ember 1945

# Chemical Industries

IN THIS ISSUE



ATOMIC POWER

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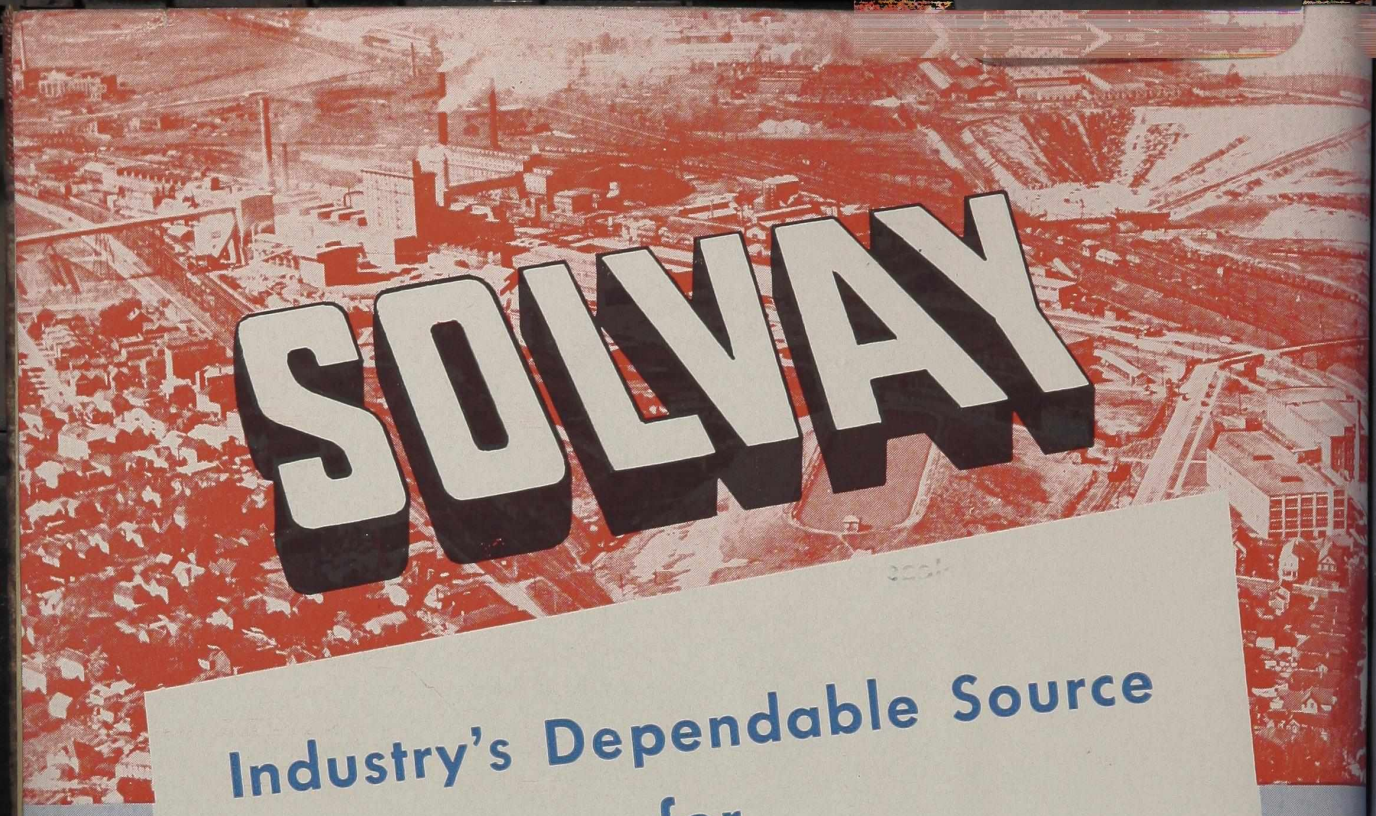

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THE CHEMICAL BUSINESS MAGAZINE

# Chemical Industries

VOLUME 57
NUMBER 3

## September 1945 Contents





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### NEWS OF THE MONTH



COVER—The atomic bomb hit on Nagasaki heralds a new age of power from the atom. AP photo.

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# ABOUT THE AUTHORS

DOUG MACMAHON (left) and Larry Russell of Mathieson Alkali Works, Inc., have collaborated in the writing of a timely article (page 462) entitled Commercial Production of Dry Sodium Methylate. Doug, heretofore assistant manager of the sales development department, has just been named assistant to the technical director of Mathieson. A graduate of Cornell University, he joined the organization in 1922 as technical representative. He has developed several patents covering applications of Mathieson products. He was born in England, son of the late James H. MacMahon, long prominent in the paper and other chemical-consuming industries and connected with the Mathieson company for almost 40 years. When Doug was six the family moved to Niagara Falls, where he now resides. He enjoys tennis and what he calls "the armchair sports."

LARRY RUSSELL, a member of the sales development department of The Mathieson Alkali Works, is engaged in market survey work on new products. Upon his graduation from New York State College of Forestry in 1938, he was employed by the St. Regis Paper Company, until he joined the Mathieson organization in 1941, as a technical service representative to the pulp and paper industry. He was promoted to his present post about a year ago. Three hobbies vie for "Larry's" spare time. They are amateur radio transmission, swimming and bridge.

IRVING KRUSHEL, who is chief chemist for North American Phillips Co., Dobbs Ferry, N. Y., was interviewed in August by our chemical editor, Howard Johnson. The result is a three page story, The Chemistry of Phosphors, page 459, in this issue. A native New Yorker, Mr. Krushel tells us that his hobbies are math and physics. His college was Brooklyn Polytechnic Institute. He writes in this issue on lithium, page 442.

It was WILLIAM ALEXANDER GALE'S university thesis on phase rule investigation which led to his association with the American Trona Corporation in 1923. Three years later when that company became the American Potash & Chemical Corporation, Gale was made assistant director of research. In 1935 he became director of research.

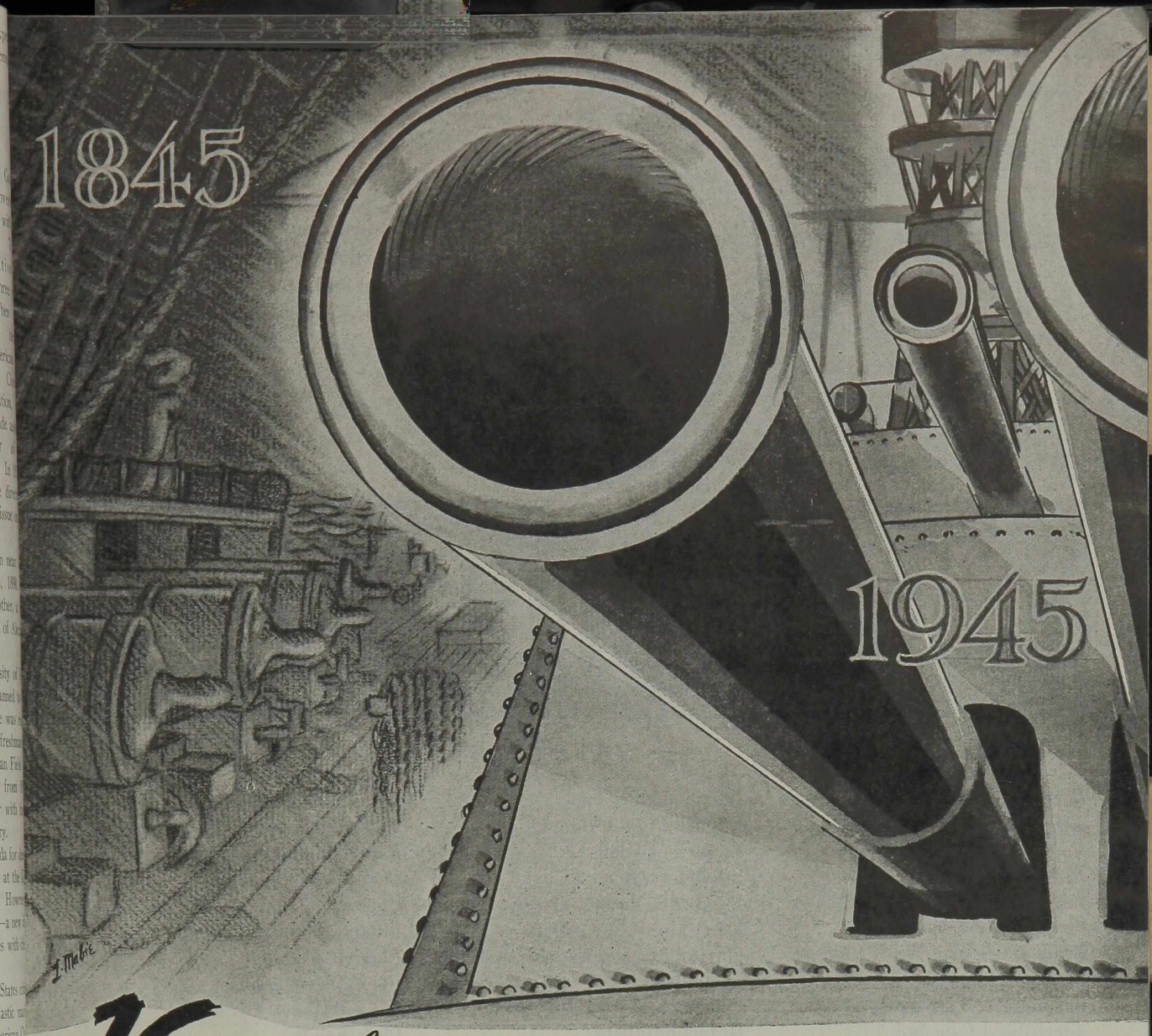
Gale was born on a farm near Lakefield, Ontario, February 3, 1898. His father was English; his mother, a Canadian, was a distant relative of Alexander Graham Bell.

On entering the University of British Columbia in 1915 Gale planned to study electrical engineering. He was eighteen when he completed his freshman year and enlisted in the Canadian Field Artillery C. E. F. Overseas from 1916 to 1919, he served as gunner with the 58th Canadian Howitzer Battery.

After returning to Canada for demobilization he resumed studies at the University of British Columbia. However, this time he elected chemistry—a new interest aroused by his experiences with chemical warfare.

Gale became a United States citizen in 1932. He is an enthusiastic marksman and a member of the American Chemical Society, the American Association for the Advancement of Science and the Society of Glass Technology.

SID SUSSMAN and AL MINDLER of The Permutit Co., appeared in Chemical Industries last May with an article on ion exchange. On page 455 they are joined by Bill Wood in the writing of a description of alkaloid recovery by ion substitution, which is one of the applications of the process to a particular industry. Bill and Sid, research group leader and chief research chemist, respectively, make their headquarters in the company's Birmingham, New Jersey, laboratories, while Al, who is research chemical engineer, works in the mid-town Manhattan office. Sid joined Permutit after completing graduate work at MIT, which succeeded study at Brooklyn Polytechnic Institute. Al's background includes chemical engineering at Lehigh and experience with the Celanese Corp. of America. Bill is a graduate of Temple University.




# 16 inches . . . . OF HELL!!

The range of guns on the Constitution was measured in hundreds of yards, or approximately 1/50th of the range of a modern sixteen-inch rifle. The total weight of a broadside was 734 pounds, or, roughly, ⅓ the weight of a single sixteen-inch projectile.

The ability of the sixteen-inch rifle to withstand the wear of the heavy projectiles and the corrosive action of the gases generated by the propelling charges is due to the plating of the barrel liners with chromium. This is only one of the many applications where extended life is obtained through the use of chrome plate.

Wear is reduced not only because of the hardness of chromium but also because of its low coefficient of friction. The sliding coefficient of friction of chrome plated steel on steel is 0.16 while that of unplated steel on steel is 0.20. The same principle has been applied to cutting edges of machine tools where chrome plating has greatly lengthened the life of the tools that make America's finished products.

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Ethylene Chlorbromide
Ethylene Dibromide
Ethylene Dichloride
Ethylene Glycol
Ethylene Oxide
Ethyl Monobromacetate
Ethyl Monochloracetate
Ferric Chloride, Crystals and Solution
Ferrous Chloride, Dihydrate
Hexachlorethane
Hydrobromic Acid
Isopropyl Formate
Magnesium Chloride, Anhydrous, Flake and Powder
Methocel (Dow Methyl Cellulose)
Methyl Bromide
Methyl Cyclohexane
Methyl Monobromacetate
Methyl Monochloracetate
Mining Salts
Monobrombenzene
Monochloracetic Acid
Monochlorbenzene
Monoethanolamine
Orthochlorphenol
Orthocresotinic Acid
Orthodichlorbenzene
Orthophenylphenol
Parachlor Orthonitraniline
Parachlorphenol
Paradibrombenzene
Paraphenylphenol
Para Tertiary Butyl Phenol
Perchlorethylene
Phenol
Phenol Sulfonic Acid
Phenyl Acetate
Phenyl Hydrazine
Phenyl-Methyl Pyrazolon
Phthalimide
Propylene Dichloride
Propylene Glycol
Propylene Oxide
Sodium Sulphide
Styrene
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Trichlorbenzene
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# WASHINGTON

T. N. SANDIFER *reporting*

## Chemical V-J Day . . . Kilgore Bill . . . Surplus Property Contract Terminations . . . German Data

### Chemicals After V-J

THE EFFECT OF THE END OF HOSTILITIES on supplies of chemicals for reconversion was being studied as this was written. At the end of the fighting a joint committee representing Army, Navy, and War Production Board was preparing a detailed report on critical materials and products, looking to meeting industry needs.

The Japanese surrender coincided with the heaviest impact of post V-E war contract cutbacks, showing a $2 billion reduction for the quarter ending with July 31, while August schedules alone were reduced by more than $1,200,000,000, even before the announcement of post-Pacific changes.

There is still speculation as to what will happen in primary materials, since about three-fourths of the total amount in cutbacks was scheduled for the last half of the year, and at this writing there had not been time for the release of primary materials in important quantities.

However, there will be an accelerated release of facilities and materials for the rest of the year, it is indicated, looking to curtailing the unemployment that may result from any prolonged drag between cutbacks and resumption of civilian output.

### Kilgore Bill

SENATOR KILGORE IS SPEARHEADING A MOVE to consolidate the various bills dealing with Government research, patent control, anti-monopoly, etc., under a new bill he has just introduced to establish a National Science Foundation. This can be construed as an indication that the previous proposal for an Office of Scientific and Technical Mobilization is out of date, at least in title, and the major features that bill contemplated might have more chance of enactment in a different guise. The new measure bears the names also of Senator Johnson, Colorado, and Senator Pepper, Florida.

In offering his bill, Senator Kilgore expressed hope that the Senate Military Affairs Committee, to which it is referred, will provide for consolidated hearings on the various phases of pending bills along similar lines: H.R. 3440; S. 825 (Research Committee for National Defense); S. 1285, a somewhat broader version of S. 825.

### German Technical Secrets Bared

RETURN OF A NUMBER of the American technical experts who followed closely behind the American armies into Germany has now disclosed some of the results of their explorations. Among these are new uses of waste cellulose materials, particularly in conversion to animal feeds; improved techniques for fermenting yeast from wood sugar in producing both animal and stock feeds; improved processes for making synthetic petroleum products; discovery that Germans were using extremely high pressure in hydrogenation plants; refinements in the gas synthesis method of producing liquid fuels and lubricants from coal; new processes in the field of synthetic rubber; new data on continuous polymerization processes in plastics manufacture; new catalysts for high octane gasoline.

### Contract Terminations

THERE HAS ACCUMULATED A $14 BILLION BACKLOG of contract settlements following the end of the war in Europe. Termination procedure is working toward a rate of between $2 billions and $2.5 billions per month. However, end of the war with Japan means the addition of new terminations of roughly $30 billions to this backlog, and a settlement rate of about $4 billions per month is foreseen as necessary.

### Congressional Agenda

THE CONGRESSIONAL RECESS which ends in September was by no means frittered away by the more extreme blocs in Congress. As a result incoming members will find the lines drawn very definitely for battle, even if not marked on the Washington war map.

One of the behind-scenes developments was the pep rally of the liberal wing of the Democratic side, ostensibly to insure tightened ranks in the Fall in support of certain measures that have not done so well earlier. And while there was no corresponding publicity, there was a commensurate evidence of the other side's determination to maintain its front.

The signs point to aggressive efforts, accordingly, by liberal bloc membership to put over the Missouri Val-

ley Authority, modeled on TVA, and presumably other regionalized Federal activities of this nature. The various Kilgore-type bills on patent regulation, scientific research, and others, are high on the list.

Other bills on which the liberals intend to concentrate, include the various reconversion proposals, liberalized surplus property handling, subsidized employment aids, increased minimum wage laws, and agricultural aids, in various guises.

## Surplus Hemp Plants

THE RECONSTRUCTION FINANCE CORPORATION is seeking to dispose of 13 hemp mills declared surplus out of a total of 42 built during the worst of the war shortages. They are located chiefly in Illinois, Indiana, and Iowa.

Two mills recalled from surplus are now in chemical production, one making red oxide of mercury and another producing bran mold used in manufacture of industrial alcohol.

## Smaller War Plants Corporation Proposed for Peace Agency

SENATOR STEWART, DEM., TENN., HAS INTRODUCED a bill to establish the present Smaller War Plants Corporation as a peacetime agency, under the title of Small Business Corporation. The change of status would become effective with termination of the present year's lease of life. With it the Corporation would receive an increase in its capital stock from the present authorization of $350,000,000 to $5 billion.

## Some German Production Utilized

WHILE THE SERVICES APPARENTLY will not use German material as such, the War Department reports that selected German industry is being allowed to resume limited operation for producing certain critical needs in Europe. Soap, fertilizer and insecticide manufacturing plants will be allowed to resume, but no German heavy industry will be put in operation except for filling on-the-spot military requirements.

## New Fertilizer Organization

REP. CLIFFORD A. WOODRUM, Democrat, Virginia, will leave Congress to head the American Plant Food Council, formation of which was announced in June, with headquarters in Washington. The organization is scheduled to open offices here September 1. An advance description of its make-up states it represents all divisions of the fertilizer industry, and has for an object, promotion of "a more abundant production and distribution of fertilizer." The organization has farmer cooperative representation, it is stated.

## Agriculture Department Reorganization

HEADED BY AGGRESSIVE former Congressman Clinton Anderson, the Agriculture Department is being drastically revamped. Chemicals and Fertilizers Branch has been attached to the Farm Machinery and Supplies Branch, Dr. Guy F. McLeod, who was chief of the chemicals unit having returned to private business. The containers and packaging, program, and farm machinery and supplies organizations have been grouped in the Office of Materials and Facilities. The general trend of the changes is to provide a more perpendicular line of organization, with various units being regrouped under major bureaus.

## Inquiry Into Raw Materials Depletion in the War Asked

A RESOLUTION CALLING FOR a Senate investigation to determine the extent of depletion of domestic raw materials of all kinds incident to meeting huge war needs in recent years has been introduced in the Senate by Senator Tom Stewart, Democrat, Tennessee.

Senator Wiley previously had agitated the matter, claiming that the United States has exhausted 95 per cent of domestic mercury, 80 per cent of lead, 70 per cent each of chromium, tungsten, and zinc, with high proportions of loss for various other metals and minerals.

## Permanent Industry Committees

AGITATION HAS BEEN STARTED to maintain civilian industry advisory committees as permanent institutions. Their job would be to advise Government agencies in maintaining war preparedness and in future production problems.

Some 53 leading producers of magnesium have been asked to form a permanent industry advisory group to aid the Government in economic planning and research.

## Some Chemical Control Orders Retained

WHILE MATERIALS FOR RECONVERSION are no longer a problem, War Production Board was forced after V-J Day to retain certain chemical control orders in the limited number still in effect.

These will cover materials still in short supply, primarily potash and phosphate fertilizers, insecticides such as rotenone, nicotine, and some protective coatings, particularly gum and wood rosins. Lead and tin will remain tight indefinitely.

There is a substantial easing of the paper supply, except newsprint, which latter will depend on what can be had from Canada and the Scandinavian sources in the next several months. Textiles and textile materials will remain tight in some industrial categories, so will crude rubber, until the Far Eastern supply opens.

Some war production must continue to meet continued demand from forces still in the field. Included in activities to remain in operation will be certain research and developmental undertakings, it is said.

## Possible Changes

SECRETARY ICKES IS STILL IN OFFICE as this is written, but is under pressure from various quarters to leave. This page does not care to speculate too far in advance, but strong indications are that the present War Production Board Chairman, J. A. Krug, would get an early offer of the Interior post if it were vacated.

Mr. Krug has a background of successful administration in Government-owned utilities and his interest might therefore be expected to lie in this direction.


*Many materials and processes contribute to the making of a smart white fabric . . . pulp and paper . . . an ingot of pure metal . . . potable water . . . or an insecticide. But to all of these . . . and many more . . . "$Cl_2$" is an important common denominator. In producing liquid chlorine and the other basic chemicals of its manufacture to the highest standard of purity and uniformity, Niagara is ever mindful of its responsibility as a leading and pioneering factor in America's great electro-chemical industry.*

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AMERICA

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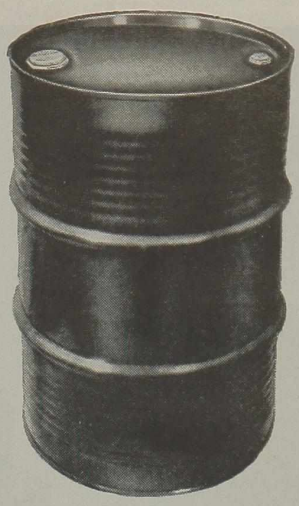

# READY TO GO!

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WHEN a plane is first in line on the flight deck of a carrier, you can be sure that everything has been done to fit it for every test. The lot, engine, fuel and every part of that plane e *ready to go!*

Today's fuel drums have to pass severe tests, o . . . the test of travel over thousands of miles ocean . . . the test of open storage for days or eeks . . . the test of submersion in surf to reach beachhead. Yet, no matter what hazards they ce, if drums leave port with Tri-Sure Closures their drumheads, they are *ready to go!*

Tri-Sure Closures provide *three* lines of defense against the loss or spoilage of a drum's contents: a hermetic *seal* that cannot be removed unless it is deliberately destroyed; a leak-proof *plug* that is always held tightly in place; an immovable *flange* that is an integral part of the drumhead.

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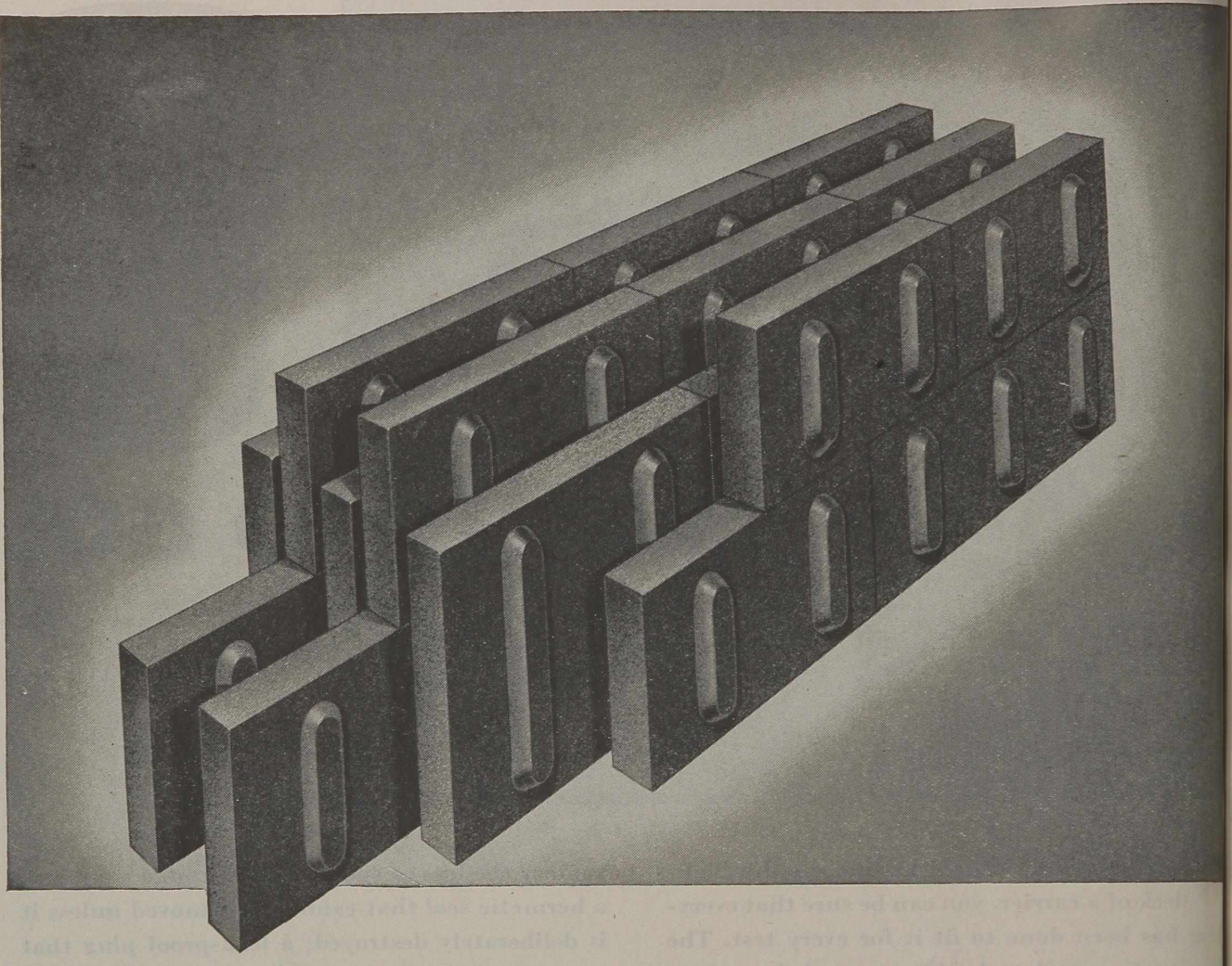
# How to speed up high-temperature reactions



**Gases at high velocities** can be heated rapidly by using "CARBOFRAX" silicon carbide checker work. An entirely new high-temperature range for chemical reactions is hereby made available.

These checker brick contain in excess of 85% SiC in the finished product. They absorb heat quickly . . . and release this heat just as rapidly on reversal.

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If you are using—or are co sidering—processes based on hig temperature reactions that requi checker work, investigate t advantages of "CARBOFRAX checkers. The services of our e gineering staff are at your dispos

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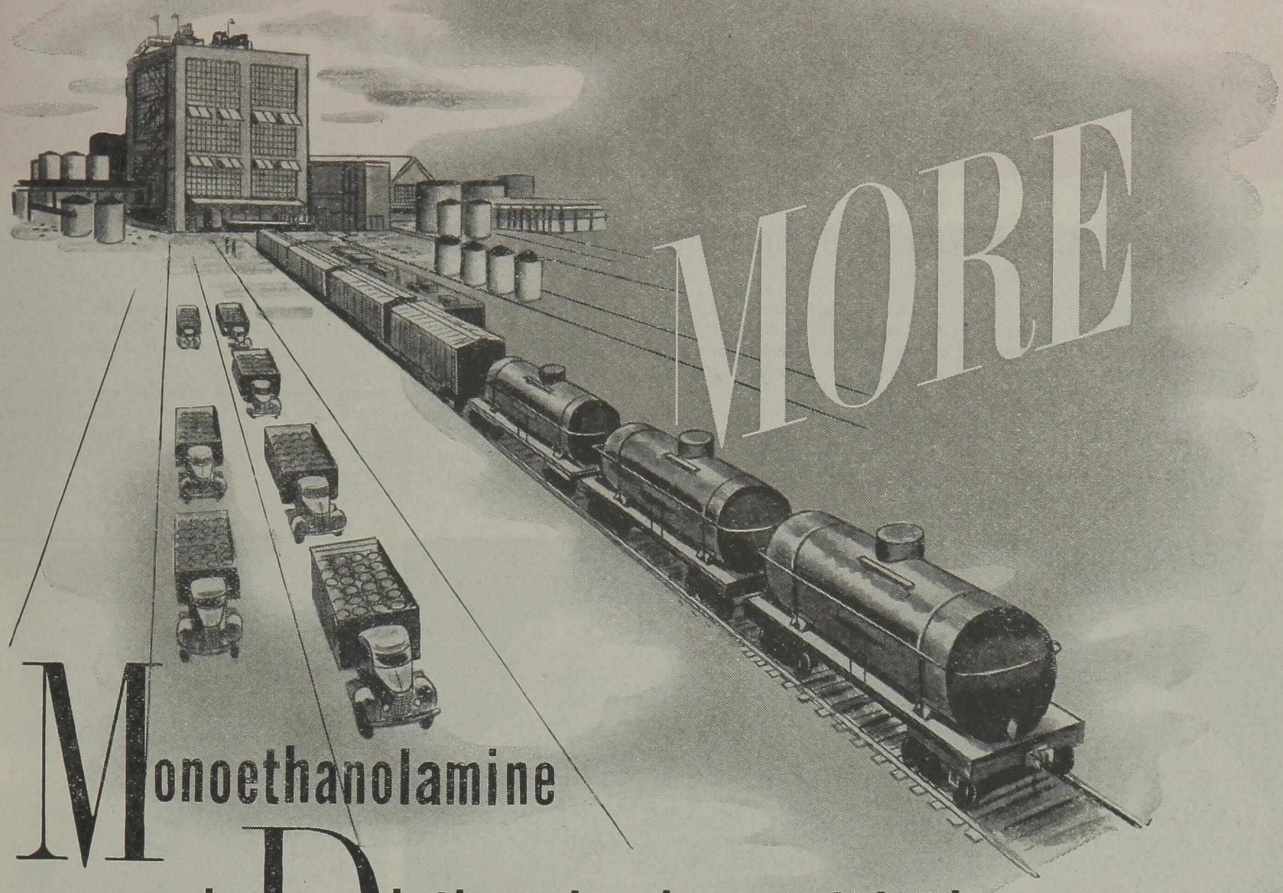

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Chemically active, monoethanolamine and diethanolamine react both as alcohols and amines. As mild bases they combine directly with acids and acid gases.

Both are used to make amine soap emulsifying agents, monoethanolamine being preferred when an amine with a low combining weight is desired. They are useful in concentrating carbon dioxide and for removing acid gases from natural gas and crude hydrogen. Diethanolamine is an intermediate in many organic syntheses; it is especially valuable in the preparation of wetting agents and detergents.

Write for prices and the booklet "Amines" (Form 4770).

*Carbide and Carbon Chemicals is a major supplier of amines, and produces 34 amines in commercial or research quantities.*

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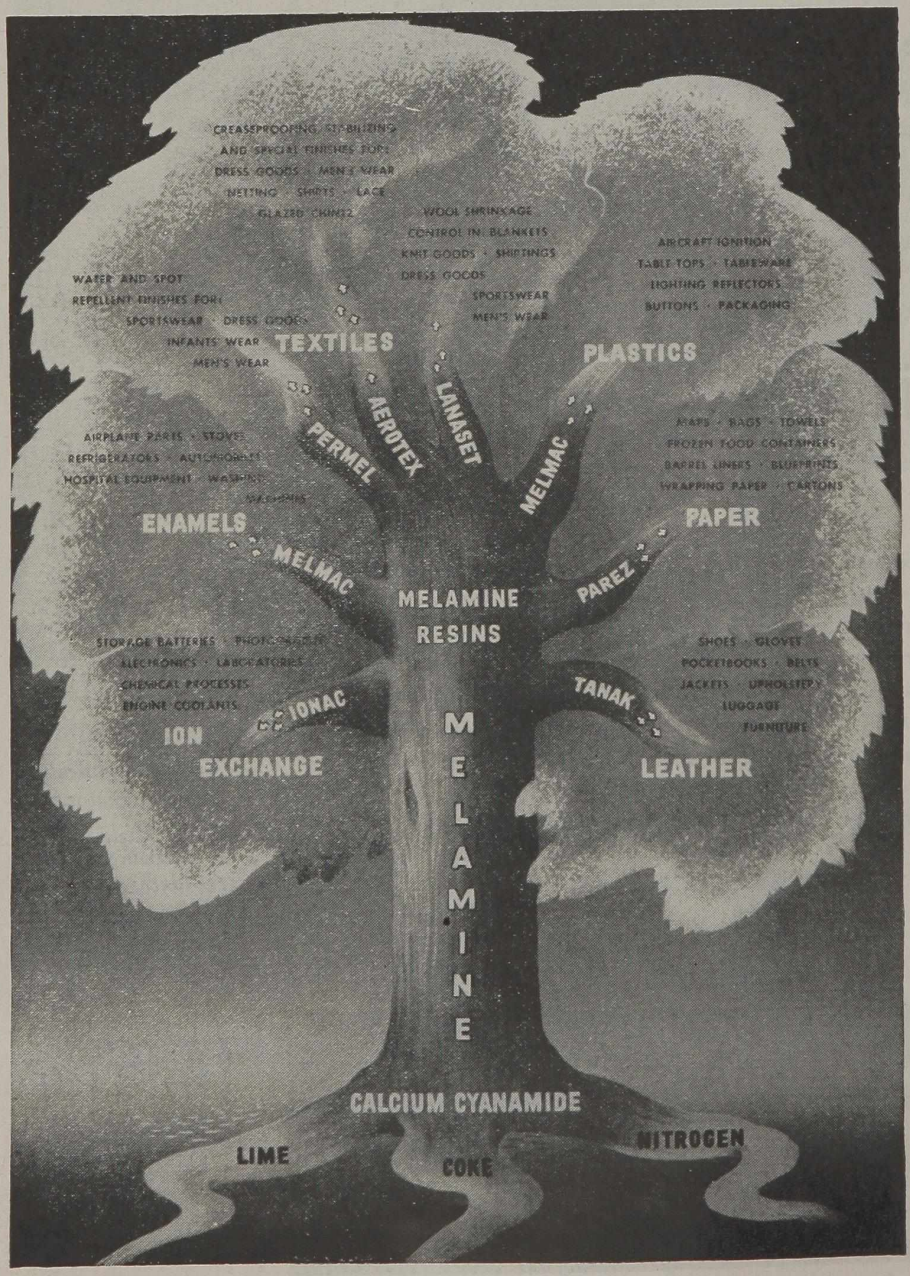
SYNTHETIC ORGANIC CHEMICALS

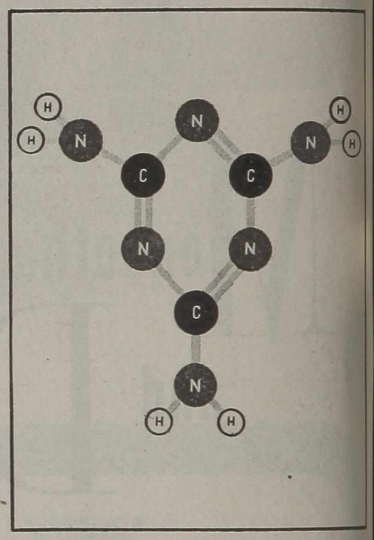
# LIFE On The

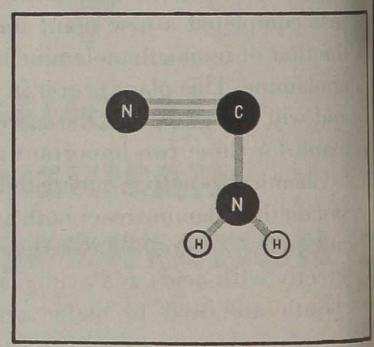
## MELAMINE . . . CHEMICAL KEY TO INDUSTRIAL PROGRESS

The history of melamine is as romantic as its uses are spectacular. First synthesized in the laboratory of Justus von Liebig in 1834, it was laid aside as too difficult and costly to make, and apparently of no practical value. It remained forgotten on chemistry's shelf for more than a hundred years until Cyanamid research undertook to develop its amazing possibilities. Its "rediscovery" by Cyanamid was both natural and logical. Melamine is a nitrogen compound, and Cyanamid long has been known for its work in taking nitrogen from the air and pioneering in the development of its derivatives. Calcium cyanamide, for example, a direct nitrogen derivative, was used at first solely as a fertilizer. However, through Cyanamid research it has proved to be a virtually inexhaustible source of chemical progress . . . including melamine.

The complete story of melamine—this amazing chemical which has already effected remarkable advances in the fields of plastics, textiles, paper, leather, enamels, and the application of ion exchange principles—is now available in a booklet, "MELAMINE." We shall be glad to send you a copy on request.

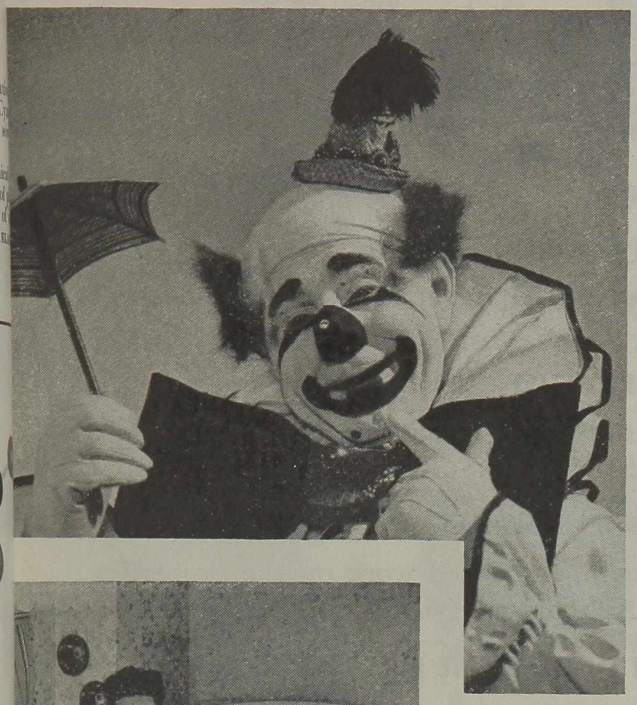


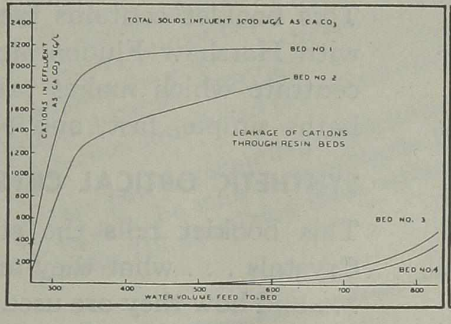


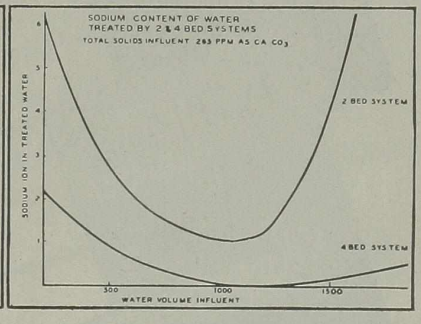
(*Above*) **THE MELAMINE MOLECULE,** as the chemist sees it, is shown above, and the cyanamide molecule below. Free cyanamide is readily obtained from calcium cyanamide, but the fact that the molecule grows in both size and complexity in its transition from cyanamide to melamine leads to complicated production problems. However, after years of intensive development by Cyanamid, melamine is today economically manufactured on a very large scale.

# The Chemical Newsfront



(*Above*) **"MAKE-UP" IS IMPORTANT** to grotesquely humorous Felix Adler, famous Ringling Bros. clown, as well as to women everywhere. Stearates impart a "clinging" quality and soft, fluffy texture to face powder. Other functions of stearates, "tailor-made" by Cyanamid, include their use as ingredients in lubricants and greases, in water-repellent compounds for textiles, and as mold lubricants and emulsion stabilizers.




(*Above*) **"THE ION EXCHANGE PRINCIPLE AND ITS APPLICATIONS,"** a new technical bulletin containing full information on Cyanamid's Ionac** ion exchange materials with explanatory curves and diagrams, is now available on request.

**Trade-mark

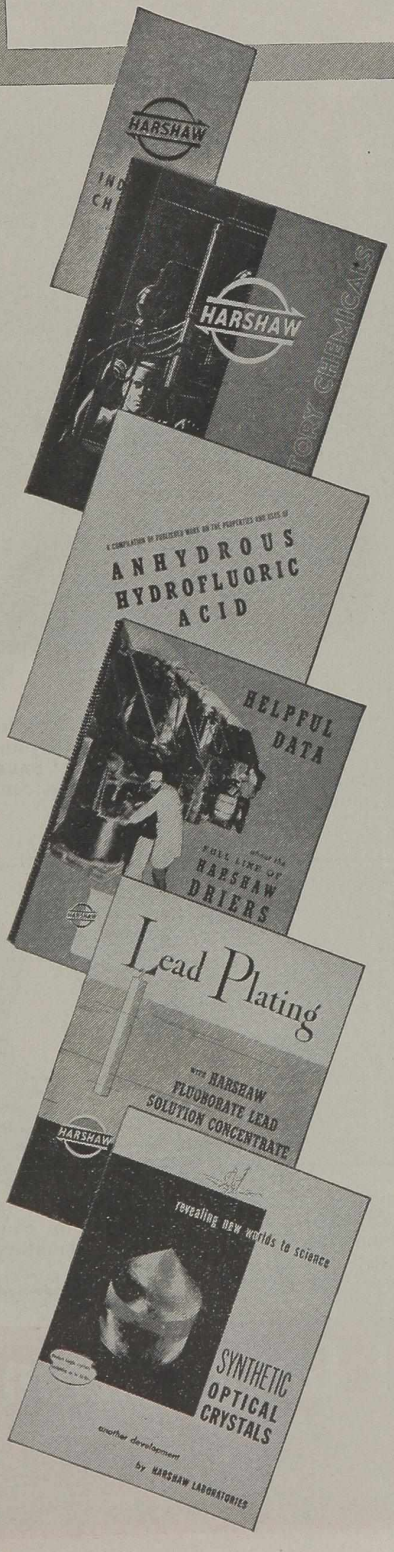
(*Above*) **IMPROVED REFRIGERATOR FINISHES,** with excellent color and hardness, outstanding toughness and resistance, with a bake time of 30 min. at 300°F., are among the timely prospects based on developments of Cyanamid resin research. Special technical bulletins on resin developments for surface coatings for present and postwar applications are available. Write to Organic Chemicals Dept. 19 at address below.

## American Cyanamid & Chemical Corporation

*A Unit of American Cyanamid Company*

30 ROCKEFELLER PLAZA . NEW YORK 20, N. Y.

# SOME OF THE BOOKLETS AND FOLDERS *available* FOR THE ASKING




### COMMODITY BOOKLET

A 32-page booklet alphabetically listing Industrial Chemicals.

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A 72-page price list of Laboratory Chemicals . . . arranged alphabetically.

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- LUBRICATING OIL
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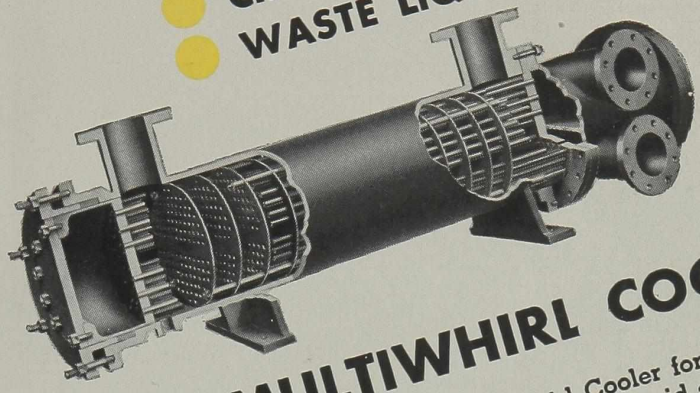

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## THE G-R MULTIWHIRL COOLER

The important advantages of the G-R Multiwhirl Cooler for cooling . . . for heat recovery . . . for heat transfer . . . on many liquid services have been proven in thousands of installations.

Some of these advantages: MINIMUM PRESSURE DROP . . . because of the correctly proportioned baffle system. MULTIPLE CONVENIENCES . . . because of the ease of installation, inspection, and cleaning. LASTINGLY SATISFACTORY SERVICE . . . because of freedom from expansion and contraction strains and provisions against leakage.

If your power-generating equipment or plant processes require cooling of liquids, be sure to investigate the G-R Multiwhirl Cooler. Write for Bulletin 710 describing these units in detail.

**G-R BUILDS ALL THESE UNITS FOR HEAT TRANSFER SERVICE . . .**

- Evaporators
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*Pioneers in Heat Transfer Apparatus*

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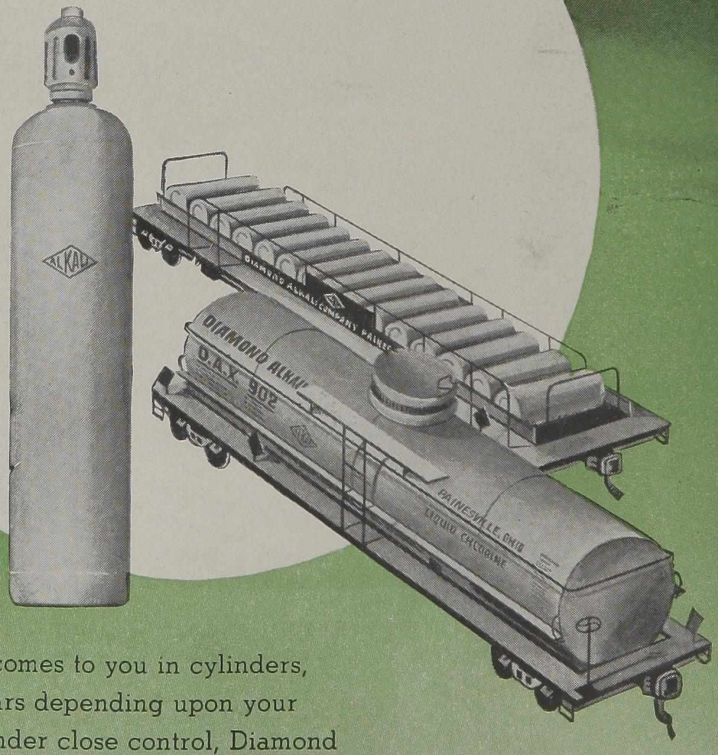


Diamond Liquid Chlorine comes to you in cylinders, multi-unit cars or tank cars depending upon your requirements. Made under close control, Diamond Liquid Chlorine is uniform, dependable and of highest quality,—always!

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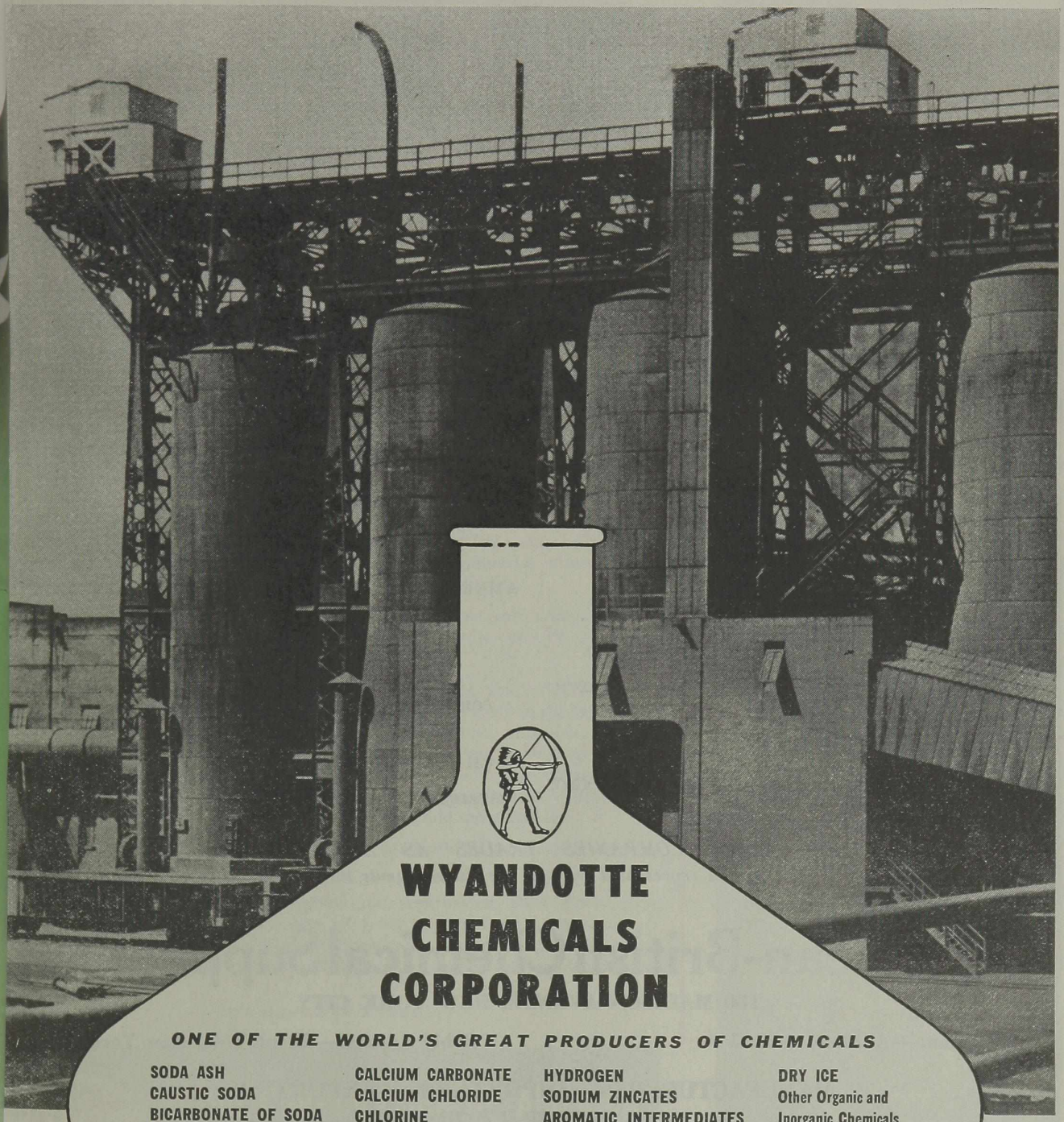
These 135-foot kilns of the Wyandotte Chemicals Corporation at Wyandotte, Michigan, handle many hundreds of tons of limestone every day. From the grey-white rock rich in calcium carbonate come soda ash and other basic materials which are the sources of the long list of Wyandotte Chemicals.



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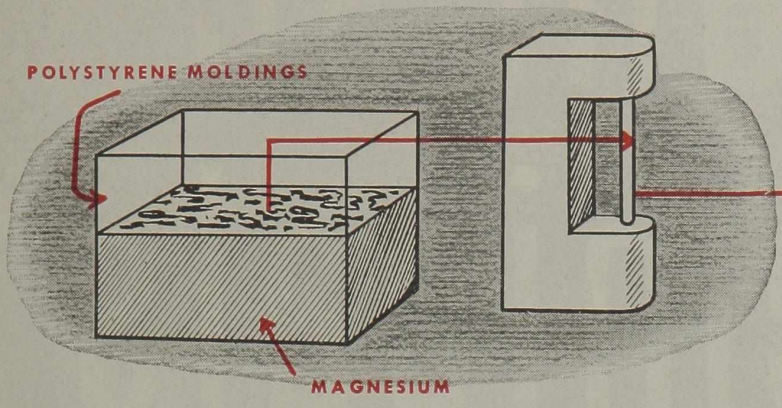
# How The Dow Chemical Company Uses the RCA Electron Microscope




**Polystyrene-silica method of reproducing surface contours into thin films.** *(1) The surface to be studied is molded in polystyrene at 160 deg. C. and under 1500-2000 lb./in.² pressure. (2) The original surface is separated from the molding mechanically, if possible, or by dissolving away the specimen with the appropriate reagent, if necessary. (3) Quartz is evaporated onto the molding in a vacuum chamber to yield an amorphous silica replica of a thickness of about 200A. (4) The surface of the molding is scored into ⅛-inch squares and then immersed in a dish of ethyl bromide containing 10 percent benzene. In a few minutes the silica squares are released, whereupon they are transferred into a rinse consisting of ethyl bromide containing a few percent of iso-amyl alcohol. They are picked up on standard specimen screens, blotted on filter paper, and are ready for examination.*

OBVIOUSLY, the tremendous magnifications and extraordinary resolution obtainable with the RCA Electron Microscope can be very elpful to the study and improvement of many industrial materials, roducts and processes, now imperfect.

Even surface studies of electronically opaque bodies—metals, minerals, lasses, etc.—can be conducted with excellent results via electron microcopy utilizing appropriate techniques.

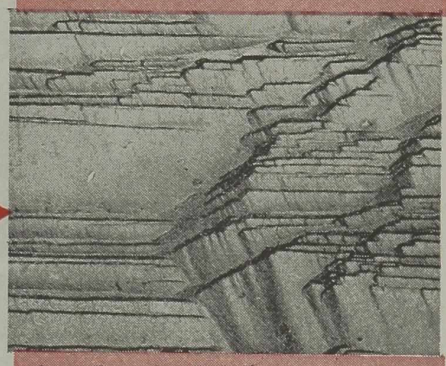
One of the most successful of these techniques is the polystyrene-ilica, surface-replica method, used by Heidenreich and Peck in the laboraories of The Dow Chemical Company. By this method, described elsewhere in this advertisement, replicas having thicknesses as low as 0.01 nicrons can be made, reproducing with extreme fidelity the characteristics of the surfaces to be studied. Electron micrographs of such replicas ield important information previously unknown and inaccessible.

Several such micrographs are published herewith by courtesy of The Dow Chemical Company.

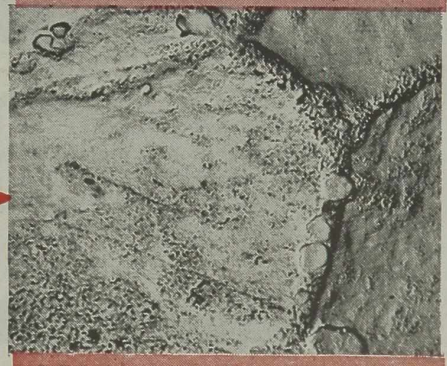
In many other industrial companies and institutions, RCA Electron Microscopes are disclosing new data of great scientific and commercial alue. RCA specialists are ready, at all times, to advise regarding the potential value of the RCA Electron Microscope in any suggested application.

