking properties of rubber compositions by the incorporation therein of a phenol, the position para to the hydroxyl group being occupied by a tertiary alkyl group. No. 423,650. Dominion Rubber Co. Ltd. (Robert T. Armstrong)

Preservation of rubber by the use of an anti-oxidant containing 5-hydroxy-2-alkyl coumarane, or a reaction product of hydroquinone and a dicyclopentadiene. No. 423,651. Dominion Rubber Co. Ltd. (Philip Timothy Paul)

Method of preservation of organic substances susceptible to oxidation by incorporation therein of a sulphonyl amino phenol. No. 423,653. Dominion Rubber Co. Ltd. (Charles William Gates)

Process for the preparation of substituted (1,3,5-triazinyl -6)-amino-phenyl- arsonic acid. No. 423,677. Parke, Davis & Company. (Ernst Albert Hermann Friedheim)

Flash lamp comprising a container, combustible material within said container, means for igniting the material, said container comprising a layer of transparent organic material, and a sealing layer of regenerated cellulose. No. 423,681. Philips Lamps Ltd. (Jan Hendrick de Boer)

Gas turbine plant design. No. 423,690. Sulzer Freres Societe Anonyme. (Walter Traupel)

Improving flex-cracking properties of rubber by inclusion of 3-methyl-4-alkyl phenol. No. 423,696. United States Rubber Co. (Edwin James Hart)

Lubricating oil having dispersed therein fatty acids salts of nickel, lead or chromium, such as the oleates, up to about 1 per cent by weight of the oil. No. 423,700. C. C. Wakefield & Co. Ltd. (Elliott Alfred Evans)

An adhesive comprising a water soluble urea-formaldehyde condensation product and ammonium chloride as a hardener therefor, both components having been separately brought into dry form. No. 423,710. I. G. Farbenindustrie Aktiengesellschaft. (Alfred Menger)

Process of adhesion which comprises cementing together wood with a liquid in the form of a foam comprising urea-formaldehyde, casein. ammonia, ammonium chloride and butylated maphthalene sulphonic acid. No. 423,711. I. G. Farbenindustrie Aktiengesellschaft (Adolf Menger, Eugen Bock)

Diabetic, white crystalline sweetening substance, comprising sorbitol, mannitol, and dulcin. No. 423,712. Joseph Kuderman.

Granted and Published Dec. 5, 1944.

Diamond grinding wheel dresser design. No. 424,161. Stanley Martin Pollard, Victor W. Windblad.

Collapsible container consisting of a cylindrical side wall formed of staves, and inwardly projecting head retaining liners at each end. No. 424,182. Ralph S. McConnell.

Method of treating mercury-contaminated surfaces comprising coating said surfaces with a composition containing free sulfur. No. 424,184. Merle Randall.

Electrical resistance wire composed of alloy of 60 to 95 per cent palladium and 5 to 40 per cent of metal from group of rhodium, iridium, and ruthenium. No. 424,202. Baker & Co. Inc. (Cecil Spencer Sivil)

Manufacture of vinyl ketones by reacting a saturated aliphatic ketone with formaldehyde at above 200 Cent., with subsequent cooling or reaction products. No. 424,206. Canadian Kodak Co. Ltd. (Joseph H. Brant, Rudolph Leonard Hasche)

(*To be continued*)

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

410,540. The Dow Chemical Co., Midland, Mich.; filed Nov. 26, 1943; serial No. 465,317; for temporary protective coating; since Oct. 11, 1943.

410,726. Lubri-Gel Products, McCracken, Kans.; filed Apr. 15, 1944; Serial No. 469,361; for hydrous aluminum silicate; since Nov. 22, 1939.

410,861. Lubri-Gel Products, McCracken, Kans.; filed Apr. 15, 1944; Serial No. 469,360; for hydrous aluminum silicate; since Dec. 2, 1941.

410,868. The J. E. Harris Co., as Arlington Paint & Varnish Co., Wooster, Ohio; filed July 13, 1944; Serial No. 472,199; for paint; since Feb. 1905.