Natural Surface of a Magnesium Single Crystal grown from the Vapor Phase. X4,750

Lamellar Precipitation in a Magnesium Aluminum Alloy. X4,750



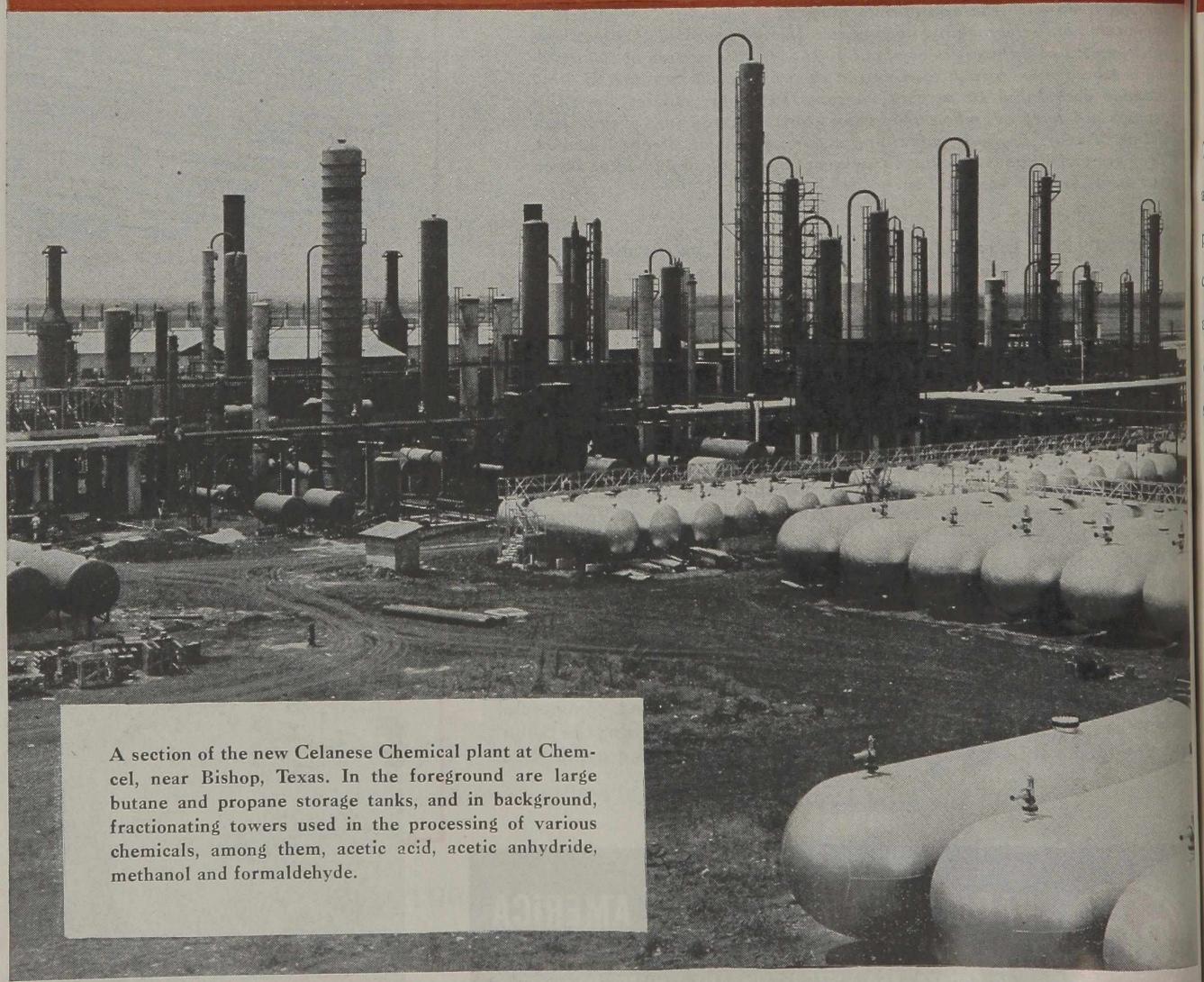
Crystallographic Etch Attack in a Magnesium Aluminum Alloy. X4,750



Polished and Etched Dowmetal M-Alloy. X4,000

BUY MORE WAR BONDS

# Celanese* Chemicals



A section of the new Celanese Chemical plant at Chemcel, near Bishop, Texas. In the foreground are large butane and propane storage tanks, and in background, fractionating towers used in the processing of various chemicals, among them, acetic acid, acetic anhydride, methanol and formaldehyde.

**CELANESE CORPORATION OF AMERICA**

# Where practical research is governed by the end use

THE NEW Celanese chemical plant, now in operation at Chemcel near Bishop, Texas, greatly enlarges the production facilities for Celanese organic chemicals. The expanse of fractionating columns, towers and collector tanks reflects the growing importance of this phase of Celanese operations and the research responsible for its development.

This new plant is located near major sources of natural gas. From it will come an important list of organic chemicals for industrial uses: lacquers, plasticizers, resins, adhesives, solvents, cleaners, paints, drugs, rubber, preservatives, plastics . . .

PLASTICIZERS
ORGANIC PHOSPHATES
LUBRICANT ADDITIVES
INTERMEDIATES
DYESTUFFS

Especially noteworthy are facilities for producing such important chemicals as acetaldehyde, acetic acid, acetic anhydride, acetone, formaldehyde, methanol and butadiene.

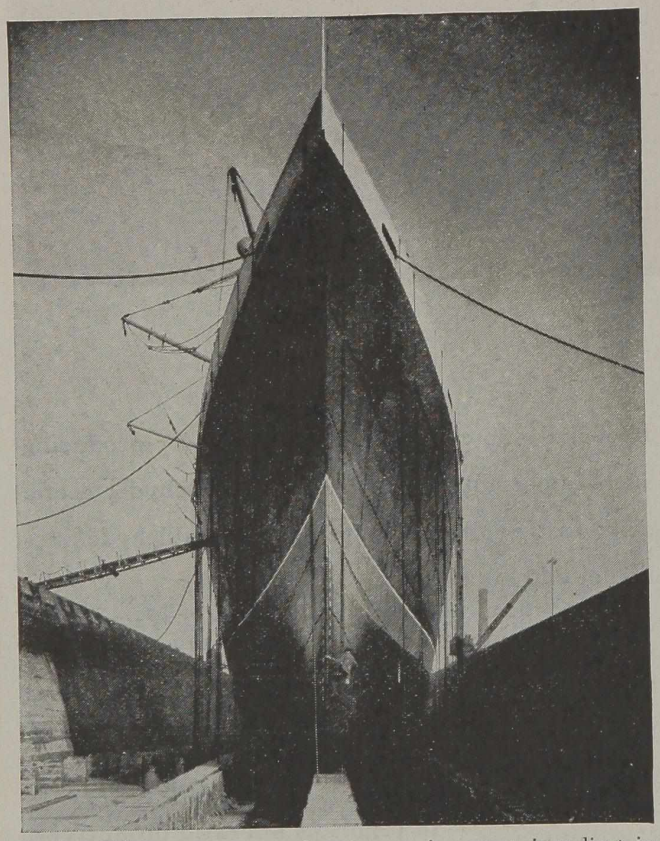
The contribution of synthetics to industrial processes has greatest practical effectiveness when end uses are known and objectives anticipated. That is why the Celanese research staff welcomes inquiries in terms of specific objectives. Celanese Chemical Corporation, *a division of Celanese Corporation of America*, 180 Madison Avenue, New York 16, N. Y.

*Reg. U. S. Pat. Off.

TEXTILES • PLASTICS • CHEMICALS

**Better Wrappings**—thanks to C. P. glycerine. Because it is non-toxic, it is safe to use in making transparent wrappings that come in contact with foods, such as cakes, candies, breads, etc.

**Better Foods**—thanks to glycerine. C. P. glycerine, a product of nature, is a food itself. That's why it's so beneficial and safe to use in beverages, candies, flavorings, other food products.



**Better Paints**—thanks to glycerine, an important ingredient in the manufacture of alkyd resins, used for making tough, long-lasting protective coatings. Nothing takes the place of glycerine.

# Why Glycerine is a Superior Humectant: LOW VAPOR PRESSURE

MANY materials and products are required to remain soft and pliable—not dry out through loss of moisture. Tobacco, adhesives, and dentifrices are just a few examples of this. Humectants (hygroscopic, water-attracting agents) are used to retain and preserve these qualities, by holding moisture, and also to add their own plasticizing action.

One of the most important properties needed in a humectant is resistance to evaporation—low vapor pressure. That is an outstanding characteristic of glycerine, which, together with its other properties, is the reason why glycerine is such a superior humectant, and why it is used by so many manufacturers.

The following table shows the vapor pressures (in millimeters of mercury) of glycerine and some other humectants at 30°C.

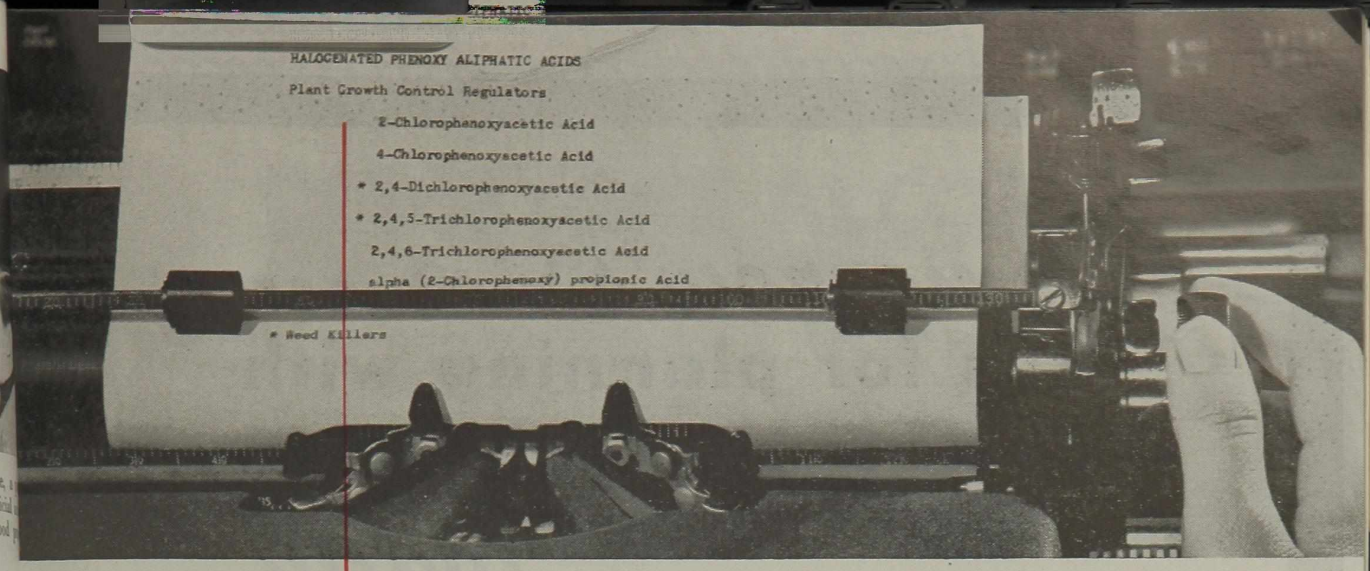
| *Glycerine* | *Humectant "A"* | *Humectant "B"* | *Humectant "C"* |
|---|---|---|---|
| 0.0005 | 0.16 | 0.009 | 0.32 |

This low vapor pressure of glycerine means that it will "stay put." It means that the composition of the material in which glycerine is used will remain substantially the same over long periods of time. It means satisfaction to consumer buyers.

Low vapor pressure, high viscosity, non-toxicity, high solvent power, compatibility, and other valuable properties, plus economy, make glycerine a superior humectant. Use glycerine, which is now freely available for the production of civilian goods. Glycerine Producers' Association, 295 Madison Avenue, New York 17, N. Y., Dept. N-6.

**Better Cosmetics**—thanks to soothing C. P. glycerine, which helps to keep skin soft and smooth. Think of glycerine, now freely available, when you plan new products. Use it—and be *sure!*

**Better Pharmaceuticals**—thanks to C. P. glycerine, the tried and tested ingredient, proved through generations of use. Use crystal clear glycerine in the formulation of your products—and be *sure!*




*from the Dow "Library" of Special Chemicals*

# Six Halogenated Phenoxy Aliphatic Acids

*Plant Growth*
*ntrol Regulators*

## Now available from the basic producer

These six chlorinated phenoxy aliphatic acids are horticultural chemicals of unusual interest. They are already attracting wide attention as weed killers and plant growth control regulators.

Two members of the group . . . 2,4-Dichlorophenoxyacetic Acid and 2,4,5-Trichlorophenoxyacetic Acid . . . are very efficient weed killers, capable of destroying many common weeds while leaving grass unharmed. All six chemicals are plant growth control agents. Certain of these are adapted for use in stimulating root growth on cuttings, setting fruit on tomato vines, preventing drop of apples and pears, and speeding ripening of bananas.

Dow's access to necessary raw materials underlies its position as basic producer of this group of chemicals.

*All six of these interesting compounds are available from Dow. Samples will gladly be supplied for investigational purposes. Your inquiries are invited.*

**THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN**

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DOW

CHEMICALS INDISPENSABL
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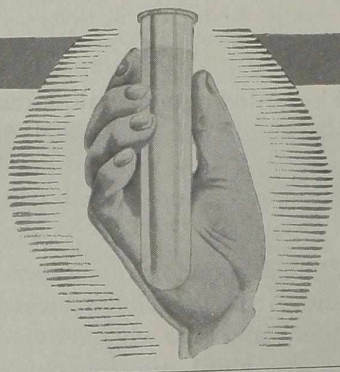
# *Tomorrow's* business calls for planning with HARDESTY ....*Today*

Yes, those easy-going, order-taking days are over — the competitive race is on! And if you are a consumer of fatty acids or related products, this means that to get *your* share of postwar profits you must have ready access to a dependable source of materials of controlled quality and purity.

Well — throughout the war, HARDESTY's research chemists were patiently creating new materials . . . materials of such revolutionary character that they will replace, at less cost, many of the prime materials formerly imported. HARDESTY has no reconversion problem and our "stepped-up" production and improved manufacturing facilities are your assurance of top quality, specially-processed products when you — and your customers — need them most.

Why not talk your problems over with us. We'll be glad to show you how we can help you step up quality, cut down costs . . . win consumer acceptance in a highly competitive market!

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



HARDESTY

**W. C. HARDESTY CO.**

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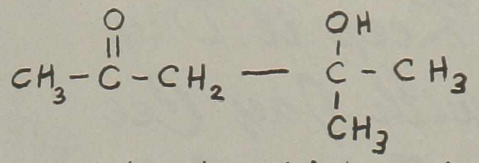
FACTORIES: DOVER, OHIO · LOS ANGELES, CALIF. · TORONTO, CANADA

# DIACETONE ALCOHOL

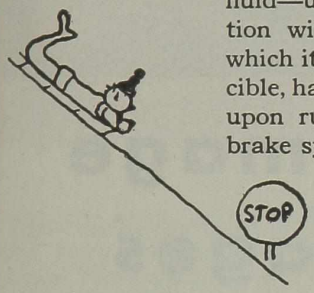
Diacetone Alcohol is miscible in all proportions with water . . . with most organic solvents. Because of its high boiling point and slow evaporation rate it is generally used as an active slow-drying solvent.



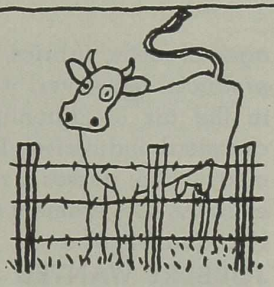
Molecular Weight 116.16

As a solvent, Diacetone blends readily with nitrocellulose and cellulose acetate in lacquer and thinner preparations . . . where it contributes blush resistance. Generally speaking, it is also a good solvent for natural resins and gums.

Diacetone is used as an ingredient in hydraulic brake fluid—usually in combination with castor oil with which it is completely miscible, has a minimum effect upon rubber parts in the brake system, high boiling point, low vapor tension, and low freezing point.




Diacetone is a satisfactory vehicle for organic fungicides and wood preservatives for the impregnation of fence posts and wood to be exposed to conditions of decay.



*Inquiries about possible use of Diacetone in your processes are welcomed*

## SPECIFICATIONS

| | |
|---|---|
| Specific Gravity 20°/20° C. | 0.938 to 0.941 |
| Color | Maximum 25 platinum cobalt (Hazen) standard |
| Water | No turbidity when one volume is mixed with 19 volumes of 60° Bé. gasoline at 20° C. |
| Acidity (other than carbon dioxide) | Maximum 0.01% calculated as acetic acid |
| Distillation Range | Distillation range is not included in our specification for diacetone alcohol because it is no indication of purity. Diacetone alcohol slowly reverts to acetone when distilled at atmospheric pressure. But it can be readily distilled at reduced pressure without appreciable decomposition if temperature is maintained below 120° C. |
| Water Solubility | Miscible with distilled water in all proportions without turbidity |
| Weight | 7.83 lbs. per gal. at 20° C. (approx.) |

## PHYSICAL PROPERTIES

Several of the physical properties of diacetone alcohol are given in the following table:

| | |
|---|---|
| Specific Gravity 20°/4° C. | 0.9382 |
| Boiling Point | 166° C. (approx.) |
| Melting Point | –44° C. |
| Viscosity at — 1.8° C. | 7.8 centistokes |
| — 2.7° C. | 8.1 " |
| — 15.0° C. | 15.3 " |
| — 30.9° C. | 43.6 " |
| — 42.7° C. | 128 " |
| — 49.5° C. | 298 " (super-cooled liquid) |
| Flash Point, Tag Open Cup | 151° F. |
| Tag Closed Cup | 138° F. |
| Vapor Pressure at 0° C. | 0.14 mm. Hg. |
| 10° C. | 0.36 " " |
| 20° C. | 0.84 " " |
| 30° C. | 1.8 " " |
| Refractive Index, $N_D^{20}$ | 1.4232 |
| Coefficient of Expansion | 0.000533 per °F. |
| Solubility | Miscible in all proportions with water. Miscible with hydrocarbons. |

Azeotropic Data: Diacetone alcohol forms a constant boiling mixture with water. This mixture boils at 99.8° C. and contains approximately 12.7% by weight of diacetone alcohol.

*For further properties and uses communicate with either of the addresses below*

**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


# Avoid Moisture Damage in Over-Seas Packages

Simply put a few small bags of Jay Cee Silica Gel, like the ones above, inside your container . . . wrap or seal tightly . . . and ship over-seas without fear of damage from "in-the-package" moisture. Jay Cee Silica Gel is an ideal drying agent . . . has amazing power to absorb atmospheric moisture. Thus the air inside of containers is kept absolutely dry and delicate metal parts are protected from rust and corrosion.

Jay Cee Silica Gel is also used in packages of foods, fabrics, chemicals, and other products. Moreover, it has wide application in the air conditioning, refrigeration, and chemical industries. Jay Cee Silica Gel is clear white; passes a rigid section test; meets exacting Government specifications; is strictly a quality product.

**JOBBERS WANTED** — There are excellent opportunities for jobbers to build profitable business on Jay Cee Silica Gel in a few territories. Write for details.

**JOLIET CHEMICALS, LTD., INDUSTRY AVENUE, JOLIET, ILLINOIS**

JAY CEE **SILICA GEL**

*A superior dehydrant*


Columbia Research Laboratories

*Report*

# Vinyl-Type Polymerization

WITH THE AID OF

# Butadiene Monoxide..

BUTADIENE MONOXIDE reacts with acids and acid anhydrides to produce mono- and di-esters. These reactions are of interest because of the potentials indicated in vinyl-type polymerization.

***Monoacetate of Erythrol*** can also be produced by heating a mixture of potassium acetate, acetic acid and Butadiene Monochlorohydrin (available as an 80% solution). The reaction produces the secondary alcohol and some Erythryl Diacetate.

***Erythryl Diacetate*** can be obtained in yields up to 90% by refluxing Butadiene Monoxide with acetic anhydride in the presence of strong acid catalysts. Ferric chloride or titanium tetrachloride are suitable; sulfuric acid or boron trifluoride tend to give higher-boiling tarry by-products.

Phthalic anhydride reacts with Butadiene Monoxide in the presence of a trace of phthalic acid to form alkyd-type resins; the use of metallic sodium as a basic catalyst gives a superior product which can undergo vinyl-type polymerization to give an insoluble, cross-linked resin.

## Technical Data and Samples

Butadiene Monoxide [(3,4-Epoxy-1-butene) (Vinylethylene Oxide)] is a colorless, relatively volatile, liquid organic compound possessing both carbon to carbon unsaturation and an alpha-epoxide group. The characteristics of this compound render it useful in diverse organic processes in addition to the production of polymerizable alkyd resins and unsaturated alcohol ethers and esters.

Important potentials are suggested for a variety of other organic chemical products and pharmaceuticals.

A Technical Bulletin reporting various reactions of Butadiene Monoxide is available on request. Samples also may be obtained for experimental purposes in your laboratory.

**COLUMBIA CHEMICALS**

TTSBURGH PLATE GLASS COMPANY • COLUMBIA CHEMICAL DIVISION

GRANT BUILDING, PITTSBURGH 19, PENNSYLVANIA

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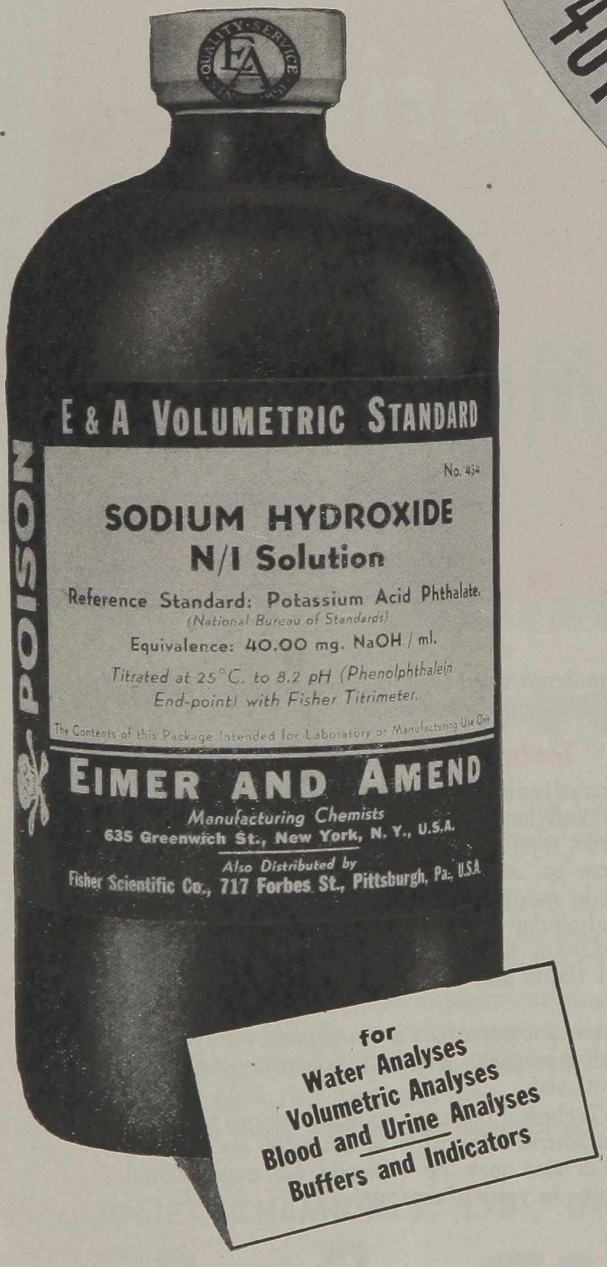


for
Water Analyses
Volumetric Analyses
Blood and Urine Analyses
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All the standard and test solutions regularly prepared in Eimer and Amend's laboratories are described in the new booklet shown above. The list is but a small portion of the hundreds of solutions which are prepared and standardized; it includes, however, those solutions which laboratories generally obtain to save time and insure greater accuracy.

Eimer and Amend's solutions are accurately prepared and very carefully standardized by means of the latest approved methods and electronic instruments. The Volumetric Standards are guaranteed to be within $\pm 0.05\%$ of the normality stated on each label.

*If your laboratory has not received "Eimer and Amend Standard and Test Solutions," write for a free copy today.*

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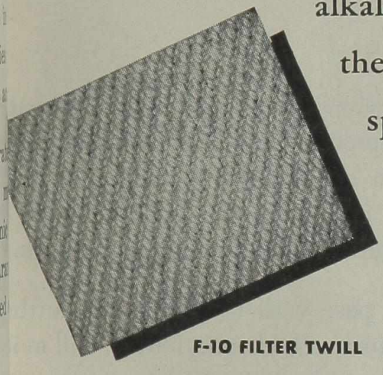
# Filter FABRICS

Because of the variety of problems found in filtration processes, it has been necessary to develop a wide range of fabrics suitable for use as filter septa. Variations in types of filters, the range of pressures in filter presses, problems in viscosity and in the filtration of corrosive liquors, require filter fabrics suited to the particular problem.

VIN-28 CHAIN CLOTH

●

We offer not only a variety of standard cotton constructions such as sheetings, drills, twills, and ducks, but also offer synthetic fiber fabrics of VINYON*, which are resistant to mineral acids and strong alkalis. Our engineers can help you to determine the conditions under which such fabrics should be specified.



F-10 FILTER TWILL

●

The synthetic fibre fabrics have certain heat limitations and are made in a limited range of constructions.

●

In writing, please give information regarding the nature of fluid to be filtered, type of filter machine used, pressure and temperature, etc.

**BUY MORE WAR BONDS**

Reg. Trade Mark C. & C. C. C.

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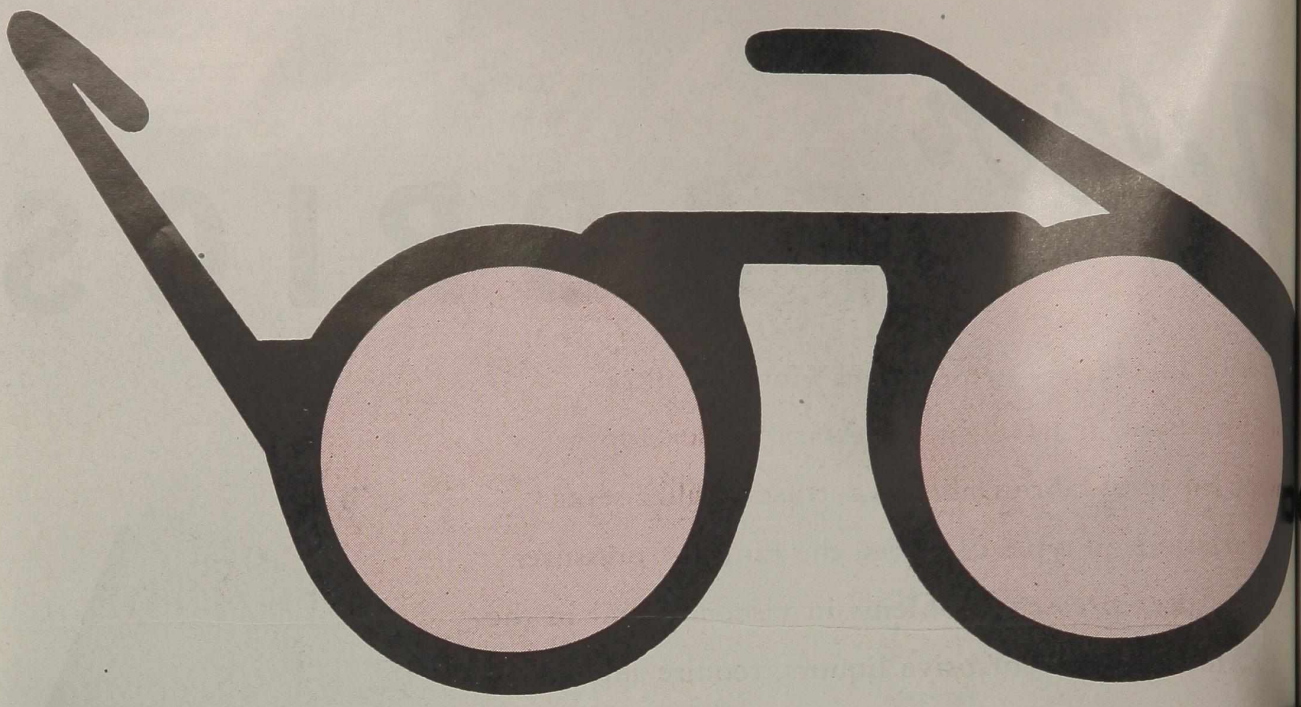


# ROSE-COLORED

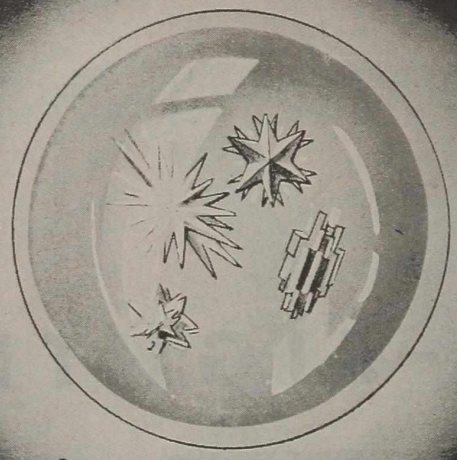
AFTER JAPAN — *what?* Many ask, "What about post-war conditions in the chemical field?" Badger people get around. We see and hear a lot. Favorable reshaping of the economic world presages a future of unprecedented peacetime greatness for American interests . . . in scope of products, and in both foreign and domestic marketing.

Plainly, the view is rose-tinted — PROVIDED the industry does not relax on the assumption that the war has crowded into five years at least two decades of normal research and development. Working through several generations of chemical-product discoveries and advancements in process engineering, Badger has seen the truth of the axiom *"There is always a better way."*

We ourselves have contributed to m important process improvements — cond ing many a new process through the p plant stage and designing the equipmen plant for successful commercial product

To keep pace with the inevitable fur developments in the chemical fields, still m changes—in standards, methods, processes equipment — will be needed.

We are ready . . . ready to help responsible concern in the chemical, p chemical or petroleum-refining industry organized to apply Badger's vast accumul of experience toward refitting today's fa ties to meet tomorrow's requirements — opportunities.



# *Crystal Craft—in sugar . . . and other chemical processes*

HAVE you ever watched the operator of a vacuum pan in a sugar factory? By experience, he can take a sample from the "proof stick", smear it on a glass plate, and decide whether the "strike" is ready to be dropped. There are several factors that enter into his decision; namely, — degree of saturation, uniformity of crystal size, texture of the crystals, brix, etc. Literally speaking, he has "Crystal Craft".

Yet, behind the scenes, another master tool is at work. Nuchar Activated Carbon is a most effective and dependable means of purifying by adsorption. Nuchar removes unwanted odors, flavors, and colors, improves the melting point of crystals and results in higher purity, removes bodies that inhibit crystal growth, thereby giving perfectly formed crystals, and in some cases results in higher crystal yields.

Nuchar Activated Carbon's tremendous surface area and adsorption powers speak in its favor, and are responsible for its wide acceptance in many chemical processes.

Try adsorption methods of purification and you'll step up production at a marked saving. Write for your sample of Nuchar Activated Carbon now.

***Nuchar Activated Carbons ★ Abietic Acid ★ Snow Top Precipitated Calcium Carbonate ★ Liquid Caustic Soda ★ Chlorine Indulin (Lignin) ★ Liqro Crude Tall Oil ★ Indusoil Distilled Tall Oil ★ Tall Oil Pitch ★ Sulphate Wood Turpentine***

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Porocel is one of the many guards keeping strict watch over the production of high-grade fighting materials for our armed forces both at home and abroad. Sabotage of refining operations by the activities of foreign matter is unlikely when Porocel is on the job.

Porocel is doing guard duty in HF Alkylation Plants throughout the world. Unwanted reaction products are effectively eliminated from the alkylate simply by passing the alkylated mixture through beds of this activated bauxite adsorbent.

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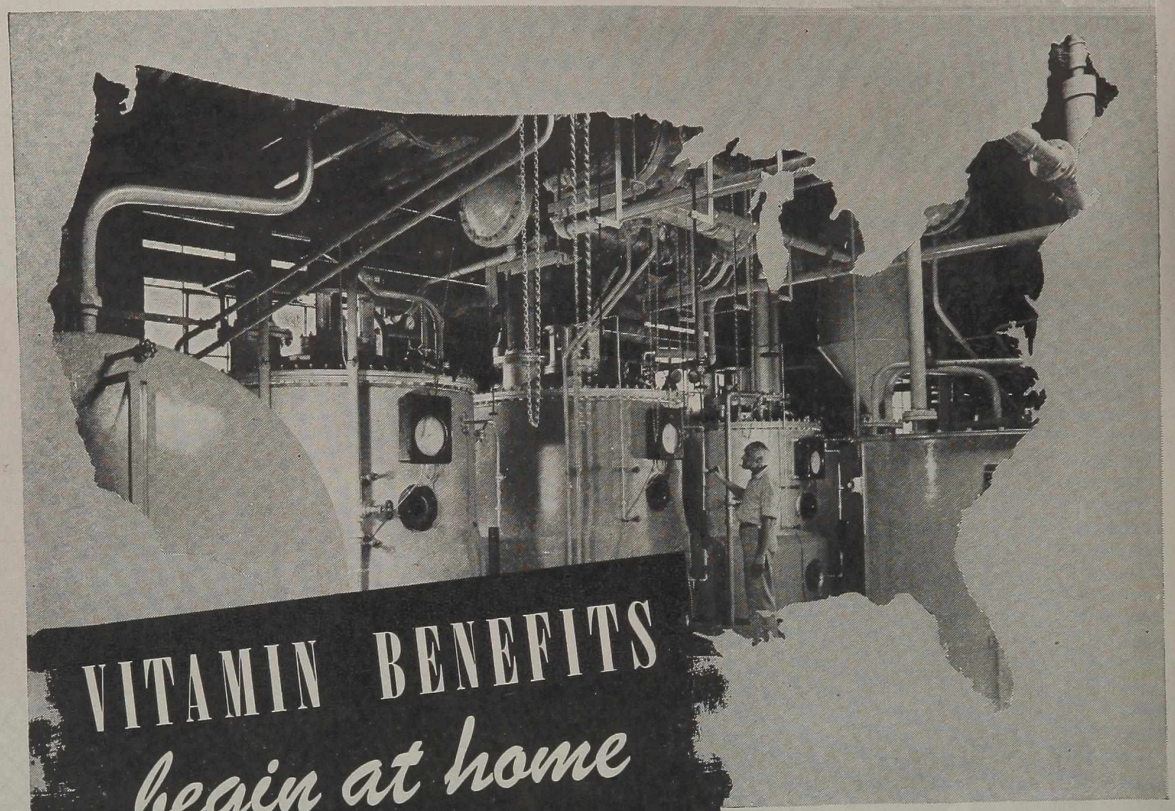
Write to Attapulgus Clay Company (Exclusive Sales Agent), 260 South Broad Street, Philadelphia 1, Penna.

**POROCEL CORPORATION • Bauxite Adsorbents and Catalysts**



# VITAMIN BENEFITS *begin at home*

Vast as our overseas vitamin shipments have been all along, still larger requirements in the United States are being met. While America lends a helping hand in European rehabilitation, our own food processors and ethical pharmaceutical manufacturers are getting what they need.

The major share of an immense American vitamin production is consumed in this country. This parallels another fact; the entire lend-lease shipments for 1944 were only six percent of a total American supply 35 percent greater than pre-war averages.

We at Chas. Pfizer & Co., are high on the list of American producers of riboflavin and ascorbic acid for domestic as well as overseas use. While not permitting ourselves to relax on the quantities needed today, we are also avoiding any relaxation on quality.

Uncompromising insistence on quality-first has been a foundation of Pfizer's service to industry and medicine since 1849. While we have pioneered as manufacturing chemists from the beginning of our company's life, our staff now includes biological engineers, pioneers of today. Chas. Pfizer & Co., Inc., 81 Maiden Lane, New York 7, N. Y.; 444 West Grand Avenue, Chicago 10, Illinois.

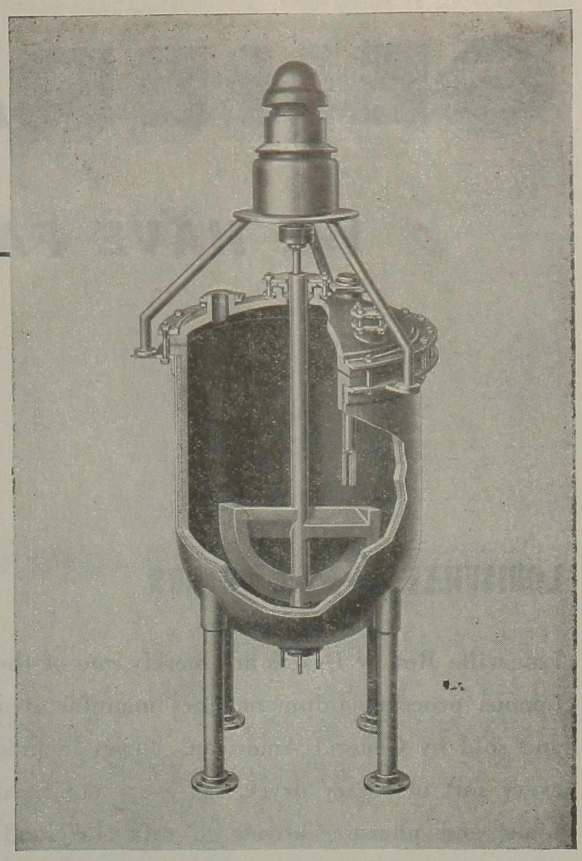
# PFIZER

PFIZER QUALITY

*Manufacturing Chemists Since 1849*

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

**New Processes Call for Higher Temperatures**



## General Ceramics

# PRESCRIPTION FOR PROCESSING

## at Higher Temperature

## is Armored Stoneware Kettles Complete With Agitator

CHEMICAL Stoneware has the corrosion resistance necessary to withstand the complex reactions used in modern processing plants. To utilize this material of construction, which is not only corrosion resistant but CORROSION PROOF, in operations which call for a high resistance to thermal shock and mechanical abuse, General Ceramics has designed the Armored Kettle illustrated.

This piece of equipment consists of a stoneware boiling kettle, manufactured of a body that has a high thermal shock resistance, mounted in a steel shell which not only serves as a support but also protects the apparatus from mechanical abuse. The head, also made of a heat resistant body, is secured to the kettle body by means of a cemented-on steel flange. The outlets are equipped with standard A.S.A. flanges. The drive is a gear head motor direct connected to a stoneware agitator and the entire assembly is heated with a tantalum coil.

This piece of apparatus is a typical example of how General Ceramics can take the load of designing and purchasing from your organization and supply you with a complete installation "ready to operate" upon receipt of your specifications.

Your inquiries on this piece of equipment or any other special processing apparatus are invited.

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**CHEMICAL EQUIPMENT DIVISION**
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In addition to the manufacturing facilities of the Chemical Equipment Division those of the Insulator Division are also available for handling ceramic problems in all branches of industry. General Ceramics & Steatite Corporation is therefore able to offer service covering all industrial applications of ceramic products.

8097

# GENERAL AMERI

## WE HAVE FACILITIES AND EXPERIENCE

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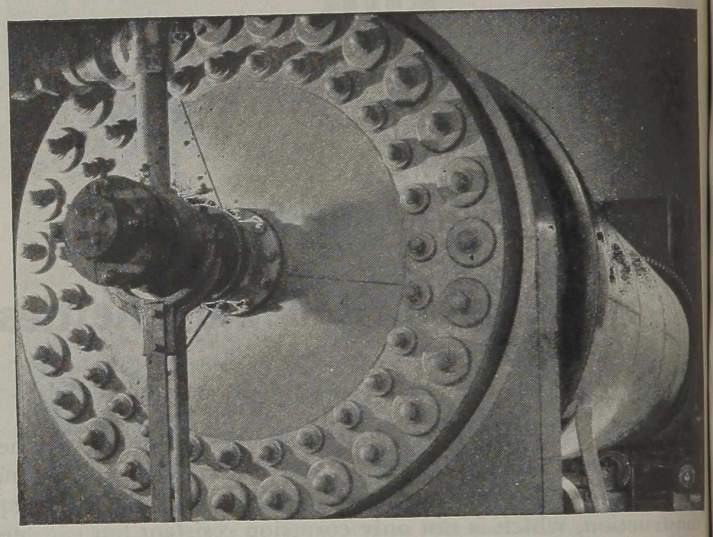
Louisville Rotary Dryers are merely *one* of the famous process equipment lines manufactured and sold by General American. Types include every sort of rotary dryer, for every use from foods and pharmaceuticals to salt and sand. Write for Bulletin No. 52 describing design and construction, Bulletin No. 53 describing the Steam-Tube type, or Bulletin No. 54 describing the Counter-Current and Parallel-Current Direct Heat types — or for *any* information you may want about rotary dryers, evaporators, drum dryers, filters, mixers, etc.



CONKEY FILTERS, CONKEY EVAPORATORS, TURBO-MIXERS, PETERSON SYNCRO-DRUM FILTERS, GENERAL AMERICAN HYDROSEPARATORS, GENERAL AMERICAN CLASSIFIERS, GENERAL AMERICAN KILNS, AMERICAN DRUM DRYERS, REICH PROCESSES, LOUISVILLE ROTARY COOLERS, LOUISVILLE ROLLER PRESSES AND SCREENS

# GENERAL AMERICAN TRANS

## PROCESS EQUIPMENT DIVISION

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If you haven't studied the potent possibilities of product improvement available through the use of Nimco Brand Lanolin, 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**

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2. GREATER *UNIFORMITY*
3. BETTER *COLOR* QUALITY
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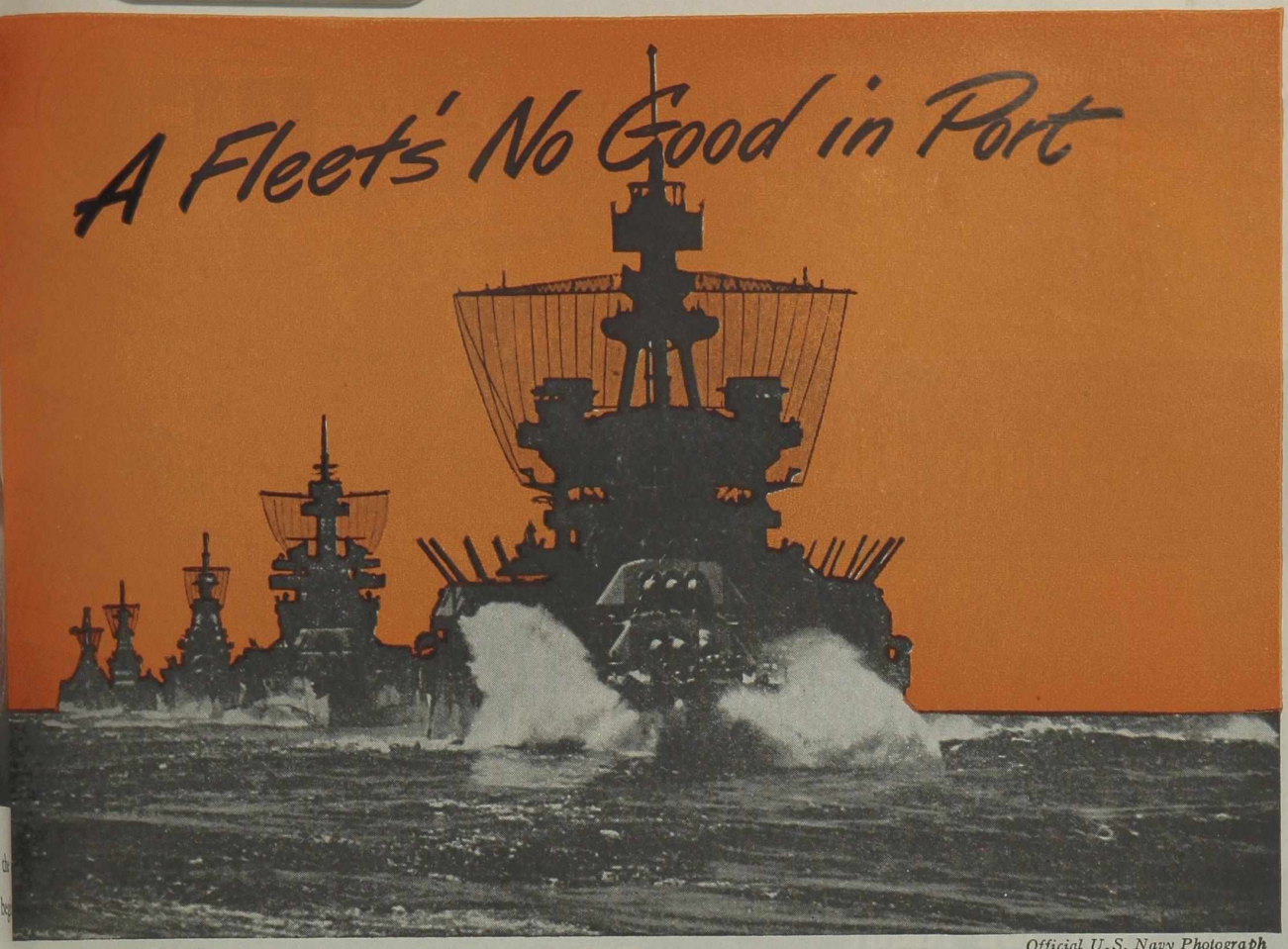


*Official U.S. Navy Photograph*

# Columbia keeps its fleets of Chlorine and Caustic Cars IN ACTION!


**Typical Records . . .**

Chlorine Car PPGX 217—
42 miles in delivering to eight different industries within 118 days.

Chlorine Car PPGX 223—
8,639 miles in 98 days, also to 8 industries.

Caustic Car GATX 32934—
2,615 miles in 140 days, 14 different industries.

Caustic Car GATX 32941—
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One of the highly important factors in our Navy's successes has been the maintenance of the various fleets at sea for an extraordinarily high percentage of time. Officers fly back to bases in advance of their fleet's return, for example, to assemble supplies for immediate loading.

Columbia, too, speeds the turnaround of its fleets of special cars. Inspection, reconditioning and loading are handled with all possible dispatch in order to increase the productivity of every car.

Customers and carriers have co-operated in speeding turnarounds and rolling up the miles for a most impressive record for these fleets. This continued teamwork, especially while demands on transportation facilities remain high, will be repaid in the delivery of greater volumes of these essential war supplies.

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ARMY NAVY

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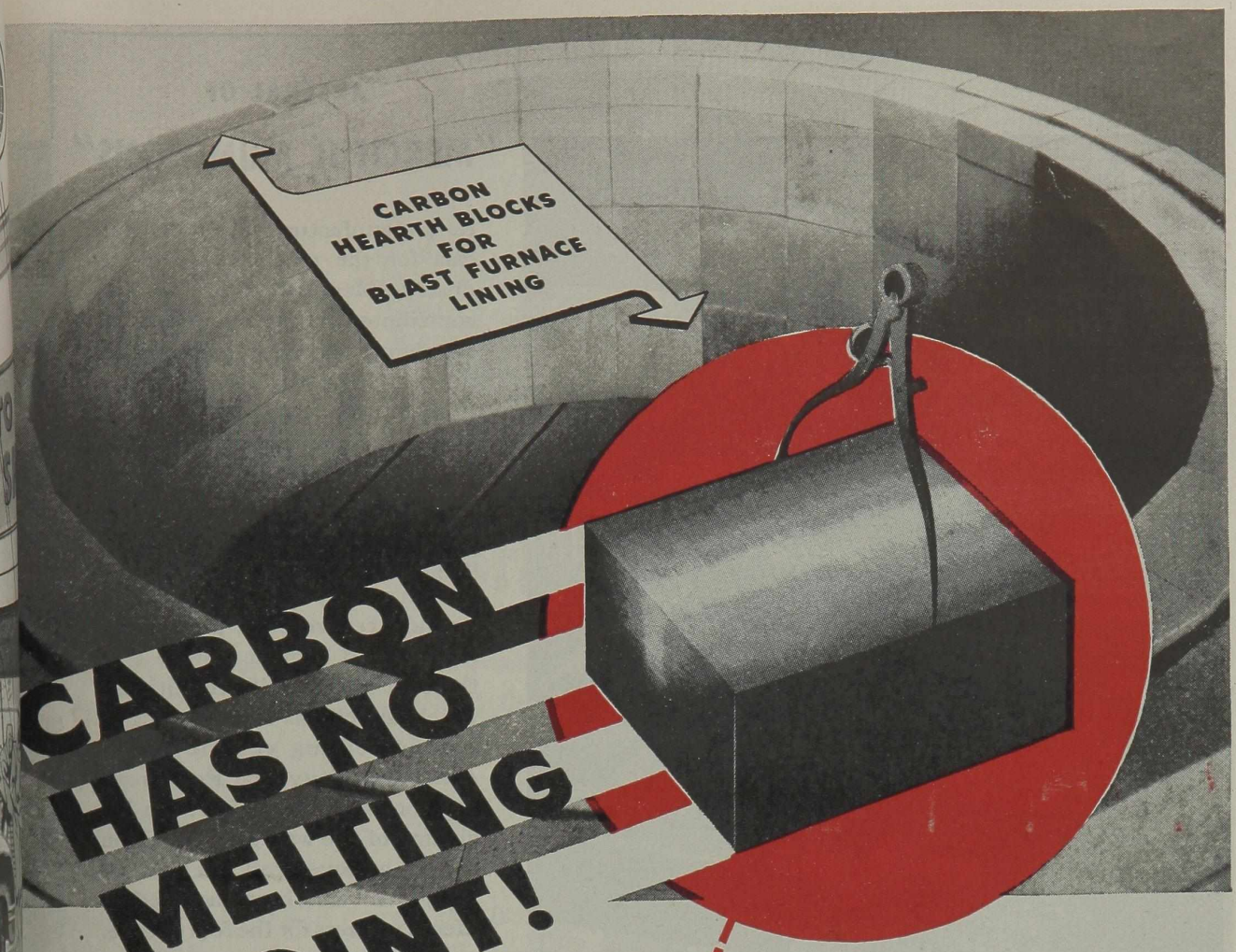
**SYNTHETIC RESINS • CHEMICAL COLORS • INDUSTRIAL PLASTICS • INDUSTRIAL CHEMICALS**




# CARBON HAS NO MELTING POINT!

CARBON, in all forms, volatilizes without melting at temperatures far above those encountered in commercial operations.

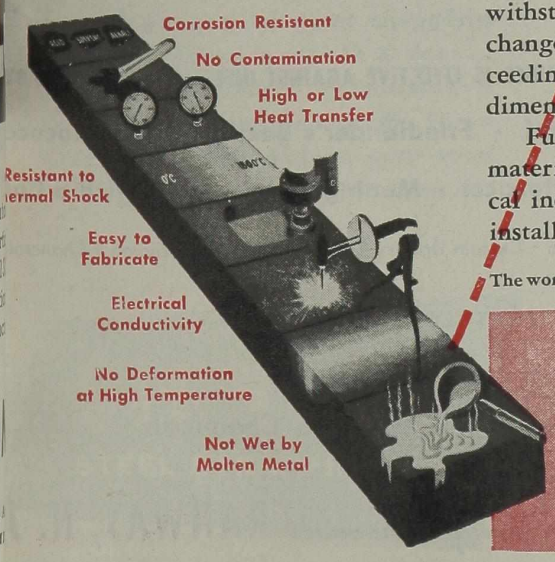
The use of large carbon blocks for blast furnace linings is an excellent example of carbon's extraordinary ability to retain its shape—*and strength under pressure*—at white hot temperatures. In addition, it is highly resistant to chemical attack by the most corrosive slags. Hence it has become the preferred material for many high temperature applications in the metallurgical and electrochemical fields.

Graphite's very low coefficient of thermal expansion—.0000015 per °F—explains why some graphite molds for ferrous and non-ferrous metals withstand several thousand pours without longitudinal or cross-sectional change. Graphite electronic tube components, at temperatures far exceeding operational requirements, maintain an unmatched degree of dimensional stability.

Furthermore, "National" Carbon and Graphite are available as porous materials or in the form of "Karbate" impervious products for the chemical industries. We invite your inquiries on the many applications and installations of these highly versatile materials of construction.

**BAR OF WHAT?**

Carbon, Graphite or "Karbate" materials, of course!

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*Unit of Union Carbide and Carbon Corporation*

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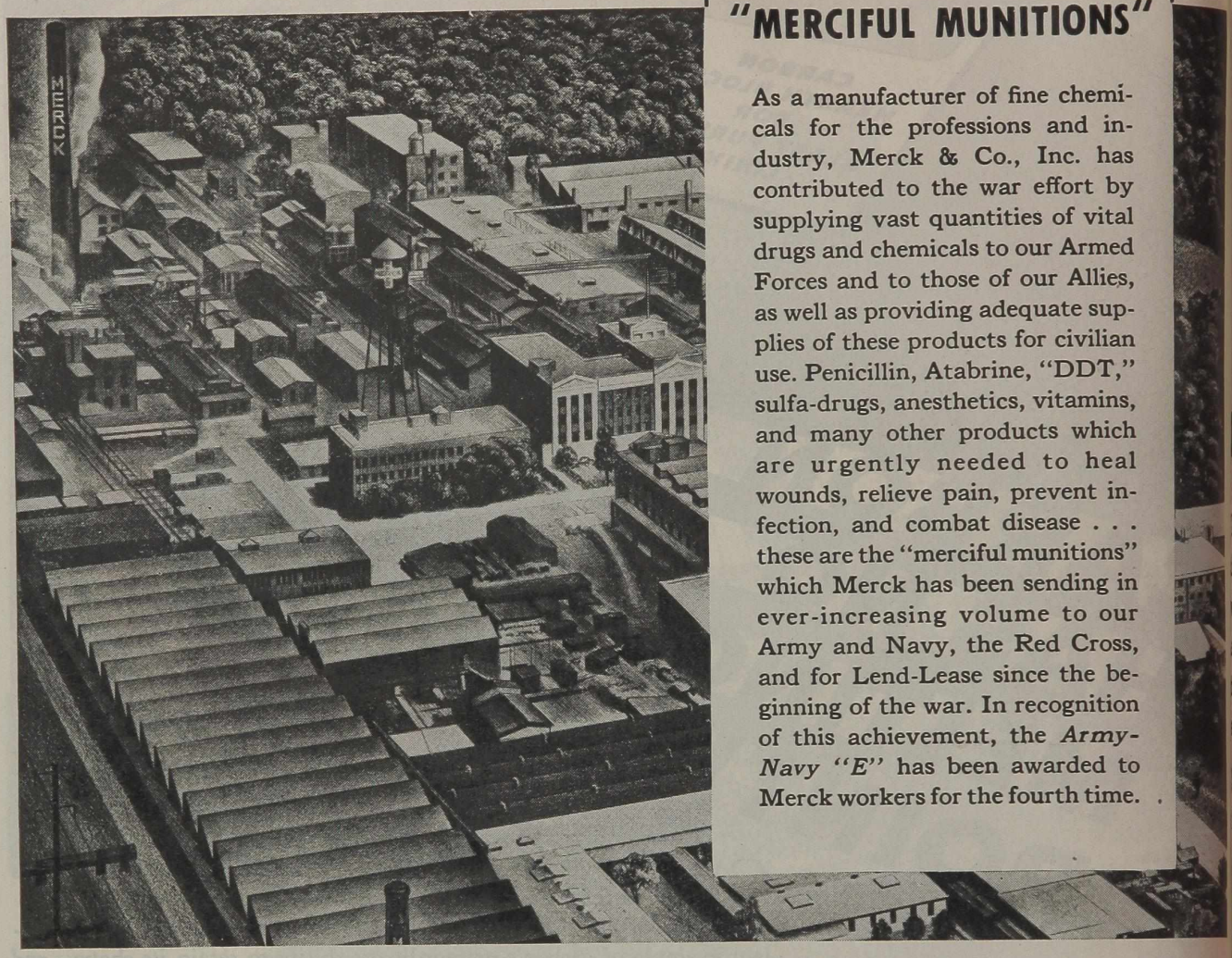

## ARSENAL OF
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As a manufacturer of fine chemicals for the professions and industry, Merck & Co., Inc. has contributed to the war effort by supplying vast quantities of vital drugs and chemicals to our Armed Forces and to those of our Allies, as well as providing adequate supplies of these products for civilian use. Penicillin, Atabrine, "DDT," sulfa-drugs, anesthetics, vitamins, and many other products which are urgently needed to heal wounds, relieve pain, prevent infection, and combat disease . . . these are the "merciful munitions" which Merck has been sending in ever-increasing volume to our Army and Navy, the Red Cross, and for Lend-Lease since the beginning of the war. In recognition of this achievement, the *Army-Navy "E"* has been awarded to Merck workers for the fourth time.

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**SULFANILAMIDE • SULFAPYRIDINE • SULFATHIAZOLE**

*These "merciful munitions"—in the development and production of which Merck & Co., Inc. has been privileged to play an important rôle—have rendered vital service both on the field of battle and at home.*

**THIS GROUP OF SULFONAMIDES IS EFFECTIVE AGAINST INFECTIONS PRODUCED BY:**

**Hemolytic Streptococci · Friedländer's Bacilli · Pneumococci**

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

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The ever continuing improvement of MGK Pyrocides* has been greatly stimulated by the tremendous military demands. As a result, higher standards of quality for insecticides derived from pyrethrum prevail for postwar production.

A companion program of research is now being carried on with DDT (dichloro-diphenyl-trichloroethane). In cooperation with one of America's largest chemical manufacturers, MGK is now developing and testing many new DDT insecticide formulations.

Identified and marketed under the Trade Mark "Multicide"* they will include the following:

LIQUID CONCENTRATES: Multicide Household Sprays, Multicide Livestock Sprays, Multicide Mill Sprays, Multicide Mosquito Larvicides.

SOLID CONCENTRATES FOR DUST AND SPRAYS: Multicide No. 80, Multicide No. 75WA, Multicide No. 50, Multicide No. 50WA, Dry Multicide.

*Remember both these names:*

MGK "Pyrocide" for pyrethrum formulations — MGK "Multicide" for DDT formulations

*They Both Stand for Fine Quality!*

# McLAUGHLIN GORMLEY KING COMPANY

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THIS reduction in water content has been made possible through extensive experimentation for military uses. An *improved* Chlorinated Lime has been developed by The Pennsylvania Salt Manufacturing Company which meets all the requirements of Chemical Warfare Service specification No. 197-54-281B, Grade 2.

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NOW . . . this superior product is available for civilian needs. Put out in a *new* container, it may be had in 700, 300 and 100 lb. drums. Prices furnished on request.

**Send for free descriptive booklet on Quaker *Improved* Chlorinated Lime**

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ACIDS, Sulphuric, Muriatic, Hydrofluoric, Hydrofluosilicic, Nitric • AMMONIA • ALUM, Sulfate of Alumina • HYDRATE OF ALUMINA • BLEACHING POWDER • AMMONIA, Anhydrous and Aqua • CARBON BISULPHIDE • CARBON TETRACHLORIDE • CAUSTIC SODA • CORROSION-RESISTING CEMENTS • LIQUID CHLORINE • FERRIC CHLORIDE • FLUORIDES AND FLUOSILICATES • HYDROGEN PEROXIDE • *KRYOLITH Flux and Opacifier • *KRYOCIDE Insecticide • *ORTHOSIL AND *PENNSALT METAL CLEANERS • SAL AMMONIAC • SODIUM ALUMINATE.

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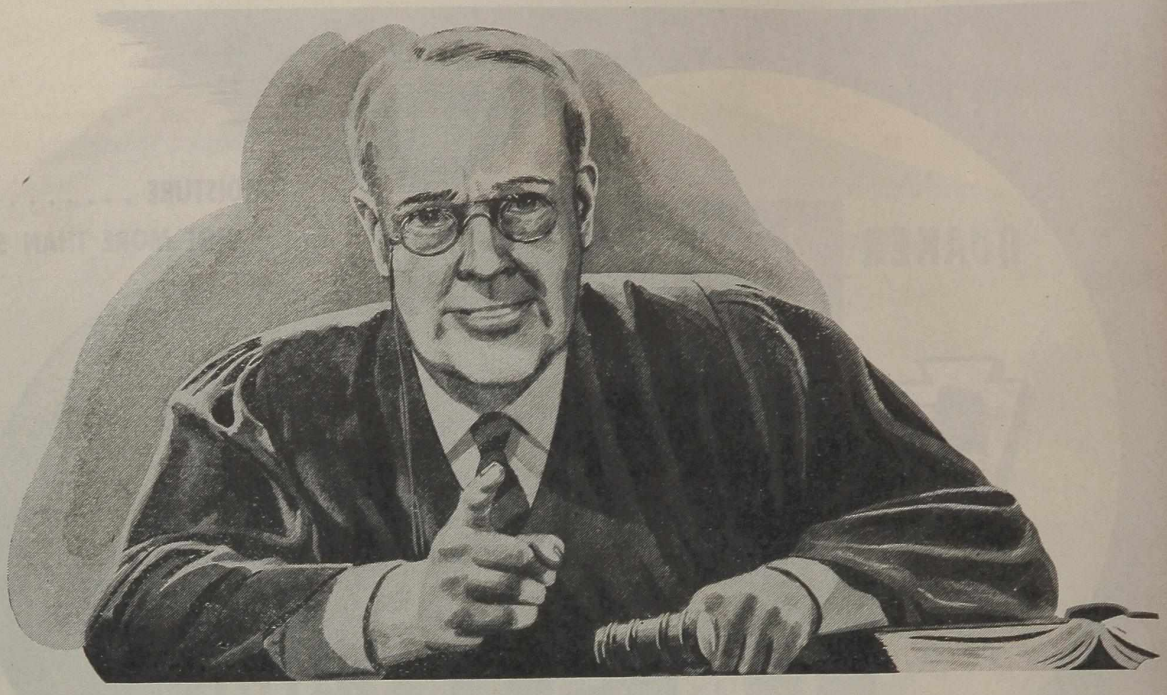

# Good Judgment—based upon facts

—tells you that the superiority of STANDARD SILICATES comes from *quality control* of all manufacturing processes. And you can be the judge of what this dependable high quality will mean in your regular production.

Standard is one of the country's largest producers of silicates of soda, with five plants strategically located to serve users promptly and efficiently. We make a complete line of sodium silicates, with specialized grades for such applications as: corrugated paper board adhesives; soap making; concrete curing; textile bleaching, finishing, sizing; cleansers and detergents for metal, fabrics, food products. It is used in the production of a catalyst for manufacturing high octane gasoline; is used in making silica-gel.

Silicates of soda are useful products, serving many chemical processing industries.

When normal conditions are resumed, and you are looking for a dependable source of high quality silicates of soda, call STANDARD!

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*Plants at* CINCINNATI · JERSEY CITY
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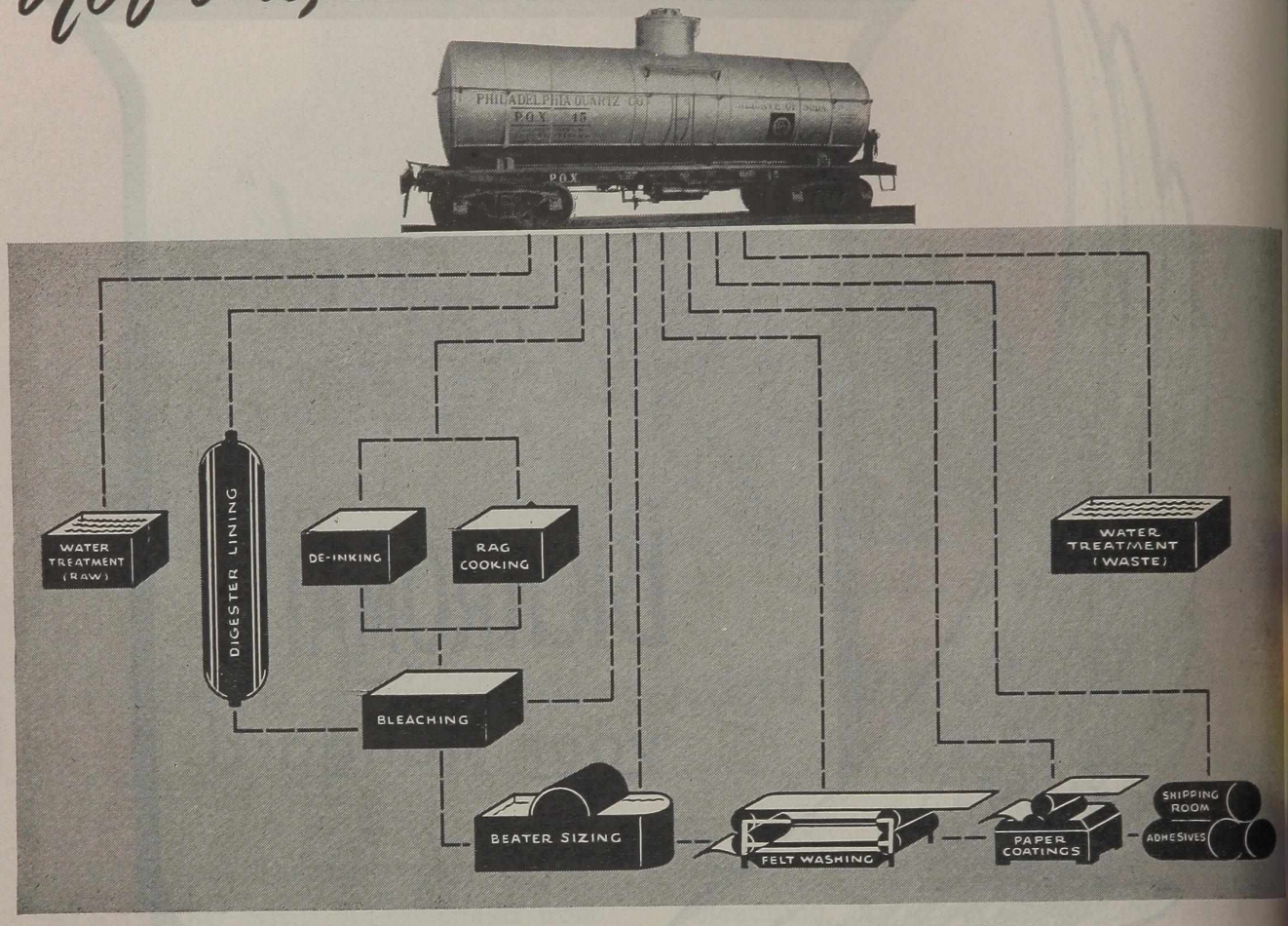
# *Not one,* BUT NINE PAPER MILL USES FOR PQ SILICATES




**How many can you name? In each of the following steps in the manufacture of paper, a PQ Silicate improves the result or lowers the cost. Often it does both. The properties which prove so useful to paper mills may suggest new possibilities in your operations.**

1. Silica sol coagulant aids (made with N Brand) remove color from fresh water supplies, also clarify white waters. PQ processes available under license without charge.
2. Linings for pulp digesters need acid-resistant cements, the binder for which is S Brand Silicate.
3. De-inking used paper stock with Metso metasilicate produces cleaner, whiter pulp. It does not discolor ground wood.
4. Rag cooking utilizes the effective detergent action of metasilicate . . . results, better color removal, higher final fibre strength.
5. Pulp bleaching (chlorine or peroxide). Brightness is increased. Finished quality improved.
6. Silicate sizing in the beater improves the finish, increases tear and bursting strength. Along with improved quality, substantial savings are often possible.
7. Felts are washed clean with Metso. They are more absorbent and last longer.
8. Coatings for paper. Clays are deflocculated with PQ Silicates. Silicate films are used for greaseproofing paper board.
9. Packaging adhesives. Silicates are odorless, quick-drying, form strong bonds for sealing the ends of paper rolls and paper board shipping cases.

**It pays to keep posted on silicates to discover how they can serve you. Read "Silicate P's & Q's", monthly message to those who use or could use silicates. Mailed free on request.**

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**PQ SILICATES OF SODA**

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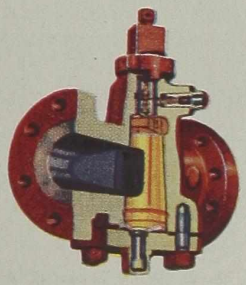
## S OIL WELL GUSHED 3,750,000 BARRELS IN 30 DAYS —OUT OF CONTROL!

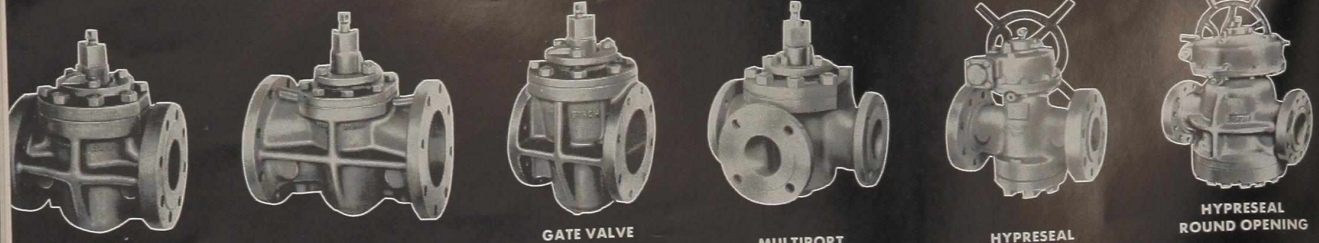
ago, at Bibi Eibat, Russia, an oil ushed forth this unbelievable pro- n in one month. Fortunes of liquid pewed upward, *out of control.* The s Dos Bocas well, south of Tampico, o, also wildly flowed at a rate esti- well above 100,000 barrels daily t emptied an entire pool of oil and barrel of oil was saved. Oil flowed ne Gulf of Mexico and the well caught fire. Back in March, 1910, mous Lakeview Gusher, north of Calif., roared in from a depth of eet, producing 60,000 barrels daily it was *out of control* and failed to e a commercial producer. The celebrated Potrero del Llano No. 4, brought in in 1910, was reported to have produced more than 115,000,000 barrels during its life. For 10 years this Mexican well averaged 10,000,000 barrels per year—but millions of barrels were lost when the well ran wild—completely *out of control.* On Feb. 15, 1916, the Cerro Azul No. 4, near Tampico, came in with a flow of 152,000 barrels. On Feb. 19, it flowed 261,000 barrels. To Dec. 31, 1921, it produced 57,000,000 barrels; then was lost—*completely out of control!*

**LACK OF CONTROL** can wreak havoc in any industry, in any plant, in any pipe line, just as it devastates production of an oil well. The "nerve center"—actually the heart of control—is in the *valves* on your lines. Any degree less than 100% safe control means danger—danger to production, at least, if not to life and property. Nordstrom Valves are engineered for 100% *safe control,* regardless of the service. That's why valve orders carrying the most severe specifications are invariably directed to Nordstrom.



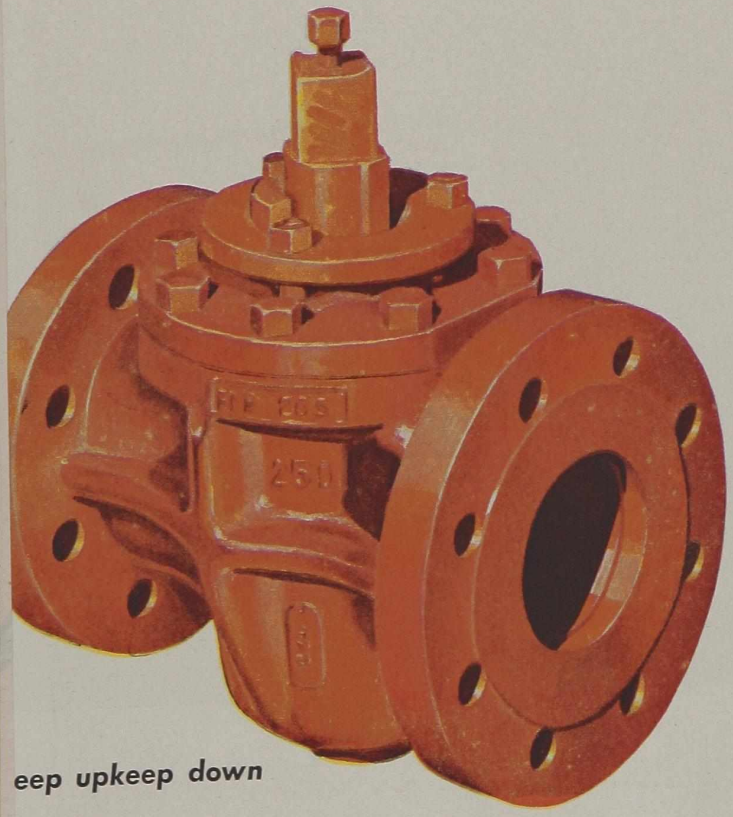
*Keep upkeep down*

RDSTROM VALVES.... INFALLIBLE *Control* AT ANY PRESSURE




# A diversity of patterns to meet your valve needs

**Sizes: ½" to 30"** **Working Pressures up to 7500 lbs.**



eep upkeep down

Nordstrom Valves are made in a variety of patterns, each suitable for a particular field of use. Nordstrom engineers have carefully proportioned the designs to produce maximum efficiency of operation.

REGULAR PATTERN. Employs tapered form of port opening, the area of which is approximately full pipe size. In this design the face-to-face length of flanged valves are necessarily greater than those of the Gate Valve Replacement pattern.

VENTURI PATTERN. Offered as an alternate in flanged sizes 6" and larger. In the Venturi design the well-known principles of streamlined flow are utilized to permit a reduction in port size with advantages of savings in bulk, cost and operating torque.

GATE VALVE REPLACEMENT PATTERN. This pattern permits replacement of, and interchangeability with, flanged gate valves, the face-to-face lengths of which have been established in industry for years. Port areas are intermediate between those of the Regular and Venturi patterns.

MULTIPORT PATTERN. This pattern provides 3-way and 4-way valves, an inherent advantage of plug valves not possible with an ordinary gate valve.

HYPRESEAL PATTERN. In the higher pressures the Hypreseal design is provided, embodying a full-floating, inverted plug. The tapered form of port opening is standard. But for some uses, such as oil pipe lines and oil field control heads, a full round bore through the valve is required. Round opening design can be supplied.

Nordstrom Valves meet the standard specifications as principally prescribed in A.S.A. and A.P.I. Standards. Complete details are given in the Nordstrom Valve Catalog.

# Nordstrom

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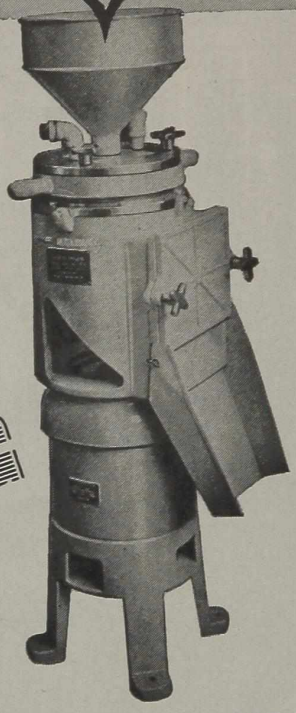

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# MONEL METAL*
# INCONEL*
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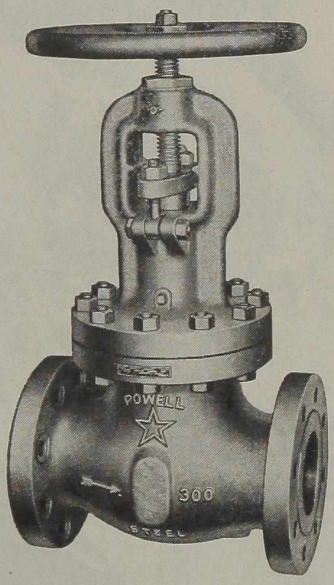


Class 300-pound Cast Steel Gate Valve with Monel Metal trim.

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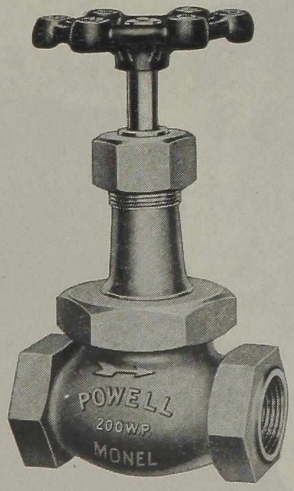
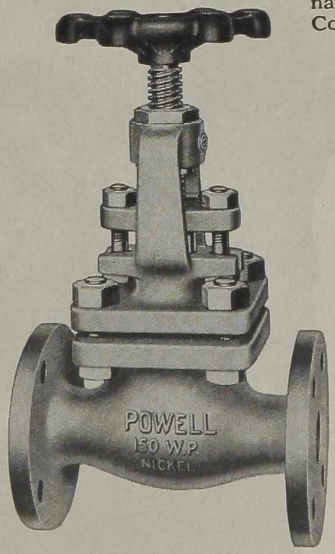



200-pound Globe Valve. Available in All Pure Nickel, All Monel Metal or All Inconel.

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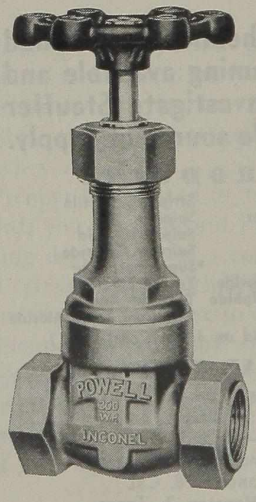
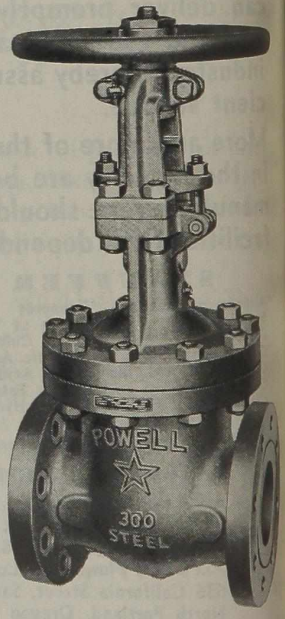



200-pound Gate Valve. Available in All Pure Nickel, All Monel Metal or All Inconel.




Class 300-pound Cast Steel Globe Valve with Monel Metal trim.

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The warp and woof of chemistry is intelligent research. Like the cloth from a loom, the chemical material you get is no better than the men who created it. For this reason, it is well to consider thoroughly the organization behind the product.

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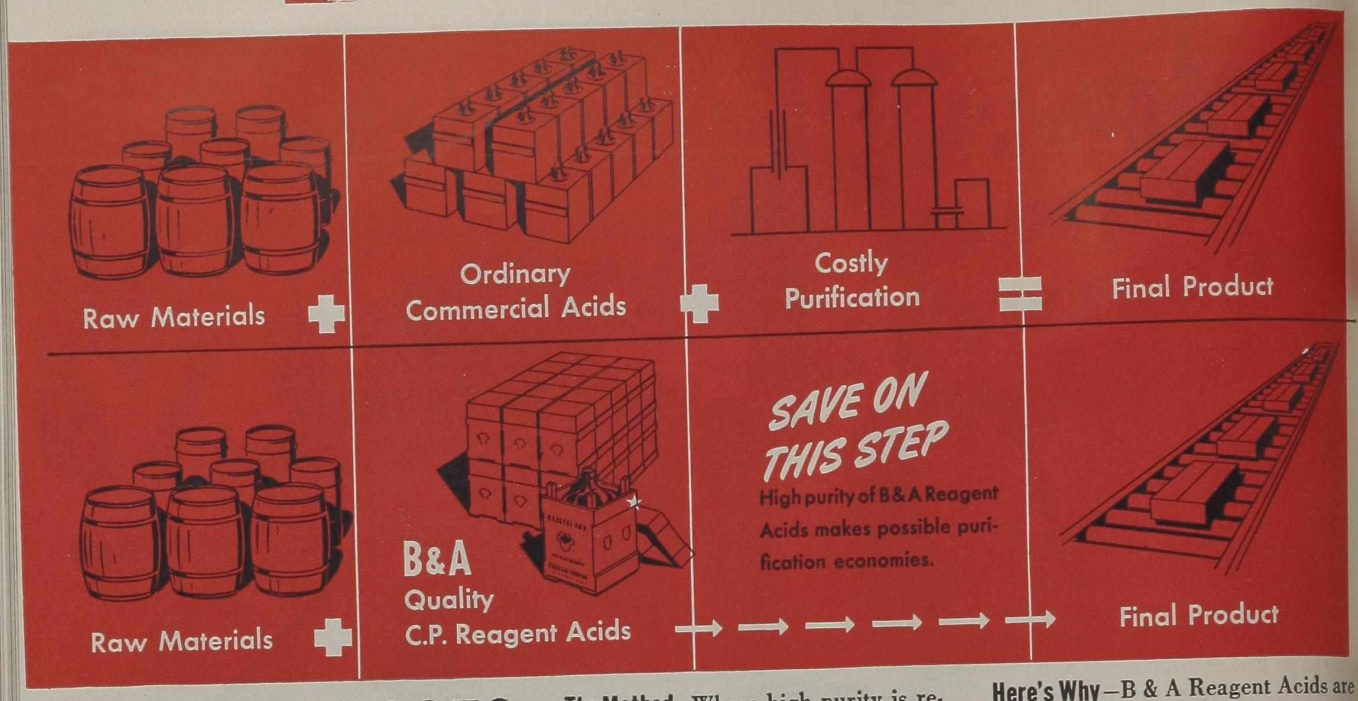


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*Have You Considered* this method to increase product quality while lowering manufacturing costs?

**The Method**—Where high purity is required for finished products such as drugs, cosmetics and food commodities, *many leading manufacturers use Baker & Adamson Quality Reagent Acids in production instead of ordinary commercial acids.*

**The Reason**—In case after case, actual plant experience has proved that when B & A high purity reagent acids go into the process, costly purification steps frequently can be avoided or cut to a minimum. Thus, manufacturing costs are reduced and product quality often improved.

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**Investigate** B & A Reagent Acids for your operations, too. Perhaps you can obtain the same significant results that other manufacturers now enjoy.

**ACID ACETIC, C.P.** Glacial, 99.5%, Reagent, A.C.S.
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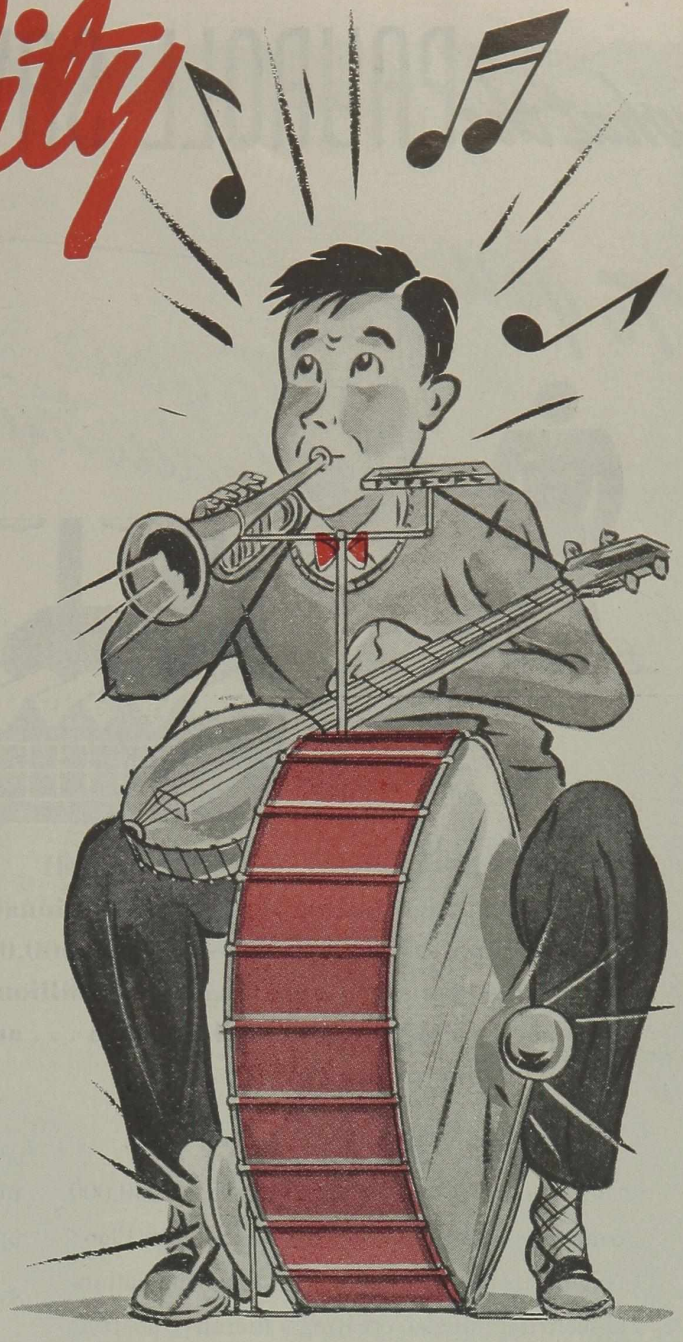
# Versatility

## ANOTHER NAME FOR

# KELCO ALGIN



n the food field and in many other industries, KELCO ALGIN continues to find new applications—as a low-cost stabilizing agent.

Unlike other water soluble stabilizers which ary in response to changes in climate and ther conditions of growth, KELCO ALGIN processed to definite standards to meet each pplication precisely. So it gives you predeermined uniformity of control over viscosity n your formula.

As demonstration of its versatility, KELCO LGIN is today being successfully used in EXTILE PRINTING PASTES . . . DISHARGE PASTES . . . GUM WATER . . . ADDING OPERATIONS . . . DIRECT DYE RINTING ON RAYONS . . . TOOTH ASTES . . . HEALTH PRODUCTS . . . APER SIZINGS . . . INDUSTRIAL HAND OTIONS . . . PHARMACEUTICALS . . . ATEX ADHESIVE MIXTURES . . . BOILER ATER COMPOUNDS . . . COLD WATER AINTS . . . FOOD PRODUCTS — and HEREVER ELSE THERE IS NEED FOR A STABILIZER, SUSENDING AND BODYING AGENT, or HYDROPHILIC COLLOID.

Perhaps KELCO ALGIN would be successfully applicable to your ormula. To find out, why not write us your intended use—NOW, hile you're thinking about it!

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# KELCO COMPANY

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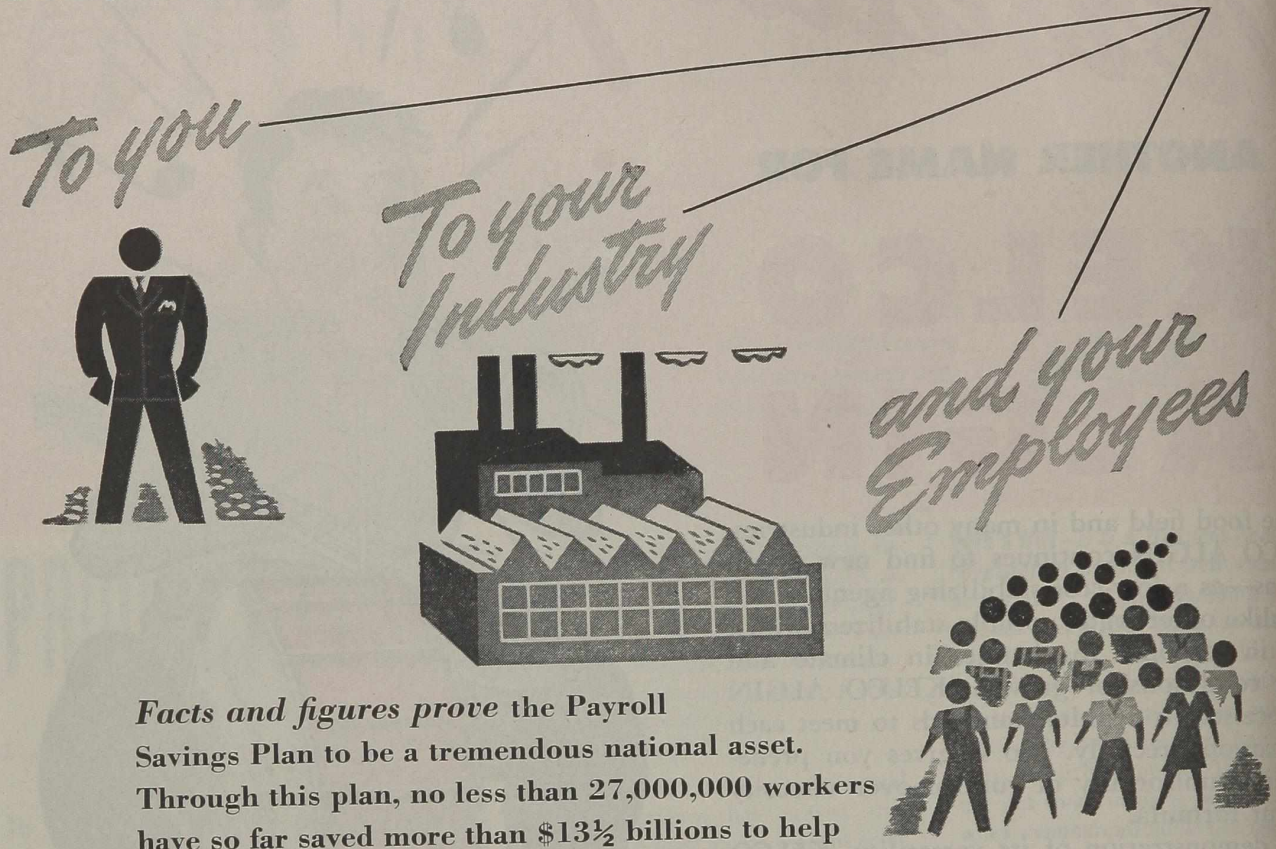


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Did you know that yours is one of 240,000 companies maintaining a Payroll Savings Plan? Not only is this combined effort fostering national security, but also creating a lucrative postwar market for you . . . and all American industry!

Have you realized that 76% of all employed in industry are now enrolled in the Payroll Savings Plan . . . averaging a $25 bond each month per employee? Through this plan, millions are now looking forward to homes, educational opportunities and old age independence!

Surely, so great an asset to your country, your company and your employees is worthy of your continued . . . and increased . . . support! Now is the time to take stock of your Payroll Savings Plan. Use selective resolicitation to keep it at its 7th War Loan high! Keep using selective resolicitation to build it even higher!

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Fibre drums for powdered eggs.....And cans that do not break

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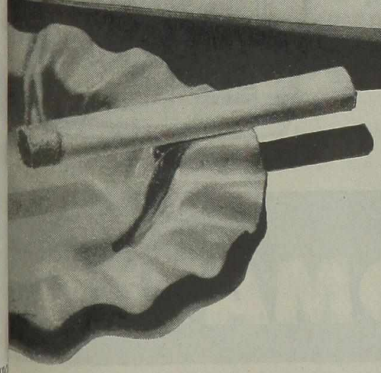
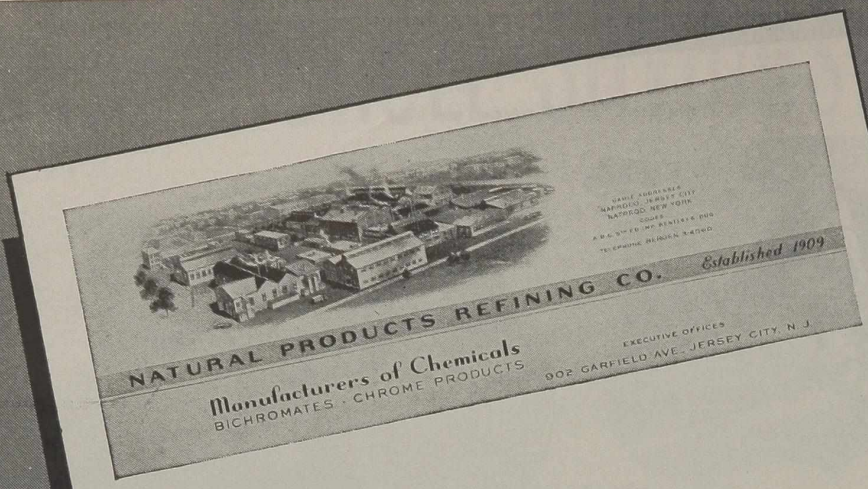


**PRODUCT VARIETY** and service are the keynotes of Continental's policy, as illustrated in this advertising. Continental's ever-increasing facilities and wide resources sustain an organization that is always prepared to give your requirements quick, expert attention. Keep your eye on Continental, and on 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.




Dear Customers:-

As the dawn of peace approaches may we remind you that we have no reconversion problems and will be better equipped than ever to fill your bichromate requirements promptly, accurately, and completely.

Cordially yours,

NATURAL PRODUCTS REFINING CO.

BICHROMATE Natural OF SODA

May we remind you also that the "Natural" Trademark is recognized in our field as the hallmark of quality.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**904 GARFIELD AVE., JERSEY CITY 5, N. J.**

# Natural BICHROMATES

Editorial

# Where Now?

by ROBERT L. TAYLOR, editor

ALONG WITH THE REST OF THE NATION, those of us in chemical industry feel the lifting of a great weight as we begin adjustment to peacetime activities once again. The victory has been won. As the wartime tension fades, and we recover from the first pleasant glow of freedom regained, we look about us. We begin to think of the job ahead, a job where enthusiasm can replace doggedness, where the joy of creation can replace the grim urgencies of destruction. What do we see, and what do we think?

**We see first a gigantic chemical industry**, one twice as large as the one we left behind in 1939, and capable of producing three times as much goods. But we see an industry which—like most others—peace has taken somewhat by surprise. While reconversion difficulties in most cases will not be serious, it will take most chemical companies a matter of months to get back on a full peacetime schedule, including complete restoration of product lines and resumption of research and development programs.

As the vice president of one of the largest manufacturers of organic chemicals said when asked what new postwar products his company had coming along, "Postwar products? We've been so busy fighting the war we've hardly had a chance to give them a thought." Thus while some announcements are beginning to come along now, any surge in new chemicals may not be expected to reach its peak for some time. There is one exception to this, however. That is the group of new chemicals developed on a commercial scale during the war and which are now being made available for general industrial use for the first time. Several price reductions on such materials have already been announced.

**A very evident aftermath** of the war is a new awakening by consumers, lawmakers, industry and the public in general to the possibilities of science in shaping the future of the nation and the general welfare. Never has science occupied in peace so central a position on the world stage.

In the Bush report, the Magnuson bill, and the new Kilgore bill, we have several attempts to translate this feeling into definite action. Such action, if it is taken in the form of national legislation, can have great significance for chemical manufacturers, who comprise an industry almost wholly founded on science. It therefore behooves them to increase their watchfulness of legislative and other government activities, to see that these activities are truly constructive, and do not harbor incipient destruction of that which they seek to promote.

**The atomic bomb has altered** the whole concept of the scientific future. At the moment our scientific leaders are wisely warning the public that the new age of the atom as a household slave will not be here tomorrow, that science has merely opened the door the first tiny crack.

But in terms of industrial planning perhaps the forerunners of that age may not be so terribly far off. The plutonium chain reaction piles at the Hanford Engineer Works in Washington, that derive their energy from atomic fission, give off such quantities of heat that cooling was a major problem in their design, and now it is reported that the discharge of spent cooling water is raising the temperature even of the mighty Columbia River. Could the chain reaction pile be the precursor of the atomic power generator, or of the atomic furnace? We are assuredly embarked on a new road even now, and wherever it leads it is bound to affect profoundly the production and use of many chemicals and chemical materials—perhaps sooner than we think.

**Chemical industry has turned** in a truly remarkable performance in its all-out effort for war. It has far outdistanced its most optimistic predictions of five years ago.

So where now? Will too much government divert the train of progress? Will lack of technical manpower slow the wheels? Perhaps—if we let them. Even in good times, forward motion is not automatic. There are always obstacles.

But today the opportunities seem to lay bright ahead for chemical industry. The world needs and wants many things that chemistry can give it. And chemistry is in a position to give many things that it could not before. Let's not muff the opportunity. Let us see if in 1950 we can look back over the preceding five years with as much satisfaction of a job well done as we now can over the last five.

## Teamwork Research is the Answer

THOMAS ALVA EDISON was a remarkable inventor, and in no sense are we belittling his genius when we conclude that Edison's day, and the day of the lone inventor in general, is past.

Bit by bit during the last few weeks the fascinating drama of the atomic bomb and its development has been revealed to a science-conscious public. We have been told of the gigantic secret projects in Tennessee, Washington, and New Mexico—of the recruiting of chemists, physicists, and engineers from colleges and industrial laboratories alike—of the cooperation among the Army, industry, and internationally famous scientists from both sides of the Atlantic.

Hardly less important than their achievement itself is the means by which it was accomplished. This was no job for a virtuoso in his garret workshop. Even if one man's genius were far-reaching enough to surmount the myriad difficulties in the course of so enormous a project, he would surely be prevented by lack of resources from bringing his ideas to practical realization. If the two bombs dropped on Hiroshima and Nagasaki are the last ones ever used (and we sincerely hope so), they cost one billion dollars apiece.

The average research project doesn't cost one ten-thousandth of that, but the same principles of research organization can be applied just as effectively to the humblest problem. They must be, in fact, for economic survival in the highly competitive years to come.

Prima donna research is just about in the same class as a one-man band. A symphony of scientists, each playing his own beloved instrument in time with the others under a capable conductor, will achieve far more harmonious and lasting results.

## Imagination Wins Wars

THE ATOMIC BOMB STORY is a veritable banquet for editorial thought. We have already commented above on the change it has wrought in regard to views concerning research methods.

It might not be heretical to point out that the atomic bomb development is also a triumph of imagination over—for want of a better word—"brass-hattism." As long ago as the last war a design for a jet-propelled airplane was submitted to the War Department. With due allowance for twenty years' progress in engineering, the specifications are strikingly similar to those of modern planes employing this principle. What happened to the design? It was "filed" for future oblivion in favor of the Liberty motor which is long since outmoded. The inventor, not one of your ordinary "crackpots," was a chief engineer of the Toronto Power Company, and the claims he made were sound and reasonable.

Memory, we fear, is a fleeting thing. If another Selective Service system is set up, some generations hence, to draft manpower for another war, the officials shall have forgotten that it was the young scientists who were instrumental in developing the most fearful weapon and the most effective defenses of World War II. They shall have forgotten that a scientist working in his laboratory may serve his country just as well—though not so dangerously nor uncomfortably—as his brother in the foxhole or its next war's counterpart.

## Canada is a Worthwhile Market

CANADIAN CHEMICAL IMPORTS in 1944 totaled $70,000,000, of which 86.5 per cent came from the United States. This is not a large amount in comparison with out overblown wartime production, but it represents a sizable chunk of business for postwar markets.

There is going to be a lot more attention paid to chemical marketing—and market seeking—in the next few years than has been the case for a long time. A number of American producers are doing good business in Canada through their own branch offices or by means of agency arrangements with jobbers; but surprisingly many of them, who think nothing of manufacturing in the East and shipping to Chicago or the West Coast, shy at the thought of "exporting" to Montreal or Toronto—geographically much closer.

Canada realizes the inherent economic weakness of her abundant resources. She has coal and minerals, but the volume per dollar's worth is too great to allow profitable shipment. The only solution is more intensive industrialization in the heart of her resources, and such a program is now being put into effect.

It takes chemicals to make chemicals, and it appears that for a long time to come Canada will take an increasingly large portion of our production—if we simply go up there and ring the doorbell.

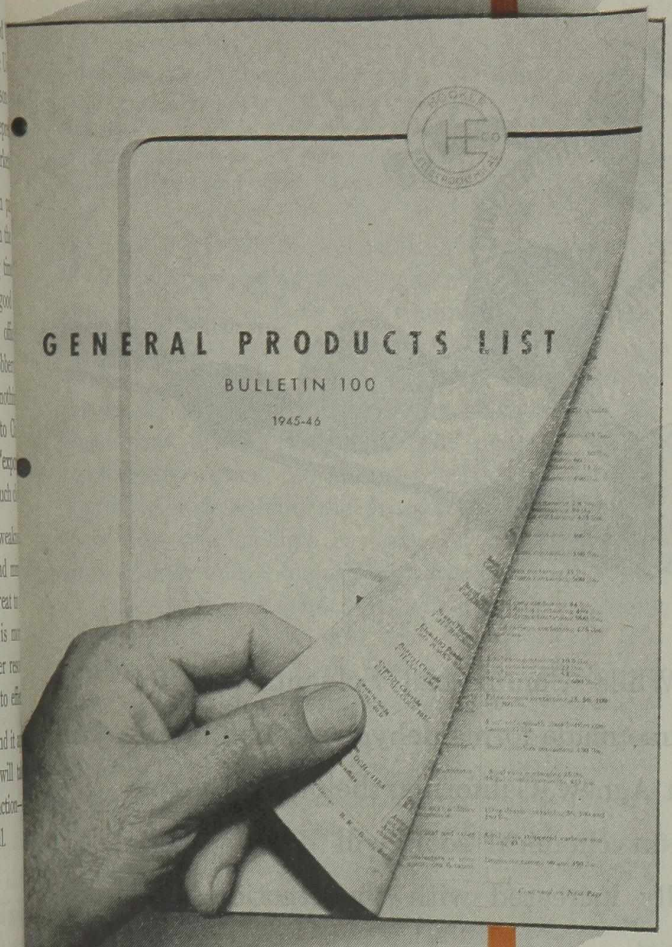
## Chemical Expansion Highest

THE COMMITTEE FOR ECONOMIC DEVELOPMENT has completed a survey of 1,406 manufacturers and 158 trade associations representing 20,000 members ascertaining what industry expects to do in 1947. Using the 1939 price levels as a basis for comparison, industrialists were queried as to the estimated dollar value of manufactures two years hence compared with that of 1939.

It is interesting to note that, with the exception of food products, the chemical and allied products group made the best showing among the non-durable goods groups in dollar volume increase, jumping from 3.7 billion to 5.9 billion. Only the tobacco growers showed a larger increase percentagewise, although the dollar increase was considerably smaller.

PAPER IS STILL SCARCE—HELP CONSERVE IT

# Seven New Chemicals Have Been Added to Hooker's General Products List




*What is the boiling range of Hooker Monochlorbenzene? What is the chlorine content of Hooker Sulfur Dichloride? Is Lauryl Chloride a liquid or solid and what are some of its uses? In what size containers is Hooker Cyclohexanol shipped?*

This is the type of information you will find in the new edition of the Hooker General Products List of nearly 100 Chemicals. Seven of these are new developments making their first appearance among the other Hooker Products.

A copy of this new bulletin which gives descriptions, principal specifications, uses and shipping information will save you time and trouble in selecting chemicals for your requirements.

When in need of chemicals, make it a habit to look at the Hooker General Products List. In that way you can be sure of the uniform high quality and purity that have been pleasing users for years. Technical Data Sheets and samples of products in which you are interested will be sent on request. Our Technical Staff will be glad to assist in the application of chemicals to your particular problems.

Take the first step in getting acquainted with Hooker by sending for this new edition of our General Products List.

Just type your name and "Bulletin 100" on your letterhead and a copy will be sent to you.

**HOOKER ELECTROCHEMICAL COMPANY**

Three Forty-seventh St.
Niagara Falls, N. Y.
York, N. Y. Tacoma, Wash.
Wilmington, Calif.

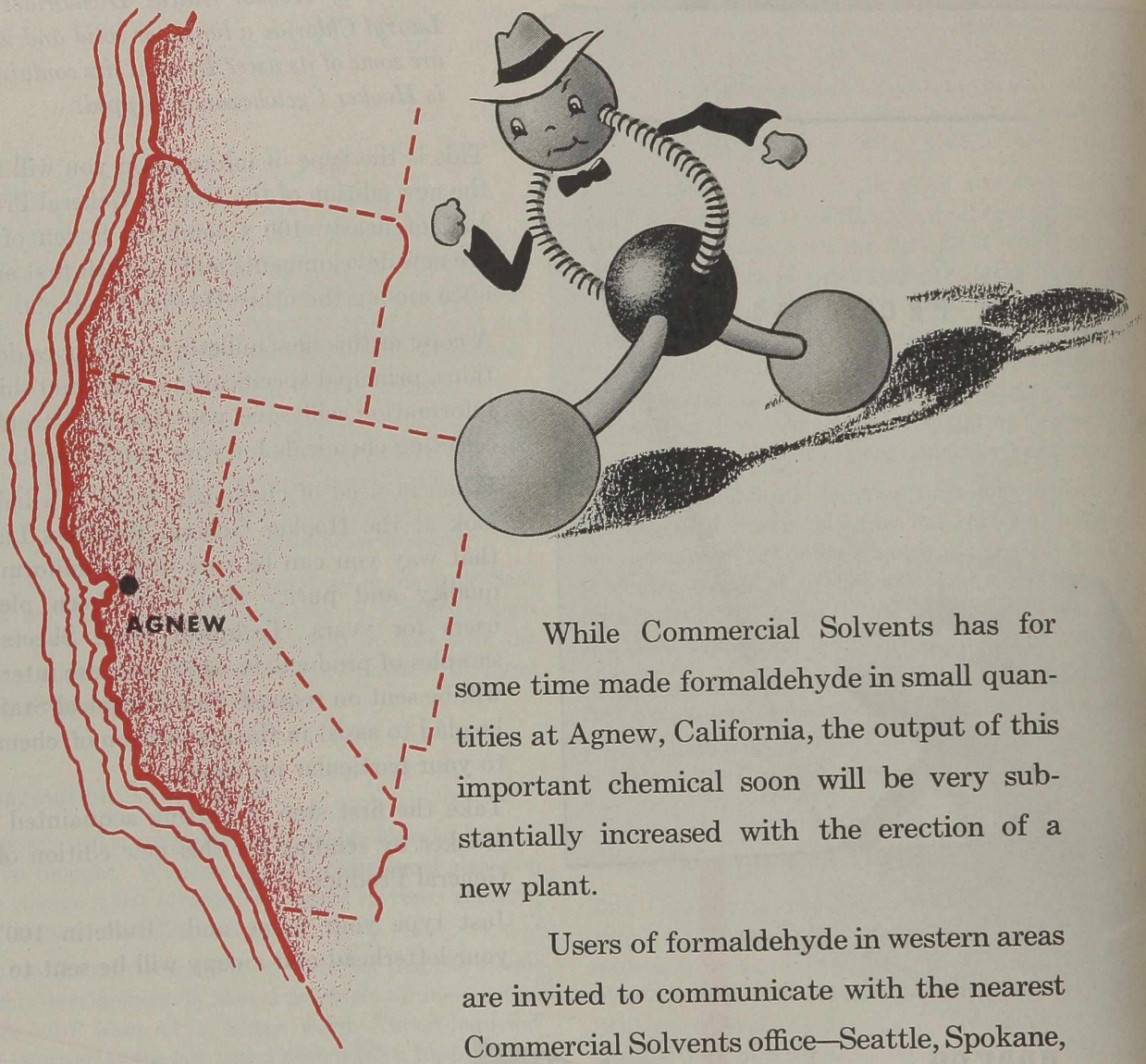
**HOOKER CHEMICALS**

stic Soda — Muriatic Acid — Sodium Sulfide
adichlorbenzene — Chlorine — Sodium Sulfhydrate

8323

# FORMALDEHYDE

## *for the West Coast*




While Commercial Solvents has for some time made formaldehyde in small quantities at Agnew, California, the output of this important chemical soon will be very substantially increased with the erection of a new plant.

Users of formaldehyde in western areas are invited to communicate with the nearest Commercial Solvents office—Seattle, Spokane, Portland, San Francisco, or Los Angeles.

**COMMERCIAL SOLVENTS**
*Corporation*
17 East 42nd Street, New York 17, N. Y.

# THE BUILDERS

by VANNEVAR BUSH

*In this keenly analytical allegory, Dr. Bush takes us to the top of a mountain where we can look down and see time and men at work on the universe of science. It seems particularly appropriate at this moment when we have so much scientific building ahead of us.*—EDITOR.

THE PROCESS by which the boundaries of knowledge are advanced, and the structure of organized science is built, is a complex process indeed. It corresponds fairly well with the exploitation of a difficult quarry for its building materials and the fitting of these into an edifice; but there are very significant differences. First, the material itself is exceedingly varied, hidden and overlaid with relatively worthless rubble, and the process of uncovering new facts and relationships has some of the attributes of prospecting and exploration rather than of mining or quarrying. Second, the whole effort is highly unorganized. There are no direct orders from architect or quarrymaster. Individuals and small bands proceed about their businesses unimpeded and uncontrolled, digging where they will, working over their material, and tucking it into place in the edifice.

Finally, the edifice itself has a remarkable property, for its form is predestined by the laws of logic and the nature of human reasoning. It is almost as though it had once existed, and its building blocks had then been scattered, hidden, and buried, each with its unique form retained so that it would fit only in its own peculiar position, and with the concomitant limitation that the blocks cannot be found or recognized until the building of the structure has progressed to the point where their position and form reveal themselves to the discerning eye of the talented worker in the quarry. Parts of the edifice are being used while construction proceeds, by reason of the applications of science, but other parts are merely admired for their beauty and symmetry, and their possible utility is not in question.

In these circumstances it is not at all strange that the workers sometimes proceed in erratic ways. There are those who are quite content, given a few tools, to dig away unearthing odd blocks, piling them up in the view of fellow workers, and apparently not caring whether they fit anywhere or not. Unfortunately, there are also those who watch carefully until some industrious group digs out a particularly ornamental block; whereupon they fit it in place with much gusto, and bow to the crowd. Some groups do not dig at all, but spend all their time arguing as to the exact arrangement of a cornice or an abutment. Some spend all their days trying to pull down a block or two that a rival has put in place. Some, indeed, neither dig nor argue, but go along with the crowd, scratch here and there, and enjoy the scenery. Some sit by and give advice, and some just sit.

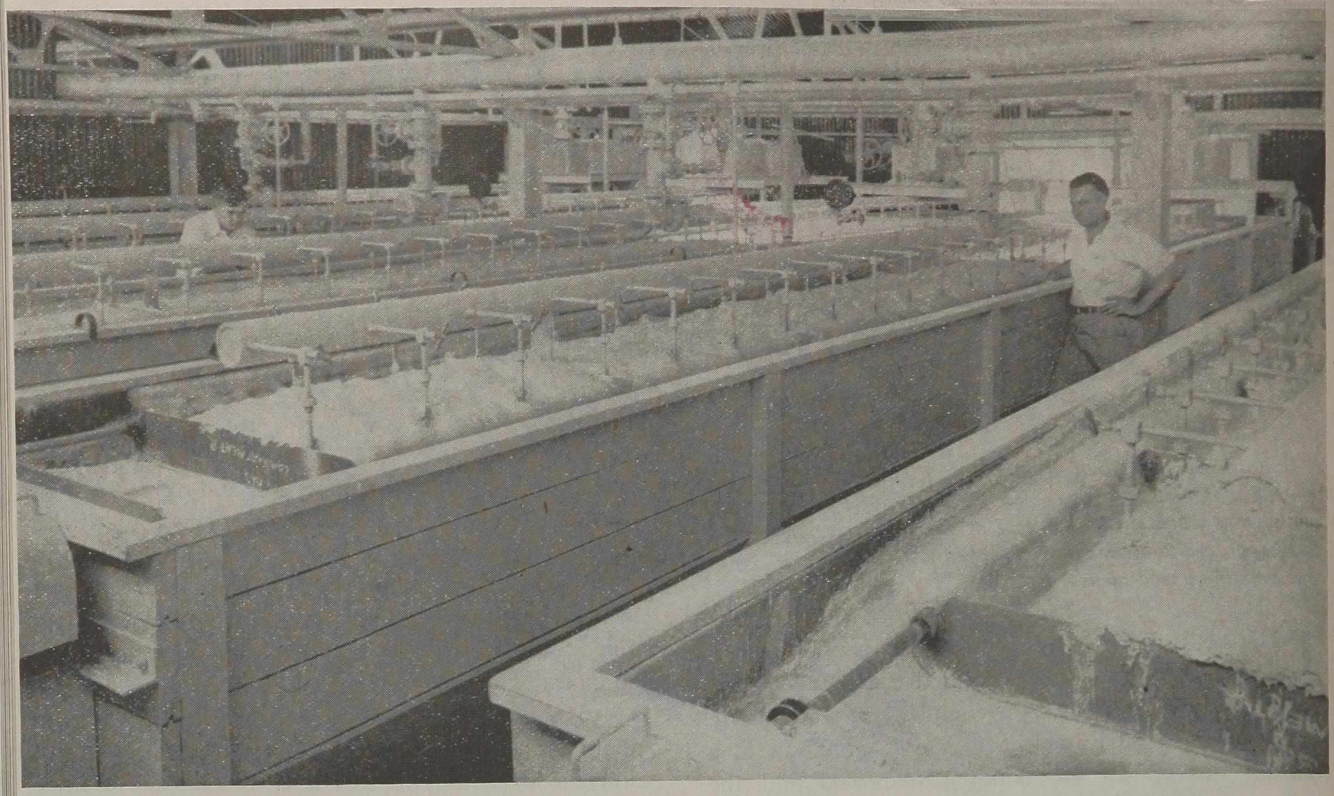
On the other hand there are those men of rare vision who can grasp well in advance just the block that is needed for rapid advance on a section of the edifice to be possible, who can tell by some subtle sense where it will be found, and who have an uncanny skill in cleaning away dross and bringing it surely into the light. These are the master workmen. For each of them there can well be many of lesser stature who chip and delve, industriously, but with little grasp of what it is all about, and who nevertheless make the great steps possible.