410,870. Benjamin James Hardy, as Color-thru Chemicals, N. Y.; filed Aug. 14, 1944; Serial No. 473,249; for paints; since Sept. 1942.

462,488-441. Continental Carbon Co., N. Y.; filed Aug. 2, 1943; for carbon black; since April 1939.

463,488. William D. MacDermid, as W. D. MacDermid Chemical Co., Bristol, Conn.; filed Sept. 18, 1943; for metal cleaners; since Aug. 30, 1943.

467,161-2. MacDermid, Inc., Waterbury, Conn.; filed Feb. 4, 1944; for dry alkaline cleansers; since May, 1940; since May, 1939.

467,401-2-3. Kimberly-Clark Corp., Neenah, Wis.; filed Feb. 14, 1944; for cellulose wadding, impregnated with phenolic resin plastic; since Aug. 17, 1943; since Aug. 19, 1943; since May 27, 1943.

468,251. The Firestone Tire & Rubber Co., Akron, Ohio; filed Mar. 13, 1944; for resin molding powders; since Feb. 4, 1944.

469,488-9. The Atlantic Refining Co., Philadelphia, Pa.; filed Apr. 20, 1944; for bituminous oils; since Sept. 1, 1931.

471,356. Paramet Corp., Long Island City, N. Y.; filed June 17, 1944; for resin coatings; since Apr. 1, 1944.

471,358. The Pennsylvania Salt Mfg. Co., Philadelphia, Pa.; filed June 17, 1944; for molding solutions; since Jan. 24, 1944.

471,497. Turco Products, Inc., Los Angeles, Calif.; filed June 21, 1944; for prevention of corrosion; since June 1, 1943.

472,014. Palmer Co. Inc., Waukesha, Wis.; filed July 8, 1944; for insecticides; since Jan. 1, 1944.

472,372. Turco Products, Inc., Los Angeles, Calif.; filed July 18, 1944; for coating concrete floors; since June 2, 1944.

472,677. Pratt & Gray Co. Inc., Norwalk, Conn.; assignor to Diebold, Inc., Canton, Ohio; filed July 27, 1944; for films; since May, 1943.

472,933. Ciba Co. Inc., N. Y.; filed Aug. 4, 1944; for dyeing assistant; since Nov. 13, 1940.

472,937. Ciba Co. Inc., N. Y.; filed Aug. 4, 1944; for urea resin; since June 19, 1942.

473,218. Marshall Engineering Co., Milwaukee, Wis.; filed Aug. 12, 1944; for removing oil from metal; since July 17, 1944.

473,333. Quaker Chemical Products Corp., Conshohocken, Pa.; filed Aug. 16, 1944; for water softener; since Oct. 8, 1940.

473,336. Quaker Chemical Products Corp., Conshohocken, Pa.; filed Aug. 16, 1944; for fulling agent; since Oct. 1, 1935.

473,352. Vita-Var Corp., Newark, N. J.; filed Aug. 16, 1944; for linoleates and insecticide; since March, 1932.

473,397. Roxalin Flexible Finishes, Inc., Elizabeth, N. J.; filed Aug. 17, 1944; for fireproofing, mildew-proofing, etc.; since 1941.

473,401. W B B Corp., Philadelphia, Pa.; filed Aug. 17, 1944; for pickling steels; since Dec. 21, 1943.

473,477. The Firestone Tire & Rubber Co., Akron, Ohio; filed Aug. 21, 1944; for accelerator of vulcanization; since July 5, 1938.

473,511. The New Jersey Zinc Co., N. Y.; filed Aug. 22, 1944; for luminescent compounds of zinc sulphide; since July 31, 1944.

473,520. Warwick Chemical Co., West Warwick, R. I.; filed Aug. 22, 1944; for textile finishers; since Aug. 9, 1944.

473,576. Oakite Products, Inc., N. Y.; filed Aug. 24, 1944; for cleaning metal; since Aug. 10, 1944.

473,577. Oakite Products, Inc., N. Y.; filed Aug. 24, 1944; for making paint adhere to metal; since Aug. 10, 1944.

473,693. Ethyl Corp., N. Y.; filed Aug. 29, 1944; for liquid detergent; since May 29, 1944.