There are those who can give the structure meaning, who can trace its evolution from early times, and describe the glories that are to be, in ways that inspire those who work and those who enjoy. They bring the inspiration that not all is mere building of monotonous walls, and that there is architecture even though the architect is not seen to guide and order.

There are those who labor to make the utility of the structure real, to cause it to give shelter to the multitude, that they may be better protected, and that they may derive health and well-being because of its presence.

There are also the old men, whose days of vigorous building are done, whose eyes are too dim to see the details of the arch or the needed form of its keystone, but who have built a wall here and there, and lived long in the edifice; who have learned to love it and who have even grasped a suggestion of its ultimate meaning; and who sit in the shade and encourage the young men.

Vannevar Bush is director of the Office of Scientific Research and Development and president of the Carnegie Institute of Washington. He was formerly vice-president of the Massachusetts Institute of Technology. The above essay is reprinted by permission of the Technology Review.



Pneumatic flotation cells separate the lithium concentrate as lithium sodium phosphate from burkeite, a double salt of sodium carbonate and sodium sulfate. Air is introduced into the cells through fine-pore carbon plates. The flotation medium is ordinary stove oil.

# LITHIUM from SEARLES LAKE

## How a Nuisance Was Turned Into a Profit at Trona

by W. A. Gale, Director of Research and Development
American Potash & Chemical Corporation
Los Angeles, California

THROUGH RESEARCH, what was once a troublesome and expensive plant problem became a profitable product, sufficient in quantity to supply a major part of the lithium requirements of the world.

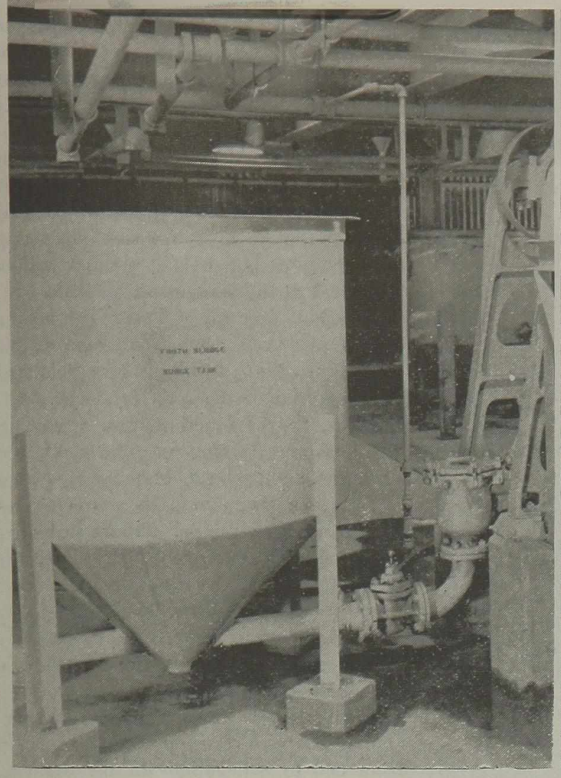
The problem was created by an unusual scale that collected in the heating tubes of brine evaporators in the plant of the American Potash & Chemical Corporation at Trona, California. In 1923 the research department of the corporation was assigned the task of combating the relatively insoluble scale. Analysis disclosed that it was almost pure di-lithium monosodium phosphate ($Li_2NaPO_4$), a compound previously unknown, which contained more than twenty percent lithium oxide.

Thus, the scale was determined to be the richest lithium raw material in the world. But the immediate problem was to prevent formation of the scale, and its solution did not supply a procedure for the recovery of the lithium content. It was not until fifteen years later that limited recovery of the concentrate was accomplished.

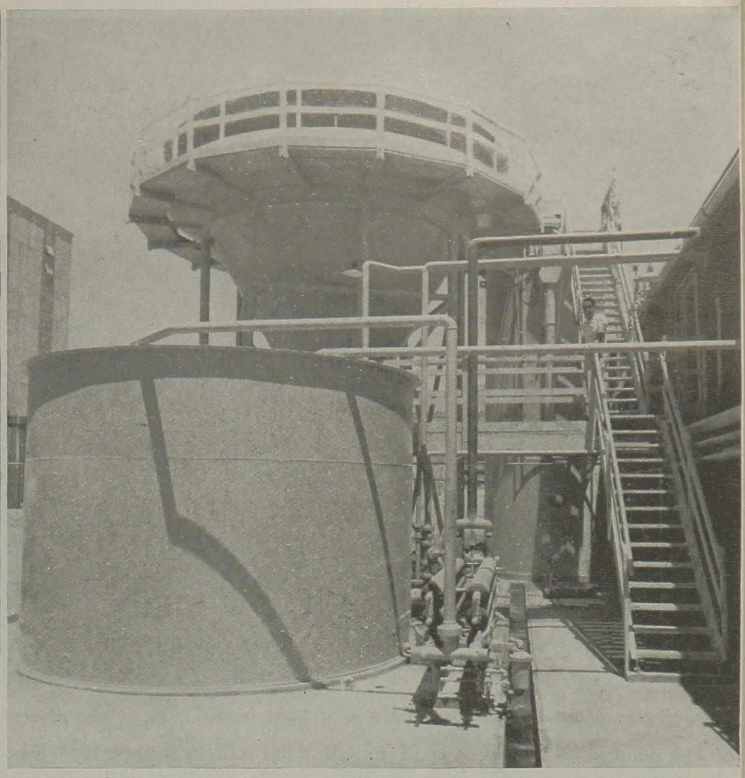
The story of lithium recovery at Trona is something of an epitome of the entire enterprise that had its beginning early in the century and has required millions of dollars for development. In 1905 a predecessor of the corporation undertook to determine and to realize on the potentialities of Searles Lake, a salt-pan or playa, situated in the northwestern part of the Mohave Desert of California. The "lake" surface is dry, except when infrequent rains bring sufficient run-off water from surrounding mountains to cover it to a depth of a few inches. The main salt body, from sixty to ninety feet in depth, has an approximate area of twelve square miles, but the total known deposit is about thirty square miles. It is estimated that each square mile has 100,000,000 tons of alkali salts, making Searles Lake one of the nation's greatest chemical stockpiles.

### NATURE OF DEPOSIT

How this vast reserve was created is a fascinating record written in the rocks during and immediately following the glacial epoch of the Quaternary period. The deposits of Searles Lake were formed by the desiccation of a lake that once had an area of 385 square miles and was fed by waters from the Sierra Nevada Mountains. There were originally four of these lakes joined by rivers, but for several thousand years Searles Lake was the sump for the system and the salinity of its water increased by solar evaporation until



The concentrate-bearing foam from the flotation cells is collected in this froth sludge surge tank.



It is then pumped into a cone settler (background) from which it goes, as a sludge, into the filter feed tank (foreground) where it is washed.

a dense brine and salt body were formed.

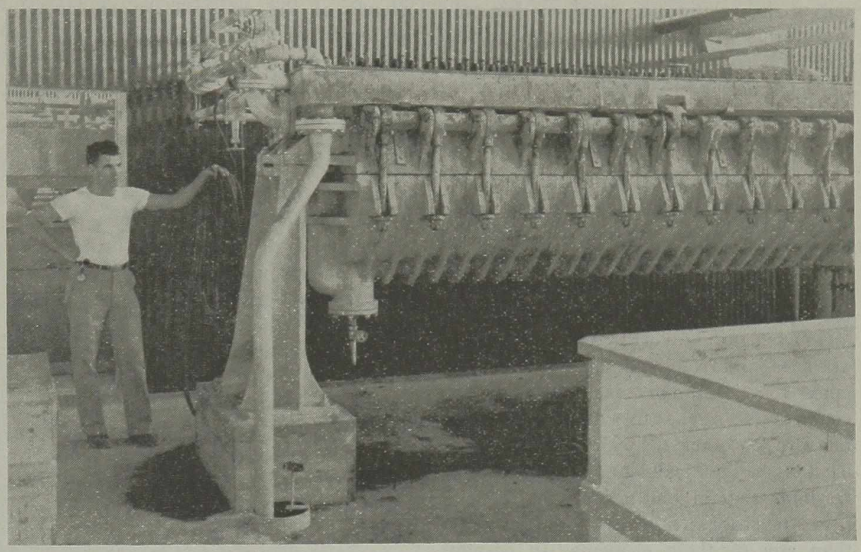
The salt body of Searles Lake is permeated with a saturated brine, the proportion of voids ranging between 25 and 45 percent. Brine is obtained from wells drilled into the salt body, pumped four miles to the corporation's plant, to enter a cyclic system which produces potassium chloride, potassium sulfate, borax, dehydrated borax, boric acid, soda ash, salt cake, desiccated sodium sulfate, bromine, sodium, potassium and ammonium bromides, as well as lithium concentrate.

Not all of these products were brought forth at one time, rather they have come along progressively as research has demonstrated how one after another of the valuable components of the brine could be recovered.

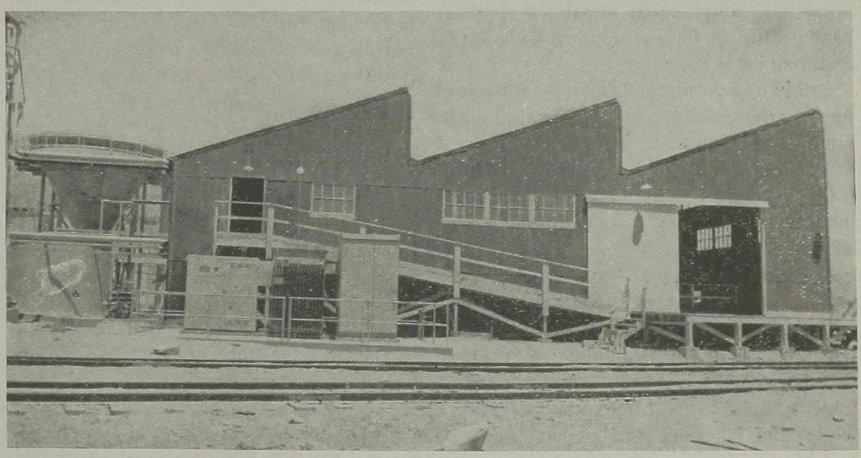
The salt body includes halite, trona, hanksite, borax and glaserite; the brine is approximately thirty-five percent dissolved solids. A typical analysis shows the following percentages by weight:

| | |
|---|---|
| Sodium chloride | 16.5 |
| Sodium sulfate | 6.82 |
| Potassium chloride | 4.82 |
| Sodium carbonate | 4.80 |
| Borax | 1.51 |
| Sodium phosphate | .155 |
| Sodium bromide | .109 |
| Sodium flouride | .012 |
| Lithium chloride | .033 |
| Sodium sulphide | .01 |
| Arsenic oxide | .019 |
| Tungstic oxide | .008 |
| Calcium oxide | .0022 |
| Ferric and aluminum oxide | .002 |
| Sodium iodide | .0014 |
| Antimony oxide | .0006 |

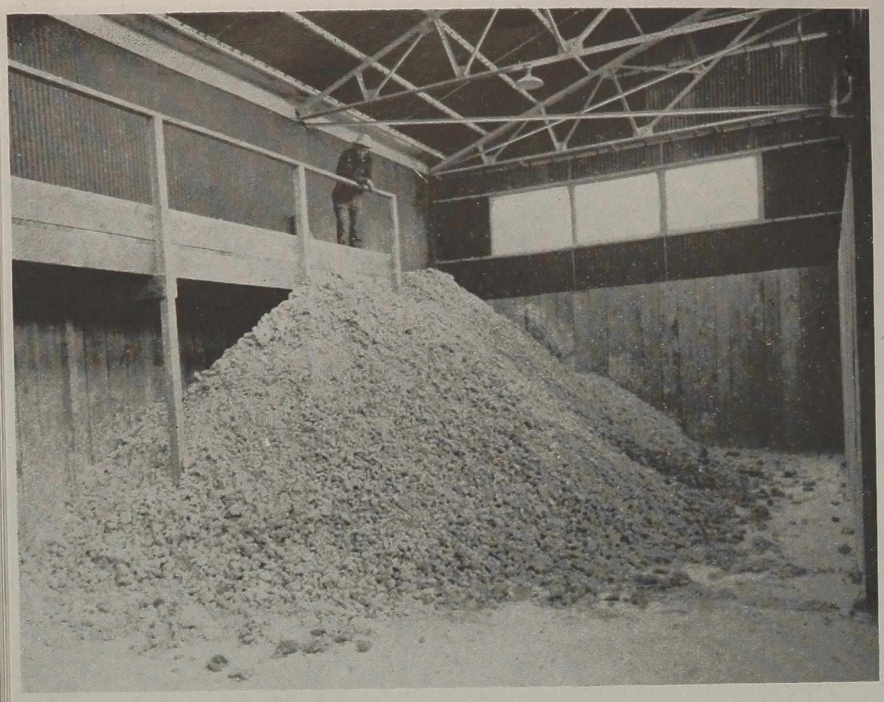
The need for potash in America during World War I turned research emphasis to the potassium chloride content of the brine. In the years between the two World Wars the other products were developed.



Sludge concentrate from the feed tank is sent to leaf-type filter presses for de-watering.



An exterior view of the lithium concentrate recovery plant at Trona, California.



Moist lithium concentrate as it looks before going to the dryers.

The demand of World War II for all the chemicals recoverable from the brine stimulated production to 494,950 tons in 1944. But the remarkable increase in output in relation to total market requirements was in lithium concentrate which has its origin in the .033 percent of the solids in the brine.

## PROPERTIES OF LITHIUM

The properties of lithium suggest some of the reasons for its increasing demand. Discovered in 1817 by August Arfvedson in minerals from a mine near Stockholm, Sweden, lithium is a silvery white, alkali metal, softer than lead and the lightest solid element, having a specific gravity of 0.543 and weighing 33.3 pounds per cubic foot. Lithium metal is made by electrolysis of the fused chloride in a mixture of other chlorides. Resembling barium, caesium, calcium, magnesium, potassium, sodium and strontium, it possesses much greater diversity of reactivity than any of these elements. In certain metals, lithium is more soluble than other alkali and alkali-earth metals, a significant quality in the development of alloys and refining agents.

Lithium has marked affinity for elements which occur as non-metallic impurities and gases in metals and alloys. It can be alloyed with aluminum, beryllium, bismuth, cadmium, copper, lead, magnesium, mercury, silver, tin, zinc and alkali-earth metals.

Metallic lithium will float on kerosene, and certain alloys with other light metals will float on water. A characteristic of its carbonate is low solubility; the chloride is particularly hygroscopic; the bromide the most hygroscopic of all materials, while four and one-half pounds of the hydride possesses as much hydrogen as a filled steel cylinder weighing 180 pounds.

From 1923 until 1934, when the Trona soda products plant for the production of soda ash and salt cake was completed, the recovery of lithium remained on the agenda of the research department. In the operation of the new plant, residual slimes, scums and sediments remained in some of the larger tanks used for intermediate process liquors. Analysis disclosed that these residues contained considerable lithium. By 1938 experimental work had shown how they might be collected and developed into a marketable concentrate. The initial process was simple, consisting principally of collecting the residues, filtering, washing and drying them. The 20 percent $Li_2O$ content of the concentrate and the facility with which it could be utilized industrially made it readily acceptable commercially. But it was definitely in the by-product status until 1942 when wartime demands for lithium and its compounds soared, demonstrating that it was then ready for the role of a co-product.

An intensive research program was undertaken. A primary consideration in beginning this endeavor was that the 17,500 tons of Searles Lake brine taken into the plant daily held two tons of $Li_2O$ or ten tons of $Li_2NaPO_4$.

## PRELIMINARY DEVELOPMENT

In laboratory, plant and pilot plant study, examination and experimentation progressed for months. This work demonstrated that the lithium-laden slimes were formed as a finely divided precipitate in the evaporation and concentration of the brine and accompanied the sodium tail salts when they were removed from the concentrated liquor. It was established that in the evaporation process lithium behaves like the other minor constituents of the brine which tend to concentrate until the limiting solubility of one or more compounds is reached at some point in the closed cycle whereupon this constitutent begins separation as a solid phase for lithium, $Li_2NaPO_4$.

The sodium tail salts from the evaporation process are separated by hydraulic classification into a coarse sodium chloride fraction and a finer fraction consisting of sodium carbonate and sodium sulfate combined as the double-salt burkeite. Investigation determined that the major part of the $Li_2NaPO_4$ is retained in this second fraction, which is the principal raw material of the soda products plant. Further, it was found that in dissolving the burkeite fraction in this plant, the lithium-sodium phosphate had a slow rate of solution, remaining as a finely dispersed residue, creating distinct turbidity, and producing subsequent operational difficulties, despite the fact that the total lithium concentration at this point is no more than 0.05 percent $Li_2O$, and a portion of this is not recoverable because it is in true solution.

Removal of the lithium material, desirable as it was, presented a problem, since from 600 to 800 gallons of the burkeite liquor are handled every minute and filtration was found difficult because of the slimy character of the solids and uneconomical because of the filter capacity that would be required. But the work did disclose that the lithium material in suspension could be removed readily by froth flotation and that optimum flotation required the generation of minuscule bubbles under relatively quiescent conditions. Further experimentation determined how to produce such bubbles, the pneumatic type of flotation cell best suited to the need, and the porous medium that would function satisfactorily in the highly alkaline liquor. The pilot plant augmented laboratory knowledge and at the same time supplied cost-estimate data for the commercial plant which was built in 1944.

## DEMANDS OF WAR

But while this research was in progress, the uses for lithium, particularly in materials essential for war, had been multiplying through study in other laboratories. On December 5, 1942, the War Production Board placed the nation's lithium supply under control, despite the fact that production in the United States was in excess of 50 percent of the world output. To assure an adequate supply of lithium, the Defense Plant Corporation on the recommendation of the War Production Board financed a development at Kings Mountain, North Carolina, for the recovery of a lithium concentrate testing 6 percent $Li_2O$, from spodumene.

The wartime need for lithium arose in part from its use in radio and fluorescent light tubes, welding fluxes, optical lenses, Edison-type storage batteries, air conditioning equipment, greases to counter extremes of heat and cold, ceramics, alloys,

glasses, as a carrier of hydrogen to inflate life raft radio antennae balloons and as a degasifier in metallurgy.

It was to meet this need that the Trona plant was hurried to completion. Procedures developed in the pilot plant were expanded manyfold, the production during the second half of the year that the new plant operated exceeding 575 tons of 20 percent $Li_2O$ concentrate. With initial operational difficulties solved, the potential capacity of the plant in relation to world production of lithium became apparent. The simplicity of the process which was developed augurs well for the postwar future of this plant, especially when it is taken into account that the sources of other lithium materials are in low-grade ores that must be mined, handpicked and crushed preliminary to concentration.

## TRONA PROCESS

The Trona process begins in the soda products plant with the burkeite filter cake, which is repulped in a deficiency of fresh water and then, in a dissolver tank, brought to an approximately saturated solution in which there is no excess of undissolved burkeite. Maximum dispersion of the flotation reagent, ordinary stove oil, is obtained by adding it during the repulping. From the dissolver tank the liquor, bearing the finely distributed lithium compound in suspension, goes to an evaporative type cooling tower for temperature adjustment and then to a conditioner tank before passing along to a battery of flotation cells.

The liquor entering the cells has approximately 0.2 percent of solids in suspension. Air at from four to eight pounds pressure is introduced from the bottom of the cells through porous carbon plates of the finest available pore size, and the froth, so generated, brings the concentrate to the surface. Passing across the sides of the cells, the concentrate goes to a cone settler for thickening, the clarified liquor from the cells being returned to the soda products plant freed of the slimy material which in the past had hindered soda ash and salt cake recovery. From the cone settler the concentrate goes to a filter feed tank for leaching with hot water to dissolve any remaining burkeite. Sludge concentrate from the tank is sent to filter presses for de-watering and thorough washing. Cake from the leaves of the Sweetland filters is dried in steam-jacketed mixer-type dryers. The crude concentrate, analyzing between 19 and 21 percent $Li_2O$, is packed in 100-pound bags for shipment.

The economics of lithium for the future is an engaging consideration when the factors that have developed in recent years are taken into account.

Lithium has been produced from minerals found in the United States, Argentina, Australia, Brazil, Canada, Czechoslovakia, Germany, Portugal, Spain, Southern Rhodesia, South-West Africa and Sweden. Lithium ores have also been reported in India, Madagascar and Russia.

Production of lithium raw materials in the United States in 1943 totaled 8,155 tons and was valued at $314,660. Indicative of the increased usage of lithium are the corresponding figures for the preceding four years:

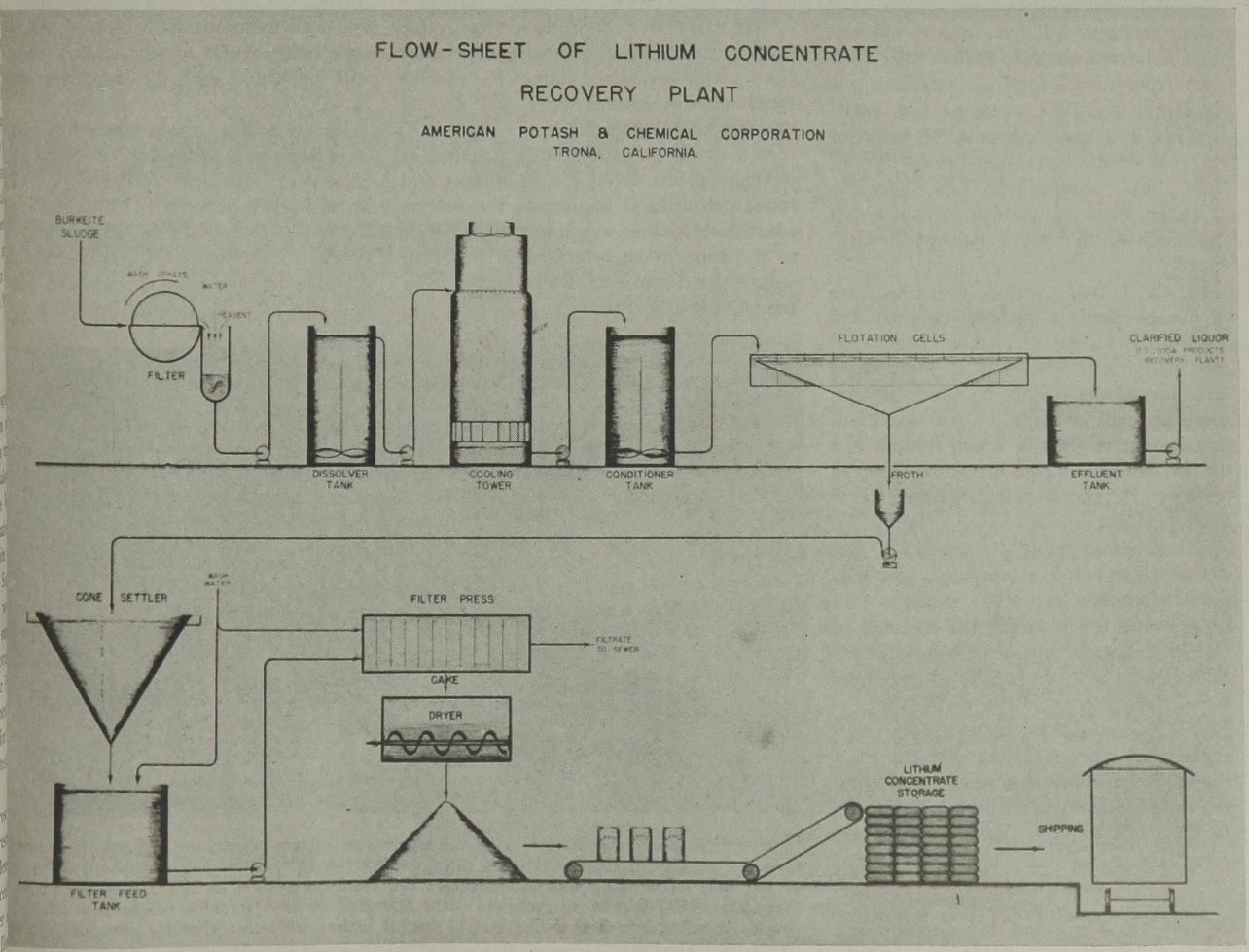
| *Year* | *Tons* | *Value* |
|---|---|---|
| 1939 | 1,990 | $ 97,000 |
| 1940 | 2,011 | 80,679 |
| 1941 | 3,832 | 115,718 |
| 1942 | 5,405 | 243,516 |

The 1943 production came from lepidolite, zinnwaldite, amblygonite, spodumene and lithium-sodium phosphate from Searles Lake, which was 202 tons.

Imports in 1943 amounted to 832 tons and came from Argentina, Brazil and South-West Africa.

While lithium has been detected in more than 100 minerals, only seventeen have sufficient quantities to be considered for commercial recovery. The thirteen in addition to the four now being used are bityite, cryolithiunite, holmquisite, lithiophilite, manandonite, cookeite, hallerite, irvingite, polylithionite, petalite, sicklerite, snarumite, and triphylite.

Little of the ores and raw materials



enter the open market, because producers of lithium and its compounds and other users operate their own mines or contract for their requirements. Only ten prospective purchasers of lithium ores were listed in 1943.

Before World War II the demand for the ores was intermittent and restricted, with the result that independent mining operations were small and sporadic. Most producers found it difficult to guarantee definite tonnages and quality, because of the variation of ores, despite the fact that this was essential to an assured market for their output

Prices for lithium ores in 1943 were $24 to $25 a ton for lepidolite, $30 for spodumene, and $40 to $50 for amblygonite, all prices f.o.b. at mine. The price of lithium-sodium phosphate f.o.b. Trona was $232.

Metallic lithium has been reduced in price from $96 per pound in 1929 to $15 per pound in 1932 and thereafter. Lithium compounds range in price from $1.25 per pound for the carbonate to $2.10 for the fluoride. While these prices are relatively high, it is recalled that most uses of lithium substances require very small quantities.

Regarding future lithium requirements, the Minerals Yearbook of the U. S. Department of the Interior for 1943 states:

"Although the increased demand for lithium minerals and compounds may be attributed to their use as bases of many essential war products, the majority of these products will have a post-war use, and it is reasonable to believe that post-war requirements for these materials will be larger than 1939, a peak pre-war year."

This is a most conservative estimate, in view of the increasing use of lithium, its alloys, compounds and minerals. Lithium alloys and lithium organics may be expected to have a marked development.

In the postwar period lithium will no doubt be used to harden, toughen and improve the grain of metals. Lead, copper, cast iron, carbon and stainless steels are among the metals in which lithium probably will be utilized. Air conditioning is another field in which lithium will be in demand. The use of lithium in greases, storage batteries, glasses, ceramics, welding fluxes and in a number of other products may be expected to increase when ample supplies are available for all industry.

Improved processes for the recovery of the element from low-grade ores and the augmented supply from Searles Lake may be expected to meet the anticipated increased demand. In satisfying this demand the United States will be in a dominant position as a result of having the largest reserves of lithium materials in the world.

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# Fastest Automatic Sprinkler Speeds Rocket Powder Production

THE world's fastest operating automatic sprinkler system, developed by C. L. Jones, Hercules Powder Co. safety engineer, in cooperation with Automatic Sprinkler Corp., is playing an important part in the nation's rocket powder program. The "High Speed" sprinkler system functions within one second from the start of the fire to the discharge of the water, and was developed to protect employees from flash fires which often occur at a certain stage in the manufacture of rocket powder.

At one of the ordnance plants designed and operated by Hercules, 46,000 fires have occurred to date but not a single person has lost his life because of them, and only a few minor burn cases have been registered. This outstanding safety record has been due largely to the success of the "High Speed" sprinkler system.

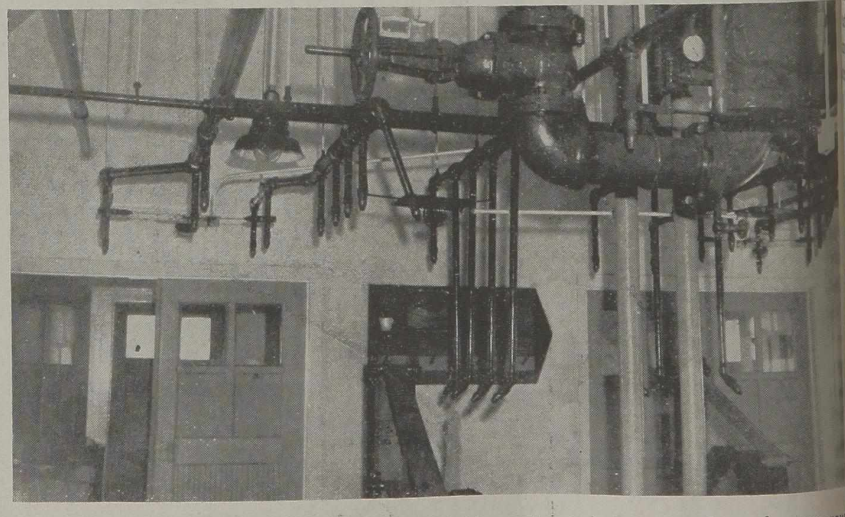
The valve is a Suprotex-deluge valve manufactured by Automatic Sprinkler Corp. with oversize piping to various spray nozzles located over and around the area to be protected.

Rate-of-rise heat detectors, located at strategic points about the equipment and room, are utilized to operate the valves, which are located as closely as possible to the zone to be protected in order to reduce the distance of water travel from the valve to the fire.

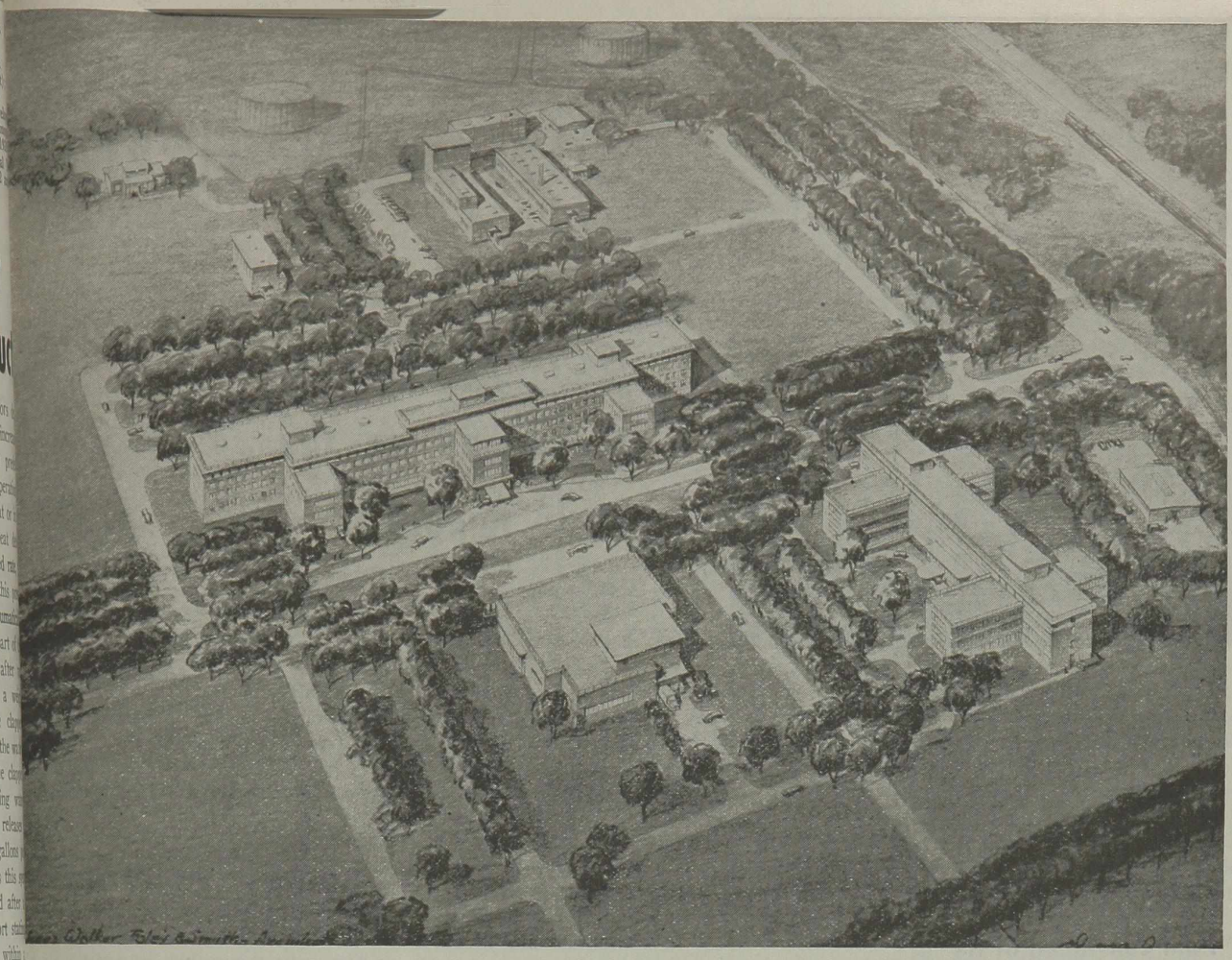
Rate-of-rise heat detectors depend on the rate of temperature increase rather than reaching a certain predetermined temperature for their operation. Thus as the temperature rises at or in the zone of any or all of the heat detectors in excess of a predetermined rate, the pressure rises rapidly and this pressure impulse is transmitted pneumatically to the release located at any part of the deluge valve. This impulse, after reaching a certain point, releases a weight which falls and releases the clapper of the Suprotex-deluge valve, the water pressure on the underside of the clapper opening the valve and admitting water to the system. Each nozzle releases water at the rate of about 35 gallons per minute.

On several occasions this system operated within 0.2 second after a fire had started, the usual report stating that the fire was extinguished within a few seconds with much of the rocket powder still unburned and the employee uninjured.

Rocket powder plants where this system is in operation include three operated by Hercules: Badger Ordnance Works, Baraboo, Wis., Radford Ordnance Works, Radford, Va., and Sunflower Ordnance Works, Lawrence, Kan. The systems are also in operation at Hercules plants in Kenvil, N. J., and Parlin, N. J.



**In operation, the "High Speed" automatic sprinkler system ejects water from the numerous sprinkler nozzles in the foreground, extinguishing the fire within one second after the start of the fire. The above illustration shows the sprinkler system at the carpet roll house of a rocket powder line at an ordnance plant operated by the Hercules Powder Co. Here the powder is rolled into carpet-like strips, several inches wide, for charging into the extruder**



The new research laboratories announced by Standard Oil Development Co., at Linden, N. J., will occupy eight buildings.

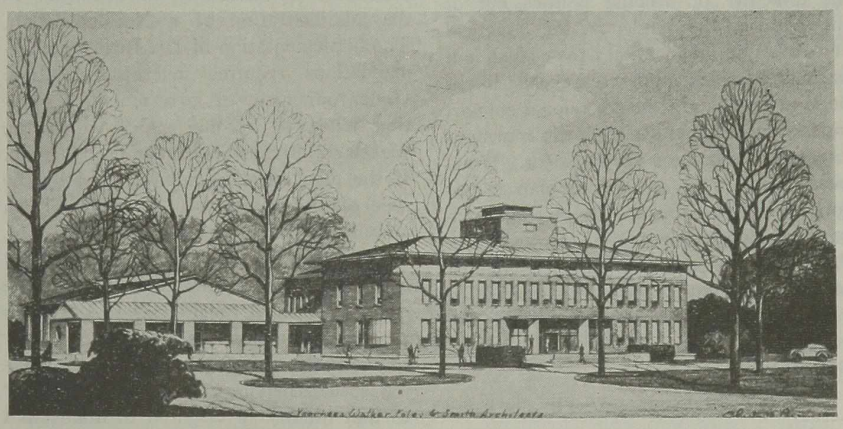
# New Standard Oil Co. (N. J.) Research Laboratories

PLANS for two major petroleum research centers, to provide modern and extensive research facilities for petroleum processes and products, were announced on August 22 by Eugene Holman, president of Standard Oil Co. (N. J.). They will be completed late in 1946 or early 1947 at Linden, N. J., and Baton Rouge, La.

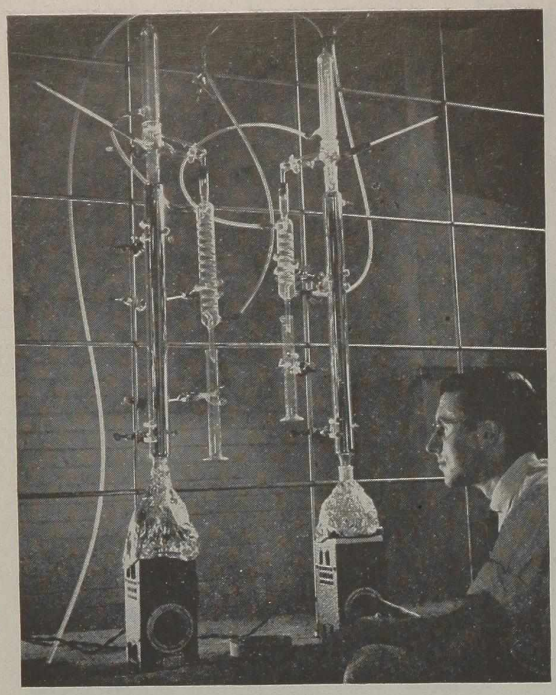
The new centers will serve as additions to the already large laboratories of the Standard Oil Development Co., central technical organization of the Jersey Standard group. The expansion program is expected to involve an ultimate expenditure of $8,000,000, and it is planned to keep all old facilities in operation. This will necessitate an increase of at least 20 per cent in the present research and technical group to staff the new laboratories.

The central structure of the development at Linden will be a research center that will occupy 200,000 square feet on a 60 acre tract. Nearby will be a separate engineering building, a motor test laboratory, pilot plant for larger scale studies, and several smaller buildings, making a total of 350,000 square feet of new space. Only one building, containing 35,000 square feet, is planned at Baton Rouge.

R. P. Russell, president of Standard Oil Development Co., noted that the new laboratories would be used not only for research on oil and oil products, but also for extending the sources of supply of these products. This latter work will include the production of liquid hydrocarbons from natural gas, gasification of coal, and the production of oil from other carbonaceous materials such as coal and oil shale. Basic studies will also be conducted on the derivation of chemical raw materials from petroleum.



New research laboratory building of the Standard Oil Development Co. at Baton Rouge, La., will provide 35,000 square feet of working space.



# GOVERNMENT-FINANCED

## Chemical Industry Comments on the Bush Report

*Last month* CHEMICAL INDUSTRIES *invited a number of research directors and top management executives in the chemical industry to express their views on the national science program recommended by Dr. Vannevar Bush's committee in its report to the President entitled "Science—The Endless Frontier."* Here are some of the replies.*—EDITOR.

### "I am convinced of its significance for America"

THE MORE I HAVE THOUGHT OVER and pondered the National Research Foundation and its proposed charter, the more I am convinced of its soundness, and of the significance which it has for the future of America. As one who has been privileged to work closely with certain phases of the war research program under government auspices and government finances, I can say that in spite of all the obstacles to success, the waste, inertia, "muddling" etc. that seem to be inevitable in such work, the net result justifies the expense and effort.

I realize all the pitfalls in the program, the difficulty of keeping politics out of the picture, the tendency for practical research, or application, to crowd out basic and fundamental research, the likelihood of diminishing congressional support unless practical results from the enormous expenditures become very evident. However, I feel that as such a plan brings forth new fundamental knowledge, privately supported industrial research will "run with the ball" in a sufficient number of cases and with sufficiently outstanding results to keep congress and the public convinced of the wisdom of continuing the financial support.

This opinion is my own and does not reflect consensus of Cyanamid opinion.

NORMAN A. SHEPARD, Chemical Director, American Cyanamid Company

### "The key to success . . ."

I FIND MYSELF in general agreement with Dr. Bush's recommendations.

The key to the success or failure of the whole plan will, of course, be the choice of the persons who are to have the responsibility of carrying it out. If the Government decides to go ahead with some such program, it is certainly to be hoped that competent supervision will be provided.

FRANCIS C. FRARY, Director
Aluminum Research Laboratories
Aluminum Company of America

### "It ought to be given a trial"

THE BUSH REPORT IS A CONSTRUCTIVE PLAN to meet the exigencies of the near future and the contingent objectives outlined in the President's request for advice.

Fluidity is a characteristic of freedom of inquiry in scientific research. This postulates the necessity of flexibility in the administration of a National Plan. The implementation of Dr. Bush's recommendations requires federal legislation. Under our form of government, legislation tends to become rigid, which the wisest statesmanship cannot easily avoid. If the plan could be administered by the type of citizen represented by Dr. Bush and his advisors, it could be successful, but it is highly unlikely that any national legislature will in peacetime so abdicate its constitutional function as to set up an autonomous administrative agency.

The incidence of pressure groups seeking special privilege is a constant threat to that fluidity so essential to intellectual freedom. Implicit in Dr. Bush's report is a preoccupation with these dangers.

Notwithstanding these hazards, Dr. Bush's plan is so constructive that it ought to be given a trial.

FREDERIC W. WILLARD, President
Nassau Smelting & Refining Company, Inc.

### ". . . may in time degenerate"

I AGREE WITH ALL of Dr. Bush's recommendations.

The only thing that worries me and others with whom I have talked is that such an organization sponsored with government funds may in time degenerate into a racket. It is human that it might become a self-perpetuating organization in which nepotism would play a controlling role.

It is my hope that such an organization as indicated may continue to be free from any political pressures and the men selected will be truly representative of the best the country can offer.

L. P. KYRIDES, Research Director
Organic Chemicals Division
Monsanto Chemical Company

### "A proper and desirable activity by the government"

WHILE THIS IS A TIME when most of us are thinking that we would like to see the government contract its many bureaus which, of necessity, it has operated during the recent years, we can see in the Bush recommendation a proper and desirable activity by the government. Certainly today, with the need so evident for long-range, broad-scale military and naval research, if we are to be afforded protection in coming years, there can be no question as to that being a proper sphere for our government. Also, the many processes relating to the new atomic bomb is perhaps the first example of a major invention which every one

* The principal provisions and recommendations of the Bush report appeared on page 245 of the August issue of *Chemical Industries*.

# RESEARCH?

will realize should be government-owned and controlled. It is also an invention that would probably not have been possible without the large funds and power of the government in arranging for the co-ordinated research efforts of so many people.

Louis Ware, President
International Minerals & Chemical Corp.

## "We have drawn heavily from our stockpile"

On the assumption that industry cannot or will not supply the funds for basic research the recommendations of the Bush report are sound and, if properly carried out, can be of inestimable value to the future of this country. However, it is believed that industry is beginning to appreciate, to a greater degree, the value and necessity of basic research and will support it more fully in the future.

There have been many trials and many more suggestions and panaceas for creation of jobs to obtain full employment. The only sound basis for the creation of jobs is the development of new industries and new products, the foundation of which for the most part is basic research. During the past few years we have drawn heavily on our "stockpile" of fundamental scientific knowledge without adequate replenishment.

It is evident that our colleges and universities will be unable to carry on the necessary amount of basic research without financial assistance. Since the resulting end point of such research redounds to the good of the whole nation, there is considerable logic and reason for the recommendation that the national government should support such type of research.

For the most part the funds should be used for matching dollars or enhancing State funds applied to basic research, as well as such moneys of universities, colleges or grants given by individuals and industry to the universities, colleges or research institutions for fundamental research in any of the sciences.

The suggestion that a permanent Science Advisory Board be set up to advise the executive and legislative branches of government on policies and budgets in government agencies engaged in research should be of value. In the past these agencies have not devoted a sufficient part of their time to basic research because it has been necessary for them to make a certain amount of showing to impress members of congressional committees. Certainly more of the research should be directed along basic lines rather than applied, and a permanent Science Advisory Board should be of considerable assistance in permitting these agencies to direct their work along such lines, provided that the Congress is willing to accept the advice and recommendation of the Board.

On the whole the report is excellent and deserves thorough consideration by everyone concerned with our maintenance of world leadership in industry, agriculture and science.

Chemical Executive

Western Regional Research Laboratory, U. S. Department of Agriculture, Albany, Calif.

## "There is something about government work"

It would be impossible from a practical standpoint to consider the establishment of government-operated research laboratories with the idea of their ever accomplishing anything.

The National Research Council with its set-up seems to have a marvelous opportunity to accomplish something for the general good of the country, but from the standpoint of a single individual citizen, I cannot see why I should be very enthusiastic about believing they have a corner on research ability.

I feel a large number of scholarships and fellowships for science should be set up in universities, but I hate to think they would all have to come out of government groups for the reason that the problem then becomes political. Everyone knows that a research man working on a basic project usually steps on a large number of political toes. I can't conceive how the original work on alcohol for fuel or butadiene or any of the other many uses could ever have developed out of a government research laboratory. Neither can I conceive how the chemurgy idea could have developed in such a laboratory.

There is something about government work, I think mostly on account of its size, which tends to dampen the vision necessary for fundamental work.

Chemical Executive

*(The writer of this letter apparently misunderstood part of the report. It does not recommend government-operated laboratories, but rather government financial support of basic research by colleges and research institutions.*—Editor.

## "It will help us catch up"

The United States must retain its world leadership in science and technology. The proposals set forth in the report prepared by Dr. Vannevar Bush and his able advisors will go a long way towards maintaining that leadership.

We have succeeded in drying up our reservoir of scientific and technical students through the selective service act. The objectives of Dr. Bush's proposals will, at least, help us to catch up some in that direction.

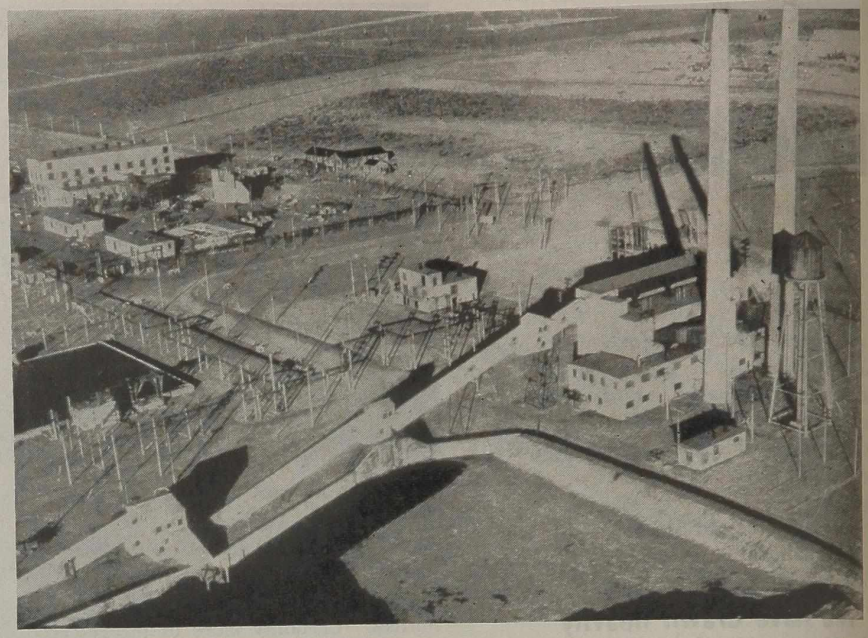
The results that flowed from the atomic bomb are but one example of the potentialities inherent in scientific research. To safeguard our national security and to open new vistas for post-war development, we must concentrate every effort to increase our basic research.

Gustav Egloff
Universal Oil Products Co.

## "The new need can be filled without destroying the system"

The important point as I see it, is that Dr. Bush, eminently qualified by training and experience to suggest such a program, has recognized the fact that there is a position for Government in the nation's research. However, he fully realizes that much of the research program must depend as it has in the past upon the American competitive system, and he has suggested a pattern whereby the new need can be filled without destroying the system which has been so exceedingly productive in the past.

H. W. Fisher, Manager
Chemical Products Division
Standard Oil Company of New Jersey



Part of the buildings at the Hanford Engineer Works, near Pasco, Wash., where plutonium was produced for the atom bomb.

# TECHNOLOGY of the ATOMIC BOMB

EDITORIAL STAFF REPORT

IT IS ONLY THE TREMENDOUS FACT of atomic energy itself that overshadows the brilliant accomplishment of chemists, physicists and engineers in making it available in the time and quantity demanded by the grim urgencies of war. This is a breath-taking and revolutionary achievement in its own right. Never before has an industrial plant measured in thousands of square feet been designed from data expressed in millionths of a gram. Never before have the reactions of a new chemical element taken less than a matter of years to develop.

AVAILABLE information on the technology of the atomic bomb and its uranium-derived constituents is still meager. But enough has been revealed to indicate the nature and magnitude of some of the accomplishments and the problems they involved.

Most of the technical data that has been made public is contained in a 30,000-word progress report* by Prof. H. D. Smyth of Princeton University, who was a member of the committee directing the project.

Scientific data leading up to the atomic bomb have been accumulating since the turn of the century. Many people in many nations of the world are among the contributors. Technological considerations, however, pertaining to production of atomic energy on a large scale, did not enter the picture until the beginning of the present war. In fact, it was not until June, 1942, that anything approaching a decision on raw material possibilities was reached. By that time, however, according to Professor Smyth, the sources of energy for the bomb were narrowed to U-235, an isotope of uranium, and plutonium, an element obtained by atomic bombardment of uranium. Thorium and protoactinium were other possible sources, but they were eliminated because of their scarcity.

U-235, when bombarded by neutrons from an outside source, will split up into a number of lesser elements with the release of tremendous energy. A so-called chain reaction is developed wherein the initial splitting of a U-235 atom releases more neutrons which in turn split other U-235 atoms and so on, until in a fraction of a second the action—if not controlled—reaches a magnitude of super-explosive violence. The reaction is, however, purely physical, not chemical as in the case of ordinary explosions. The weight of the products is less than the weight of the reactants, and the difference is represented by the energy released. It is exactly according to the prediction of Einstein 40 years ago when he introduced the theory that mass and energy were the same thing in different forms, as expressed by the equation: $E = mc^2$ (energy equals mass times the velocity of light squared). On this basis, one pound of matter is said to equal more than ten billion kilowatt-hours of energy, which explains the tremendous power of the atomic bomb.

The second source of atomic power, plutonium, was selected for the bomb project because in addition to being fissionable (capable of being split) it appeared to have two important advantages over U-235. One of these was greater stability. U-235, especially in amounts above a certain critical limit, appeared to be so unstable that almost any stray neutron might set it off with earth-shaking results. Plutonium, on the other hand, was relatively safe. The other advantage was that, theoretically at least, plutonium could be more easily isolated than U-235. Also, it was the more plentiful of the two by virtue of its derivation from U-238, of which about 140 parts exist in uranium ore to 1 of U-235.

* *Atomic Energy for Military Purposes*, by Henry DeWolf Smyth, to be published September 15 by Princeton University Press, Princeton, N. J.

Thus it was decided to go ahead with large-scale production facilities for both materials. If one didn't work, perhaps the other would. At the time not more than a microgram (millionth of a gram) of plutonium had ever been produced, and little more of U-235. In fact by the end of 1942 total production of plutonium amounted to slightly over half a milligram.

Pilot plants were out of the question because of lack of time. So plans for the Clinton Engineer Works at Oak Ridge, Tennessee, and the Hanford Engineer Works at Pasco, Washington, were launched as several-million-fold projections of the data at hand. Engineers, chemists, physicists, materials, money and other requirements were rounded up. One of the first tough technical problems was the weighing of experimental run materials and yields to an accuracy of 0.03 micrograms, necessary because errors would be magnified many millions of times in expanding the data to plant scale. Special high-sensitivity weighing equipment was designed and built to do the job. This was but the beginning of many seemingly (at times) insurmountable obstacles, some of which were apparent at the beginning, with others looming up as the work progressed. But the gamble was taken, to the extent of over $2,000,000,000 (roughly the cost of replacing the U. S. Fleet).

## RAW MATERIAL

The principal source of uranium is pitchblende, in which it occurs along with radium. There are major deposits of pitchblende in the Great Bear Lake region of northwestern Canada (see pages 469 and 528 this issue), and other known deposits in Connecticut, North Carolina, Texas, Great Britain, Austria, Czechoslovakia, Russia, Sweden and Norway. Carnotite, another source of uranium, is found in the United States, Australia, Portugal, and Africa.

The material for the atomic bomb, or Manhattan District project, as it is officially known, was obtained from Canada as commercial black uranium oxide. This was put through an ether extraction process, developed especially for the project, to remove impurities and render the final product as the brown dioxide. "This oxide," says Professor Smyth, "is now used as a starting point for all metal production, and no higher degree of purity can be expected on a commercial scale. It was a remarkable achievement to have developed and put into production on a scale of the order of one ton per day a process for transforming grossly impure commercial oxide to oxide of a degree of purity seldom achieved even on a laboratory scale."

The uranium metal was prepared initially by electrolysis of potassium uranium pentafluoride, then of uranium tetrafluoride. But this method was not entirely satisfactory and a new process was developed independently at Iowa State College which proved to be "extremely simple, rapid and low cost."

## ISOTOPE SEPARATION

In the large scale production of U-235 the problem was separation of the element from its more abundant isotope, U-238, in quantities large enough to produce atomic bombs. Based on known separation methods at the start of the work, the job was colossal.

U-235 is so similar to U-238 in its properties that the separation had to be based on minute physical differences.

Two methods were finally selected from the several considered. One involves ionization of the uranium and shooting it through the field of a large electromagnet, as in the mass spectrograph. The device used is known as a calutron. It consists of an ion source from which a beam of uranium ions is drawn by an electric field, an accelerating system in which the ions are accelerated to high velocities, a magnetic field in which the ions travel in semicircles of radius depending on ion mass, and a receiving system. The heavier particles of U-238, because of their greater momentum, describe a greater arc than the lighter U-235, so that receivers properly located at the end of the curve are able to catch the U-235 and U-238 separately. Out of one ton of natural uranium it is theoretically possible to get about 14 lbs. of U-235.

The electromagnetic separation plant at the Clinton Engineer Works was in large scale operation during the winter of 1944-45, and produced U-235 of sufficient purity for use in atomic bombs.

The second method involves diffusion of a volatile uranium compound through a submicroscopic filter, or barrier, through which it was found that the U-235 would pass slightly more readily than the U-238. Thus by successive passes through the barrier, the U-235 becomes more concentrated as more of the U-238 is screened out.

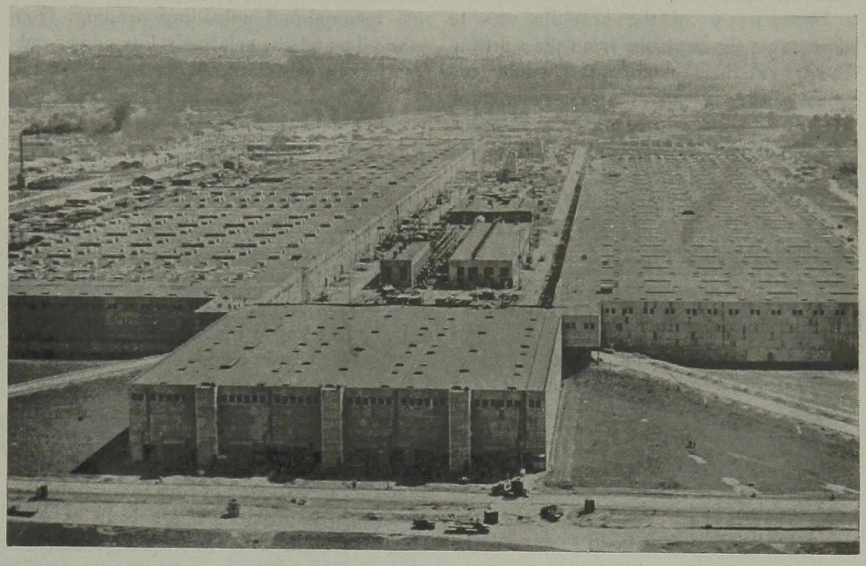
The principal problems were the development of satisfactory barriers and pumps. Acres of barrier and thousands of pumps were required. The separation gas was uranium hexafluoride, for which production and handling difficulties were so great, however, that a search for an alternative was undertaken. Since much of the separation was to be carried out at low pressure, problems of vacuum technique arose—on a previously unheard-of scale.

Ultimately a very satisfactory barrier was developed and the plant was put into operation before the summer of 1945.

## PLUTONIUM DEVELOPMENT

Production of plutonium, for which a plant was constructed first at the Clinton Engineer Works and later, on a larger scale, at the Hanford Engineer Works at Pasco, Washington, is based on the principle that when U-238 is bombarded with neutrons it does not split like U-235 but rather absorbs some of the neutrons and is thereby converted into neptunium (element 93 in the periodic table) which in turn changes spontaneously into plutonium (element 94) by beta ray (electron) emission.

Enough plutonium for ultra-microchemical work was produced by bombardment of several hundred pounds of uranyl nitrate with neutrons in cyclotrons. By the end of 1942 something over 500 micrograms had been obtained in the form of pure plutonium salts. Although this amount is less than would be needed to make the head of a pin, for the microchemists it was sufficient to yield considerable information; for one microgram



**Air view of one of the production buildings at the Clinton Engineer Works, Oak Ridge, Tenn. Separation of U-235 from other uranium isotopes was one of the operations at this plant.**

is considered sufficient to carry out weighing experiments, titrations, solubility studies, etc.

"From its position in the periodic table," says Professor Smyth, "plutonium might be expected to be similar to the rare earths or to uranium, thorium, or osmium. On the whole it turned out to be most like uranium and might even be regarded as the second member of a new rare-earth series beginning with uranium. It was discovered fairly early that there are at least two states of oxidation of plutonium. (It is now known that there are four, corresponding to positive valences of 3, 4, 5 and 6.) Thus by the end of 1942, plutonium, entirely unknown eighteen months earlier, was considered an element whose chemical behavior was as well understood as that of several of the elements of the old periodic table."

Calculations were worked out which showed it should be possible to produce plutonium by a chain reaction similar to that which takes place when U-235 explodes, provided the reaction could be controlled. The first chain reaction pile to produce plutonium was accordingly set up at the University of Chicago in 1942. It was built of graphite bricks in which were imbedded regularly-spaced lumps of uranium and uranium oxide in the amount of approximately six tons. The structure was in the shape of a partially flattened sphere.

The purpose of the graphite was to slow down the neutrons from the splitting U-235 so their momentum would not carry them out of the pile completely and off into space to be wasted. Paraffin, beryllium and heavy water were also found to be efficient arresters, or "moderators" as they are called, but their other properties made them less convenient than graphite for the purpose.

In addition to shooting out of the pile, some of the neutrons, it was found, were expended on impurities in the mass, thus requiring a certain minimum purity if the chain reaction were to be self sustaining.

Instruments situated at various points in the pile or near it indicated the neutron intensity, and movable strips of absorbing material (cadmium) served as controls, much as fire-breaks in a forest serve to control a fire. "Since there were bound to be some neutrons present from spontaneous fission or other sources," states the Smyth report, "it was anticipated that the reaction would start as soon as the structure had reached critical size if the control strips were not set in 'retard' position. Consequently, the control strips were placed in a suitable 'retard' position from the start and the neutron intensity was measured frequently. This was fortunate since the approach to critical condition was found to occur at an earlier stage of assembly than anticipated." This was the first successful attempt of man to initiate a self-maintaining nuclear chain reaction.

The scale of present production of plutonium has not been disclosed for security reasons. It has simply been reported as "very large."

## PLUTONIUM PLANT

In the preliminary calculations it was assumed that a single bomb would require on the order of one to 100 kilograms of plutonium. To produce a kg. per day was estimated to require dissipation of energy released at the rate of 500,000 to 1,500,000 kilowatts. A chemical plant was required that could separate some grams of plutonium per day from some tons of uranium, and the plans and design had to be based on information obtained by microchemical studies involving only half a milligram of plutonium.

The proposed extrapolations were staggering. In peacetime no engineer or scientist in his right mind would consider making such a magnification in a single stage, and even in wartime only the possibility of achieving tremendously important results could justify it.

One of the first decisions in designing the plutonium plant was whether the piles should be helium cooled or water cooled. Water was finally selected for several reasons, among which were hazard from leakage of a high pressure gas carrying radioactive impurities, the difficulty of getting large blowers quickly, the large amount of helium required, the difficulty of loading and unloading uranium from the pile, and the relatively low power output per kilogram of uranium metal. These considerations, however, had to be balanced against the peculiar disadvantages of a water-cooled plant, principally the greater complexity of the pile itself and the danger of corrosion.

The large piles were built with a lattice of uranium rods, rather than lumps, in graphite, because it was easier to reach the rods with the cooling system and easier to remove them from the pile.

Cooling water could not be allowed to flow directly around the uranium rods because the rods would react with the water sufficiently to impart a dangerous amount of radioactivity to it, possibly even to the point of disintegrating the rods. This problem was solved by sealing each rod in a protective jacket or "can." Strangely enough, this "canning" operation turned out to be one of the most difficult problems encountered. It was finally solved by sheathing the rods in aluminum.

All the piles designed for large-scale operation are understood to depend on stray neutrons from spontaneous fission or cosmic rays to initiate the reaction.

Production of fission products, of which there are some thirty, causes poisoning of the piles. Even at the high power level used in the Hanford piles, only a few grams of U-235 and U-238 are used up per day per million grams of uranium present.

Operations on plutonium got under way at Clinton [illegible] tions at Hanford. The main purposes of the Clinton plant were to produce some plutonium and to serve as the initial plant for chemical separation of the plutonium from uranium.

The Clinton pile consists of a cube of graphite containing horizontal channels filled with uranium. The uranium is in the form of metal cylinders protected by gas-tight casings of aluminum. The cylinders, or slugs as they are called at the plant, may be slid into the channels in the graphite; space is left to allow entry of cooling air to flow past and to permit pushing the slugs out at the back of the pile when they are ready for processing.

## CHEMICAL SEPARATION

After formation of plutonium in the pile, the problem, according to Professor Smyth, was one of separation "at the daily rate of, say, several grams of plutonium from several thousand grams of uranium contaminated with large amounts of dangerously radioactive fission products comprising twenty different elements," among them radioactive xenon and radioactive iodine.

Four methods of chemical separation were examined: volatility, absorption, solvent extraction, and precipitation. The work on absorption and solvent extraction has been extensive and such methods may be increasingly used in the main process or in waste recovery of uranium, but the Hanford plant was designed for a precipitation process.

Most of the precipitation processes which received serious consideration made use of an alternation between so-called (IV) and (VI) oxidation states of plutonium. Such processes involve a precipitation of plutonium (IV) with a certain compound as a carrier, then dissolution of the precipitate, oxidation of the plutonium to the (VI) state, and reprecipitation of the carrier compound while the plutonium (VI) remains in solution. Fission products which are not carried by these compounds remain in solution when plutonium (IV) is precipitated. The fission products which carry are removed from the plutonium when it is in the (VI) state. Successive oxidation-reduction cycles are carried out until the desired decontamination is achieved.

When the Hanford plant was designed the choice of a separation process lay between two possibilities, both precipitation processes. The final choice represented a combination of the two. Its success has exceeded all expectations.

The chemical separation equipment at the Clinton plant, which also may be typical of the Hanford plant, although this is not stated in the report, is housed in a series of adjacent cells having heavy concrete walls. These cells form a continuous canyon-like structure about 100

(*Turn to page 524*)

# DDT for EVERYBODY

## (But Watch Your Step!)

EDITORIAL STAFF REPORT

**END OF THE WAR AND CANCELLATIONS of Army and Navy contracts have released a flood of DDT production for civilian use. Formulators are climbing on the band wagon, and already you can buy DDT insecticides in department stores. Manufacturers and sellers will do well to heed the precautions and suggestions of the USDA presented as part of this report.**

THE PRESENT production of DDT is about 3,000,000 lbs. per month. Translated into terms of effective insecticides containing 5 per cent of the active material, which will probably be the maximum in civilian products, this means a monthly production of 60,000,000 lbs., or 360,000 tons a year. Obviously, our productive capacity is great enough to take care of usual needs and more, and it will not be long before compounders for civilian use can get all they want. War contract cancellations were being sent out at this writing and WPB predicted that virtually all future production will go to civilians. There is still a pent-up Government demand—for the War Food Administration, for the Public Health Service, for UNRRA, and other agencies, but these will absorb only a fraction of the production.

It is characteristic of the popular press that extravagant claims and promises have been made, both for the "miracle insecticide" itself and for its imminent availability. DDT is truly remarkable, but it must be used correctly and under intelligent direction to prevent destruction of beneficial insects and other wild life as well as to prevent injury to man and domestic animals.

As one manufacturer put it, "In our opinion DDT has received too much of the kind of publicity which intrigues the layman. We believe that publicity for the immediate future should emphasize the necessity for proper ready-to-use formulations and for knowledge about the possible harmful effects to human beings as well as to valuable insects."

It is with these remarks in mind that we present the plans of the various manufacturers to supply the civilian market—both household and agricultural—with the new insecticide material.

*(USDA Photograph by Madelaine Osborne)*

**A DDT insecticide is being tested experimentally against the corn borer. The machine is a self-propelled crop duster equipped to control rate of speed, air velocity, and feed rate.**

### MANUFACTURERS' PLANS

The Geigy Company, New York, whose parent firm in Switzerland originated DDT insecticides and holds the U. S. Patent (2,329,074) governing the manufacture and sale of insecticidal compositions containing the material, does not plan to engage in retail business. It is negotiating under this patent with other firms who produce and formulate the compound; and to firms who lack research and formulation facilities it hopes to sell its concentrated compositions. In the case of household powders these will merely need extension with pyrophyllite, or for sprays, with deodorized kerosene.

It also proposes to market through the usual farm supply channels a line of proprietary formulas which it has developed for the control of agricultural pects and insects attacking man and animals.

Geigy's production of DDT is in the plant of the Cincinnati Chemical Works, which is partly owned by the parent dyestuff house of J. R. Geigy, of Basle.

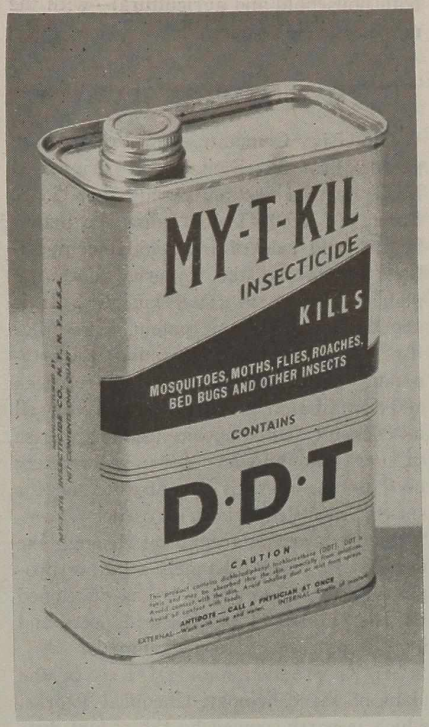
The Pennsylvania Salt Company is also ready to supply civilian needs. Essential users of DDT, including farmers, fruit growers, dairy and cattlemen, will be the first to benefit from the company's supplies, said J. G. Brunton, in charge of Penn Salt's DDT output. After essential needs are met, householders and amateur gardeners will be able to purchase unlimited quantities of DDT insecticides in drug stores, grocery, hardware, and department stores, and seed supply houses. He predicted that civilian DDT will be supplied in four different forms: as a dust or spray for large agricultural users, beaches, and resorts; as a household insect spray and as a household dusting power—both to control flies, ants, mosquitoes, roaches, and other pests; and as a garden insecticide, possibly in an oil or water base.

Research is now being carried out at the company's Whitemarsh Laboratories to find new combinations and uses for DDT. One of the combinations being investigated is a practical and economical method for moth-proofing clothes more effectively than heretofore.

Another producer who, like Geigy and Penn Salt, does not engage in retail insecticides but sells the concentrated material to formulators, is concerned about the racketeers who hope to get rich quick on the popular demand for DDT.

"These fellows," one of the officials of the company protested, "were cleaning up on the black market in gas and meat a few months ago. Now they're getting ready to clean up on DDT."

He cited the case of one exploiter who bottled pints of a 0.78 percent solution of DDT and sold the half cent's worth of material for a dollar a bottle. Adequate




**Within a few days after WPB release of the material, DDT appeared in department stores.**

precautionary labelling was apparently considered unnecessary, and the buyer was on his own to use the composition effectively and safely.

He maintained that his company will exercise the greatest caution in seeing that the concentrated material is sold only to reputable insecticide manufacturers who cooperate with the U. S. Department of Agriculture, the Public Health Service, and other government agencies which work in the public interest.

## CAUTION NEEDED

Sievert A. Rohwer, assistant chief of the Bureau of Entomology and Plant Quarantine, recently cautioned members of the DDT Producers Industry Advisory Committee as follows: "Industry has a privilege and a responsibility, and must use DDT wisely, both in the interest of public welfare and for the good of the industry. "There is a great deal that is yet to be learned about how to safely use DDT insecticides, from the standpoint of hazard to user, to the consumer of products on which residues may occur, the effect they may have on soils, and on the whole balance of nature in terms of beneficial insects and wild life."

In regard to the safe usage of DDT insecticides, the following statement of W. G. Reed, chief of the Insecticide Division, Livestock and Meat Branch, of the U. S. Department of Agriculture, is pertinent:

"Since DDT is now being released . . . for civilian uses, many insecticide manufacturers are rushing to get products containing it on the market. They should bear in mind that insecticides shipped in interstate commerce are subject to the Federal Insecticide Act which requires that the labels must not be false or misleading and that in some cases they must bear ingredient statements. To avoid making faulty statements which may later have to be changed, or which may even result in legal action, manufacturers are urged to submit copies of their proposed labels (which may be in rough draft form), together with the formulas of their products, to this Division for an opinion as to their legal status. The address is Insecticide Division, Livestock and Meats Branch, O. M. S., U. S. Department of Agriculture, Washington 25, D. C. . . . Published statements about DDT have led to some false ideas as to its effectiveness. Proposed labels which we have seen have made numerous broad claims which were unwarranted. The term DDT has been used in the name—as, for example, "DDT Roach Powder"—implying that the product consisted entirely of DDT when only 10 per cent of DDT was present; and insufficient directions for use have been given. In some cases needed cautions have been omitted from the labels. . . ."

If all of the ingredients are active, no ingredient statement is required, but the law requires that the nature and percentage of each inert ingredient appear on the label; or in lieu of this, the nature and percentage of each active ingredient together with the total percentage of inert material.

The law does not require poison labeling, but neither must the label imply that the contents are safe or non-poisonous.

## RESPONSIBILITY

DDT is a powerful weapon against discomfort, disease, and crop loss if used correctly; but on the other hand, inadequate or misleading statements by manufacturers leading to improper use by the public will bring disrepute to the material and to the industry as well.

For that reason it is desirable that manufacturers and formulators go beyond the requirements of the law in making the labels explicit and unambiguous in their directions. The accompanying table lists suggestions offered by the Department of Agriculture. It is recommened that these suggestions be studied by all who intend either to make or to use DDT formulations.

### SUGGESTED CAUTION LABELS FOR DDT FORMULATIONS

#### *DDT*

*(Dichlorodiphenyltrichloroethane—technical*
*Setting Point 88° C. minimum)*

CAUTION: DDT is toxic and when in solution can be absorbed through the skin. Avoid inhaling dusts, and mist from spray. Avoid contamination of foodstuffs.

#### *Solutions*[1]

(1) *Petroleum Oil Solutions, containing not more than 20% DDT Technical*
CAUTION: This solution if brought into repeated or prolonged contact with skin can cause toxic symptoms.
Avoid excessive inhalation and skin contact.
In case of spillage on the skin wash with soap and water.
Avoid contamination of foodstuffs.
Do not use on household pets or humans.

(2) *Petroleum Oil Solutions, containing more than 25% DDT Technical*
CAUTION: This solution if brought into contact with skin can cause toxic symptoms.
Avoid inhalation and skin contact.
In case of spillage on the skin wash immediately with soap and water.
Avoid contamination of foodstuffs.
Do not use on household pets or humans.

(3) *Emulsions containing not more than 25% DDT Technical*
Same as (1) above.

(4) *Emuslions containing more than 25% DDT Technical*
Same as (2) above.

(5) *Combustible Mixtures*
Same as above, and add:
CAUTION: Do not spray into or near fire or open flame.
Do not smoke while spraying.

[1] If the solution contains other hazardous ingredients or solvents, appropriate additional cautions must be added to the foregoing.

#### *Dusts and Powders*

CAUTION: Avoid excessive inhalation.
Avoid contamination of foodstuffs.

It was the opinion of the toxicologists that the white household powders and dusts should be colored. This recommendation for coloration is made solely for the protection of human life but does not conclude that the product is highly toxic to man to the extent that it requires a poison label with skull and crossbones.

# RECOVERY of ALKALOIDS By Ion Exchange

by S. SUSSMAN, A. B. MINDLER and W. WOOD
The Permutit Co., New York, N. Y.

A NEW PROCESS for alkaloid recovery by adsorption on an ion exchanger is described here for the first time. A solvent extraction is required to complete alkaloid recovery after its liberation from the exchanger, although, in some cases, liberation and extraction are carried on conjointly.

THE ADSORPTION of alkaloids by cation exchangers has been known for many years[10] but commercial utilization of this reaction for alkaloid recovery or purification was retarded by the lack of satisfactory procedures for recovery of the adsorbed alkaloids. With the development of acid-resistant organic cation exchangers about 1935, interest was renewed in the possibilities of ion exchange for alkaloid recovery.[3, 7]

Riley[6] disclosed the use of acid-regenerated cation exchangers for the adsorption of nicotine while Higgins[4] reported the use of these materials in the sodium condition for the adsorption of nicotine, strychnine, quinine, cinchonine, and other alkaloids from alkaline, neutral and acid solutions. A process for recovering nicotine adsorbed on a cation exchanger was patented by Tiger and Dean.[9] By treatment of the exchanger with an acid, the alkaloid cation was replaced with hydrogen ion and the liberated nicotine was recovered as an aqueous solution of its salt.

The advent of the war jeopardized our supplies of quinine from the Netherlands East Indies and directed attention to the possible use of cation exchangers in the recovery of quinine and related alkaloids from low quality South American barks. It was found that, while the cation exchangers adsorbed the quinine bodies effectively, acid and salt regeneration treatments, using either cold or hot solutions, gave low yields in the recovery of quinine from the ion exchanger. Hot acid removed the alkaloid to a greater extent but the resulting quinine was of poor quality.

Early in 1941 the Permutit Laboratories developed a new process for the recovery of such alkaloids from ion exchangers. The basic principle was the use of a more effective liberating agent for the replacement of the alkaloid cation on the cation exchanger and the use of an appropriate solvent for the removal of the liberated alkaloid from the exchanger bed.[5] In contrast to earlier work, it was found that alkaline solutions were the most effective liberating agents. However, because of the extremely limited solubility of many of the alkaloids in water or aqueous alkali, it was necessary to introduce non-aqueous solvents such as alcohol, chloroform, amines, acetone, methyl acetate, mixtures of these, or others, for the removal of the liberated alkaloid base from the exchanger bed.

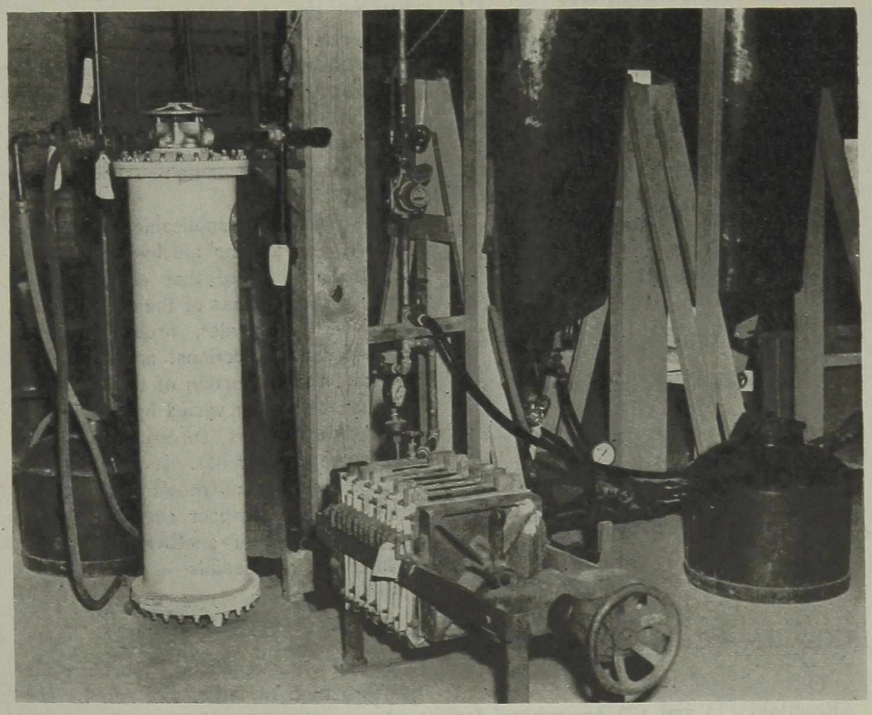
The over-all ion exchange process for alkaloid recovery consists of the following steps:

1. Contacting the alkaloid-containing extract or waste solution with the cation exchanger to effect adsorption of the alkaloid. The effluent from the ion exchanger may be re-cycled to the percolator for re-use.
   $H_2Z + 2\ A$ (alkaloid base) $\longrightarrow (AH)_2Z$
   $H_2Z + (AH)_2SO_4$ (alkaloid salt) $\longrightarrow (AH)_2Z + H_2SO_4$
2. Recovery of alkaloid may be accomplished by either of two procedures.
   (a) by a two-step method consisting of treatment with an aqueous alkaline solution followed by treatment with an appropriate solvent, or
   (b) by a one-step method in which the alkaline liberating agent and solvent are combined. The liberating agent may be dissolved in the solvent or one compound may serve both functions (i.e., amines).
   $(AH)_2Z + 2\ NH_4OH \longrightarrow 2\ A^* + (NH_4)_2Z + H_2O$
3. Backwash of ion exchanger bed to cleanse bed of foreign matter and reclassify granules of ion exchanger.
4. Regeneration with acid
   $(NH_4)_2Z + H_2SO_4 \longrightarrow$
   $H_2Z + (NH_4)_2SO_4$
   This step and the following may be eliminated if the alkaloid is being adsorbed from an acid solution.
5. Short rinse to displace the spent acid from the bed.

Choice of the two-step or one-step recovery method depends upon the particular conditions involved in any case. For example, in the recovery of quinine from a relatively pure solution of the alkaloid, it is possible to remove adsorbed quinine by a one-step treatment with a solution of ammonia in a non-aqueous solvent, such as alcohol or an alcohol-chloroform mixture, but for the recovery of quinine or cinchona alkaloids from crude extracts the two-step process offers certain advantages. During the aqueous alkali treatment a major portion of the color

(*Turn to page 549*)

* Removed by solvent.



Scopolamine recovery plant using ion exchange at the Debruille Chemical Corp., Brownsville, Texas.

# New Fields for Development Offered by

# ACETYLENE-ALDEHYDE REACTION

THE GERMAN APPLICATION of the reaction between acetylene and formaldehyde to the production of butadiene by means of the Reppe process which is described here serves as a reminder of the multiplicity of compounds, both new and old, which can be prepared from relatively inexpensive aldehydes or ketones and acetylene.

A RECENT REPORT that the butynediol produced from formaldehyde and acetylene had been used as the intermediate material for the preparation of about 20% of the German butadiene requirements has thrown the spotlight on a series of reactions which have been only incompletely reported in American technical literature, the reaction between acetylene and aldehydes or ketones.

In the preparation of butadiene by this process, as described by Dr. Reppe of I. G. Farbenindustrie A.-G. in an address in 1940, aqueous formaldehyde, probably in the form of its dihydrate, reacts with acetylene in two steps, first forming propargyl alcohol and then butyne-2-diol 1,4 by the following reaction scheme,

$$HO\text{-}CH_2\text{-}\boxed{OH+H}\,C\equiv CH \longrightarrow HO\text{-}CH_2\text{-}C\equiv CH + H_2O \quad (1)$$

$$HO\text{-}CH_2\text{-}C\equiv C\,\boxed{H+HO}\text{-}CH_2\text{-}OH \longrightarrow HO\text{-}CH_2\text{-}C\equiv C\text{-}CH_2OH + H_2O \quad (2)$$

A small amount of propargyl alcohol is always produced along with the butynediol.

The butynediol is then hydrogenated to form butanediol which is dehydrated in two steps, first to tetrahydrofurane and then to butadiene as shown below.

$$HO\text{-}CH_2\text{-}C\equiv C\text{-}CH_2OH + 2H_2 \longrightarrow HO\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}OH \quad (3)$$

$$\begin{array}{l} CH_2\text{-}CH_2 \qquad CH_2\text{-}CH_2 \\ | \quad | \qquad\quad | \quad | \\ CH_2\ CH_2 \longrightarrow CH_2\ CH_2 \quad + H_2O \\ | \quad | \qquad\quad \diagdown \ \diagup \\ O\,\boxed{H\ OH} \qquad\quad O \end{array} \quad (4)$$

$$\begin{array}{l} CH_2\text{-}CH_2 \\ | \quad | \\ CH_2\ CH_2 \longrightarrow CH_2{=}CH\text{-}CH{=}CH_2 \\ \diagdown \ \diagup \\ O \end{array} \quad (5)$$

Reactions (1) and (2) are general for aldehydes and ketones and take place in the presence of copper acetylide although acetylides of silver, mercury and gold as well as compounds of these metals which can form acetylides under the reaction conditions and the finely divided metals themselves may be used. It is necessary to use acetylene under pressure if high yields are to be obtained.

It would appear that this would be a dangerous operation as acetylene is present under pressure and copper acetylide is an explosion initiator, however, careful study of the explosion limits for acetylene under pressure and of the reaction conditions made it feasible to transfer the process to large scale operations. The temperature required is about 100° C. while the pressure should be above three atmospheres, the exact conditions depending on the aldehyde or ketone being reacted. Careful maintenance of pH is important, the required value ranging between pH 2 and 7.

For safety, the copper acetylide must be deposited in a definite, finely divided form on carriers, and it is prepared in the reaction chamber at the beginning of the run from suitable copper compounds.

The reaction is applicable to aromatic as well as aliphatic aldehydes. It must be also emphasized that either one or both hydrogen atoms of the acetylene can react with aldehydes, producing either mono- or poly-functional acetylene alcohols and the proportion of the two products can be widely varied by varying the reaction conditions (pressure, temperature, type of solvent). It is also noteworthy that the alkyneols can react in the presence of copper acetylide with a further amount of another aldehyde to yield mixed alkynediols.

## BUTYNEDIOL

It is of great economic importance that the formation of butynediol can be carried on readily by acetylene and technical 30% aqueous formaldehyde in about 98% yields. It is of interest to note that the process was developed from the small autoclave scale to a continuous unit producing over two tons of butynediol on a 100% basis, in about two years.

Butynediol is produced in a pressure tower which is filled with a copper acetylide catalyst on a carrier. Thirty per cent formaldehyde solution and dilute acetylene are fed in at the top of the tower, the formaldehyde trickling over the catalyst at a temperature of 90-100° C. reacting with the acetylene which is under a pressure of three atmospheres, and leaving the lower end of the tower as an aqueous solution, containing approximately 35% butynediol. Like all acetylene reactions, the formation of butynediol is highly exothermic, the considerable heat of reaction (24 k. cal. per mol of butynediol) being removed by the evaporation of water. The latter is removed from the excess acetylene by means of a condenser and separator, the acetylene being recycled. The small amount of propargyl alcohol formed and the small amount of methanol (which occurs in technical formaldehyde) are separated by distillation and recycled. The acetylene make-up is compressed and continuously added to the acetylene stream. For month-long operation without shut downs, it is necessary to work in the presence of cuprene-hindering substances, for otherwise after days or weeks, a plugging of the reaction tower takes place as a result of the formation of cuprene which, once begun in any part of the contact mass, spreads autocatalytically.

In the second phase of the process, the 35% aqueous butynediol solution is hydrogenated continuously to a 35% solution of butanediol. This is carried out in a packed tower with a nickel catalyst through which hydrogen is circulated at a pressure of 200 atmospheres.

## TETRAHYDROFURANE

In the third phase of the new process, the aqueous solution can be distilled to produce butanediol which can then be dehydrated directly to butadiene. However, for technical reasons the dehydration is best carried out in two steps via tetrahydrofurane. It has been found that butanediol forms tetrahydrofurane quantitatively on heating the dilute aqueous solution with a small amount of phosphoric acid at

about 300° C. under 100 atmospheres pressure. Tetrahydrofurane is easily separated from the water by distillation.

In the last step of the process, tetrahydrofurane and water vapor are passed over a phosphate catalyst at 260-280° C. to produce butadiene.

The catalytic removal of water from 1,3-butylene glycol and 1,4-butylene glycol to form butadiene is among the most difficult of technical catalytic processes as it is extremely difficult to find catalysts which will produce only butadiene. This is especially true with 1,3-butylene glycol from which, on purely theoretical grounds, many by-products are possible and, in practice, an even greater number of unexpected by-products occur. With 1,4-butylene glycol or tetrahydrofurane there are apparently fewer possibilities. However, with the usual dehydrating catalysts, formaldehyde is split off producing propylene, a reaction which 1,3-butylene glycol also shows although to a lesser degree. The catalyst used in the preparation of butadiene from 1,4-butylene glycol is essentially the same as that for its preparation from 1,3-butylene glycol.

## OTHER PRODUCTS

The alkyneol synthesis from formaldehyde and acetylene not only gives a simple synthesis for many important technical products, but also opens up new possibilities of preparing difficultly obtainable compounds by simple processes.

As mentioned previously, progargyl alcohol is first produced from acetylene and formaldehyde under the catalytic influence of copper acetylide. This is then converted to butynediol by the addition of another molecule of formaldehyde. By suitable means (raising the acetylene concentration, working in the presence of solvents, varying the catalyst, use of a countercurrent process, etc.) the reaction can be carried out so that propargyl alcohol is the principal product, making propargyl alcohol a plentiful raw material.

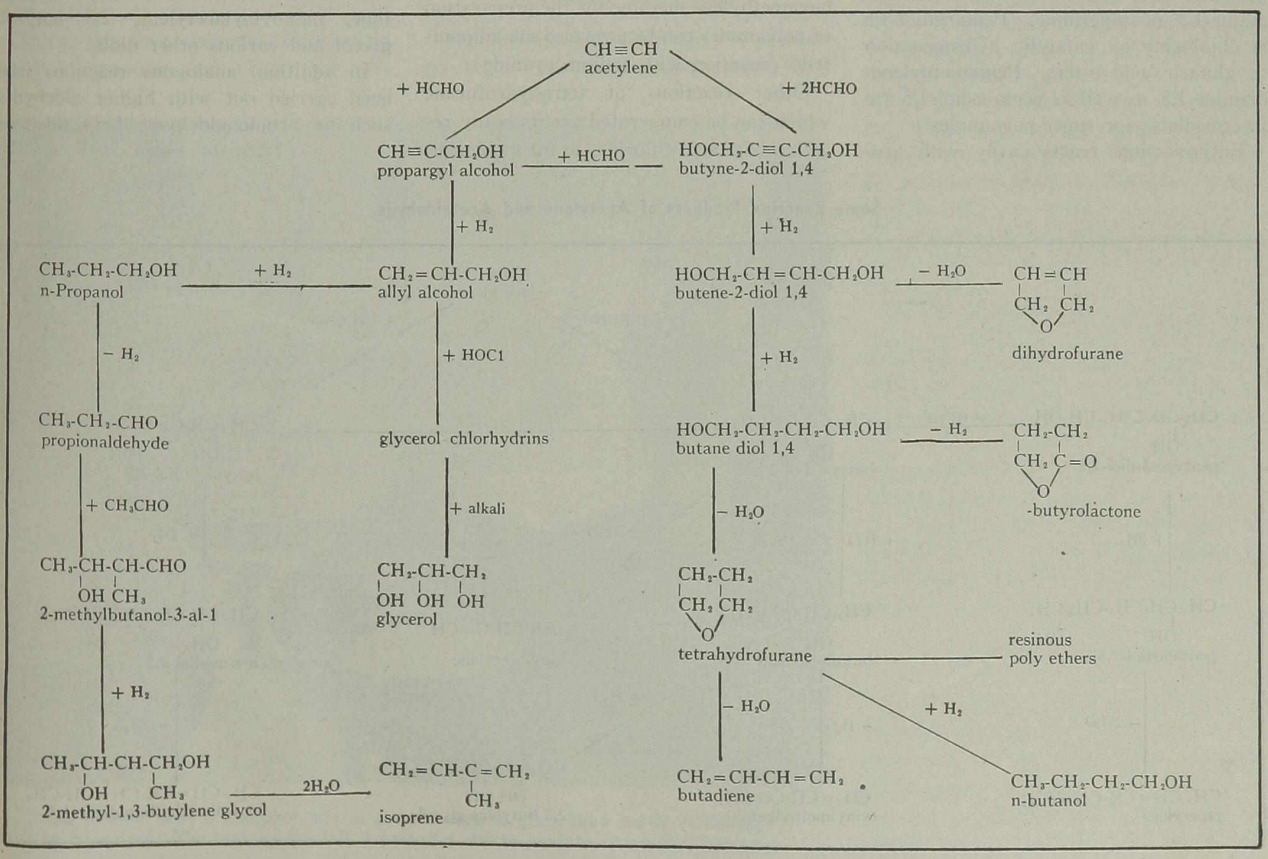
The hydrogenation of propargyl alcohol is an excellent example of selective catalysis. Depending on the catalyst and the reaction conditions (mainly pH), allyl alcohol, n-propanol or propionaldehyde can be produced without appreciable quantities of by-products. The partial hydrogenation of propargyl alcohol produces allyl alcohol in good yields and by known methods, for example, by the addition of HOCl or $Cl_2$ and $H_2O$ followed by hydrolysis, it can be converted into glycerin.

While hydrogenation with the normal hydrogenation catalysts (Cu, Ni, etc.) in neutral or alkaline medium leads to n-propanol, hydrogenation in acid medium yields propionaldehyde as the principal product. The availability of propionaldehyde permits the preparation of the mixed aldol, 2-methylbutanol-3-al-1 by the aldol condensation using propionaldehyde and acetaldehyde. This reaction proceeds with greater than 80% yields, acetaldol and propionaldol being formed only in minor quantities. By hydrogenation of the mixed aldols followed by dehydration, isoprene, the building block of rubber, is produced. This isoprene synthesis permits the preparation of sufficient quantities of isoprene in adequate purity to settle the disputed question of "butadiene or isoprene rubber" and to establish whether butadiene-isoprene copolymers offer any advantages over Buna S.

It should also be pointed out that propargyl alcohol adds hydrogen halides easily and can be converted into chlorallyl alcohols which can find use as polymers or as copolymers either alone or in the form of their esters. The oxidation of propargyl alcohol with chromic acid produces propargyl aldehyde; the addition of alcohols, for example, methanol to propargyl alcohol, produced difficultly obtainable acetol through the intermediate dimethoxydioxane.

Butynediol reacts similarly to progargyl alcohol when hydrogenated under various conditions. At high temperatures, using copper catalysts, n-butanol is the principal product. Partial hydrogenation leads to butenediol, mainly the cis form, and complete hydrogenation to butanediol. Butanediol, as such, finds use in the construction of electrolytic condensers. Oxidation with HOCl or with $H_2O_2$ or $Na_2S_2O_8$ produces racemic erythritol; oxidation with $KMnO_4$ or $KClO_3$ and $H_2SO_4$ as a catalyst, meso-erythritol. Erythritol can be used in the preparation of alkyd resins and softeners. While the oxidation of butenediol in solution produces erythritol, the oxidation of butenediol in the vapor phase yields maleic acid. How-

**Some Reaction Products of Acetylene and Formaldehyde**



ever, it is more convenient to first convert the butenediol to its inner ether, dihydrofurane, which then is oxidized catalytically by means of air. We have in this series of reactions a new synthesis for maleic acid.

Butanediol, obtainable by the complete hydrogenation of the triple bond of butynediol, can be used as a replacement for glycerin for many purposes. Its esters, either with single or polyfunctional carboxylic acids are valuable softeners, textile waxes and synthetic resins.

Butanediol shows an interesting behavior on dehydrogenation. Instead of the expected succinic aldehyde, gamma-butyrolactone is formed almost quantitatively merely by trickling the intermediate over copper catalyst about 200° C. The reaction is probably an intramolecular Cannizzaro reaction.

The ready availability of gamma-butyrolactone opens up a whole new field of compounds. Gamma-halogen butyric acid can be obtained by the action of a hydrogen halide on gamma-butyrolactone. By reacting with NaSH, the sodium salt of thiodibutyric acid is formed. Both of these easily obtainable dicarboxyclic acids are interesting starting materials for polyamides, alkyd resins and softeners. The sodium salt of gamma-cyanobutyric acid is produced from gamma-butyrolactone and NaCN. From the latter alpha-piperidone can be produced by hydrogenation and glutaric acid by hydrolysis. Glutaric acid, a useful component for alkyd resins and softeners, can be converted catalytically to the dinitrile with ammonia. The dinitrile can be converted by hydrogenation into either pentamethylenediamine-1,5 or piperidine. Pentanediol-1,5 is obtainable by catalytic hydrogenation of glutaric acid esters. Pentamethylenediamine-1,5, as well as pentanediol-1,5 are intermediates for super-polyamides.

Butyrolactone reacts easily with aromatic compounds under the influence of Friedel-Crafts catalysts. For example, benzene, butyrolactone and $AlCl_3$ yield phenyl butyric acid and phenylenedibutyric acid. Phenolates form the alkali salts of phenoxybutyric acid with butyrolactone which in the form of their Co, Mn, Zn, and Pb salts are of interest as dryers (Soligenes) and in the form of their esters of poly-functional alcohols are of interest as dyeing assistants. Depending on the reaction conditions, gamma-butyrolactone can react with ammonia or amines to form either gamma-oxybutyric acid amide, which is used as a textile assistant, or, by the simultaneous loss of water, to form alpha-pyrrolidone or its N-substituted derivatives. The vinylation of pyrrolidone to N-vinylpyrrolidone takes place readily. Polyvinylpyrrolidone—in this case polymerization takes place even with aqueous sodium bisulfite—is a hard colorless water soluble glass which is of interest either alone or as a mixed polymer with acrylic acid as a thickener or as a water soluble adhesive.

Tetrahydrofurance, the primary dehydration product of 1,4-butylene glycol, is probably the most valuable intermediate of the new butadiene synthesis. Because of its high solvent powers, it can be used as a solvent and will dissolve high polymers, such as polyvinylchloride, polyvinylcarbozole, rubber, Buna S, etc. It is the basic raw material for a large number of products: Tetrahydrofurane is readily split with HCl and, depending on the reaction conditions. 4-chlorbutanol, gamma-dichlorodibutyl ether, or 1,4-dichlorbutane are produced. From 1,4-dichlorobutane, hexamethylene diamine for the preparation of polyamides can be prepared via adiponitrile (reaction with sodium cyanide).

Other reactions of tetrahydrofurane which can be enumerated are its ready reaction with acid chlorides to form chlorbutanol esters and its easy chlorination with elemental chlorine to 2,3-dichlorotetrahydrofurance, the chlorine atom in the 3 position being readily substituted with an alcohol residue.

Of technical importance is the reaction of tetrahydrofurance with ammonia and amines to form pyridine or its N-substitution products from which antioxidants, pesticides and vulcanization accelerators can be prepared. Dehydrogenation of pyrolidines leads to the pyrrole series. In this manner, the alkyneol synthesis leads to two classes of technically important compounds, the pyrroles and pyrrolidines which were previously practically unobtainable.

The recent work of Professor Meerwein has shown that it is possible, by the use of certain catalysts, to produce soft, resin-like to solid, rubber-like plastic masses from tetrahydrofurane. The reaction involved is a splitting of the five membered ring followed by an ionic chain reaction which links up the molecules to form poly ethers. It is of interest to note that the otherwise stable five-membered ring undergoes a reaction which was previously known only for the three-membered ring of ethylene oxide.

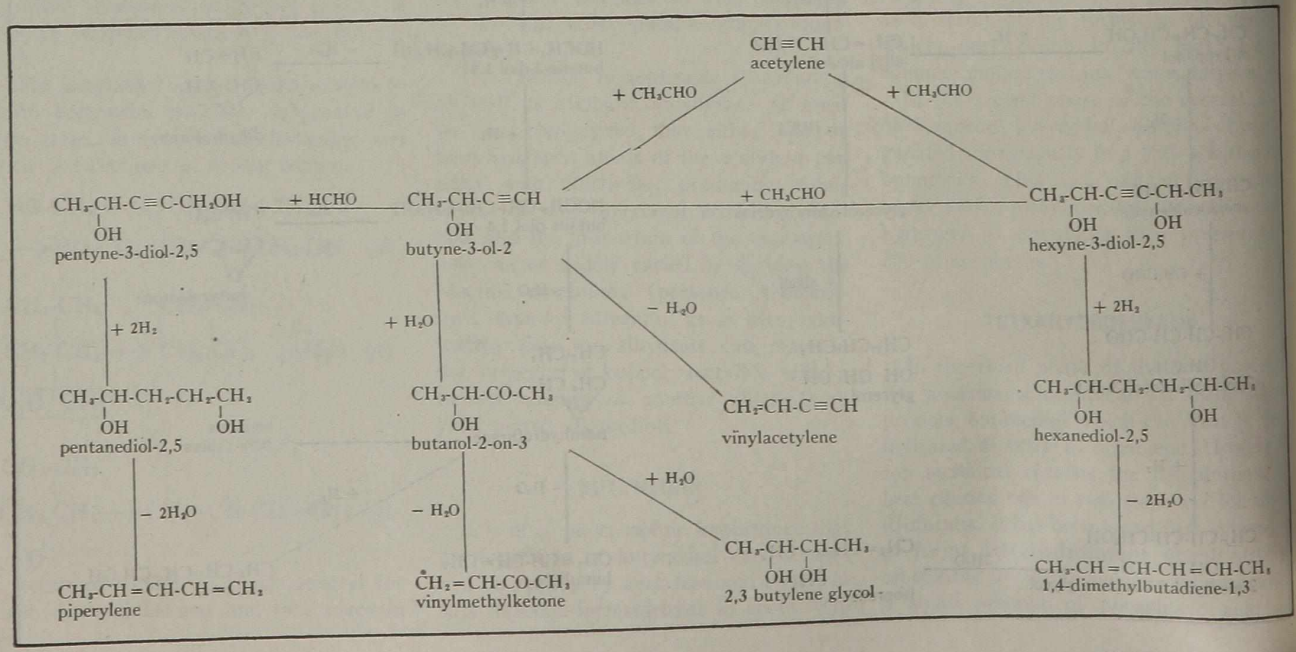
## REACTION WITH ACETALDEHYDE

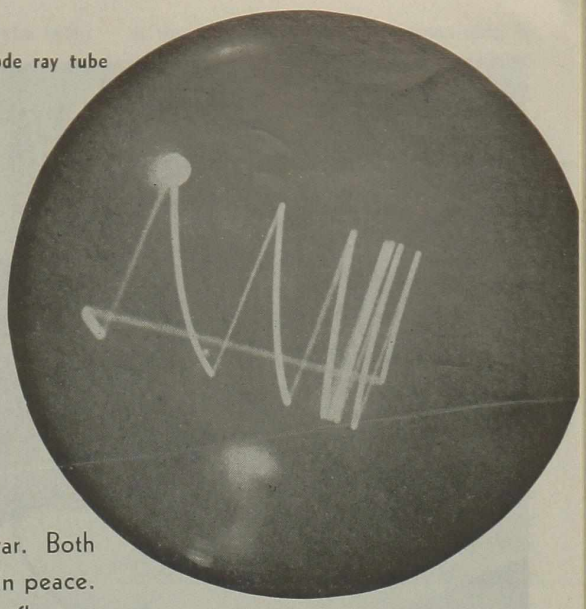
The major reactions of acetaldehyde and acetylene in the presence of copper acetylide are shown in the accompanying table. This synthesis makes the preparation of the analogues of butadiene, piperylene and 1,4-dimethylbutadiene, now used as components for copolymers in the preparation of synthetic rubber and other valuable compounds such as vinylmethylketone, monovinylacetylene, 2,3 butylene glycol and various other diols.

In addition, analogous reactions have been carried out with higher aldehydes, such as propionaldehyde, butyraldehyde.

(*Turn to Page 549*)

**Some Reaction Products of Acetylene and Acetaldehyde**





Light pattern on screen of cathode ray tube

# CHEMISTRY OF PHOSPHORS

by HOWARD C. E. JOHNSON, Chemical Editor, Chemical Industries, based on an interview with IRVING KRUSHEL, North American Philips Co., Dobbs Ferry, N.Y.

RADAR WAS ONE OF OUR MOST USEFUL WEAPONS in war. Both radar and its brother, television, will become increasingly important in peace. An essential element of both of these is the cathode ray tube on whose fluorescent screen the image of the disclosed object appears, and whose success is due in a large measure to the development and refinement of phosphor chemistry.

ON APRIL 15, 1912, the luxurious Titanic hit an iceberg and foundered with the loss of 1500 lives. On the foggy morning of July 28, 1945, an Army bomber crashed into the Empire State Building, killing fourteen persons. In these tragic and apparently unrelated events there was one common element: both could have been prevented by radar.

The phosphor-coated screen of the cathode ray tube, which could have registered the image of the menacing iceberg and the sharp outline of the world's tallest building, has performed yeoman service in war and will continue to serve well in peace, detecting far-off obstacles in the paths of ships and planes. It will serve, too, in television, visually recording distant events for the enjoyment of millions.

Not only in radar and television will fluorescent screens find application. They are already widely used in fluoroscopes for direct observation of X-ray patterns, as in pulmonary diagnosis. Fluorescent lamps will utilize large quantities of phosphor chemicals, as will luminescent paints. The latter have long been used to provide luminous watch faces.

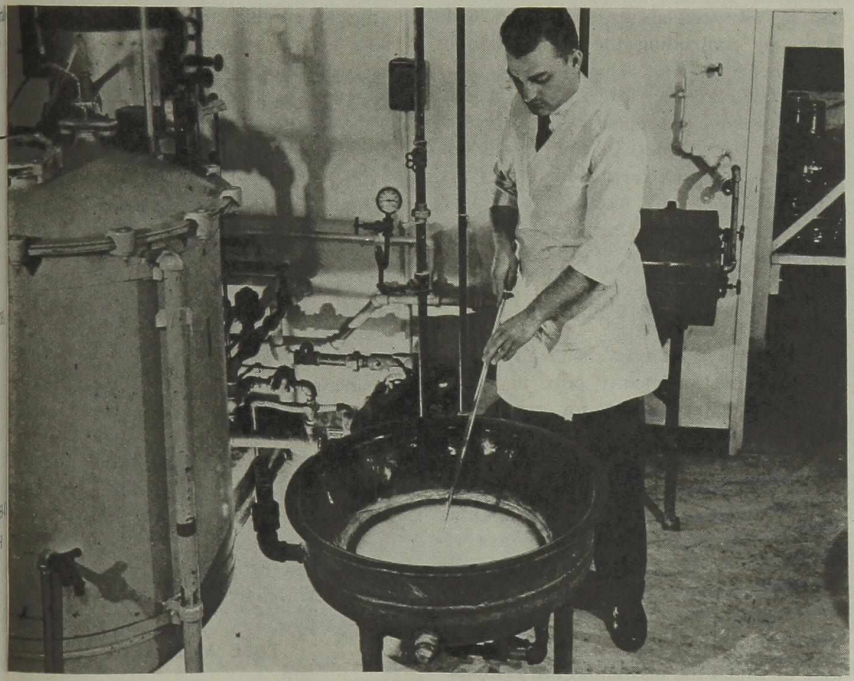
## CATHODE RAY TUBE

The fundamental principle of a cathode ray tube is simple, and differs little from that of a radio detector tube. In the latter an electromagnetic beam of constant frequency, which has had superimposed upon it (by variation of the amplitude) the pattern of a sound wave, is resolved in such a fashion that the sound wave itself is obtained. In the cathode ray tube, the high-frequency electromagnetic wave upon which is superimposed a light-wave pattern is resolved so that the light image is projected on a phosphor-coated screen.

The resolution is accomplished in this way: The electron stream from the hot cathode is collimated by passing through round apertures. The bundle of parallel rays is thereafter deflected by the electromagnetic field set up by the detected beam in such a way that the electrons fall upon the phosphor screen in the pattern of the transmitted image.

The electrons are, of course, invisible. But when they hit the target, some of their energy is imparted to the electrons in the outer shells of the activator atoms, raising them to higher energy levels. When they return to their normal energy levels, the excess energy is radiated as visible light.

Not all of the electronic energy is translated into light. By far the greater part of it—90 per cent or more—is lost in the phosphor crystal as heat and other invisible radiation. Some of the electrons stay on the screen, but a great number bounce off and are collected by the conducting graphite coating on the inside of the glass shell. The percentage of transformation of electronic energy to visible light is termed the efficiency of the phosphor.

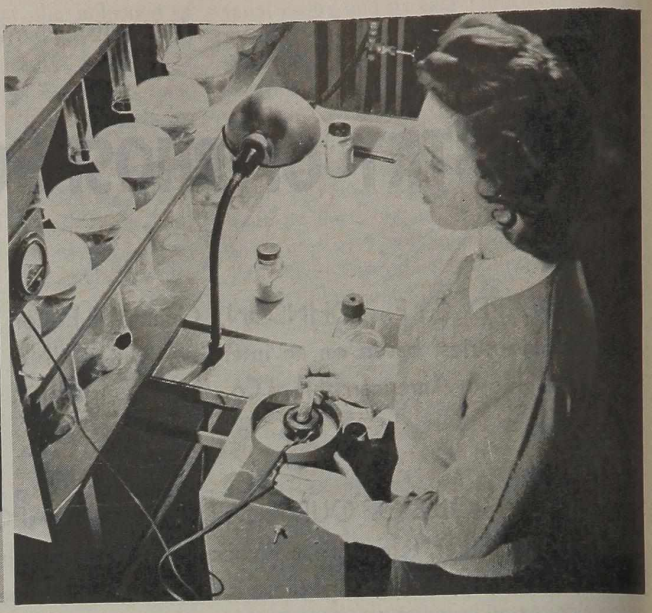


Irving Krushel stirs a phosphor mix in a steam-heated glass-lined kettle in the dust-free laboratory. The tank on the left is part of a still to produce twice-distilled water.

## PHOSPHOR MATERIALS

It is obvious that the nature of the fluorescent screen depends upon the characteristics of its component materials. Fluorescent substances differ widely in the color, intensity, and duration of the phenomenon. It is essential, then, that

A phosphor is being applied to a 10" cathode ray tube. The glass shell has been washed, dried, and moistened with a binder. After the phospor is dumped, the tube will be shaken to distribute the powdered material uniformly over the surface of the glass.



Uniformity of the coating is checked by means of a light meter. Constant illumination from the box is transmitted through the coating. As the photoelectric detector is moved over the coating, transmission is recorded on the dial at the extreme left.

the phosphor coating be uniform in its characteristics.

Most naturally occurring phosphors are impure crystals. The impurity is isomorphous with the more abundant material and forms mixed crystals with it. Since the atoms (more strictly, ions) are not the same size, there is a certain amount of strain in the crystal lattice. This strain manifests itself by increasing the susceptibility of the crystal to excitation; consequently, the impurity is quite properly called an activator.

One could use the natural material, but the results would not be satisfactory. Nature does not exercise rigorous control over the species and amount of impurities in naturally occurring minerals, and the fluorescent characteristics of various samples would be quite different. In practice it has been found much more satisfactory to introduce a controlled amount of a specific material into an extremely pure basic substance. Even then, under the most rigorous control the characteristics of each batch will differ slightly.

The basic phosphor materials used are zinc orthosilicate, activated with manganese; zinc beryllium silicate, likewise activated; zinc sufide, activated with silver, copper, or manganese; zinc cadmium sulfide, activated with silver or copper; zinc sulfide, activated with silver and quenched with nickel; and calcium tungstate, sometimes activated with arsenic oxide but often used without an activator.

Of these materials, only zinc silicate occurs naturally; the rest are made from basic materials, usually by precipitation. The required basic ingredients are silica, zinc oxide, zinc sulfate, hydrogen peroxide, sulfuric acid, hydrogen sulfide, ammonium hydrosulfide, ammonium sulfide, copper nitrate, silver nitrate, manganese carbonate, and beryllium oxide.

The proportion of components in a phosphor has a remarkable effect upon the quality of fluorescence. A varying ratio of zinc to cadmium in silver-activated zinc cadmium sulfide, for example, will give fluorescence ranging through most of the visible spectrum from blue to red. Similarly, an increase in the amount of manganese or beryllium in manganese-activated zinc beryllium silicate will change the color of the fluorescence from yellow to orange.

Persistence of the fluorescence is another variable which is dependent upon composition. Short persistence is desirable under some circumstances, while at other times a longer duration is preferred. This can be adjusted accurately within wide limits by controlling the composition of the phosphor.

The presence of a foreign material will often quench phosphorescence. Nickel, for instance, will destroy the phosphorescence of a silver-activated zinc sulfide phosphor. A quenching agent is sometimes desirable to shorten the persistence of a projected image.

## MANUFACTURE

Even the so-called "chemically pure" salts are not sufficiently pure to use in phosphors. Zinc sulfate, for example, is rendered free from iron by oxidizing the iron with hydrogen peroxide and precipitating it with ammonium hydroxide. Copper is renewed by electrodeposition. Other impurities, such as manganese, are removed by precipitation with hydrogen sulfide.

At the Dobbs Ferry, N. Y., plant of North American Philips Co., the laboratory in which the phosphors are manufactured and developed is closed off completely from other sections of the plant. All air passing into this laboratory is both mechanically and electrostatically filtered to remove dust. A slight positive pressure is maintained which forces air out through cracks and crevices, preventing dust-laden air from entering.

Operators in the laboratory wear special lint-free clothing which is donned in a small double-door chamber adjoining the manufacturing section. They do not come in contact with the chemicals, and containers are covered at all times.

The equipment is of glass, glass-lined, or ceramic construction, such materials having little or no effect on the phosphors. Twice-distilled water is used to ensure the absence of metallic ions.

Spectrographic analysis of raw materials, activators, and phosphors is employed at all stages of production to control the composition of the finished product.

Some phosphors are affected only slightly by impurities. Some of the important ones, however, are sensitive to adulteration as minute as one part in a million. In view of this, it is not surprising that extreme precautions must be taken to achieve maximum purity.

The highly purified phosphor is activated by the addition of a minute amount of pure activating material. The batch is then heated for one to two hours at 900 to 1200 deg. C. The activator dissolves in the fused phosphor, and mixed crystals form upon cooling. The size and shape of phosphor particles are greatly affected by the heat treatment. Color, efficiency, and fluorescent characteristics are, to a great extent, determined by this operation.

## TUBE ASSEMBLY

The finished phosphor, ground to the proper mesh, is bound to the freshly

washed glass tube with sodium or potassium silicate, nitrocellulose in amyl or butyl acetate, or phosphoric acid. The binder is swirled in the tube to moisten the screen surface and the excess poured out. The phosphor is then added by means of a long-handled scoop and shaken around to give a uniform coating. The uniformity of the coating is measured by the transmission of light, the percentage transmission of a constant source of illumination being measured by a light meter.