473,709. Roxalin Flexible Finishes, Inc., Elizabeth, N. J.; filed Aug. 29, 1944; for wrinkle finish compositions; since 1936.

473,827. Monsanto Chemical Co., St. Louis, Mo.; filed Sept. 1, 1944; for vulcanization accelerators; since Nov. 19, 1943.

473,956. Plastikpli Labs. Inc., Chicago, Ill.; filed Sept. 7, 1944; for paint; since Aug. 16, 1944.

474,049. The Pennsylvania Salt Mfg. Co., Philadelphia, Pa.; filed Sept. 9, 1944; for fluoboric acid; since Feb. 24, 1944.

474,073. Fisher Scientific Co., Pittsburgh, Pa.; filed Sept. 11, 1944; for chemical to absorb carbon dioxide; since Sept. 5, 1944.

474,179. Union-Baystate Co. Inc., Cambridge, Mass.; filed Sept. 13, 1944; for adhesive cement; since Aug. 9, 1944.

474,236-7. The Freedom Oil Co., Freedom, Pa.; filed Sept. 15, 1944; for oils; since May 26, 1944; since June 19, 1944.

474,265. Alumatone Corp., Los Angeles, Calif.; filed Sept. 16, 1944; for aluminum paints; since Aug. 1, 1939.

474,348. Oroline Products Co., Chicago, Ill.; filed Sept. 18, 1944; for metallic pigments; since May, 1926.

474,364. Standard Varnish Works, Staten Island, N. Y.; filed Sept. 18, 1944; for rubber-like protective film; since July 13, 1944.

474,418. Fred'k H. Levey Co. Inc., N. Y.; filed Sept. 20, 1944; for printing inks; since Feb. 21, 1944.

474,458. John W. Masury & Son, Inc., Baltimore, Md.; filed Sept. 21, 1944; for paints; since Aug. 30, 1944.

474,555. Vita-Var Corp., Newark, N. J.; filed Sept. 23, 1944; for synthetic resin; since Aug. 10, 1944.

474,558. Vita-Var Corp., Newark, N. J.; filed Sept. 23, 1944; for paint; since Aug. 10, 1944.

474,559. Vita-Car Corp., Newark, N. J.; filed Sept. 23, 1944; for synthetic resin; since Aug. 10, 1944.

Trademarks reproduced and described include those appearing in Official Gazette of U. S. Patent Office, Nov. 28 to Dec. 19, 1945.

STRIPCOAT
410,540

LUBRI-SAL
410,726

LUBRI-PLASTIC
410,861

ARLINGTON
410,868

TRIPLE ACTION PERFORMANCE
410,870

CONTINEX
462,438

KNIGHT
462,441

KEMTEX
463,488

Prang
464,297

METALEX
467,161

PENETREX
467,162

Kacelite
467,401

Kacetex
467,402

Kimpreg
467,403

Clean-O-Lizing
467,792

VELOFORM
468,251

THE ATLANTIC REFINING COMPANY ATLANTIC
469,488

469,489

PARAPEN
471,356

PENNSALT MS-1
471,358

AVERT
471,497

THE Guardian LINE
472,014

CERI-SEAL
472,372

DENSITROL
472,677

PROTEX
472,933

RESIFIN
472,937

PENGRIS
473,218

PYROLENE
473,333

THERMOL
473,336

VITA-VAR
473,352

EMYCEL
473,397

RADEX
473,401

BUTEX
473,477

473,511

DUR-LANA
473,520

CRYSCOAT
473,576

CRYSCOAT
473,577

ETHYL
473,693

CYCLOCURE
473,827

473,709

UNIDYE
473,954

PLASTIKPLI
473,956

PENNSALT FA 42
474,049

CAROXITE
474,073

UBAPOL
474,179

FOLUBE HD
474,236

FOMUL
474,237

CHROMATONE
474,265

OROLINE
474,348

PLASTO-PAK
474,364

G & G SOLVENT
474,410

LEVECOL
474,418

Relief
474,445

474,458

SURFA-TONE
474,555

SURFA-TONE
474,558

VITA-CLOR
474,559

PLASTONI
474,631