The complete assemblage of the tube, including the so-called "gun" assembly—the arrangement of cathode and electrical contacts in the base of the tube, is beyond the scope of this article. Suffice it to say that after the aquadag (graphite) coating is applied to the inner surface of the tube and the gun assembly sealed in, the tube is sealed off under a vacuum of the order of $10^{-6}$ mm. Hg.

The vacuum is produced by an oil diffusion pump used in conjunction with a mechanical pump. It is of interest to note that the oil in the pump is vacuum-distilled at frequent intervals in order to prevent contamination of the tubes in the process of evacuation.

The vacuum obtained by the pump is of the order of $10^{-6}$ mm. Hg. The residual air is removed by a "getter," a button of metal, such as barium or magnesium, which reacts with oxygen and nitrogen. The getter is heated by a high-frequency coil after the tube has been sealed off, and the final vacuum obtained is of the order of $10^{-7}$ mm. of Hg.

The thoroughness of the evacuation is an exceedingly important factor in the life of the tube. Gas molecules remaining in the tube are ionized by an electron stream; and since the negatively charged particles, moving in the same direction as the electrons, are thousands of times as heavy as these and consequently undeflected by the electromagnetic field, they stream to the center of the target and eventually "burn" the phosphor coating, seriously impairing the tube.

The phosphorescent character of cathode ray tubes is so sensitive to impurities that every precaution must be taken to ensure absolute cleanliness. Here the oil from the oil diffusion pump used to produce the high vacuum is distilled to remove foreign material.

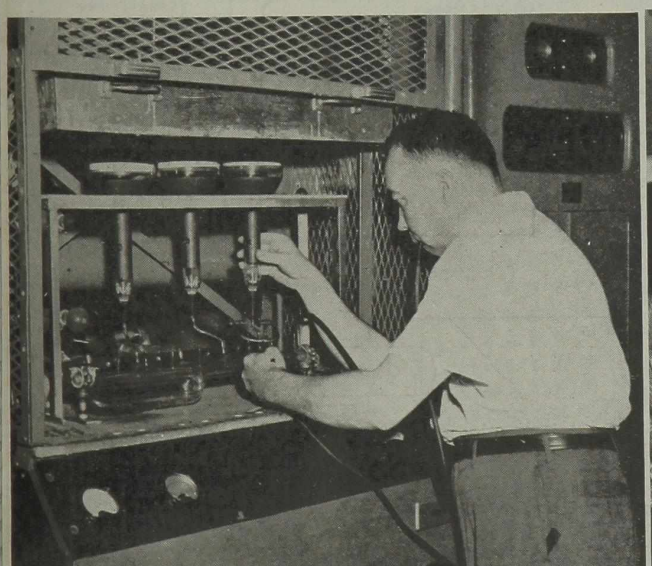
## EXPANSION INDICATED

The last few years have seen improvements in phosphor chemistry, and present research is leading toward the production of cheaper and better materials. Higher efficiency is to be expected, i. e., a greater proportion of the electronic energy will be transformed into visible light. Also, hope is held out for longer lasting phosphors manifesting improved optical characteristics.

By applying chemical engineering methods of production to the laboratory techniques, larger batches of material are now being made at a lower cost per pound. An improved, less expensive product will find an expanded market in all types of fluorescent lighting, displacing the less efficient ones now used in neon advertising displays and the like.

Screen production is also being improved by the use of new or adapted techniques. Electrostatic deposition of the phosphor, for example, will give a more uniform coating, thereby cutting down the number of expensive rejects in cathode ray tube and fluorescent tube manufacture.

The largest potential market, television, will probably benefit the most from these improvements. The postwar television tube will undoubtedly give better service at less expense to the user, and this factor alone should enhance the popularity of this new medium of information and entertainment.



Five-inch tubes are being sealed to an exhaust manifold connecting with an oil vapor pump which removes 99.999999 per cent of the air. The remainder is removed by a metallic "getter."

Electrical characteristics and light output of a complete 3" tube are being tested. Alignment, uniformity of cathode surface, and screen condition are a few of the items checked.

# Analysis and Packaging of PURE SODIUM METHYLATE

by J. D. MacMAHON and L. E. RUSSELL
The Mathiesen Alkali Works, New York, N. Y.

SODIUM METHYLATE IS NOW PRODUCED commercially in powder form, substantially free of impurities. Two special problems that had to be solved, to assure delivery of a product of high purity, were the methods of analysis and packaging. As the result of cooperative research by the Calco Chemical Division of American Cyanamid Company and The Mathieson Alkali Works, a new analytical method was developed, while the packaging problem involved development of vacum-tight seals for bottles, cans and drums.

SODIUM methylate, $NaOCH_3$, has usually been prepared by the user, as needed, by the interaction of metallic sodium and methyl alcohol. Hydrogen is evolved and a solution of sodium methylate in excess methanol is obtained. This procedure may be dangerous. In addition, it is difficult to produce a pure product, since reaction products are formed with components of the air, unless special precautions are taken.

Recently, sodium methylate in powder form, substantially free of alcohol and inorganic alkalies, has been made commercially available. The process of manufacture, a modification of the process by which Mathieson has produced caustic soda for many years, begins with the electrolysis of sodium chloride or sodium hydroxide in a stationary mercury cell. Treatment of the resulting sodium amalgam with methanol yields sodium methylate.

The details of the process may be followed in the accompanying diagram. The electrolysis of sodium hydroxide takes place in an amalgam cathode cell. A typical cell is about 18 inches wide and and 25 feet long and has mercury seals at each end to keep the electrolyte in the cell. Practically pure oxygen is obtained as a by-product.

Sodium chloride may also be used as an electrolyte, in which case chlorine instead of oxygen is obtained as a by-product.

The circulating sodium amalgam passes through a specially designed contact tower (or chamber) in which it reacts with methanol, according to the equation

$$NaHg_x + CH_3OH \longrightarrow CH_3ONa + 1/2H_2 + Hg_x.$$

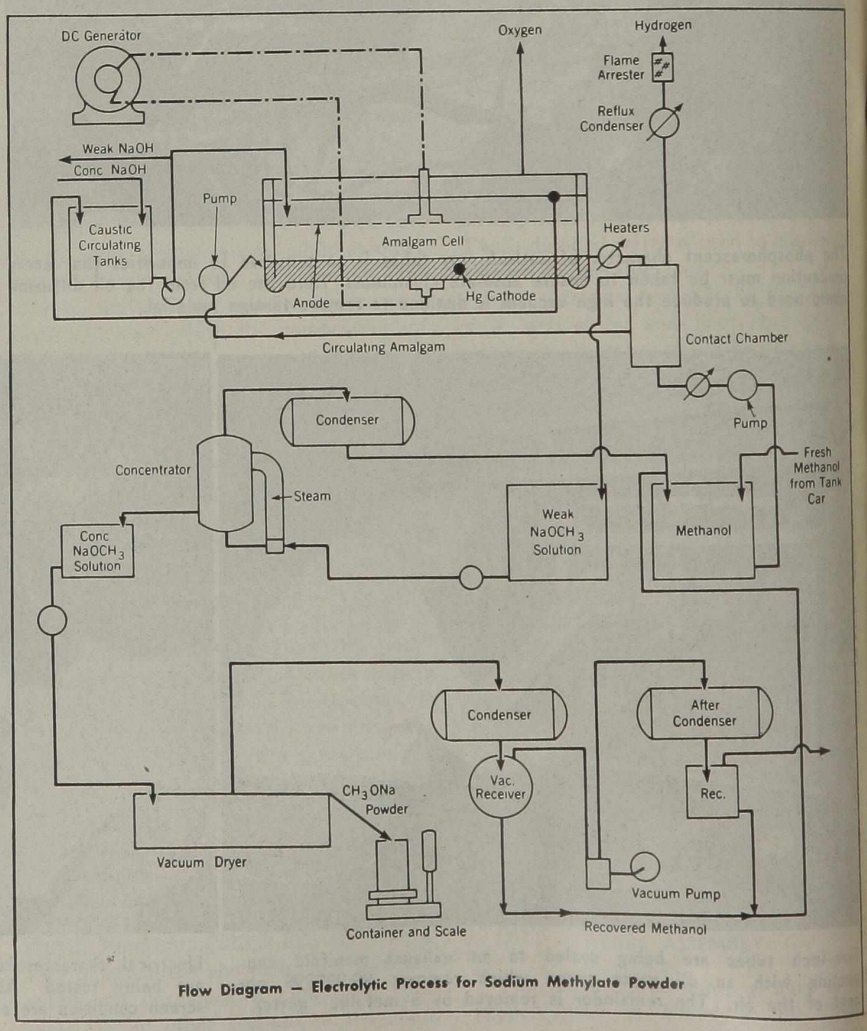
Substantially pure mercury is removed from the bottom of the tower.

The resulting 5-15 per cent methylate solution is pumped into an evaporator and concentrated to 30 per cent. Recovered methanol is collected and recycled. The gas from the contact chamber, which passes through a reflux condenser and flame arrester, is practically pure hydrogen.

The concentrated methylate solution is reduced to a dry powder in vacuum dryers. The methanol is condensed from the vapors both before and after the vacuum pump. Heating is continued until the methanol content is less than 3 per cent, resulting in a free flowing powder. At this point, the vacuum is broken and the crystallizer and contents are cooled to room temperature. A door is opened and the product self-discharged through a closed system into air-tight steel containers. The recovered methanol is recycled.

## ANALYTICAL METHOD

To assure a product suitable for the manufacture of sulfadiazine, which requires sodium methylate of unusual purity, a new analytical method had to be developed since those in existence were inadequate. To this end, the Calco Chemical Division of American Cyanamid Company, producer of sulfadiazine, co-




**Flow Diagram — Electrolytic Process for Sodium Methylate Powder**

operated with Mathieson in developing the new analytical procedure. The product which now reaches the user contains a minimum of 95 per cent sodium methylate, not over 2 per cent inorganic alkalies, and not over 3 per cent methanol.

The method of analysis comprises the following steps:

1. Alkalimetric determination of apparent total alkali, including sodium carbonate, after decomposition of the sample with water.
2. Alkalimetric determination of apparent alkali, exclusive of sodium carbonate, by titrating the aqueous solution of the sample after precipitation of the carbonate with barium chloride.
3. Direct determination of the sum of hydroxide and carbonate, by titration, using the Karl Fischer reagent,* [1, 2] of the water equivalent to these compounds.
4. Determination of total methanol by distillation of the aqueous solution followed by determination of the specific gravity of the distillate.

From these analyses, separate values for sodium hydroxide, sodium carbonate, sodium methylate, and methanol may be calculated. These include all the known constituents, except for some formate which may be formed by oxidation.

### PACKAGING PROBLEMS

Another factor which required special consideration was the problem of packaging. Sodium methylate reacts with moisture, carbon dioxide, and oxygen of the atmosphere to give sodium hydroxide, sodium carbonate, and sodium formate. Such reactions must be prevented if the product is to reach the consumer in its original state of purity. In addition, these reactions are exothermic, and an improperly sealed container may create a fire hazard.

Tests were first run under ideal conditions on samples of sodium methylate sealed in glass tubes, and it was found, over a period of months, that the product was perfectly stable under these conditions.

Tests were also run on samples stored in glass bottles with different types of seals. Stored in bottles sealed with a plastic cap and ordinary hard paper liner, samples showed 25 to 75 per cent loss in seven months. When a plastic sealing ring was used, there was no decomposition in this period of time.

When a container was properly sealed, the methylate reacted with the oxygen in the container, it was found, to leave a residual pressure of about four-fifths of an atmosphere. Tests in glass tubes showed this reaction to be complete in twelve hours. To permit rapid evaluation of the ability of a closure to maintain the desired vacuum, a special test was devised. A glass manometer tube was sealed in a hole drilled in the drum or bottle to be tested. With the closure to be tested in place, the internal pressure was reduced to four-fifths of an atmosphere in the container and the manometer partially filled with mercury. It was found that closure which would hold such a vacuum for 24 to 48 hours would hold indefinitely.

As a result of these tests, specifications were drawn up for the drum and bottle closures to be used. For bottles, the closure consists of a plastic cap with a rubber liner. A cellophane seal is placed over the cap as an added precaution and to indicate whether the bottle has been previously opened. On small metal containers, a crimped-top lid with a rubber gasket and sealing compound has been found satisfactory. For the drums of 50 to 200-pound capacity, a drum with a full opening head is employed. This is sealed with a bolted rim closure, a rubber gasket and a sealing compound. The containers must hold the desired vacuum, corresponding to a pressure of four-fifths of an atmosphere. This guarantees that there will be no further breathing and diffusion of oxygen to continue the decomposition of the product.

These specifications insure the delivery of sodium methylate in its original state of purity to the consumer. To obtain most satisfactory results and to eliminate fire hazards, it is recommended that the contents of a container be used as soon as it is opened. To this end, sodium methylate is packaged in a range of sizes so that the entire contents of a container may be used at once.

Since it is a highly reactive compound, sodium methylate must be used with necessary precaution. It should be stored in a cool, dry place; contact with oxidizing agents must be avoided; unused material should be disposed of in large quantities of water; and containers should be completely empty and clean before discarding. In case of accidental contact with sodium methylate, flush with water, then neutralize with dilute acetic acid. In case of fire, smother with sand.

### USES[3]

Sodium methylate is widely used in the preparation of organic intermediates. One of the most important of these is acetoacetic ester, necessary for the manufacture of many compounds. These include dyes and pigments, such as the "Hansa Yellows" which are used in lacquers and inks, and the pyrazolones, used in textiles because of their fastness to light.

The perfume industry uses considerable quantities of sodium methylate in the preparation of aldehydes, ketones, and esters. For example, nonaldehyde is used in making rose oil, benzaldehyde in heliotrope perfume, methyl nonyl ketone for the sweet pea odor, and ionone for violet perfume. Flavoring extracts, chemically similar to scents, are also made by processes involving the use of methylate. In the field of cosmetics, products made with methylate include a light screen medium for sun tan lotions and creams.

During the war, the most important application of commercial sodium methylate has been in the field of drugs, where it is used to prepare sulfadiazine, sulfamerazine, atabrine, the barbiturates (veronal, phenobarbital), and some of the vitamins.

### REFERENCES


[1] Fischer, K., *Agnew. Chem.*, 48, 394-6 (1935).
[2] Smith, D. M., Bryant, W. M. D., and Mitchell, J., *J. Am. Chem. Soc.*, 61, 2407-12 (1939).
[3] Byrkit, G. D., and Soule, E. C., *Chem. and Eng. News*, 22, 1903 (1944).


* This reagent, which reacts quantitatively with water, sodium hydroxide and sodium carbonate, among other chemicals, is a mixture of iodine, sulfur dioxide and pyridine in methanol.

## KORESIN---German Synthetic Rubber Tackifier Produced on Pilot Plant Scale in the U. S.

Koresin, a tertiary butyl phenol condensation product, has been reported in many quarters as the only new material, potentially valuable to American practice, found in the recent Allied investigation of the German rubber industry.

In the recent summary report, "Production and Performance of German Synthetic Tires," a joint compilation of the Rubber Bureau of the WPB and the Office of Rubber Reserve of the RFC, it is noted that since the German production of Koresin was inadequate, it was used only in the most critical spots. Further it is claimed that Koresin was not only used to save natural rubber but to improve the quality. It was considered to be particularly essential in such places as tread cement and ply freshening solutions as it was considered bad practice to use a natural rubber cement between Buna plies or under Buna tread. It was the opinion of the German tire technologists that a better tire was produced with a Koresin wash than with crude rubber cement. The only place where a crude rubber cement was permitted was in the ply turn-up around the bead where a tackier adhesive was required than could be obtained from Koresin and Buna.

In the report attention is called to the fact that, generally, German carcass stocks had high zinc content and it does not necessarily follow that the use of Koresin in American type carcass stock compounds with a fairly high black content would react in the same manner.

This material is now being produced in the United States on pilot plant scale and tests are under way to ascertain its value to American practice.

# Continuous Service Allowed By New GAS TURBINE

**THE GAS TURBINE, a subject of discussion since the time of Hero in 130 B.C., has at last been shown in an economic design in the form of a 2500 H.P. marine unit, operating at 1200° F. with a thermal efficiency of 29%.**

THE UNVEILING of the new 2500 H.P. marine gas turbine at the plant of the Elliott Co. at Jeanette, Pennsylvania, on July 25 promises to add a new major class of prime movers to the three now in use, the steam engine, the steam turbine and the internal combustion engine.

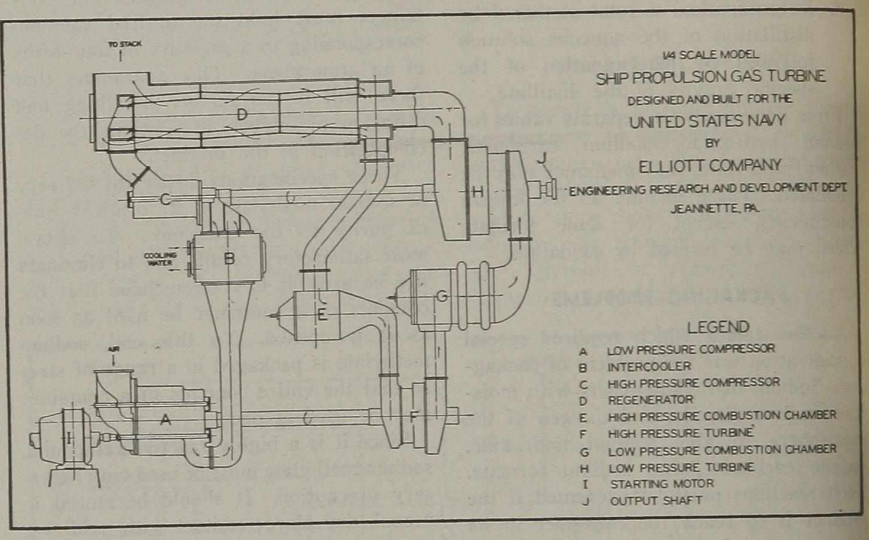
Large gas turbines have been constructed and successfully operated before, notably by Brown-Boveri in Switzerland, but on the basis of thermal efficiency they have generally been unable to compete with the present prime movers. This has been because of the non-availability of alloys capable of withstanding the temperatures required for the obtainance of sufficiently high thermal efficiencies.

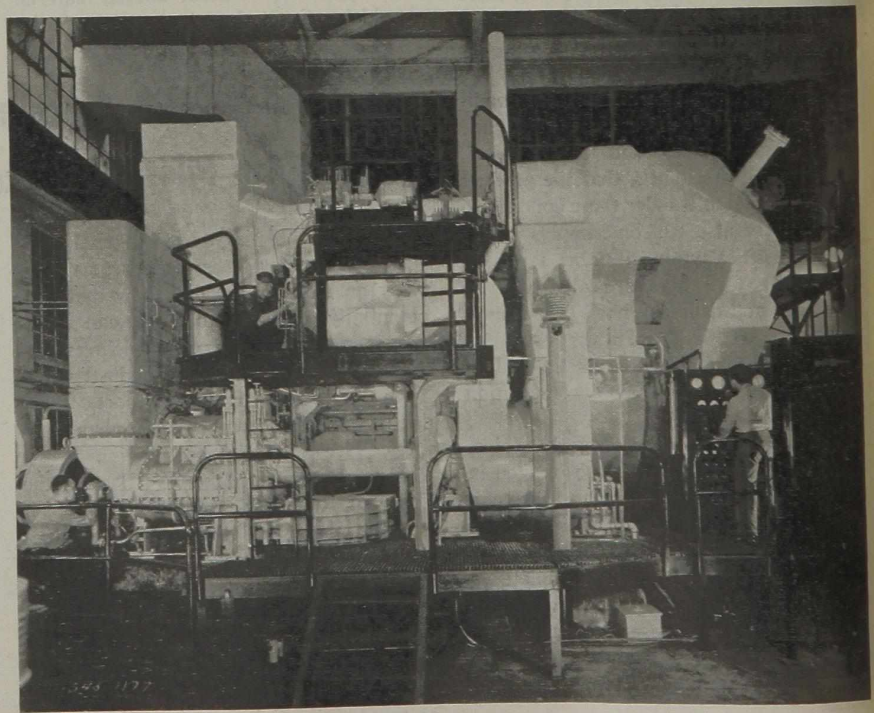
The plant pictured below operates at a turbine temperature of over 1200°F. and an overall efficiency of about 29% which is probably capable of extension to 31% by slight modifications. Newer units are being designed to operate at 1400°F. capable of giving a thermal efficiency of about 34%. These efficiencies compare with an efficiency of 26%, which may be looked upon as the practical limit of a modern small steam plant, and 33% the corresponding limit for an up-to-date Diesel engine. It was stated that the partial load characteristics of this plant are such that it will successfuly compete with either a steam plant or Diesel engine. The unit is designed for a life span of ten years.

Its operation may be followed from the flow diagram below. Here air for the combustion reaction enters a low pressure compressor (A) of the Lysholm type (for a more complete description see pg. 482) after passing an intercooler (B) (the intercooler is not absolutely necessary, providing a power unit which does not require the use of water), from which it proceeds to the high-pressure compressor of the Lysholm type (C) where pressure of over 90 pounds per square inch is reached. After passing through a regenerator (D) the air passes to the high pressure combustion chamber (E) where partial oxygen usage occurs. The next step, the high-pressure turbine (F), provides sufficient power to operate the low-pressure compressor (A).

After expansion through the high pressure turbine (F) the gas enters the low pressure combustion chamber (G) from which it expands through the low pressure turbine (H) providing the power for the high pressure compressor (C) and the output shaft (J). The waste gas then proceeds to the stack via the regenerator (D) where the incoming air is heated by the stack gas. An electric motor (I) on the same shaft as low pressure compressor (A) and the high pressure turbine (F) is provided for starting.

Although the present plant was designed for marine usage, the builders expressed the belief that the gas turbine plants now under construction would be competitive with existing prime movers for demands up to 15,000 H.P. although the gas turbine is not practical for very small or very large units. Insufficient units have been built to allow a proper evaluation of total investment for a gas turbine unit but the "guesstimate" was given that it would equal that of a Diesel unit with a similar power output. Although this unit has been operated entirely with high-grade Diesel fuel, no trouble is expected in the use of Bunker C fuel oil.



**The 2500 HP gas turbine pictured above, the first built in the United States for continuous long-time service, has delivered power more economically than steam turbines of comparable size and promises to provide the packaged power unit, the dream of many engineers.**

# HEADLINERS in the NEWS

ROBERT S. WILSON, Goodyear Tire & Rubber Co. vice-president will direct the War Production Board's rubber program, replacing John L. Collyer, who returns to Goodrich.

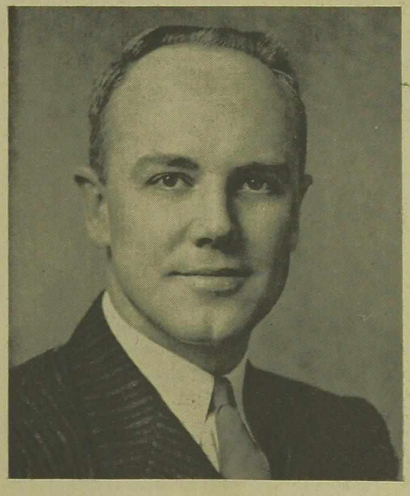
JOHN E. OHLSON, formerly assistant to the manager of plant operations at Wyeth, Inc., has been appointed senior chemical engineer for Pennsylvania Salt Manufacturing Co.

WILLIAM E. HANFORD, manager of the central research laboratory of General Aniline & Film Corp., has been named director of research, succeeding E. C. Williams.

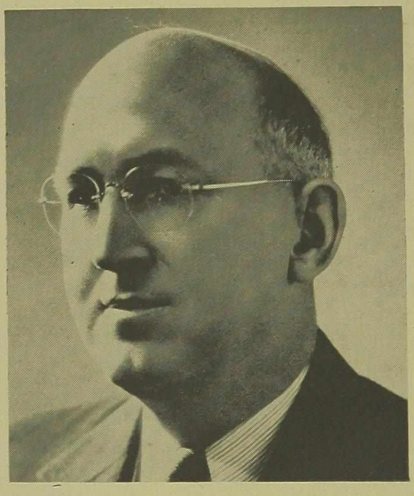
CORNELIA T. SNELL is the first woman to hold the chairmanship of the NY section of the ACS. Dr. Snell, a staff member of Foster D. Snell, Inc. succeeds Ross A. Baker

THOMAS H. VAUGHN recently became research director of Wyandotte Chemical Corp. Assistant director for the past six years, he was previously with Union Carbide & Carbon.

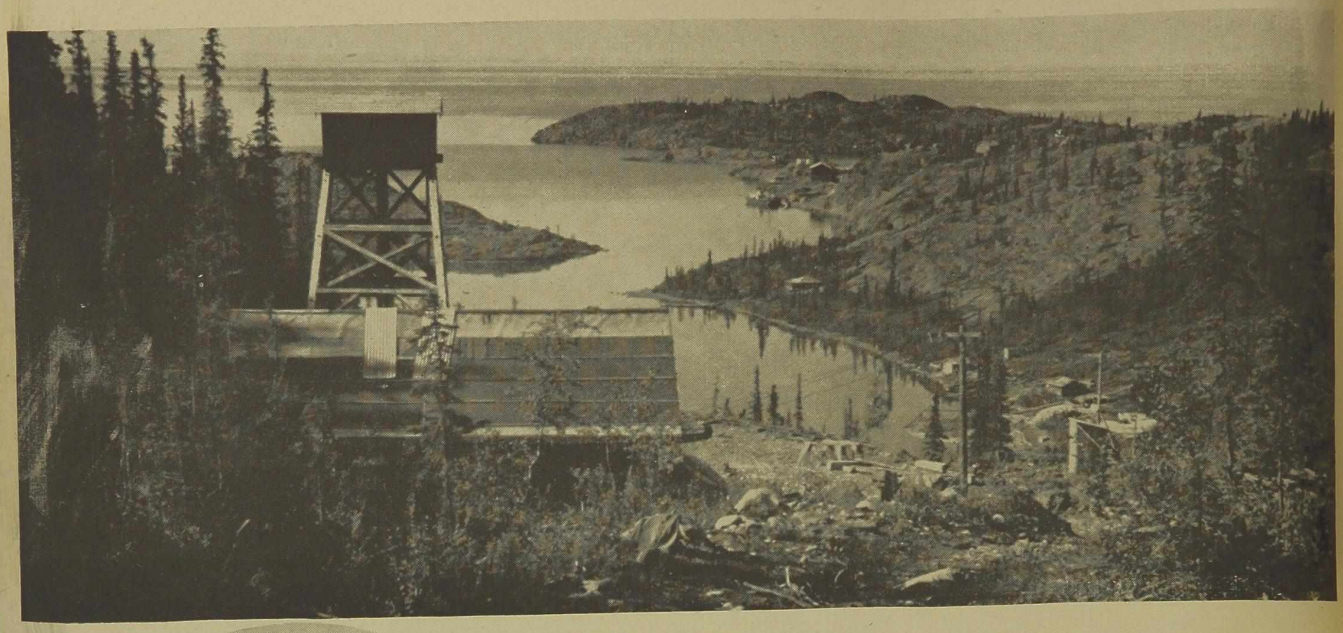
C. G. GERHOLD will manage the Riverside research and development laboratories for Universal Oil Products Co. He had previously been head of the development department.

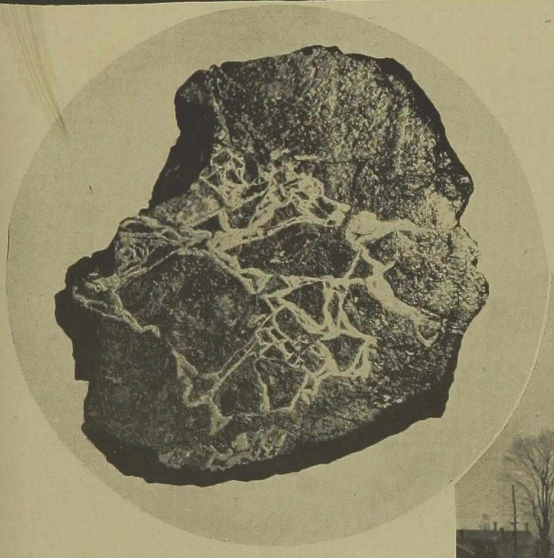


G. W. SALISBURY of the New York State College of Agriculture at Cornell University has received the Borden award of $1,000 for research affecting dairy problems.



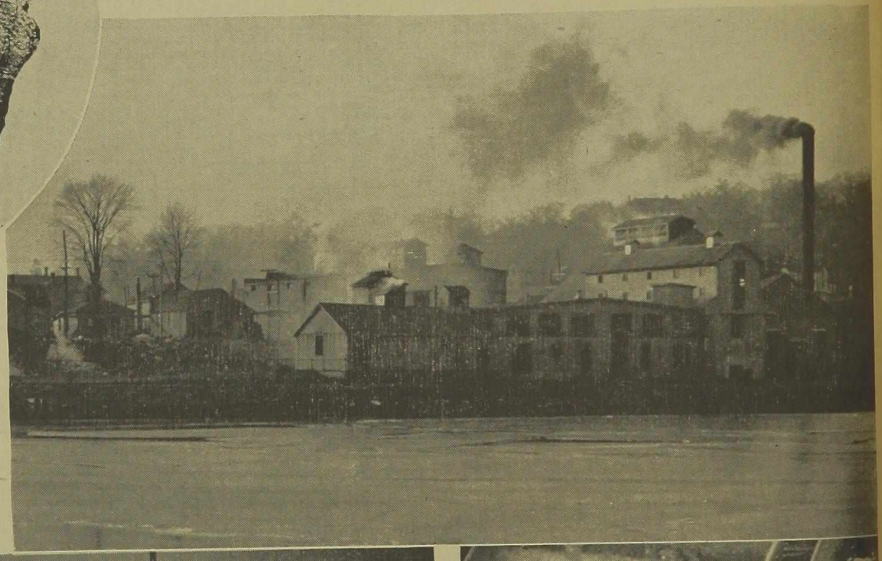
G. M. TROUT of Michigan State College was recipient of the $1,000 Borden award for the outstanding research on dairy products, at a directors meeting of the Dairy Science Assn.



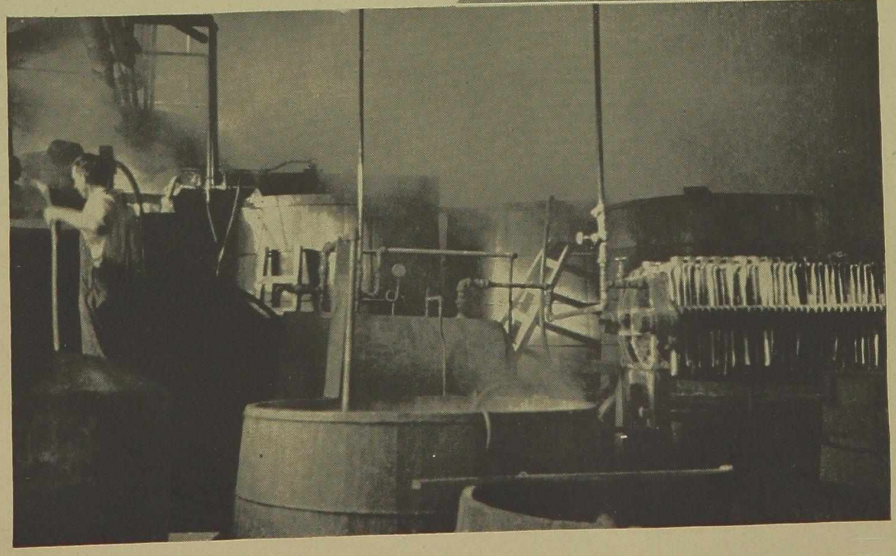


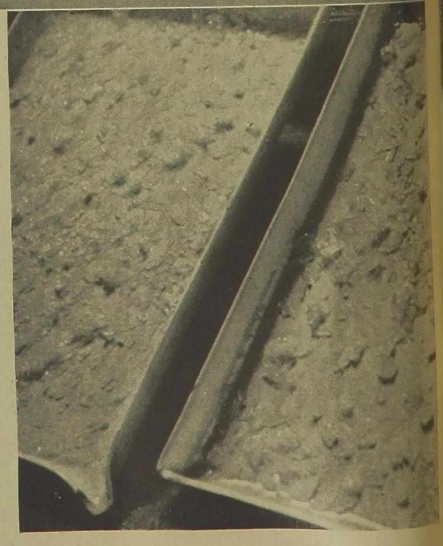
## Uranium From Canada

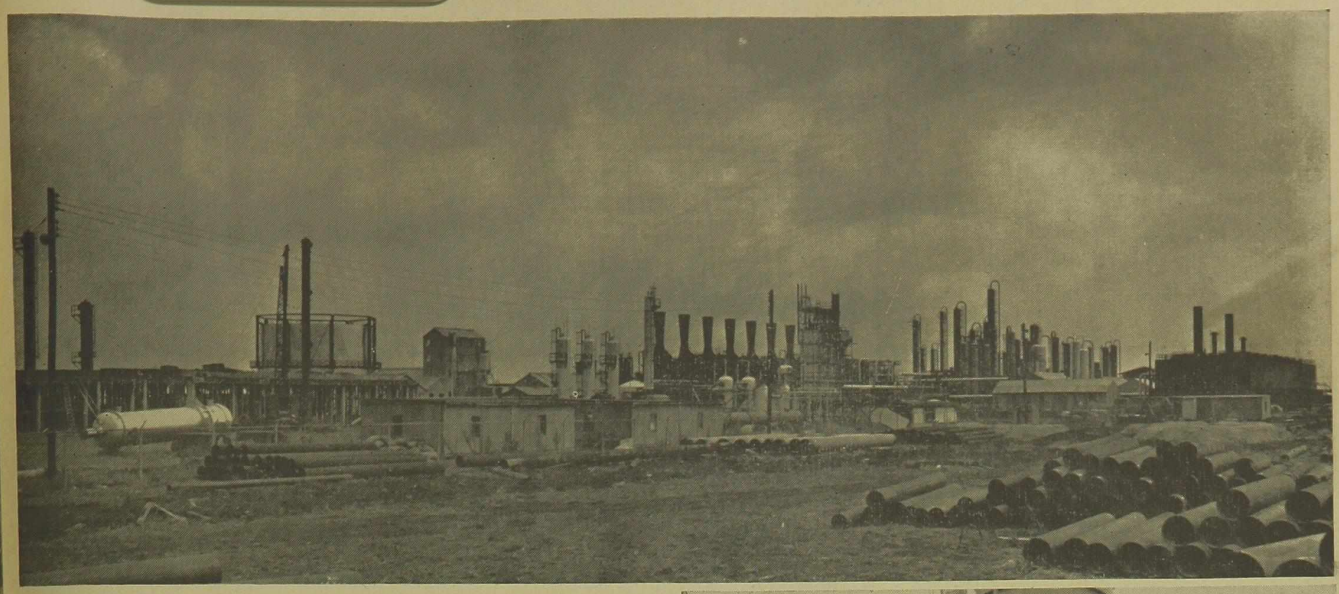
The source of atomic power, uranium, is refined from pitchblende at the plant of the Eldorado Mining & Refining Co., Port Hope, Ontario. The scene above shows the mines with the number two shaft power line and the collecting plant in the distance. Left, a sample of pitchblende, courtesy of the Bureau of Mines, Ottawa, Ontario, Canada.



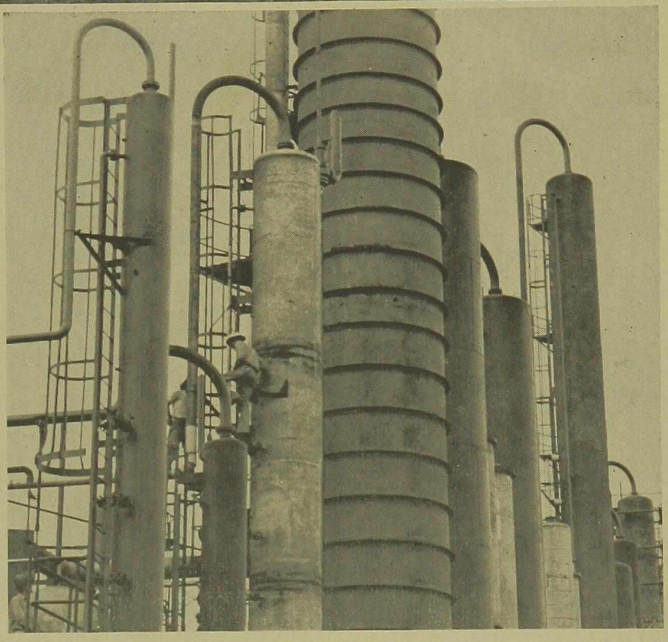
At right, a view of the refinery shows a portion of the lake in the foreground. Refined uranium is produced in the tank pictured below. On the trays, below right, are uranium nitrate crystals.







# Celanese Texas Plant Starts Production



Celanese Corp. of America has started large-scale production of chemicals at its new Bishop, Texas, plant. Now 60 per cent completed, the plant will produce acetic acid, acetic anhydride, acetone, methanol, hexamine, and formaldehyde from natural gas. It is located in Chemcel, near Bishop, in Neeces county, Texas, where there is an abundance of petroleum and natural gas resources. It is expected that eventually a number of other products will be added to those mentioned here. Above is a general view of the plant, with a close-up of some of the fractionating towers at the right.

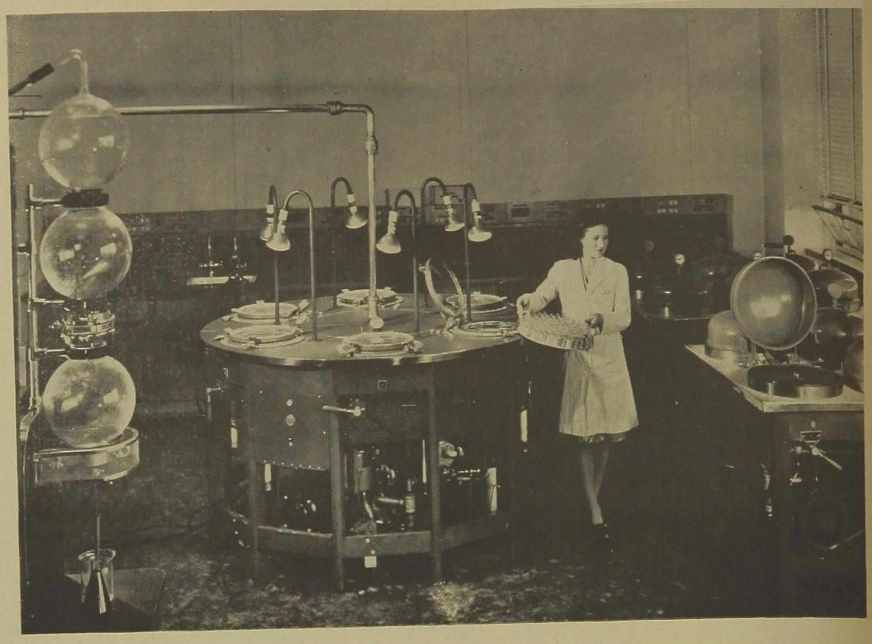
# Chemists Study Highpolymer Techniques at Brooklyn Poly Clinic

In the first clinic of its kind in the country, 19 scientists came to the Polytechnic Institute of Brooklyn, last July, for advanced instruction concerning the weight and shape of polymeric molecules From left to right, setting up an X-ray diffraction unit, are E. Klein, New York University, E. Hultberg, North American Philips, and Rose Finkelstein. In the center, M. A. Sizer, Armour Foundation, and Janice Sutter, Du Pont, adjust a crystal in the Weissenberg goniometer. H. J. DiGiovanni, N. A. Philips, and G. M Woten set camera for X-ray tests.

## Electronic Drying Speeds Penicillin Output

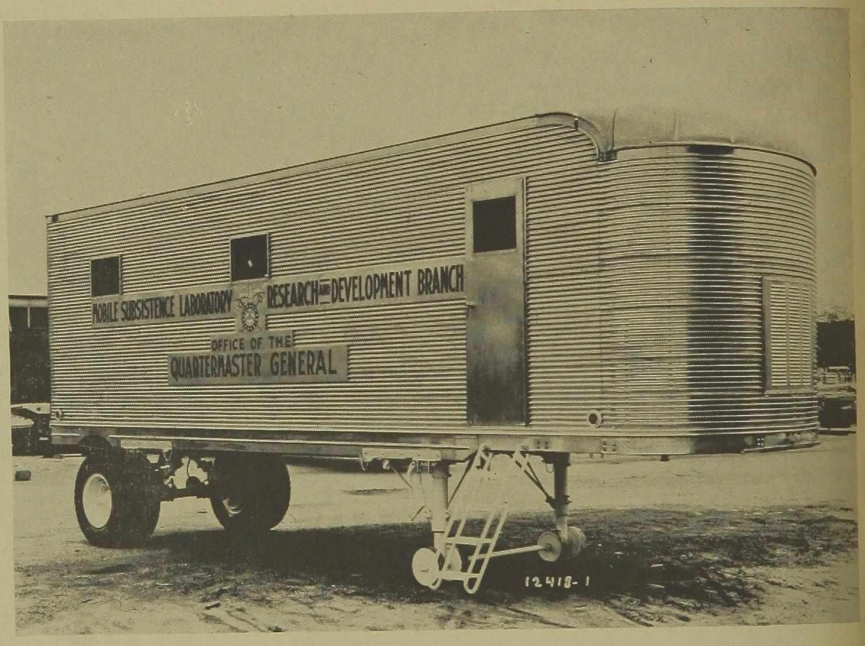
An all-electronic drying system developed by RCA is being used to speed production and reduce cost of penicillin. It occupies one-fourth of the floor space and requires one-third of the initial investment of conventional equipment. Development work is being continued to extend the application of radio-frequency drying to other biologicals and pharmaceuticals, anti-toxins, foods and granular chemicals.

The system consists of three separate units: (1.) Radio heat bulk-reducer—which completes in 30 minutes a bulk-dehydrating operation requiring 24 hours by existing method; (2.) Electronic vacuum drier—which in three minutes reduces 1 cc. quantities of concentrated penicillin solution to a dry film in vials, and; (3.) Vacuum heating chambers—which remove the last percentage of moisture from the vials, completing the drying process.



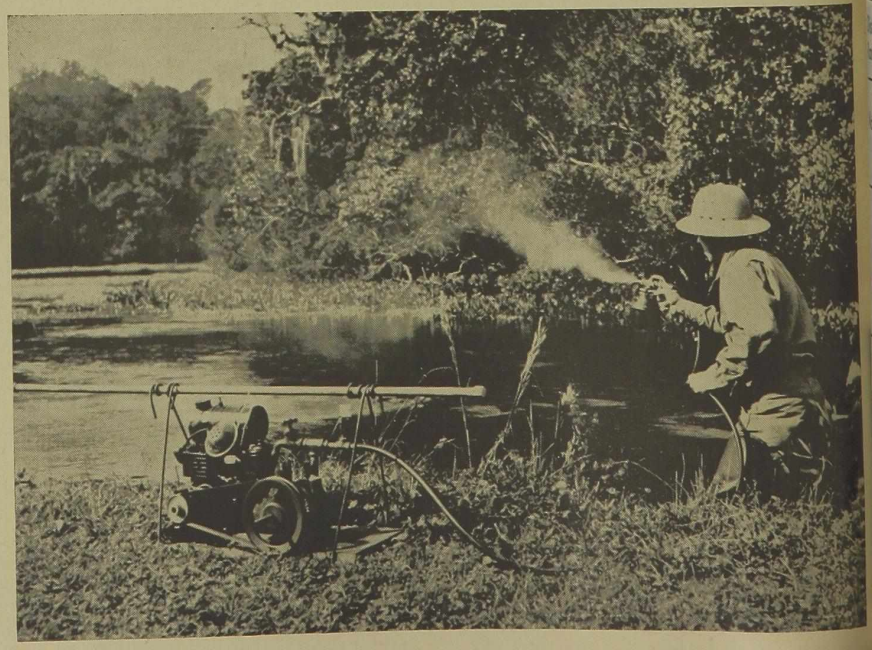
## Trailer Laboratory Safe-Guards G.I. Food

On-the-spot examination, by means of a completely self-contained mobile laboratory, guards against contamination of processed foods being procured by the Army. The body of the trailer is divided into two compartments, the front section being the laboratory proper, which is fully-equipped for chemical and bacteriological testing, and the rear section containing mechanical equipment, including an electrical generator, hot and cold water system, refrigerator compressor, air compressor, vacuum pump, and a still for water.




## Paint Sprayer and DDT Control Mosquitoes

A U. S. Department of Agriculture worker spreads a DDT compound on an area where mosquitoes breed. He is using power paint spraying apparatus. In one test with this type of equipment, the spray was drifted on the wind for 600 feet. The insecticide kills mosquito larvae as well as the adult insects.



# WE CAN SUPPLY YOUR PILOT PLANT

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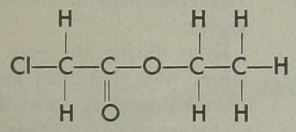
If you need the Monsanto intermediates . . . Ethyl Chloracetate or N-Butyl Chloracetate . . . for a "pilot plant run" of one of your developments, we can make prompt shipment. Commercial quantities, however, are not available at present. Prices will be sent upon request.

If you have not yet tried these products in your laboratory and if you are interested in studying the use of these intermediates for your long-range production, we shall be pleased to send you samples at no cost and without putting you under obligation. For further details, please contact the nearest Monsanto office, use the coupon or write: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri. District Offices: New York, Chicago, Boston, Detroit, Charlotte, Birmingham, Los Angeles, San Francisco, Seattle, Montreal, Toronto.

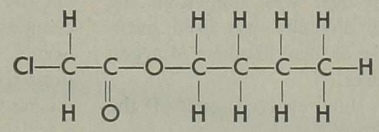
## ETHYL CHLORACETATE



| | |
|---|---|
| Appearance | Clear light straw to tan color, darkens somewhat from contact with steel. |
| Assay | Approximately 97% Ethyl Chloracetate |
| Acidity | 0.6% Maximum as Monochloracetic Acid |
| Distilling Range | 95% within 5.5°C. between 139°C. and 147°C. |

Note: Flash point { Closed cup.....125°F. / Open cup.....128°F.
Fire point.....131°F.

## N-BUTYL CHLORACETATE



| | |
|---|---|
| Appearance | Clear light straw to tan color, darkens somewhat from contact with steel. |
| Assay | Approximately 97% Butyl Chloracetate |
| Acidity | 0.25% Maximum as Monochloracetic Acid |
| Distilling Range | 95% in 11.5°C. between 175°C. and 189°C. |

Note: Flash point { Closed cup.....155°F. / Open cup.....155°F.
Fire point.....161°F.

MONSANTO CHEMICALS
SERVING INDUSTRY...WHICH SERVES MANKIND

**SAMPLES UPON REQUEST**

MONSANTO CHEMICAL COMPANY,
Dept. I-22, Organic Chemicals Division,
1700 South Second Street, St. Louis 4, Missouri

Without cost or obligation, please send data and samples as indicated:
☐ Ethyl Chloracetate; ☐ N-Butyl Chloracetate

*Name*_____
*Company*_____
*Street*_____
*City*_____ *Zone*_____ *State*_____

# BETWEEN THE LINES

## *Helium Excites New Interest*

*Once regarded as a waste, helium has emerged from the war as a "threshold" material, a gas for which new uses have been found, and for which there is every promise of a still wider field of usefulness.*

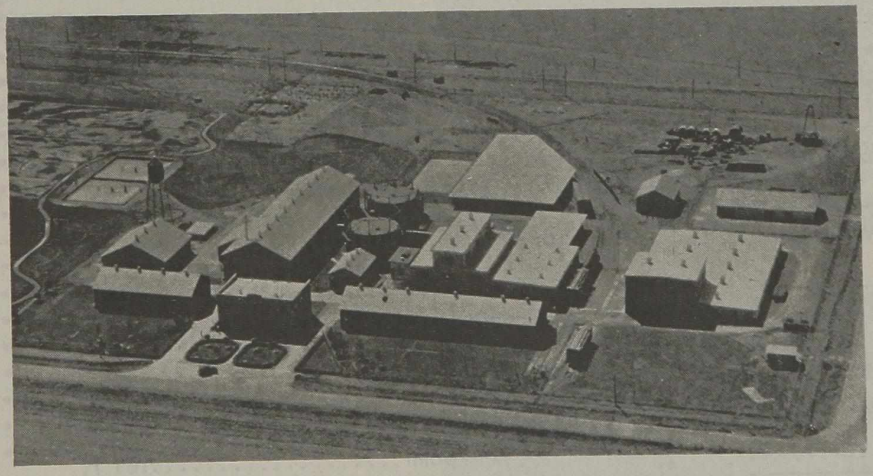
AS A LIFTING GAS for airships it has been familiar to the public for some years. With the disappearance of lighter-than-air craft as imminent commercial possibilities shortly before this war, the public tended to forget about helium, forgetting, or overlooking, that this is only one of the gas's potentialities.

During the war, however, it has come into industrial use on a scale only now beginning to be mentioned. For instance, magnesium fabrication presented some seemingly impossible obstacles. Welding of magnesium, for instance, was very difficult—because it is easily ignited, the surfaces to be welded would burn almost instantly when heat was applied in the process. This difficulty has been overcome by the use of local blankets of argon and helium gases.

There was thus evolved one of the major industrial uses for helium almost coincidentally with the large-scale production of magnesium. This led to wide employment of helium in the aircraft industry, among others, so that during 1944, sales of this gas to commercial distributors in the United States rose to more than 250,000 cubic feet per month, double the 1943 rate.

The extent of its use is indicated by the report that a total of 2,187,205 cubic feet went to commercial distributors during 1944. In addition, an undisclosed amount was taken by the Navy for lifting its anti-submarine blimps, for Army and Navy meteorological balloons, and for medical uses, besides a number which are still secret. The 1944 commercial or non-military shipments from the Bureau of Mines producing installations in the Southwest were nearly 30 times as large as those of 1938. Even more will be available for 1945 and later.

The Bureau of Mines of the U. S. Interior Departments controls the entire production and distribution of helium for the Government, but actual marketing is handled principally by commercial distributors of compressed gases, who maintain stocks of helium in cylinders throughout the country. In addition to about 30 commercial dealers or consumers, a number of scientific and educational institutions were regularly supplied with helium during the past year, according to records. These included Johns Hopkins Hospital, Massachusetts Institute of Technology, Yale, University of Texas, Columbia University, and Sloane Physics Laboratory at Yale.



*U. S. Bureau of Mines Helium Plant near Amarillo, Texas*

For some years medical and scientific groups have experimented with helium in treating respiratory diseases, for mixing in hospital anesthetics, and for treatment of underwater workers' "bends."

Its value in welding such materials as magnesium is of course apparent in its characteristics of non-flammability, inertia and non-explosiveness. With the supply now stabilized, research has increasingly diverted from the basic problem of locating helium-bearing gas to development of new uses for helium in metallurgical industries. There are many such uses, it is believed.

### *Future Linked to Light Metals*

In this connection the present interest in Congress, and in the West, in the future of light metals is relevant. There has been wide discussion for illustration, of the possibilities of using magnesium metal in articles for which other metals were used before the war—autos, etc. One of the prime obstacles in using magnesium sheet in body work, it has been reported after experiment, is the lack of suitable welding processes.

Aluminum also has some drawbacks in this respect, it is stated. Thus, it has superior thermal conductivity compared with steel, making it suitable for some uses perhaps to greater advantage than steel, but this, in the opinion of some experts, is offset by some added difficulty in welding.

If it were possible to use aluminum, magnesium, and some other of the newer metals to any substantial degree in place of iron and steel, under conditions of prevailing shortages, the advantage to reconverting manufacturers today would be obvious.

Even during the war, the Bureau of Mines was giving an increasing amount of attention to the post-war potentialities of helium gas, and has been producing this gas in five plants established under an earlier Act of Congress. (Amarillo and Exell, Tex., Cunningham and Otis, Kans., and Shiprock, New Mexico, are known locations.)

In the last Interior Department appropriation the Bureau of Mines sought $80,000 for helium utilization and research to find new uses for the gas and new ways of handling it. Bureau officials feel that there are some promising aspects of the use of helium in connection not only with magnesium and light or semi-light metals, but in treatment of other metals.

The five plants are substantially in operating condition, minus certain oddments of construction, it is stated. The Bureau has been faced during the war with fluctuations in demand for the gas, as well as changes in conditions in the gas fields and in the supply pipelines. Actually, in the latter stages of the war the Bureau was producing gas slightly in excess of requirements, and this was being stored for possible future demand. More interesting still, it is known that the plants could have produced even more gas if it had been needed.

The Government has still to acquire some gas rights, it is understood, but owns the field from which the Amarillo, Tex., plant operates. At Exell, north of Amarillo, gas is taken from private pipe-

lines of gas companies, into the helium plant, where the helium is extracted and the residue returned to the pipeline. The Government, incidentally, pays only for the difference between the quantity of gas taken into the plant and the amount returned to the pipeline. Almost the same procedure is followed at Amarillo, the gas being taken from the Government-owned gas field, the helium extracted, and the residual gas sold to a gas company which has a pipeline from the plant to a fuel-gas market.

### *Costs Reduced*

This suggests helium costs, and in that respect, Bureau officials point out that the level to which the cost of any new product can be reduced is unpredictable.

In 1921, the first year in which a production-scale helium plant was operated, the out-of-pocket cost of plant operation, maintenance, etc., was $486 per 1,000 cubic feet of helium produced; in the fiscal year of 1944, it is stated, that cost had been reduced to $6.27 per 1,000 cubic feet, or about one-seventy-eighth of the initial unit cost. Such costs do not reflect capital charges, of course, but total costs have been reduced in proportion.

It may be remembered by some that in the early stages of helium development there was the very spectacular possibility of revolutionizing air transportation through the wide use of lighter-than-air craft. The United States, as was publicized at the time, held the only known supply of helium, and apparently was headed for an early lead in this field.

Unfortunately, several air tragedies involving American dirigibles occurred in fairly rapid sequence, which convinced the public, if not the services, that helium gas was not the complete answer. We virtually abandoned this type of airship, and except for certain very successful war uses in the present conflict, never revived it. As indicated, helium was an invaluable aid to us in this latest attempt to utilize airships.

Meanwhile, Germany continued in the field with temporary success, but owing to the lack of helium, lost its principal demonstration airship several years ago when the gas it was compelled to use exploded with frightening loss of life. Up to this time, helium was principally identified, in the popular imagination at least, with its possibilities in the air.

It may be recalled that prior to this war, Germany attempted to obtain large amounts of helium from the United States. What the Germans wanted with it can only be guessed. Some obvious uses, suggested by our own war experience, may be surmised. In the light of more recent advances in the use of light metals, the necessity perhaps in Germany of using these metals whether desirable ordinarily or not, hints that they may have

[illegible] stance. On the other hand, our experts now returning from studying German chemical developments have run onto so many leads that the Germans may have had plans in mind beyond anything we could have imagined before the war.

Whatever the answer to these questions, the Bureau is now concerned immediately with more prosaic phases of its use. One of these is a further reduction in its cost and improvement in its transportation. About one pound of steel is required to transport one foot of helium, using a pressure of 2,000 to 2,500 pounds per square inch.

### *Seek Lighter Container*

The Bureau has found that by subjecting helium to high pressure it can be reduced to 1/160th of its normal volume. If it can be shipped in liquid form, the volume can be reduced still further, to about 1/800th of its volume at atmospheric pressure. Shipped in a lighter container its transportation cost is reduced; moreover, it can be shipped in quantity even by air. The Navy was especially interested in the latter possibility during the late stages of the war, having in mind its transportation overseas.

One of the projects therefore, involves finding means of liquefying helium on a large scale and developing containers for it in this form. Some of the findings that can now be reported are that the Navy used less helium than it first anticipated, due to the efficiency of the gas in use in Navy light aircraft.

This suggests again a parallel situation to one earlier in the history of helium development. Lighter-than-air craft may be revived or not, but the vastly reduced cost of the gas, the wider application of new metals and new industrial processes, may be geared to postwar plans only now in the blue-print stage. That is what some scientists and some members of Congress visualize.

## *Agricultural Society Elects Brand*

The "Agricultural History Society" of the United States, at their recent Twenty-sixth Annual Meeting, announced the election of the following officers:

President: Charles J. Brand, Washington, D. C.

Vice President: Richard O. Cummings, University of California.

Secretary-Treasurer: Chas. A. Burmeister, War Food Administration.

Executive Committee: Clarence H. Danhof, Lehigh University.

Mr. Brand is consultant to the president of The Davison Chemical Corporation, Baltimore, Md. At this meeting, Dr. Arthur Peterson, of the Army Industrial College of the War Department, former President of the Society, made his annual address entitled "The Agricultural History Society—The First Quarter Century."

# NEW PRODUCTS & PROCESSES

## *Silicone Rubber* NP 155

Dow Corning Corporation announces the commercial availability of Silastic, a silicone rubber, produced in various stocks for molding, extruding, coating, and laminating. Largely because of their inorganic origins, these rubbery organosilicon oxide polymers remain elastic after heating at temperatures up to 500° F. and retain flexibility at temperatures as low as —70° F.

Silastic stocks are available for molding flat sheets, gaskets and other shapes. Silastic coated lead wire and other continuous extruded shapes are made from Silastic stocks designed for extruding.

Also available are Silastic stocks compounded for coating glass or asbestos cloth to produce flexible, water-proof, heat stable, oil resistant gaskets, diaphragms, tape and electrical insulation which is nontracking, arc and oxidation resistant. Laminates may be made by curing under pressure multiple layers of Silastic coated inorganic fabrics. Silastic is also used to insulate wire wound resistors with waterproof, heat resistant, elastic coatings able to withstand the severe and repeated thermal shocks specified for Grade I Class I resistors.

Silastic coatings adhere to glass, vitreous enamel, iron, steel and aluminum. They constitute protective coatings which are resistant to oil and salt brines at elevated temperatures.

Silastic stocks now available have exceptional temperature stability, tensile strength of from 200 to 330 pounds per square inch, elongation ranging from 70 to 115%, high resistance to water, brine and oil, and electrical properties of the following magnitude: dielectric constant at 1,000,000 cycles of 5.0 to 7.5; power factor at 1,000,000 cycles of 0.13 to 0.18%; and dielectric strength of 500 volts per mil. The properties of Silastic stocks, notably their tensile strengths, are being steadily improved.

## *Resin Plasticizer* NP 156

A new and unique type resinous plasticizer is used to prevent premature failure and loss in signal strength of high frequency cables for Navy equipment. Known as Paraplex G-25 and developed by the Resinous Products & Chemical Company, this product might be described as a "polymeric" plasticizer, the first resinous type plasticizer compatible with polyvinyl chloride and which combines the desirable features of ester type plasticizers with the permanence and non-migrating quality of a synthetic resin.

The limitations inherent in chemical plasticizers such as the phthalates have long been recognized in connection with nitrocellulose. The tendency to migrate from the plastic—particularly when applied over a porous substrate or one in which the plasticizer is soluble—resulting in gradual embrittlement of the plastic, has been a very frequent cause of difficulty.

This plasticizer combines the advantages of monomeric ester-type plasticizers such as dibutyl sebacate and dicapryl phthalate with the permanence and resistance of a synthetic resinous material and offers definite possibilities for other specialty stocks based on vinyl resins as well as synthetic rubbers of the Buna N type. Such stocks can be compounded to give maximum resistance to oils and avi-

temperature flexibility needed in so many aircraft applications. Oil resistant gasket stocks and molded hydraulic seals are typical examples of this application.

The plasticizer imparts low heat deformation to rigid polyvinyl chloride stocks and is reported to be an efficient plasticizer for cellulose nitrate, chlorinated rubber as well as certain thermosetting phenolic resins. Paraplex G-25 also is useful in special resistant aircraft caulking and seam sealing compounds. The superior oil resistance, permanence and low extractability of Paraplex G-25 compounds is of special significance in fabric coatings. Hot melt coatings for food packaging can be formulated readily because of the wide compatibility range and excellent heat stability of this plasticizer.

## *Synthetic Lubricant* NP 157

A new synthetic internal combustion engine lubricant having unusual advantages over mineral oil, particularly for for cold weather use, has been announced by Carbide and Carbon Chemicals Corporation. This lubricant, which is now being produced in commercial quantities, has properties quite different in many respects from oils derived from petroleum.

War-free and manufactured to any desired viscosity, the new materials have pour-points varying from — 30 to — 88° F. and flash points ranging from 300° F. up. They have densities approximating that of water. Carbon residue values are less than 0.01 per cent, regardless of viscosity, and the lubricant is characterized by low change of viscosity with change in temperature, having viscosity indices in the range of 140 to 160. It contains no petroleum oils.

These new lubricants practically eliminate sludge and varnish formation in the engine, and wear of the moving parts is in line with wear experienced with ordinary mineral oils. Ease of starting in cold weather is an outstanding advantage.

There are indications already that these lubricants will be widely used in internal combustion engines when they are available for other than critical military use.

Information on the chemical nature of these materials is restricted under secrecy orders.

## *Styron 411* NP 158

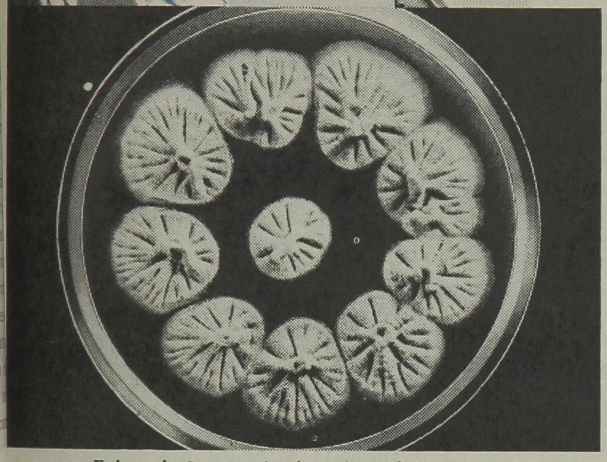
A greatly improved polystyrene, designated at Styron 411, has been announced by The Dow Chemical Company to replace the present Styron K-27 as of September 1st. The Company further announced that there is no increase in the price of the improved material.

Among mechanical advantages claimed for Styron 411 are increased weld strength and better machinability. Buffing operations are more easily performed. In

# AT HOME, TOO

## Penicillin Heyden is doing a fighting job!

Ever-increasing amounts of Penicillin Heyden are becoming available to fight disease on the home front. Day after day, larger and still larger shipments are leaving our Princeton plant to meet civilian needs.



Enlarged photograph of a culture dish showing separate colonies of Penicillin producing mold.


This brochure tells a story you'll want to read. We shall be glad to mail it upon request made on your business stationery.


*Awarded to the personnel of our Princeton, N. J., plant for excellence in the production of Penicillin. This plant is devoted entirely to the manufacture of this product.*

*Employees of all other Heyden plants have been similarly honored for excellence in production.*

Sodium and Calcium Penicillin Heyden, in vials of 100,000 and 200,000 units, with eighteen months expiration date, for human and veterinary purposes, are available through distributors in the United States, selling under their own labels.

For research and compounding, Penicillin Heyden, in both vials and bulk, is sold directly to the user by Heyden

FINE HEYDEN CHEMICALS

# HEYDEN *Chemical Corporation*

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*Chicago Sales Office:* 180 N. Wacker Drive, Chicago 6, Ill.

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

trimming, the new material shows reduction in tendency to tear back or produce a laminar condition when cut at the gate. In improving the mold release and eliminating external lubrication, Dow engineers greatly improved surface appearance. The reduction of surface marks in 411 enhances appearance and adds brilliance and gloss. Welds are scarcely perceptible in the new material and prove distinctly superior to regular polymers.

Although availability of Styron 411 is subject to WPB regulations, Dow, cognizant of an increased demand, is making every effort to provide increased production facilities to meet the present and future demands for both military and civilian end users, they said.

## *Silicone Lubricant* NP 159

Merco Nordstrom Valve Company is now the exclusive distributor of a new valve lubricant for which unusual properties advantageous for a number of severe services are claimed.

This lubricant is colorless and one of its outstanding properties is that its viscosity changes only slightly over a very wide temperature range. It is recommended for working temperatures ranging from 40° F. to 400° F. Due to its extremely low vapor pressure, it does not evaporate appreciably even at elevated temperatures.

Its principal services are for steam, hot water, hot air, oxygen, high vacuum, also for dilute solutions of mineral acids (except nitric and hydrofluoric acid below 250° F.); hydrochloric acid, natural and synthetic rubbers, acetic acid, acetic anhydride and ethyl alcohol below 250° F.

It is available only in soft bulk form for application by grease guns.

## *Light Absorbent* NP 160

A new ultra-violet light absorbent and fluorescent chemical compound known as β-methyl umbelliferone is now made commercially available by Carlisle Chemical Works, Reading, Ohio. It is claimed to have outstanding properties as a sunscreening base in cosmetics and should also find widespread industrial application wherever it is desired to eliminate or reduce the adverse effects of sunlight.

## *Higher Phthalic Vehicle Offered* NP 161

In the April 4, 1945, amendment of WPB Order M300, Schedule 59, the War Production Board raised the amount of phthalic anhydride permitted for use in the vehicles of "semi-alkyd" primers and finishes. Vehicles employed in the production of such finishes were formerly restricted to 15-16% phthalic anhydride (based on total vehicle solids), but to permit the production of superior finishes, this percentage has now been raised to a maximum of 20%.

S&W Aroplaz 1378 Solution (50% Solids in Mineral Spirits)* is a modified alkyd resin which is now being produced by USI for use as the composite, total vehicle solids component in specification finishes. The resin meets the chemical requirements of the specifications and when properly pigmented the resultant finishes possess the physical properties demanded by the specifications. It is also well suited for use in finishes other than military which the WPB considers essential but which they limit to a maximum phthalic anhydride content of 20%.

## *High-Frequency Heat Saves Vitamin C* NP 162

By using high frequency electricity for blanching vegetables in place of flowing steam or boiling water, food chemists at the State Experiment Station at Geneva reduced the loss of vitamin C in treated raw cabbage from the 30 to 40 per cent occasioned by the usual blanching methods to only 3 per cent by electronic blanching.

For their successful preservation by freezing or dehydration, vegetables are usually briefly exposed to flowing steam or boiling water. This heat treatment inactivates enzymes which may cause deterioration of flavor and destruction of vitamins during storage. However, these heat treatments sometimes damage the texture of the vegetables, making them soft, and the steam or boiling water also leaches out vitamin C and some of the B complex vitamins, thus reducing the nutritive value of the food.

By using high frequency electricity washed fresh vegetables could be placed directly in the container which goes to the consumer, passed through a high frequency field to inactivate the enzymes, and then directly into the freezer. This would eliminate much handling and possible contamination of the vegetables before they reach the consumer. The results obtained from the electronic heating of cabbage have led to more extensive tests with other vegetables. While the experiments have been on a small laboratory scale, it is possible that rapid advances in electronics during the war may make possible the large-scale use of electronic heating in the commercial processing of fruits and vegetable in the not far distant future.

## *Hormone Tablets For Oral Administration* NP 163

Conestron tablets, natural conjugated estrogens to provide completely effective oral therapy for the menopausal patient, have just been announced by Wyeth Incorporated.

Oral administration of estrogens has already demonstrated its superiority over the time-consuming injection therapy. Not only has it wide acceptance by the medical profession but it bids fair to become the preferred therapy.

This new addition to the Wyeth line of prescription items is packaged in two sizes: bottles of 100 and 1,000, each containing 0.625 mg. estrone sulfate.

## *Nylon Improved By Borates* NP 164

A patent relating to the production of stabilized high molecular weight polyamides having filament and fiber-forming properties was granted this week to Celanese Corporation of America.

According to this invention—United States Letters Patent No. 2,378,494—the polyamides themselves or the reaction mixture from which they are produced (diamines and dibasic acids) are heated with boric acid or a salt or ester of boric acid, such as zinc borate. The boric acid or salt is present in comparatively small amounts.

This process yields polyamides of improved stability which are eminently suitable for melt spinning to produce filaments and films.

## *Brass Cleaner* NP 165

Cowles Detergent Company announces the latest development of their research department, Cowles KW—Clean Bright brass cleaner. This product is said to be a high-speed, efficient, free-rinsing brass cleaner. It can be used in still tank (with or without electric current) and in washing machine equipment. KW cleans bright and does not attack or tarnish the metal, and is also adaptable to cleaning die-castings.

## *Aluminum Anodizing* NP 166

A modified chromic acid anodizing process for aluminum, employing sulphuric acid for partial maintenance of the bath, was developed several years ago by San Diego U. S. Naval Air Station and has been used in production ever since. Because of the shortage of chromic acid, this process has been made available to industry in order to determine its general applicability.

When aluminum is anodized in a chromic acid solution a certain amount dissolves and neutralizes part of the chromic acid. The chromic acid which has thus combined with aluminum does not support anodizing and is entirely useless. As much as 90% of the chromic acid added to an anodizing bath is used up in this manner.

The process developed by San Diego Naval Air Station replaces this chromic acid with sulphuric acid to combine with aluminum. The chromic acid lost by drag-out and other mechanical means must be replaced with chromic acid to maintain the chromic acid content.

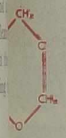
The steel tank must no longer serve as cathode in the circuit because of the activating effect of the cathodic depolarization. For this reason one should use bars or slabs of carbon as cathodes.

Since a "neutral" tank is liable to de-

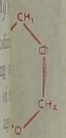
# NEW CHEMICALS FROM DU PONT

# "HARNESSED" FORMALDEHYDE

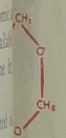
# TRIOXANE



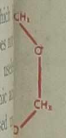
**ADVANTAGES IN USE**—Can be used as a source of anhydrous monomeric formaldehyde for reaction with various materials. Provides better control of reaction, better yields and quality of product, shorter reaction time, smoother reaction than is possible with aqueous formaldehyde or other formaldehyde polymers.



**STABILITY AND DEPOLYMERIZATION**—Stable in alkaline or neutral solutions. Depolymerized to formaldehyde by small amounts of strong acid or acid-forming materials. Depolymerization rate is easily controlled.



**SOLUBILITY AND MISCIBILITY**—Miscible with many types of organic compounds; dissolves a wide range of materials such as phenols, aromatic hydrocarbons, amides such as urea, and many others. Trioxane increases the solubility of the protein zein in water and alcohols. Trioxane acts also as a plasticizer and as an anti-gelation agent for zein.



**USE IN ORGANIC REACTIONS**—Trioxane can be used in reactions with such compounds as phenols, amides, amines, proteins, hydrocarbons, and in general, with compounds with which formaldehyde will react in slightly acidic media.

## TRIOXANE

**Cyclic trimeric polymer of Formaldehyde**

**PROPERTIES**

| | |
|---|---|
| **Colorless, crystalline compound** | |
| **Molecular Weight** | **90.05** |
| **Odor** | **Mild, Pleasant** |
| **Melting Point** | **61°C** |
| **Boiling Point** | **115°C** |
| **Vapor Pressure** | |
| 25°C | 13 mm |
| 86°C | 283 " |
| 114.5°C | 759 " |
| 129°C | 1212 " |
| **Flash Point** | **45°C** |
| **Density (molten) @ 65°C** | **1.170** |
| **Solubility** | |
| Water | Readily Soluble |
| Alcohols | " " |
| Ketones | " " |
| Ethers | " " |
| Esters | " " |
| Chlorinated Hydrocarbons | " " |
| Aromatic Hydrocarbons | " " |
| Vegetable Oils | " " |
| Naphthalene | " " |
| Phenol | " " |
| Petroleum Ether | Slightly Soluble |

**AVAILABLE** in limited quantities for research and development. Write for more data, samples and technical advice: E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals, Field Research Section, Wilmington 98, Delaware.

DU PONT
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BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

**DU PONT ELECTROCHEMICALS**
**FIELD RESEARCH SECTION**

velop both cathodic and anodic areas and anodic corrosion may be very severe, the tank should be further protected against corrosion with several coatings of a chromic acid resistant paint. It also appears desirable to keep it in the cathodic circuit because in the presence of carbon cathodes, cathodic corrosion is liable to be less than anodic corrosion through imperfections in the paint coating.

The addition of sulphuric acid upsets the ordinary relationships between pH and free chromic acid content and amount of current drawn by the aluminum alloys. Hence pH determinations are no longer of much value without complete chemical analysis and another system of control is needed.

A new bath is made up as usual to contain 2½% chromic acid or 21.5 lbs. per 100 gallons. Additions of chromic acid are made to maintain the current density at not less than 1.5 and preferable not over 2.5 amperes per square foot, until the total chromic acid content reaches 10%. Further maintenance of current density is obtained by gradual additions of sulphuric acid (either concentrated or diluted, depending on the size of the addition). When the total chromic acid content drops below 10% because of drag-out and other losses, chromic acid is added to restore the 10% minimum before sulphuric acid is again added.

The chromic acid content is determined by means of the same method of chemical analysis as is used for chromium plating solutions.

The experience of San Diego Naval Air Station has shown that the film formed in the modified bath has the same properties as a film of equal thickness formed in the regular chromic acid bath in respect to corrosion protection, wear resistance and paint adhesion.

Tests of the corrosiveness of the modified solution on aluminum alloys indicate that it is of the same general order of magnitude as that of the regular chromic acid bath.

## *Concrete Improver* NP 167

Chemists at Ohio State University have learned that concrete will last much longer with far less maintenance expense if a by-product of the paper industry is added to the cement used. An investigation conducted by Dr. Wesley G. France and Fred M. Ernsberger showed that when cement is placed in water many of the particles clump or flock together. Since tests have shown that the best results are got from cement only when each of the countless particles is wet all over, this tendency of the particles to bunch together greatly reduces their combined effectiveness or efficiency in concrete.

The second step of this investigation showed that the clumps are broken up when a small amount of calcium lignosulfonate is added, which disperses the cement particles. Tests have proved that concrete produced with dispersed [illegible] is stronger, less porous and lasts four to five times longer than when made with plain cement.

Dispersed cement providing these new standards in concrete already has been used in millions of yards of concrete for buildings, industrial plants, bridges, dams, airports, reservoirs, filtration plants and highways.

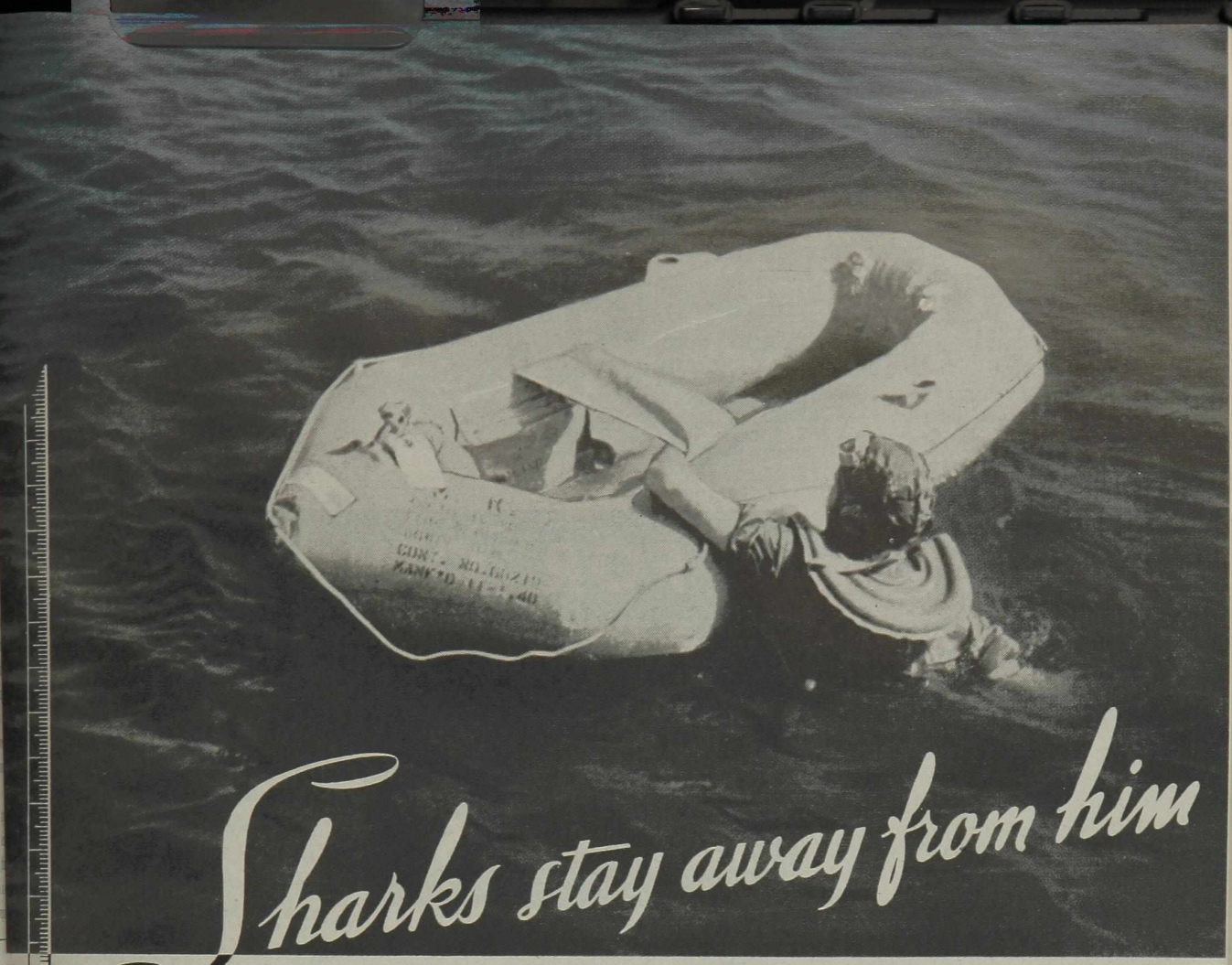
## *Anti-Fog Preparation For Goggles* NP 168

A new anti-fog preparation for keeping goggle lenses, face shields, and welding plates clear is announced by the American Optical Company, Southbridge, Mass.

Fog on lenses, the concern points out, is annoying, but, more important, it is actually dangerous since it obscures vision and increases accident frequency.

The new AO anti-fog material, the manufacturer claims, is made from a scientific formula to penetrate the ultramicroscopic pores of glass and deposits a thin film which helps prevent fogging, steaming, and frosting of all types of glass surfaces. In addition, it removes grease and dirt from glass, and allows perfect visibility.

The preparation is easily applied by simply spreading it on both surfaces of glass, rubbing the surfaces thoroughly, and then polishing them with a soft cloth or paper. The anti-fog preparation is



# *Sharks stay away from him*

## . . . when this new "magic" chemical colors the sea an inky black!

Fliers and other service men downed in tropical waters, now have a new protection against sharks. It is, in fact, a two-edged weapon—a chemical salt combined with black dye.

When dissolved in water, this chemical offends the shark's sense of smell, and, by forming an inky black cloud, creates another deterrent as well as providing partial concealment.

This is another typical example of chemical exactness in the making of wartime supplies. Chemists throughout the country have made a vast contribution in seeking, and obtaining, *quality* in the making of war supplies of every kind.

The J. T. Baker Chemical Co. supplies the chemical used in the new shark repellent. This company has been trained to produce purity to the decimal for Fine and Industrial Chemicals. It has supplied, and continues to supply, purity to the decimal to the government's predetermined and exacting standards.

If you have special chemical requirements for war production or in anticipation of post-war needs—if you require chemical measured purity to predetermined standards, we invite you to discuss your problems in confidence with Baker.

**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

obtainable in a one-ounce jar or a one-pound jar.

### *Dermatitis Preventive* NP 169

Tarbonis is said to be an efficient agent in combating occupational dermatitis resulting from exposure to chemicals, greases, solvents, dyes, and many other ordinarily irritating substances.

Tarbonis is a therapeutic agent, not merely a protective. It is said to be rapidly effective in clearing up a high percentage of developed cases of contact dermatitis. It is easy to apply, does not inhibit perspiration, is pleasant, odorless, greaseless, and stainless. It will not mar or soil hands, clothing or the work itself.

### *Portable Quinine Extraction Plant* NP 170

The War Department has announced a process of quinine extraction designed to save time and shipping space—a completely portable plant to produce quinine at the scene of harvest. It was developed principally for use in South America. The project was under supervision of Maj. Robert Lee Keys, Commanding Officer of the Cinchona Research Unit.

The plant, simple in construction, produces a quinine concentrate in the field from wet bark. Heretofore, dry bark had to be gathered from the jungle—generally an almost impossible task insofar as the South American areas were concerned—and shipped to a permanently located extraction plant.

The plant weighs only 1,500 pounds, and can process 13,000 pounds of bark a month, using 1,000 pounds of chemicals. The 13,000 pounds of bark produce approximately 170 pounds of totaquine, one of the antimalarials obtained from cinchona bark.

Two of these plants use the ion exchange principle. Besides the engine-pumped model, which is designed to produce from 500 to 1,000 pounds of bark per day, there has been assembled a similar hand-pumped, gravity-flow model. This plant operates in a manner identical with the engine-powered model save that circulation of the acid fluid through the ion exchange system is accomplished by gravity flow. Agitation of the bark mass is obtained by stirring with a paddle or other hand-operated device. Its capacity is about one-half that of the engine-powered plant.

The third plant does not use the ion exchange principle. Instead, the alkaloids are precipitated from acid solution by the addition of strong alkali. Alkali precipitation is not well adapted to commercial operation since, even under laboratory controls, some 25 per cent of the alkaloids remain in solution and are lost; since none of the chemicals used are recoverable, no advantage in transportation requirements is realized. However, the method is peculiarly adapted for small scale operation, since it can be carried on with the very simplest sort of equipment and a minimum of technical knowledge.

Chemicals can be supplied locally for small scale production, since vinegar can be used for the acid solution and leachings from wood ashes for precipitation. The products constitute a usable antimalarial, conforming, so far as impurities are concerned, with USP standards.

### *Improved Method for Electrolytic $H_2$ and $O_2$* NP 171

Consolidated Mining and Smelting Co. of Canada, Ltd. has developed an improved method for the electrolytic production of hydrogen and oxygen, which consists basically in the addition of vanadium pentoxide to the electrolyte.

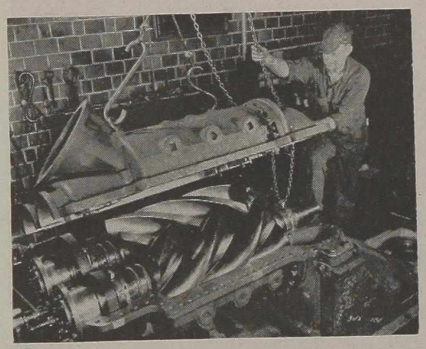
The addition agent is said to be of particular value in the electrolysis of a caustic alkali electrolyte containing impurities tending to raise the operating voltage of the cell, in that the pentoxide addition comprises a method of reducing operating cell voltage.

The modified process has been employed by Consolidated in its own plants for some time, but publication of the patent was withheld by government order since its issuance in late 1942.

# NEW EQUIPMENT

## *Rotary Gas Compressor* QC 613

The Lysholm compressor, now being manufactured by the Elliott Co., consists of only two moving parts, cooperating rotors, which are timed by the ground gears shown at the left of the illustration. These gears are directly mounted on the shaft and journaled in precision automotive type bearings. All parts are enclosed in an accurately machined casing carefully jacketed to insure symmetrical temperature distribution, producing direct



alignment of parts even under extreme conditions of operation. The compressor shown is capable of handling 12,500 cfm. at a compression ratio of 2-3 to 1.

The Lysholm compressor is a genuine positive displacement machine which, for each turn of the shaft, takes in and compresses a fixed volume of air independent of the back pressure imposed and over a broad range the operating pressure its operation is independent of the quantity of air passing through the machine.

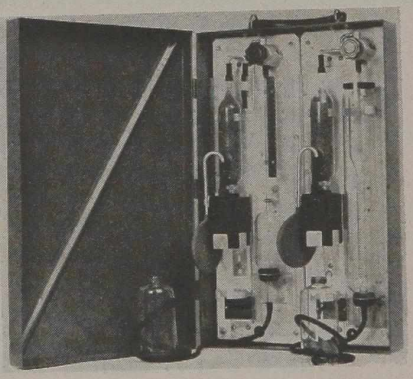
In operation the air enters the bottom of the casing at the right and bites of the air are trapped by the successive pairs of helical lobes. As the rotors turn, the male and female lobes intermesh and compress the air until the discharge port is uncovered and the air is squeezed out in rapid overlapped bites, producing a steady flow of compressed air. The quantity of air is directly proportional to the speed of rotation and is independent of the discharge pressure. It has been stated that the volumetric efficiency of this compressor is practically 100% at 2,500 RPM, and the adiabatic efficiency can reach 80-85% at the proper speed and pressure ratio.

## *Gas Analyzer* QC 614

The Hays Corporation announces the development of a special analyzer for testing the purity of oxygen, carbon dioxide, and nitrogen in the range from 90% to 100%.

It is of particular interest to the manufacturers of commercial oxygen and carbon dioxide but has many practical uses in industrial processes. The new analyzer known as the Hays Series "E" came into being as the result of the demand for testing the high purity of oxygen for use in flying. It is quite similar to the standard Orsat but differs in technique of operation.

It is offered in two styles—a wall mounted model for permanent installation



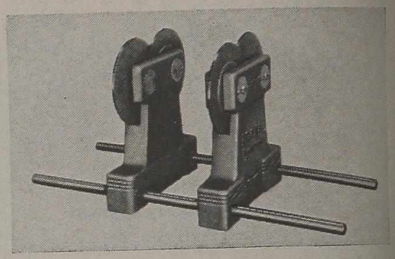
and a portable model supplied in a metal case with leather carrying handle. It may be obtained with a single unit or with two units. A junior model (Series EJ) is also obtainable with a burette capacity of 30cc. The smaller model measures 6¼" x 9⅝" x 3¾" and weighs, fully charged, less than six pounds.

All models feature a new four-way valve designed by Hays engineers to conserve space and facilitate operation.

## *Balancing Ways* QC 615

The Ideal Commutator Dresser Co. announces a new line of super sensitive balancing ways. Through the use of "scale type" bearings in the small 10" size sensitivity to .007 ounce inches is made possible. Special sensitive bearings used in the 20" and 42" size permit accuracy in balancing to .009 ounce inches.

The work is carried on free turning discs, mounted on precision bearings. The discs are ground on outside diameters, mounted on ground spindles and balanced. Standards supporting the revolving discs

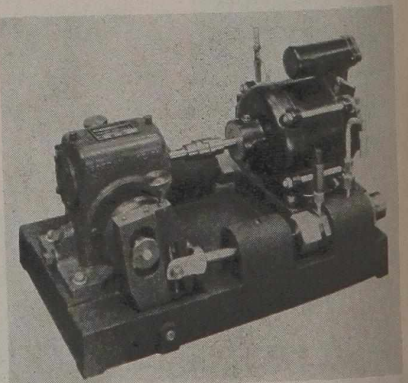


are movable on shafts to take different lengths.

Ideal balancing ways simplify static balancing, straightening and truing of parts such as fans, pulleys and fly wheels. Four sizes are available, 10", 20", 42" and 60" swing, with a 400, 1,000, 1,000 and 5,000 lb. capacity respectively.

## *High Pressure Variable Stroke Pump* QC 616

The requirements for a sturdy, continuous-duty, high-pressure, adjustable stroke pump for such uses as pilot plant operations and experimental pressure



work are met by the "Precision"-U.O.P. duplex high pressure variable stroke pump developed in collaboration with the Universal Oil Products Co. The individual cylinders permit two different types of liquids to be pumped simultaneously, or if an increased volume is desired that is beyond the capacity of a single cylinder, both cylinders can

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Please send me more detailed information on the following new equipment.

| | | | |
|---|---|---|---|
| QC 613 | QC 617 | QC 621 | QC 625 |
| QC 614 | QC 618 | QC 622 | QC 626 |
| QC 615 | QC 619 | QC 623 | QC 627 |
| QC 616 | QC 620 | QC 624 | QC 628 |
| | | | QC 629 |
| | | | QC 630 |

Name ..... (Position) .....

Company .....

Street .....

City & State .....

be piped in parallel. Because of the compact design, these pumps are particularly adaptable to most applications where space is at a premium. They are designed for continuous operation and will maintain a given flow rate continuously, delivering full rated output at maximum rated pressure. Volumetric efficiency throughout the full range is over 90%.

## *Electric Marker* QC 617

The New Ideal electric marker is 6" long, weighs 10 oz., and can deliver 30% more power than previous models—yet an adjusting nut makes it possible to vary the impact so that it can be used to mark glass. The new marker operates like a small electric hammer from any AC outlet, making 7,200 cutting strokes per minute, and marking the surface with lines that cannot be wiped away or worn off with ordinary usage. It is

available with either a diamond or hardened alloy point and can be used to mark such varied materials as steel, wood, ceramics, and plastics.

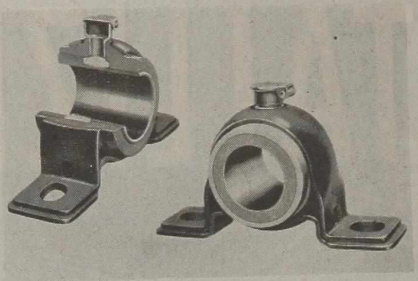
## *Bearing* QC 618

A new low priced bronze bushed bearing for small shafts especially adapted for fan and blower service, known as the Type "F" Bronzoil bearing, has been announced by the Dodge Manufacturing Corp.

This bearing is fully self-aligning. The inner housing is spherical to conform to a spherical socket in the formed steel outer housing which permits free self-alignment and avoids cramping the shaft.

For lubrication a liberal oil reservoir with a close fitting wick surrounds the bronze capillary bushing which carries about one-third of its volume of lubricant, and supplies the required amount of oil as needed.

The formed steel base is sprung slightly when hold-down bolts are tightened insuring proper pressure between inner and outer housing. This permits free self-alignment while maintaining the inner housing in its correct position. The feet of the base are flat and will not collapse under the heaviest pull exerted by the hold-down bolts.



Sound isolation can be provided by use of neoprene oil resistant grommets.

## *Running Time Recorder* QC 619

A new instrument for recording machine running-time has been developed by The Bristol Co. for checking machine performance. The instrument records the operating or "on" time of production machinery and other similar equipment. The chart record gives the total "on" time in hours, minutes, and seconds for a given period. "Off" periods are also shown on the chart as well as the time at which they occurred.

The running-time readings are magnified in such a way that the total operating time of a machine can be easily and accurately determined.

## *Trigger for Fire Extinguishers* QC 620

The trigger control used on the smaller sizes of Kidde carbon dioxide fire extinguishers has now been extended to the larger portable models. Operated entirely with one hand, the extinguisher is controlled by an upward pull of the index finger, the largest extinguisher requiring approximately the same trigger force as the smallest. It can be latched open by a slight forward motion.

This new control represents the perfection of a valve which was developed to


provide an on-and-off control of discharge with a minimum of effort; to permit a high rate of flow of the carbon dioxide, avoiding directional changes in its passage insofar as possible; to allow easy locking-open with one hand; and to incorporate these features in a small, compact part, relatively light in weight and simple in design.

The one-piece handle closure protects the valve itself, is light in weight and fits the hand comfortably. Other improved features of the extinguisher as a whole are the permanent bushing and removable siphon tube, which allow inspection, periodic hydrostatic testing and, when necessary, replacement of any part, without devalving.

The locking pin fits into a blind hole so that there is no possibility of its getting bent and jamming, and the seal wire is placed where it is least likely to be broken, and most easily observed.

The extinguisher is carried and operated with one hand, leaving the other free at all times to manipulate the discharge nozzle.

## *Safety Pump* QC 621

A new plastic hand operated suction pump has been announced by The Alden Speare's Sons Co.

It is designed primarily for handling acid and can be attached to carboys with

a capacity of 5 to 13 gallons. It will stand constant immersion in practically all grades and kinds of commercial acids and is quickly and easily installed, eliminating the hazard of juggling heavy carboys.

As the plastic is unaffected by alcohols, oils or water, it can also be used for the transfer of other liquids where a metal pump would cause undesirable contamination.

## *"Karbate" Couplings* QC 622

The National Carbon Company has now perfected four new Karbate pipe connections for use in the chemical and process industries.

Type FC is a flexible coupling particularly suited to field installations or any pipe run connecting one phase of the process with another, as it eliminates the use of cements in joining lengths of pipe. The FC coupling permits sufficient pipe movement to meet all conditions encountered in the average plant.

Type V flanged connections offer all the advantages of the Van Stone type

# TRIGGER-FINGER CONTROL

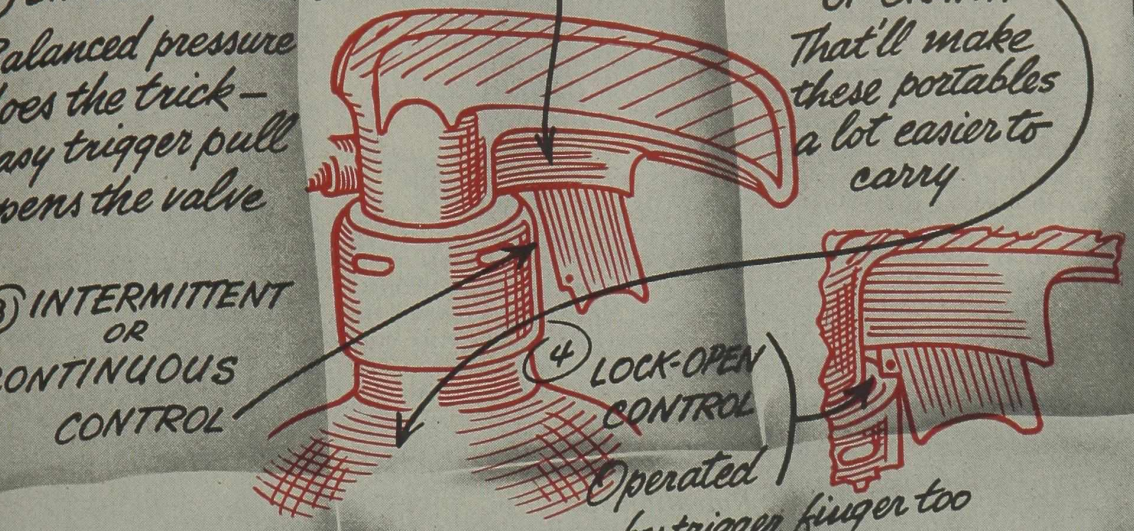
(For 10, 15 and 20-lb. Fire Extinguishers)

(1) SINGLE-FINGER OPERATION
Balanced pressure does the trick — Easy trigger pull opens the valve

(2) LOW CENTER OF GRAVITY
That'll make these portables a lot easier to carry

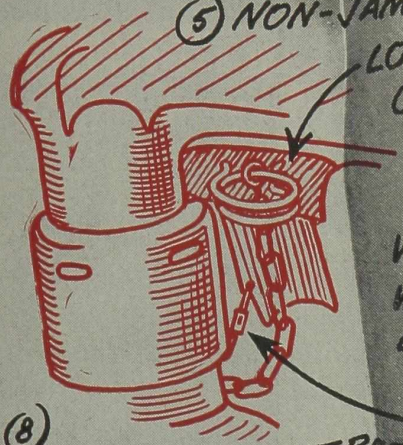
(3) INTERMITTENT OR CONTINUOUS CONTROL

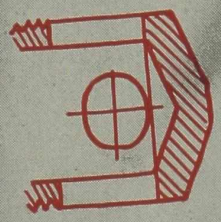
(4) LOCK-OPEN CONTROL
Operated by trigger finger too



(5) NON-JAMMING LOCKING-PIN
Can't get bent over

(6) VISIBLE SEAL WIRE makes inspection easy





(7) IMPROVED RECOIL OUTLET

(8) RECHARGING WITHOUT REPLACEMENT PARTS
Simplifies putting extinguisher back in working condition after use.

(9) HYDROSTATIC TEST WHEN NECESSARY — without devalving

SAFE - FOOLPROOF - SIMPLE - STREAMLINED - A Novice can operate!

10-, 15-, and 20-pound extinguishers with this new valve will be ready for delivery October 1st. Place your order now.

*The word "Kidde" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc.*

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of flanges. Thickness and sturdiness of the small diameter collars provide a construction which may be used with companion flanges of almost any design or material. Separate cast iron split flanges permit easy pipe alignment and installation.

Type V nozzles and Type SC slotted couplers now available are usually factory-installed, and are particularly recommended for use on tanks, towers, heat exchangers and similar equipment.

## *Emergency Alarm* QC 623

A new safety emergency alarm feature that protects process equipment and materials has been added by the Brown Instrument Co. to its line of electronic air-operated controllers.

The new feature, known as the Brown Electronic Contact Controller, provides safety alarm principles that operate automatically as well as adding an on-off control to the air control for the actuation of such control devices as motorized valves and solenoid valves.

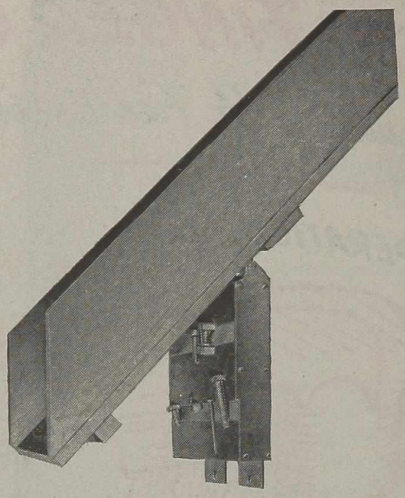
As shown in the accompanying picture of the contact controller, contacts (A) and (B) are made or broken by the action


of cam (C) and roller (D), and the spring loaded lever to which it is attached. The control point is set by loosening the knurled knob (E) and rotating cam (C), so that its notch corresponds to the position of the temperature pen that has been previously moved to the desired point. The pen position sounds the emergency alarm. A red pointer on the scale, not shown in the picture, indicates the temperature setting of the contact controller.

## *Permanent Spout Magnet* QC 624

A new Alnico spout magnet for separating tramp iron from wet or dry material from chutes has been announced by the Dings Magnetic Separator Co. The magnet is available in both single and double gap design. Iron particles catch below a step in the magnet face where they will not be knocked off by the flow of material down the chute and when the flow is stopped, the magnet opens on hinges for removal of iron.

The non-electric feature of the magnet

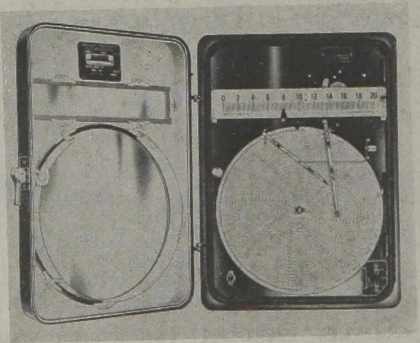


eliminates the need for wiring and the possibility of fire or explosion and is approved by the Mill Mutual Fire Prevention Bureau. Non-magnetic metal spout extensions are available where the magnet is to be used on metal chutes. These magnets are made in both Class A and B sizes and for spout widths of six inches or over.

## *Potentiometer Controller* QC 625

A new series of electric-type potentiometer controllers has been announced by the Bristol Co. Five basic control unit types are available. Three are electric contact types to be known as the Microact controllers and the other two are electric proportioning and current input types. The control units are mounted on the internal panel of the Bristol Pyromaster potentiometer recorder and any type may be readily converted to any other type by following simple wiring and mounting instructions.

The three Microact units are provided with one, two, and three precision-type toggle switches respectively and six different terminal board connection arrange-



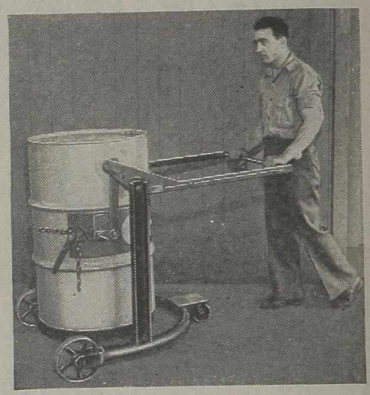
ments to meet a wide assortment of control circuit requirements.

Proportioning controllers may be used with any type of electric proportioning valve and may be obtained with resetting contacts. The proportional current input controller is primarily designed to provide close temperature control of electric furnaces and ovens.

## *Drum Handling* QC 626

The new Falstrom "Barrel-lift" can raise a loaded drum off the floor, transport the drum, tilt it to dispense the contents, and it may be rotated when thorough mixing prior to pouring is desired. Drums placed in the Falstrom "Barrel-lift" are maintained in a balanced position and little effort is required for any of these operations.

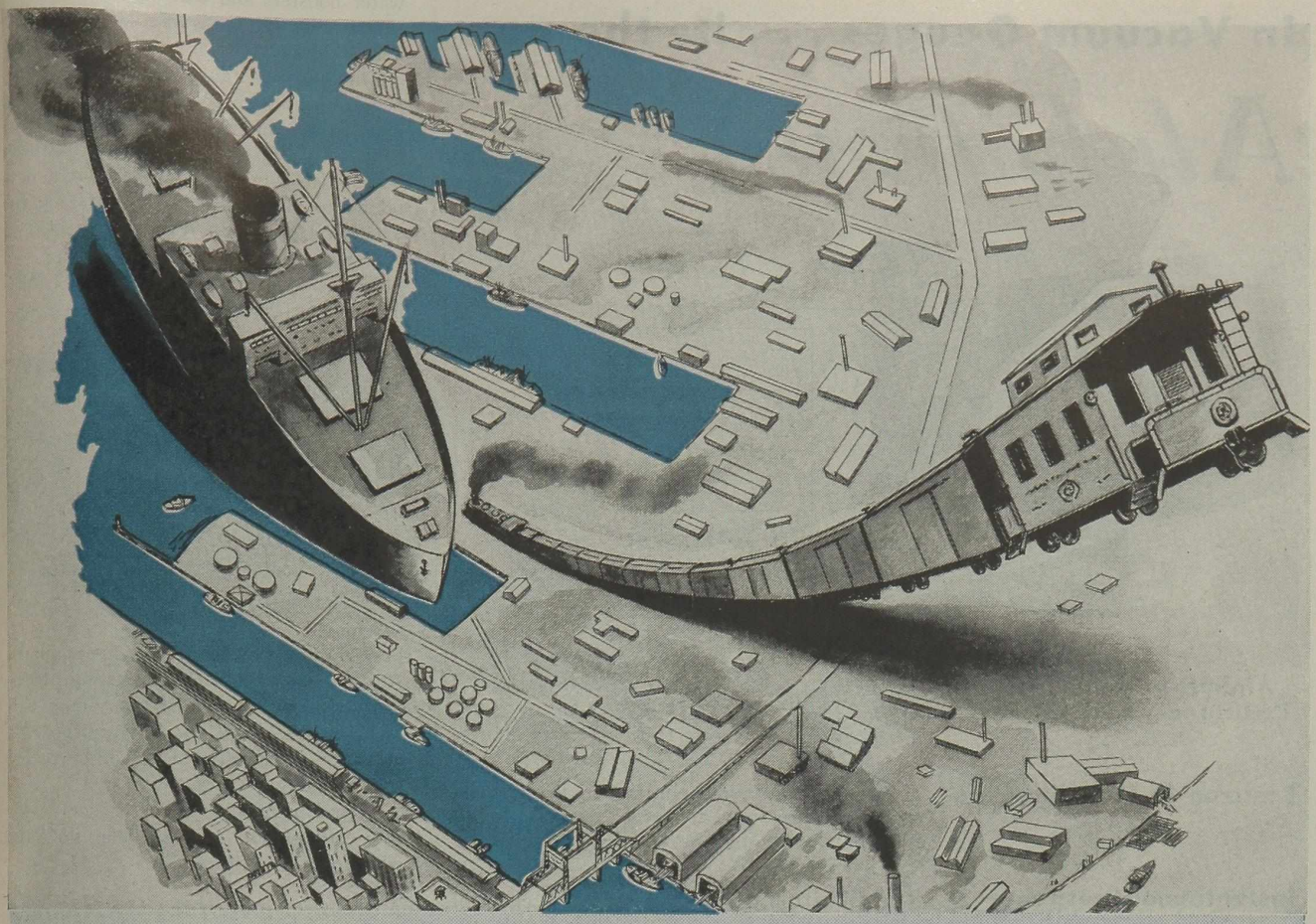
The pick-up is simple with a safety-locked chain arrangement encircling the drum. Self locking safety stops provide finger tip safety control. The mechanical linkage of the lifter is adjustable to give several degrees of leverage permitting the handling of drums up to 1000 lbs. gross



weight. Saddle tilt locks hold open head drums in a vertical position during transport which effectively prevents tipping and spilling of contents. Drums may also be locked in tilted position. Use of this "Barrel-lift" enables drums to be handled by one operator. The unit is heavy duty, all-steel welded construction. Shipping weight is 113 lbs. This "Barrel-lift" is a product of the Falstrom Co.

## *Pumps* QC 627

An improved and augmented line of Type "SHB" horizontal centrifugal pumps is now being marketed by Yeomans Brothers Co. for general service. They are designed as circulating pumps,



# Rails Meet Tidewater to Provide Exceptional Shipping Facilities for Your Plant in TACOMA

## Four Railroads—plus a Municipal Belt Line

• Four transcontinental railroads meet tidewater in Tacoma — Northern Pacific, Great Northern, Union Pacific and the Chicago, Milwaukee, St. Paul and Pacific. The Tacoma Municipal Belt Line — operating between all railroads, marine terminals and the principal industrial district—provides free switching service on line-haul traffic. The city is served by 53 motor freight lines operating to all parts of the country.

## Locate Here—on an Excellent Harbor

• Commodities may be water-shipped from Tacoma to East Coast ports cheaper than shipping by rail from many mid-western points. On Tacoma's fine sheltered harbor are modern public and private terminals providing both open pier and transit shed installations. In normal times, some 40 steamship lines, plying to all parts of the world, make Tacoma a regular port of call. Large industrial sites, near deep water, are for sale at low prices by the Port of Tacoma Industrial district.

## Check Tacoma's Many Other Advantages, Too

• Lowest power rates—pure water—nearby raw materials —favorable taxes—ideal climate for year-round production. These are just a few of the features Tacoma offers. Because this modern industrial city is already center of the electro chemical and metallurgical industry on the Pacific Coast, a ready supply of basic processed materials is available here—a "pool" of skilled workers as well! Check these advantages. And remember there may be others of importance to your particular operation. For further information on any point, write or wire: The Tacoma Chamber of Commerce, Tacoma 1, Washington.

**Locate Your Plant in**

**Tacoma**

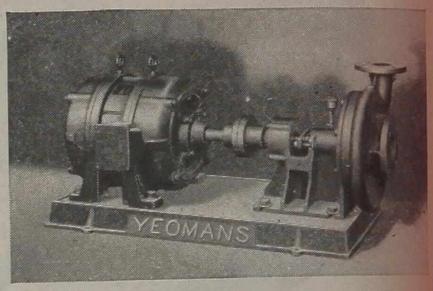
**WASHINGTON**

**Home of the Nation's Lowest Power Rates!**

water boosters and will handle high temperature liquids, foodstuffs and many acids and alkalis.

The previous range up to 125 gallons per minute has been increased to a 1000 g.p.m. maximum. Heads have been raised from 40 to 250 ft. This increase has been accomplished by the addition of nine new pumps to the line for a total of 13 units. The available speeds range from 1450 to 3500 r.p.m.

New pumps in this expanded "SHB" line have suction and discharge connec-

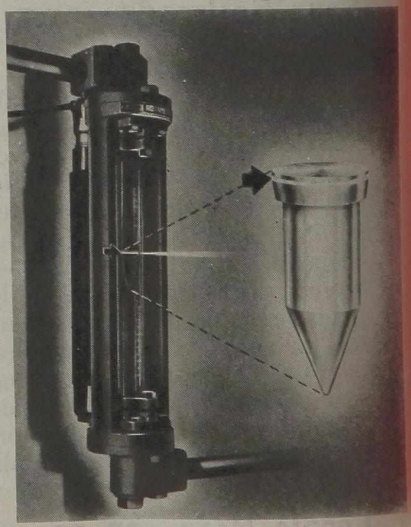



tions up to six inches. They are equipped with a renewable self-lubricating sleeve bearing in addition to a heavy-duty ball thrust bearing and can be furnished for operation by electric motor or by pulley and sheave.

Bronze impellers or all-bronze water end construction are available for uses where the alloy is needed.

### *Rotameter Rotor* QC 628

The new patented Schutte & Koerting Line-o-Light rotor is especially well suited for sharp, clear Rotameter readings of opaque liquids. It has the same basic design as a standard SK rotor with a disc of light-transmitting material sandwiched in the rotor head which substantially reduces the distance that the light must travel through the opaque liquid

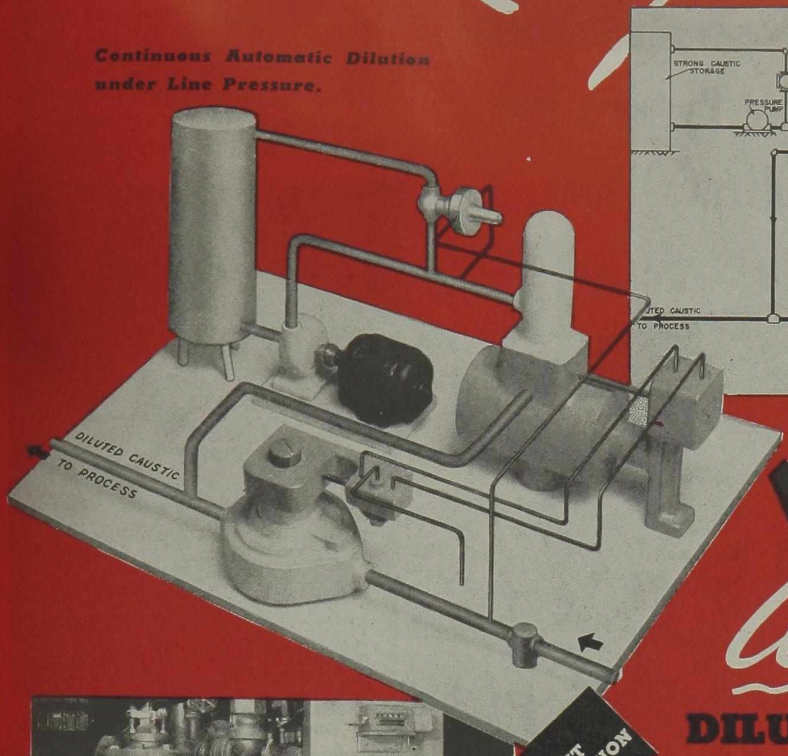


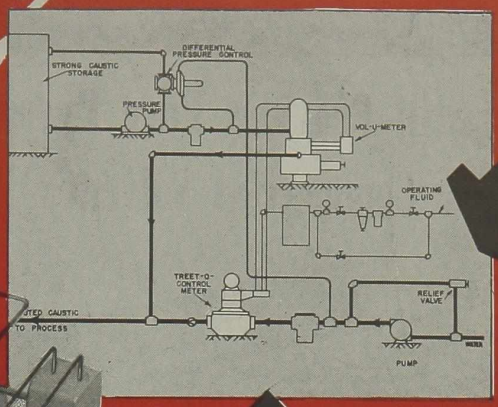
from its source behind the tube. The rate-of-flow is thus delineated sharply in the resultant band of light on the tube reference scale and operators can make easy, accurate readings.

This Line-o-Light rotor can be used for practically any application and in

# A Working PRINCIPLE

**Continuous Automatic Dilution under Line Pressure.**

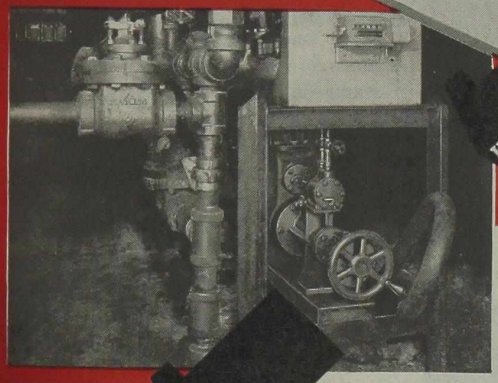



FLOW DIAGRAM

SCALE MODEL

PLANT INSTALLATION



## FOR *Continuous* DILUTION OF REAGENTS TO ANY FINAL CONCENTRATION

*Continuous* AUTOMATIC DILUTION WILL WORK FOR *You*

For manufacturers who plan to beat postwar competition, the economy of operation and uniformity of end product resulting from "streamlined" production methods cannot be overlooked. The trend is already underway and many plants today are converting from batch tank measurements, relieving the operator from an excessive burden of responsibility. By using a tried and proven %Proportioneers% system, you eliminate guesswork, speed production, safeguard your investment in raw materials, maintain accurate control over end product.

***Ask for Bulletin 1700***

# % PROPORTIONEERS, INC. %

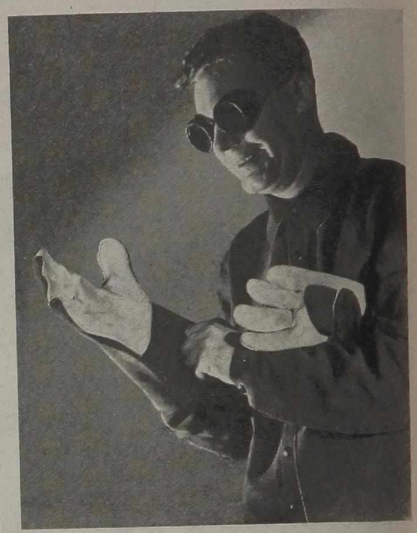
WRITE TO % PROPORTIONEERS, INC.%, 10 CODDING ST., PROVIDENCE 1, RHODE ISLAND

any type tapered glass tube rotameter. Two types of discs can be furnished: Lucite for general applications and Pyrex glass for extremely hot or highly corrosive fluids.

### *Safety Glove* QC 629

A new safety glove made from high grade chrome-tanned cowhide is announced by the American Optical Company. Designed for welding, the new glove can also be worn for hand protection in other heavy-duty operations.

The principal feature of the new glove

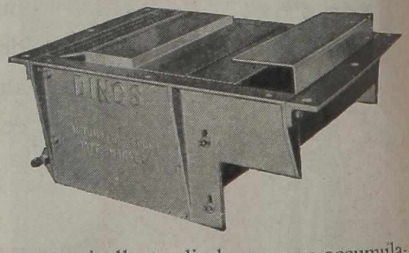


is its one-piece back construction. Because of this construction there are no seams on the back of the glove to catch sparks or molten metal.

### *Safety Gate for Spout Magnet* QC 630

The safety gate of a new electro-magnet for chutes of the Dings Magnetic Separator Co. is designed to do double duty in the protection of machinery and material from tramp iron.

Particles of iron are attracted to a step in the face of the double gap high intensity magnet so as not to be knocked off by the flow of material. When material and current are shut off, the safety gate rises




automatically to discharge any accumulation of iron.

If the current is interrupted while the material is still flowing, the entire burden is automatically discharged through the safety gate until the flow can be shut off and current restored. Freedom from damaged machinery, explosions, fires and contaminated material is claimed.

# "This powder cures any disease!"

"COUNT PALMA'S POWDER"— magnesium carbonate— was sold as a secret panacea all over Europe during the eighteenth century.

Because the sale of this powder proved so lucrative, chemists everywhere tried to duplicate it. They not only succeeded in discovering its composition, but their experiments helped clear up much of the mystery regarding the true nature of magnesium.

Prior to this research, magnesium had been confused with other metals. The alchemists mentioned "magnesia" but the name seems to have been a very elastic one with them. In Pomet's "History of Drugs," published in 1712, "magnesia" meant manganese. It was not until the studies of Davy and Bussy in the nineteenth century that magnesium was clearly defined as a separate element.

Magnesium burns brilliantly when heated in air or oxygen, or even in carbon dioxide, emitting a brilliant white light. This light is rich in ultra-violet rays and consequently is highly useful in photography.

For more than three-quarters of a century, MALLINCKRODT has specialized in the development and production of magnesium compounds to be used in medicine and industry. For magnesium products of dependable uniformity and purity, **specify MALLINCKRODT Magnesium Acetate, Bromide, Chloride, Carbonate, Hydroxide, Phosphate, Stearate, Sulfate, Trisilicate, etc.**

**MALLINCKRODT** FINE CHEMICALS Mallinckrodt SINCE 1867 **CHEMICAL WORKS**

FOR VICTORY BUY UNITED STATES WAR BONDS STAMPS

*78 Years of Service to Chemical Users*

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# PACKAGING & SHIPPING

*by T. PAT CALLAHAN*

## *Glued Unit Loading*

The gluing of pallet loads of corrugated or solid fiber shipping containers, developed recently by the Army Quartermaster Corps and Materials Handling Section, Bureau of Supplies and Accounts of the Navy Department in collaboration with National Adhesives, has now been adapted to wooden boxes.

*T. Pat Callahan*

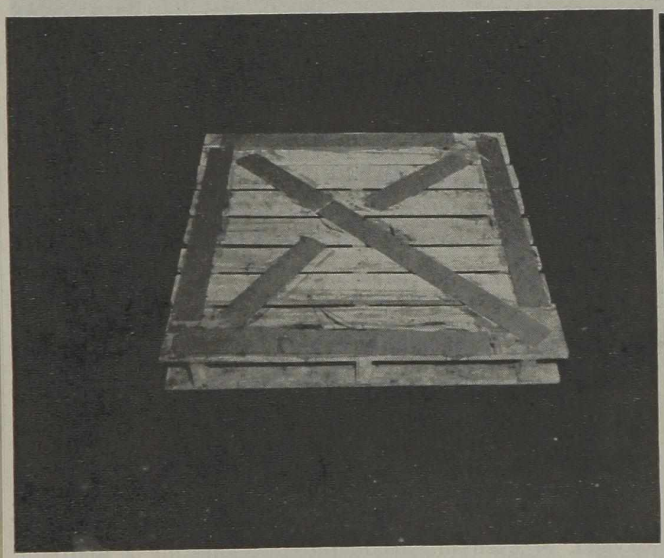
As the result, the savings in man hours, scarce steel strapping and in some instances, in containers themselves, can now be realized by those shipping in wood. While the gluing procedure differs somewhat, National's Pallet Adhesive No. 4 is satisfactory for both types of containers and appropriate specifications will be published shortly.

The method found most satisfactory for unit loading wooden boxes requires that strips of ordinary 60 point chipboard 4 inches in width be glued both sides and placed in this pattern—

—both on the pallet base and between each succeeding layer of boxes comprising the load. Thus, the glued strip forms the perimeter of the pallet and each layer of boxes thereon and forms an X within the border design.

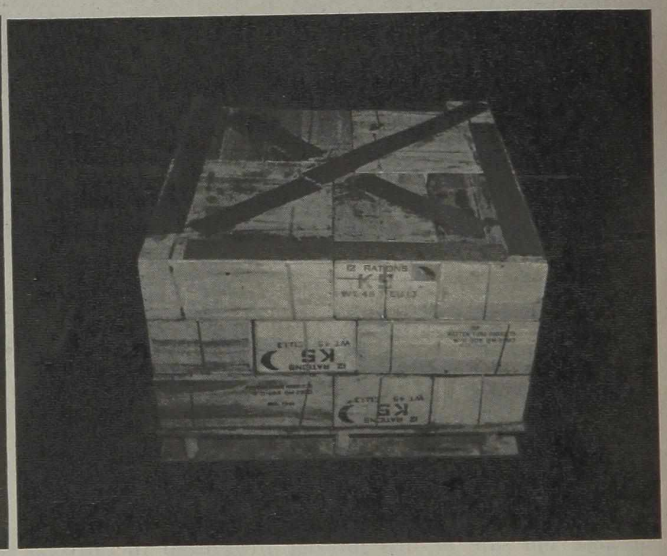
The chipboard acts as a cushion . . . absorbing much of the shock to which such loads (unstrapped) are subjected in domestic handling and shipping. Further, it ensures contact between the layers of boxes despite any unevenness of the mating surfaces. Severe angle drop tests of unit loads each weighing over a ton were conducted by the Naval Supply Operational Training Center at the Naval Supply Depot, Bayonne, New Jersey. These tests prove the ability of the load to withstand destructive forces and stresses of car loading and cross country hauling, and to safeguard amply against the side-slipping of individual units comprising the glued load. In fact, all ultimate failures, in tests carried to non-commercial extremes, were of the chipboard strips which parted in about the middle—leaving close to 30 points of board firmly adhered to each wooden surface.

The advantages of glued unit loading



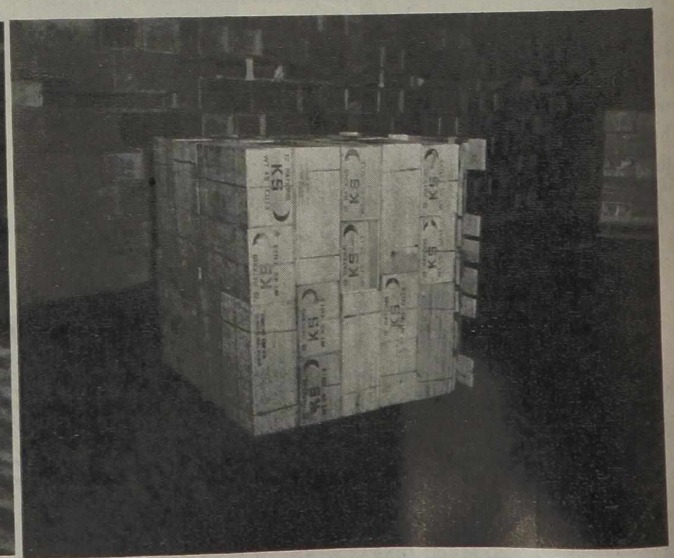
*Official U. S. Navy Photos (BuS and A—NSOTC)*

*Suggested method of placing chipboard strips on pallets*



*Suggested placement between courses of wooden boxes*

*Unit load undergoing drop tests*



*Unit load following three drop tests and a tip-over test*

# How can 16 POUNDS of MULTIWALLS CARRY A TON OR MORE OF MATERIALS?


The average 100-lb.-capacity Multiwall Paper Bag is only 8/10 of a pound in weight. Only 16 lbs. of Multiwall bags, therefore, are required to *carry and protect a full ton of material.*

These figures hold an important story of Multiwall packaging efficiency and economy. They also indicate the strength and toughness of the paper of these bags. This paper is made according to exacting specifications and must pass exhaustive tests concerning strength, flexibility, and moisture resistance.

Multiwall design is another reason for Multiwall stamina and efficiency. Bags are constructed of several plies made in tube form so that each bears its share of the burden.

### ADDITIONAL MULTIWALL ECONOMIES

Multiwall Paper Bags are tight and sift-proof. They help keep storerooms tidy. And, because materials do not readily cling to their smooth interior walls, they empty quickly and cleanly . . . cut retention losses to a minimum.

St. Regis bag filling machines and methods offer still another worthwhile economy. Results have shown that these machines definitely speed filling operations, reduce labor and equipment costs, and release manpower for other jobs.

To find out how Multiwall Bags and bag-filling systems can be advantageously applied to your business, write or call your nearest St. Regis office TODAY.

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, Texas Denver, Colo. No. Kansas City, Mo. Los Angeles, Calif.
New Orleans, La. Franklin, Va. Seattle, Wash. Nazareth, Pa. Toledo, Ohio

vary somewhat depending upon individual circumstances.

## *Materials Handling Guide Offered*

A new "Materials Handling Analysis Guide" has just been published by Towmotor Corporation, manufacturer of power lift trucks and industrial tractors. It is being offered free to anyone interested in locating and analyzing handling


problems in factories, terminals and warehouses. It is believed to be the first booklet any manufacturer has published on this important but little understood subject.

## *Pressure Carboy 1D*

A new specification was adopted by the Interstate Commerce Commission; namely, I. C. C. Spec. 1D, boxed glass carboys. This specification, ICC 1D, developed by the Glass and Wood Packages Committee of the Manufacturing Chemists' Association, marks the first time that any glass carboy has been permitted by the Interstate Commerce Commission for the shipment of regulatory acids in a bottle which is constructed to withstand accumulated pressures.

We are quoting specification 1D in full, as it will be noted that there are a great many exceptions to the standard ICC 1A specification, and that this is an entirely distinct departure from the current practice in shipping certain acids.

### *"Specification 1D*
### *Boxed Glass Carboys*

#### *General*

Containers must comply with Specification 1A except as follows (paragraph references are to Specification 1A):

3. Closure:

(a) Threaded screw cap which shall be constructed of a suitable plastic or other material resistant to lading.

(b) Gasket or lining for cap must be used and shall be resistant to lading and

(1) Must be liquid tight or

(2) Must be liquid tight up to venting pres-

# "He says he likes them seamless"

WE'RE in no mood for arguments with the hosiery trade. All we know is that the Crowntainer, a seamless can, made a hit the moment we put it on the market.

The Crowntainer is actually a steel bottle. It is far stronger than ordinary cans. And because of its shape and type of construction, its uses are innumerable.

The Crowntainer is further proof of "cangenuity"—Crown's ability to combine ingenuity with can-making skill and experience. This ability is a source of profit for you. Nor is it limited to the production of new kinds of containers; it has many applications of benefit to can users. If you wish a sample, just tell us your problem.

CROWN CAN

INDEPENDENT AND HELPFUL

CROWN CAN COMPANY • NEW YORK • PHILADELPHIA • Division of Crown Cork and Seal Company, Baltimore, Maryland

sure when such venting is prescribed for the material which is to be shipped.

(c) At least one complete continuous thread must be engaged with gasket in place.

Manufacture

4. Capacity and marking of carboy:

(a) 6.5 U. S. gallons nominal capacity, 7.0 U. S. gallons overflow, tolerance plus or minus 10 fluid ounces.

(b) Marking:—Each carboy bottle must be permanently marked in bottom as follows:

Maker's mark (to be registered with Bureau of Explosives)
Year of Manufacture
ICC-1D

5. Glass carboy bottle:—Must be machine blown, thoroughly and properly annealed, with screw thread finish having at least one continuous thread to accommodate closure; top of lip smooth and even; must contain 14 pounds of glass, tolerance minus 8 ounces plus 16 ounces. Minimum thickness to be .075 inch. Defective carboys not authorized.

6. Does not apply.

7. (a) Outside Containers: — Wooden boxes completely enclosing body and neck of carboy, with 4 vertical corner posts, two cleats for shoes and two carrying cleats. An opening not exceeding 3 inches in width may be provided directly above the neck of bottle, if the top of the box is made up of not more than two pieces of lumber of 25/32 inch thickness. Bottom board of the two ends of the box must be constructed of lumber at least one inch thick, must be flush with the carrying cleats and be at least 2¾ inches in width. Cleats or other fast used to secure cover must not extend beyond carrying cleats.

(c) Assemble sides and ends with grain of wood horizontal and nail as specified. Nail bottom to sides and ends; fasten top by any efficient means. Cleats for shoes to be along edges of bottom parallel to carrying cleats and at right angle to the direction of bottom board or boards.

(d) Parts and dimensions as follows: (below)

(e) Does not apply.

(f) Does not apply.

*Marking of Outside Container*

8. (a) ICC-1D. This mark shall be understood to certify that the complete package complies with all specification requirements.

9. (g) Bottles shall be capable of withstanding a sustained internal pressure of 20 p.s.i. gauge for a 15-day period. Bottle manufacturer shall demonstrate to Bureau of Explosives that bottles of a proposed design will meet this test prior to start of production.

*Tests*

(h) One bottle selected at random from each 200 produced on each mold shall be subjected to an instantaneous hydrostatic pressure test to bursting. Pressure at which bottle bursts must be not less than 40 p.s.i., 12 additional samples must be selected from the same lot of 200 bottles and tested in the same manner. All 12 samples must pass required test otherwise entire lot shall be rejected.

10. Does not apply."

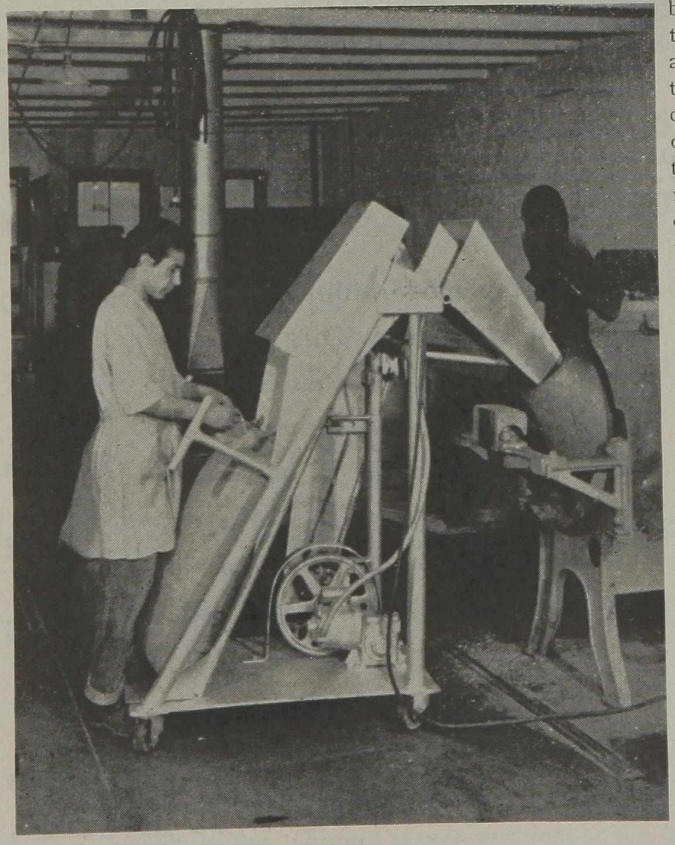
| | *Minimum dimensions* | | | *Nails—sides*[4] *and bottom* | |
|---|---|---|---|---|---|
| *Carboy Capacity, nominal not over Gallons* | *Thickness sides, top, bottom and ends Inch* | *Vertical corner posts Sq. Inches* | *Carrying cleats and shoes Inches* | *Size Penny* | *Spacing*[5] *average Inches* |
| 6.5 | ½[1] | 2.0[2] | ½ x 2¾[3] | 6 | 2 |

[1] Except as prescribed or permitted under par. 7(a).
[2] Note: Cross sectional area.
[3] Other dimensions with equal cross section acceptable. In lieu of separate carrying cleats, side board, at point where cleats should be located, may be constructed of lumber not less than one inch thick so that overhang will be at least ½ inch.
[4] Screws of equal efficiency authorized.
[5] Spacing 6 inches acceptable along edge grain of bottoms.

## *Bag Dumper*

The Ritchie Bag Dumper for lifting and emptying heavy bags has been announced by ASCO Manufacturing Company. Operating on a ¼ horsepower electric motor, the machine will quickly lift and empty bags of grain, nuts, sugar, beans, cement, ore, powdered glue, dry chemicals, or anything in bags up to 350 pounds.

An automatic shut-off switch stops the motor at top and bottom positions of the lift. As an added safety feature, a special clutch arrangement disengages the motor if downward return of chute is obstructed. The upward lift takes ten seconds, with eight seconds to lower.



*Bag Dumper in Operation*

An adjustable height chute at the front fits narrow openings and funnels the bags' contents into a vat or machine without spilling. Two spikes catch and hold the bag while dumping. The chute will handle a bag 24 inches wide.

The Ritchie Bag Dumper is manufactured and sold by ASCO Manufacturing Company, 601 South Anderson Street, Los Angeles 23, California.


*We can't blame Adolph for calling us crazy. It was April 8, 1942... and the headline on Adolph's morning paper read "U. S. SENATE SEES 700,000-TON SYNTHETIC RUBBER PRODUCTION BY '44." You see, even after years of manufacturing, his own synthetic industry had never produced more than 110,000 tons per year... and it had taken years to equip the armies that were rolling through Europe and North Africa. "700,000 tons! Verrückt, those Americans!"*

But that was 1942... before Adolph found out about free enterprise... or Yankee ingenuity... or good old-fashioned American teamwork.

Our Senators knew what they were talking about, however, they'd seen the chemical plants springing up all over the country. They knew that the chemical, oil and rubber industries were pulling together... exchanging ideas and formulas.

And they knew what most of us didn't ... that for many years our chemists had been quietly working on synthetic rubber, and the results of these experiments were now being pooled... to bring near-perfect manufacturing efficiency to the new synthetic industry.

Let's see what happened: In 1942, only about 40,000 tons of synthetic rubber went out to fight. But by 1944, streamlined processes and new materials had shaved hours from manufacturing time, and made possible the production of more than 800,000 tons of synthetic rubber—an output that required literally scores of chemicals in unprecedented quantity.

The chemical industry that has helped work this and many other wartime miracles will continue to provide new and even more startling discoveries after peace ... as always, in the interest of greater service to industry and the development of a more comfortable way of life.

☆ ☆ ☆

*Special Multiwall paper shipping sacks, many made by Bemis, are the principal containers used by this great new industry for its product.*

*Bemis makes bags of almost limitless types and sizes for literally hundreds of different uses and new uses are developing daily. Remember, almost everything you eat, use or wear may make at least part of its trip to you in a Bemis Bag.*

# PLANT OPERATIONS NOTEBOOK

## *Quantity of Coal In Loose Piles*

In the open, coal is usually stored in conical piles. If it is bituminous coal the tonnage in a pile can be estimated by multiplying the cube of the diameter, in feet, of the pile at its base by 0.00248. For anthracite coal the factor is 0.00172.

Coal is also stored in elongated piles and upon examination it will generally be noted that the pile can be divided into three parts. The two curved-end portions when added together can be considered as a simple cone and the weight calculated by the method noted in the preceding paragraph. The central portion has a triangular section from end to end and its volume is one-half the volume of a rectangular block with the same base and height. The length of the triangular section may be estimated by subtracting the width of the base of the pile from its length.

To determine the weight in an elongated pile the width of the base is squared and multiplied by the length of the triangular section and multiplied by the factor 0.00474 to obtain the number of tons. This value is added to the number of tons in the two curved ends to get the total tons in the pile. The corresponding factor for anthracite coal is 0.0033.

All measurements for use with the above factors must be in feet and the rules are based on the fact that one ton of coal will generally occupy approximately 38 cubic feet whether anthracite or bituminous. The difference in the factor is due to the fact that the natural cone for anthracite is 0.25 times as high as the diameter of its base, while the factor for bituminous coal has been found to be approximately 0.36.

## *New Idea in Safety Posters*


*"Jumbo" safety posters of the humorous type pictured above have replaced the usual no-accident safety scoreboard at the East Alton plant of the Western Cartridge Company.*

## *Protection from Flammable Solvent Fire Hazards*

Every year, flammable solvents, such as gasoline, naphtha, benzene, and acetone, cause fires and explosions that kill or injure hundreds of persons and destroy property worth millions of dollars and to ensure safety, adequate protection from these hazards must be provided.

Even when used in small quantities, flammable solvents require careful handling. According to the Safety Research Institute they should be kept in approved safety cans and used only where there is no danger of ignition from flames, sparks, or high temperatures due to fire or friction. Smoking in the area of application should be prohibited.

Where large quantities of flammable solvents are used, further protective measures are necessary.

For the prevention of disastrous explosions, the concentration of solvent vapor in the atmosphere must be kept below the lower explosive limit by using equipment that minimizes the escape of vapor into the air and by supplying a sufficient amount of fresh air for removal of that which escapes by means of adequate natural or mechanical ventilation. In practice, the vapor content of the workroom air should be kept below the "maximum allowable concentration for continuous exposure," providing basic protection from toxicity and explosion.

Good general ventilation, however, does not eliminate the localized fire hazards created by volatile flammable solvents. Special precautions must be taken to prevent the ignition of spills, creeping vapors, which may travel 100 feet or more from the point of origin, vapors collected in low places, such as pits or basements, and the explosive vapor-air mixtures that remain in emptied solvent containers.

A further removal of all possible sources of ignition is provided by use of enclosed explosion-proof electrical equipment, installed in accordance with the National Electrical Code and use of non-sparking bronze tools for the workers.

Flammable solvents should be stored and handled in equipment installed in accordance with the standards of the National Fire Protection Association.

solvents, an ample number of portable fire extinguishers, bearing the approval of the Underwriters' or Factory Mutual Laboratories, should be provided. Types suitable for use on fires in flammable liquids include foam, vaporizing liquid, carbon dioxide, loaded stream, and dry powder. In addition, equipment presenting special fire hazards, such as open tanks containing solvents, may require individual protection with built-in fire-extinguishing systems.

## *Plant Intercom Aids Inspection*

Certain departments at the B. F. Goodrich plant in Akron, Ohio, have been using plant intercom to speed up production and cut down rejects for over a year and a half. In operation the inspector, who is seated before a microphone, reaches up and pulls a lever to reach the ear of the worker at his place of work. By talking to him immediately a deficiency that is occurring in a certain operation can be stopped before the error is repeated and thus prevent its continuation. The set up is such that it is also possible for the workman to press the appropriate button and talk to the inspector, using a microphone that picks up speech as far as fifty feet away.

This device is credited with the saving of valuable time, labor, money and speeding up production of various critical items used in Army bombers. This idea was originated by Frank E. Trockle of the Miller Rubber Division of B. F. Goodrich. The two systems now in use were designed by the Electronic Engineering Co.

## *Hazardous Chemicals*

The Division of Labor Standards in the United States Department of Labor in cooperation with the Manufacturing Chemists Association has inaugurated a new series of bulletins on "Controlling Chemical Hazards." These bulletins, designed for use by all concerned with safety practices, describes the hazards of the chemical, its characteristics, safety precautions for installation, handling and storage, protective clothing, permissible and hazardous concentrations, and first aid treatment. A bibliography is also included and the technical accuracy of each bulletin has been checked through the Manufacturing Chemists Association.

The first of these bulletins, "Ammonia," is now available and it is expected that eventually over 100 will be published. Supplies of up to 25 copies will be distributed without charge upon request by the Division of Labor Standards, as long as the free supply lasts. Larger orders may be obtained for 5¢ a copy from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

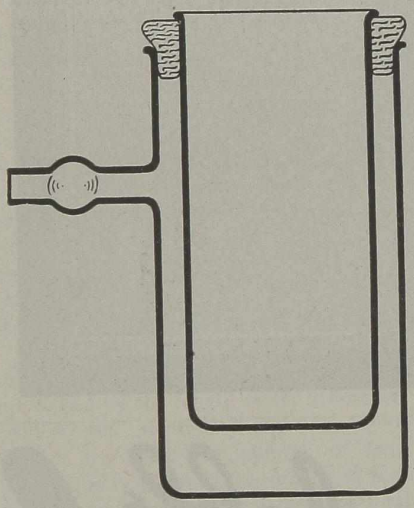
# LABORATORY NOTEBOOK

## *Sublimation Apparatus*

Sublimation is the best method for purifying a large number of compounds. It is simple and quick, and as a rule yields a pure product with practically no loss of material.

The only kind of apparatus which can be purchased for this purpose consists of two narrow tubes, which permit the sublimation of small quantities only.

The apparatus illustrated can be built easily in various sizes and permits the



sublimation of larger quantities. Twenty-five grams of crude 2-methyl-1-1,4-naphthoquinone can be sublimed in a 3″ wide beaker in eight hours, yielding a pure and stable product. It consists of two thick-walled Berzelius beakers, a rubber ring, and a side-arm which is attached to the larger beaker. A side-arm with a stop-cock is preferable. The ring may be drilled out of a block of rubber, or an inverted rubber stopper with a hole is equally satisfactory. If it is not convenient to attach a side-arm, use a smaller inner beaker and a larger rubber ring, bore a hole and insert a glass tube for evacuation. The distance between the bottoms of the two beakers can be adjusted easily by the size of the rubber ring. A gummed tape is fixed around the edge of the outer beaker in order to strengthen it. The thick-walled beakers, even with flat bottoms, stand up under a high vacuum.

As the rate of sublimation increases with the surface, the material should be well pulverized and put into the outer beaker in a thin layer. The wide-mouthed inner container permits the use of more efficient cooling material than running water. For ordinary purposes ice water is satisfactory, but dry ice and freezing mixtures can be employed if necessary.

After the unit is evacuated it is slightly immersed in an oil-bath which is gradually heated to a temperature at which the rate of sublimation is satisfactory. If the sublimed crystals have a tendency to drop off easily, a sheet of glass-cloth can be placed over the product to be sublimed. The flat bottom has the advantage that the sublimate can be scraped off easily.

The apparatus can also be used as a molecular still if the distillate can be frozen.—A. A. Recsei.

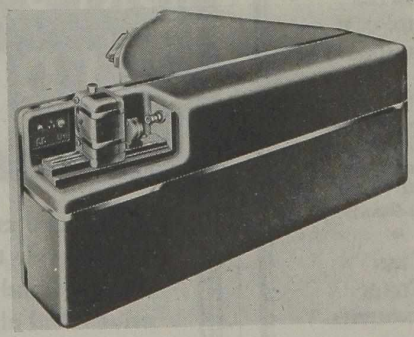
## *Two Meter Spectrograph*

A new two meter grating spectrograph designed for the analysis of highly alloyed ferrous metals and other materials containing complex spectra, as well as for general research work, has just been announced by A. R. L. Dietert.

Capable of identifying 72 elements, the new Spectrograph may be used for identification, sorting, and miscellaneous or research applications, as well as routine or research quantitative analysis.

A high-dispersion yet compact instrument was achieved through the use of super-fine gratings with a large number of ruled lines per inch. Two kinds of original gratings are available. One grating has 36,600 lines per inch or 91,500 total lines. This grating produces a dispersion of 3.40A per mm. in the first order and 1.70A in the second order. The spectrum available for photography in the first order is 2100-7000A and 1850-3500 in the second order.

The second grating has 24,400 lines per inch, totaling 61,000 lines. This gives a dispersion of 5.2A per mm. in the first



order and 2.6A per mm. in the second order: The spectrum that may be covered in the first order is 1850 to 9200A and 1850 to 4500 in the second order.

The new two meter spectrograph can be supplied with either of the two gratings described. Both gratings may also be furnished, in which case, one or the other may be brought into use by a small angular shift of the incident beam from one grating to the other.

A 24 inch movable camera provides a 20 inch spectrogram on a 35 mm. spectrum film. The camera is movable on a radius arm allowing instantaneous photography in the regions from 1850-9200 Angstroms. This makes for a very versatile operating unit. This allows positioning along the Rowland circle so that any 20 inch portion of the total 60 inch spectrum may be photographed at one time.

Controls and camera are located at the same end of the instrument. A single control panel governs shutter timing, camera and aperture racking and grating door opening.

The outside dimensions of the spectrograph are 8 feet 9 inches by 6 feet 6 inches.

## *Plastic Loupe*

A new plastic Berger loupe, exceptionally useful in occupations involving eye-tiring close work, is announced by the American Optical Company.

Unlike previous models made with heavy, uncomfortable metal frames, the

new loupe possesses a light-weight plastic frame which is held securely and comfortably before the eyes by an adjustable elastic headband.

## *Microfiltration Apparatus*

A small filter-funnel and receiver has been described by A. G. Howkins, Glaxo Laboratories, Ltd., Greenford, Middlesex, England. It was designed with the object of avoiding contamination of filtrates by contact with rubber. The principle is very simple and can be extended to larger pieces of apparatus.

A constriction is made near the open end of a small test tube, the mouth of which is then opened out to form a funnel, and a short side arm is sealed on to the tube below the constriction. With the aid of carborundum powder, a porcelain filter-funnel of suitable size is ground to fit the receiver. If care has been taken to make the angle of the receiver mouth identical with that of the funnel, little difficulty should be experienced in obtaining a satisfactory joint, and there should be no necessity to use vacuum grease.

# INDUSTRY'S BOOKSHELF

## *Chemistry of Medicinal Substances*

ORGANIC CHEMISTRY, *by Eldin V. Lynn.* Second Edition, Lea & Febiger, Philadelphia, 1945. 355 pages, $4.50.

THE PURPOSE of this text is to make clear to students of pharmacy and medicine the organic chemistry of medicinal substances. The second edition has been made necessary by revisions of the Pharmacopœia and Formulary and the introduction of many new compounds, such as sulfa drugs, penicillin, and the various barbiturates, into therapy.

The development of the material follows a logical pattern. It starts with the hydrocarbons and progresses through the olefines, oxygen compounds, poly-functional molecules, nitrogen derivatives, derivatives of sulfur and other elements, aromatic compounds, and heterocyclics. There are separate chapters devoted to volatile oils, alkaloids, dyes, glycosides, proteins and enzymes. By illustrating the principles of organic chemistry with compounds which are used in pharmaceutical and medical practice, the necessity for a separate text on fundamental organic chemistry in the chemistry of pharmaceuticals is obviated. The applications to pharmacy and medicine appear in their correct relationship to the general subject.

## *Controlling Household Pests*

HANDBOOK OF PEST CONTROL; THE BEHAVIOR, LIFE HISTORY, AND CONTROL OF HOUSEHOLD PESTS. *Mallis, Arnold.* New York, McNair-Dorland Co., 1945, 554 pp., illus., diagrs. Price $6.00.

THE ENTOMOLOGIST of buildings and grounds department of the University of California in Los Angeles in informal and often humorous style describes the behavior of household pests from roaches to rats, and supplies available information as to their control and destruction. The efficacy, and lack of it, of numerous agents is thoroughly discussed, and the limitations of as recent a preparation as "DDT" are brought out. The book is well illustrated, and not the least valuable feature is a comprehensive bibliography.

## *Popular History Of Penicillin*

YELLOW MAGIC, *J. D. Ratcliff.* Random House, N. Y., 1945; 173 pp., $2.00.

THE STORY of penicillin would be fascinating even if it were told in the dullest factual prose; but when it is told with wit and charm, as it is here, the pleasure of a couple of hours' light reading is multiplied many fold.

The author takes us back, Hollywood fashion, to the London laboratory where Alexander Fleming almost threw out a mold-contaminated *Staphylococcus* culture —but didn't. From that culture, back in 1928, he developed the bactericide which was to revolutionize therapy twelve years hence.

After learning of Fleming's original discoveries, the reader is acquainted with the atmosphere surrounding the general field of chemotherapy — Ehrlich's researches leading to salvarsan and the disappointment attending further explorations; the disillusionment and consequent disrepute in which chemotherapy was held after these experiences; and the renascence of interest, following Domagk's discovery of the precursor of the sulfa drugs, leading to a zealous renewal of pencillin research.

The atmosphere was right for a vigorous attack, and war, with its ever-present infections, tragically spotlighted the urgent need for a miracle drug.

The greater part of the book deals with the extensive clinical testing of penicillin, both in civilian hospitals and on the battlefield; and the phenomenal growth of production facilities under the WPB, with the cooperation of a score of pharmaceutical and chemical companies.

Even though penicillin production has reached the intended goal and its clinical usage established for a host of diseases, the story is not yet finished. In closing the author notes the directions in which its uses are being extended, and in which the techniques of its administration are being improved. Nor is penicillin accepted as the *ne plus ultra* of bactericidal agents. Mentioning the parallel development of gramicidin, streptomycin, and other new drugs, the author says, "In the end it may turn out that the greatest single job that penicillin has done is in refocusing attention on the constant warfare that goes on in nature. . . . Such warfare goes on constantly in the earth, otherwise the earth would be uninhabitable. . . . As it is, the microbes of these diseases are promptly destroyed. By what? When we know the answer to that, disease will be eliminated."

A technical audience might prefer more technical facts and less exclamation points than the author has included; but the casual reader, who is interested chiefly in the background and historical perspective of the dramatic story, will find this book not only adequate, but fully satisfying.

## *Gas Turbine*

THE MODERN GAS TURBINE. *R. T. Sawyer.* Prentice-Hall, Inc., New York, N. Y., 216 pp. Illustrated. $4.00.

THE ANNOUNCEMENT of the construction of the first practical gas turbine (described in the forepart of this issue) in the United States for use as a prime mover makes this concise well-written volume most timely. The book reviews the history of the developmental steps leading to the present turbine from Hero's gas turbine in 130 B.C. to date, and includes a well-written discussion of the fundamentals of gas turbine operation. This is followed by sections dealing with the gas turbine as a prime mover, in industry, in marine service, in railway service, and as an aircraft engine. A final chapter on jet propulsion is appended.

Although there is much on the calculations required in design this volume is definitely not intended for designers. However, it is recommended reading for one who desires an explanation of the principles of gas turbine operation without too much resort to the more complex thermodynamic formulas.

## *Nuclear Chemistry*

FRONTIERS IN CHEMISTRY, VOLUME 3: ADVANCES IN NUCLEAR CHEMISTRY AND THEORETICAL ORGANIC CHEMISTRY. *Edited by Burk, R. E., and Oliver Grummitt.* Interscience Publishers, Inc., New York 1945. 165 pp., diagrs., bibliographies. Price $3.50.

INCLUDES Isotopes and their applications in biochemistry, by Albert S. Kenton; Applications of isotopes in catalytic reactions at surfaces, by Hugh S. Taylor; Techniques in nuclear physics, by H. R. Crane; Resonance and organic chemistry, by Leslie G. S. Brooker, and the hydrogen bond and its significance to chemistry, by W. H. Rodebush.

## *Plastics for Industry*

INDUSTRIAL PLASTICS, *Herbert R. Simonds,* 3d Revised and Enlarged Edition, Pitman Publishing Corp., New York. 396 pp., $5.

THE PLASTICS INDUSTRY is hard to keep up with. Hard, that is, until Mr. Simonds gets out a new issue of his "must" for everyone in the plastics industry. The third edition of "Industrial Plastics" brings up to date the list of top plastics in American industry by including three new materials. The author, who hit the plastics industry by way of steels and their alloys and processes, brings up a new angle of approach—plastics as engineering materials.

## *Other Publications*

GAS ABSTRACTS. Vol. 1, No. 1, which appeared in April, represents a new service of the Institute of Gas Technology to the gas industry. This service would appear to be an attempt to render the same service to the gas industry now rendered the chemcial industry by "Chemical Abstracts" with the exception that patents are not abstracted. An index of the classifications used in the assembly of the journal would be of great assistance. Published by the Institute of Gas Technology, 3300 Federal St., Chicago.

# BOOKLETS & CATALOGS

## *Chemicals*

A822. CALGON. "Calgon Data for the Textile Chemist" titles a 16-page booklet of Calgon Inc.

A823. CARBON BLACK. The properties of Continex SRF are described in two bulletins (44-3 and 45-1) of the Witco Chemical Co.

A824. CHEMICALS. Price list. Heyden Corp.

A825. INSECTICIDES. A 42-page translation of a paper from Helvetica Chimica Acta titled, "The Constitution and Toxic Effect of Botanicals and New Synthetic Insecticides" is available from Geigy Co., Inc.

A826. MERCERIZING ASSISTANTS. The complete series of mercerizer's assistants, B Alkapens, of the Burkart-Schier Chemical Co. are described in a recent 2-page technical data sheet.

A827. MICA. "Mica in Protective Coatings" titles a 16-page booklet of the English Mica Co.

A828. MINERAL WOOL INSULATION. A 28-page catalog of the Baldwin-Hill Co. describes in detail the various high and low temperature mineral insulations which they manufacture.

A829. OXYGEN. The production and use of oxygen is described in a new 24-page illustrated booklet of the Air Reduction Co.

A830. PLASTIC COATINGS. The uses of Amercoat plastic coatings are described and pictured in a 12-page booklet of the Amercoat Division of the American Pipe and Construction Co.

A831. RESINS. The Plastics Division of the American Cyanamid Co. has issued a 22-page booklet picturing and describing the uses of the various grades of melamine resins.

A832. SYNTHETIC RUBBER. The properties of Ameripol D are outlined in the new 8-page edition of a catalog of B. F. Goodrich Co.

A833. TRYPTOPHANE. The Special Chemicals Division, Winthrop Chemical Co., Inc., is distributing copies of a review, "Recent Research on Tryptophane," covering 68 articles.

A834. ZINC AND ZINC COMPOUNDS. Copies of a 44-page supplement (No. 179) to the U. S. Public Health Reports titled, "Biological Hygienic, and Medical Properties of Zinc and Zinc Compounds," are available from the American Zinc Institute, Inc.

## *Equipment—Methods*

F445. BARREL LIFT. The new Falstrom barrel lift is described in a bulletin (No. 112), recently issued by the Falstrom Co.

F446. CHEMICAL STONEWARE. The General Ceramics and Steatite Corp. has just issued an 8-page bulletin picturing and describing over seventy pieces of their standard stoneware equipment.

F447. COOLERS. Specifications, descriptions and pictures of the Worthington Evaporative Coolers are contained in an 8-page booklet (Bulletin [illegible]) of the Worthington Pump and Machinery Corp.

F448. DRYING OVENS. The Gehnrich Oven Division of the W. S. Rockwell Co. has issued a 4-page folder (No. 116) describing and illustrating the construction and methods of operation of their drying ovens.

F449. DYNAMOMETER MANUAL. W. C. Dillon and Co., Inc., has issued a 20-page manual noting the various uses to which the traction type dynamometer may be put.

F450. ELECTRICAL AND AUTOMOTIVE EQUIPMENT. A 16-page booklet (Form GU-86), has been issued by the Wagner Electric Corp., describing its entire line of electrical and automotive products.

F451. ELECTRONICS. A 20-page book (E6358) entitled, "Introduction to Electronics," to provide an understanding of electronic principles and their usage is available from the Allis-Chalmers Manufacturing Co.

F452. EQUIPMENT. Price list with illustrations and descriptions of the various items. Precision Equipment Co.

F453. FLOORING. The Continental Asbestos & Refining Corp. has recently issued a new bulletin describing their self-bonding, self-healing flooring compound, Stonoleum.

F454. GREASE INTERCEPTION is the subject of a 16-page bulletin of the Josam Manufacturing Co.

F455. HEAT TREATING. The use of cyanamid salts in "Isothermal Heat Treating" is described in a 12-page booklet of the American Cyanamid and Chemical Corp.

F456. MANGANESE STEEL. "Non-Magnetic Applications for Amsco Manganese Steel" titles a detailed illustrated 30-page bulletin (No. 1144-NM) of the American Brake Shoe Co.

F457. MELLON INSTITUTE. Reprints describing the work of the past year have been made available by the Mellon Institute of Industrial Research.

F457. PRINTER-DEVELOPER. A 4-page folder has been issued by the Charles Bruning Co. describing their Model 41 printer-developer for the production of black and white prints.

F458. STIFFNESS GAUGE. The new Taber V-5 motor-driven stiffness gauge is pictured and described in a leaflet (No. 4506) of the Taber Instrument Corp.

F459. WATER HEATER. The New ADSCO type R water heater is described in a bulletin (No. 35-76B) in which capacities, dimensions, and list prices of the 22 available sizes are noted. American District Steam Co.

## CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

Chemical Industries, 522 Fifth Ave., New York 18, N. Y. (9-5)

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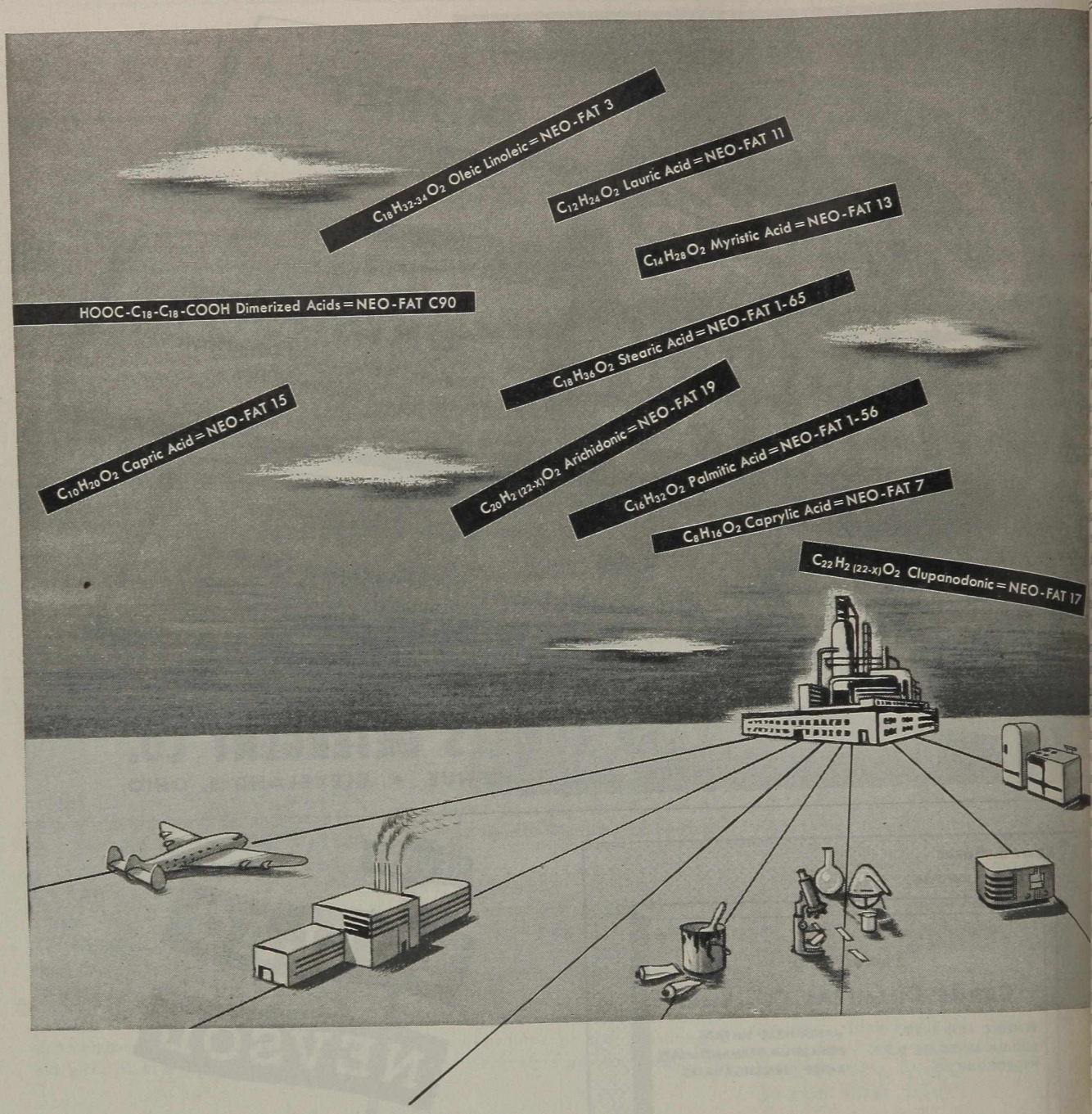


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# NEWS OF THE MONTH

## *V-J Actuates Sweeping Changes Affecting Chemical Industry*

IN THE aftermath of Japanese surrender, various government agencies announced broad shifts in policy which will have a widespread influence of all phases of the chemical industry.

The War Production Board, in a move to facilitate reconversion and speed the flow of products into civilian channels, on August 20 scrapped over two hundred individual controls over industry. Not all the revocations took effect immediately, but almost all of those concerning chemicals were brought about as of August 31, and the remainder will take effect September 30. Among the latter are schedules governing peroxygen chemicals, glycols, carbon black, synthetic organic detergents, phthalic anhydride, bismuth chemicals, and miscellaneous chemicals.

Many basic chemicals and important raw materials are included among those already free from restrictions: chlorine, alcohol, phenol, formaldehyde, styrene, aromatic solvents, acetic acid, urea and melamine resins, aniline, vinyl polymers, phthalic alkyds, sulfuric acid, chlorinated solvents, sodium phosphates, and potassium carbonate.

The fact that allocation has been rescinded does not imply that all materials are freely available. Many items are still scarce, and WPB will impose even more stringent inventory controls over such materials. While chemicals themselves will probably not be affected, such things as shipping containers and construction materials used in the chemical industry will be subject to strict inventories, possibly for several months.

In addition to these orders, there is a "directive" now being prepared which provides that where a company obtained materials on special ratings for a war contract which has now been cut back, the materials left over can be used without restriction.

### *Manpower*

Within an hour after the Japanese surrender announcement, the War Manpower Commission dropped all job controls, creating a free labor market. Job referrals, employment ceilings in all industries, area classifications based on labor stringency, and regional as well as inter-regional recruiting of workers were abolished.

Cutbacks in military production and the release of men from the armed forces will create a labor pool sufficient to meet the needs of all employers.

### *Petroleum*

At this writing it was certain that most of the restrictions instituted by the Petroleum Administration for War would be abolished shortly. Among the restrictions slated for elimination are those governing fuel oil use and burner installations and distribution of naphtha. Controls on shipment of petroleum products into the Eastern seaboard area, however, will probably be continued into the late fall or winter.

### *Anti-Trust Suits*

Attorney General Clark announced on August 20 that the War and Navy Departments had withdrawn all requests for postponement of anti-trust suits. These requests were originally made on the ground that proceedings might interfere with the war effort.

Although eight suits involving chemicals have already been settled, six remaining cases will be brought to trial as rapidly as possible. Defendants are the Allied Chemical & Dye Corp., et al (dyestuffs); General Chemical Co., et al (laboratory chemicals); General Electric Co., Fried. Krupp, et al (tungsten carbide); Imperial Chemical Industries, Ltd., et al (chemicals); William S. Gray & Co., et al (methanol); and Merck & Co., Inc., et al (pharmaceuticals).

Defendants of the disposed cases were E. I. du Pont de Nemours & Co., et al (four cases involving chromic, formic, and hydrochloric acids, and explosives); Monsanto Chemical Co., et al (sulfuric acid); Mutual Chemical Co. of America, et al (bichromates); Tannin Corp., et al (quebracho); and Victor Chemical Works, et al (oxalic acid).

## *WBP Survey Shows Industry Pattern Same As in 1940*

A War Production Board survey of the $20,300,000,000 expansion of manufacturing facilities between July 1, 1940, and May 31, 1944, shows that the prewar geographic pattern of industry was followed for the most part in the placement of new facilities constructed during the war.

Approximately $19,000,000,000 worth of manufacturing facilities, representing 93 per cent, were placed in 179 previously existing areas. More than a third, or $7,500,000,000 of the total value facilities authorizations, were located in ten of the nation's leading industrial cities: Chicago, Detroit, New York, Philadelphia, Los Angeles, Houston, Pittsburgh, Cleveland, St. Louis, and San Francisco.

Ohio led the states with 1,293 facilities and authorizations totaling $1,677,000,000; Pennsylvania followed with 1,220 authorizations valued at $1,675,000,000; Michigan was third with 1,145 authorizations valued at $1,549,000,000; Illinois was fourth with 1,067 authorizations with $1,490,000,000 valuations. New York was fifth with 1,111 authorizations with a value of $1,383,000,000. Texas, with its petroleum and allied industries, was sixth with 441 authorizations at $1,259,000,000 valuation.

"New plants" were 88 per cent federally financed. However, "expansions" of old plants were 53 per cent privately financed, and 66 per cent of the value of "conversions" federally financed.

## *Chemical Engineer Heads Purdue*

*Frederick L. Hovde, former assistant to the president of the University of Rochester, recently on leave of absence to head the Government's rocket-development program, has been named president of Purdue University. He succeeds Edward C. Elliott, who retired in June. Dr. Hovde received his Bachelor's degree in chemical engineering from the University of Minnesota in 1929. Later he attended the University of North Dakota and did research work in physics and chemistry at Oxford, England.*

## *Chemical Manufacturers See 60 Per Cent Expansion*

An industrial market survey conducted by the Committee for Economic Development shows that the chemical industry expects to expand its peacetime markets some 60 per cent in dollar volume above the levels of 1939. A breakdown of the compiled figures is shown on the chart below. The expansion was expected to be achieved by 1947. Inasmuch as the report was prepared prior to the termination of the war, it is likely that an estimate made now would set 1946 as the year of achievement. Since the estimates are made on 1939 dollars, the actual expansion will be somewhat less than the figures seem to indicate.

In dollar volume the value of chemical manufacture is expected to rise from $3,733,700,000 of 1939 to $5,907,000,000 in 1947. All industry is expected to make gains of 4.16 per cent, according to the survey. The peacetime expansion in the chemical industry is expected to be greater than any other industry except automobiles, transportation equipment and tobacco products.

"Although the war production of the chemical industry has been huge," the survey stated, "it can reconvert to peacetime products with very little difficulty. No layoffs of workers are anticipated, except in the explosives industries.

"Most companies favor the sale of Government-owned plants to private industry, scrapping some plants, and holding a few others as stand-by facilities. Government contract cancellations will strongly affect the explosives plants, and will have some influence in the drug industry. Otherwise, the industry expects no problem from cancellations.

"Supplies for some in this industry are adequate, but most companies are taking steps now to obtain new machinery and materials as available."

## *Biffen Will Head Johns-Manville Lab*

*Frank M. Biffen has been appointed chief of the chemical service section, Johns-Manville Research Laboratory, Manville, N. J. A native of London, England, Mr. Biffen was for ten years associated with the Government Laboratory, London. Prior to his joining Johns-Manville in October, 1944, he was director of the analytical laboratories of Foster D. Snell, Inc.*

## *Sulfur Trade Delayed By Shipping Rate*

The current freight rate, set at $9 per ton by the War Shipping Administration for the movement of sulfur from the Gulf to ports in the New York area, is considered far too high by chemical producers. Resumption of trade is being delayed, although the Office of Defense Transportation has agreed to make vessels available.

Having paid as little as $1.80 per ton to move their sulfur before the war, producers who require large quantities of sulfur for the production of sulfuric acid believe the current rate should be set in the neighborhood of $3.10 or $3.15, if it is to be brought into line with other WSA rates on bulk commodities.

The larger chemical producers, most of whom have waterfront facilities in the area of Staten Island, in Boston, and in Baltimore, are seeking a restoration of this service but state that at WSA rates it is even more expensive than the substitute all-water route they have been compelled to use during the war—by barge up the Mississippi, by ship down the Great Lakes, and by barge again down the New York State Barge Canal system. The inland water rate has varied between $8.50 and $8.75 depending upon the point of origin.

At least one ODT offering of cargo space for this movement is known to have been turned down. In the meantime, protests have been lodged with WSA, which has ascribed the existing rate to the fact that vessels assigned to the service must make an average 1,700-mile ballast leg to the Gulf, that the vessels vary in size, and that it is the purpose of that agency to maintain the existing rate structure to the end that all receivers be on an equal basis.

One chemical producer stated that even if one leg of each voyage in this trade is in ballast, a rate of not much more than $4 would be justified. In no case, he said is there any justification for a rate in excess of $8 per ton.

PEACETIME CHEMICAL EXPANSION

| Industry | Value of manufactures at the 1939 price level (Millions of Dollars) 1939 | Estimated 1947 | Per cent Increase Est. 1947 Over 1939 |
|---|---|---|---|
| Rayon and allied products | $247.1 | $575.5 | 132.9 |
| Wood naval stores | 14.1 | 24.8 | 75.9 |
| Fertilizers | 185.7 | 282.0 | 51.9 |
| Tanning materials, natural dyestuffs, mordants, assistants and sizes | 42.2 | 65.4 | 55.0 |
| Plastic materials | 77.7 | 203.3 | 161.6 |
| Explosives | 71.1 | 106.4 | 49.6 |
| Compressed and liquefied gases—not made in petroleum refineries or in natural gasoline plants | 53.4 | 116.1 | 117.4 |
| Bone black, carbon black and lampblack | 14.6 | 24.3 | 66.4 |
| Printing ink | 49.1 | 62.2 | 26.7 |
| Glue and gelatin | 34.3 | 40.3 | 17.5 |
| Mucilage, paste and other adhesives, except glue and rubber cement | 4.2 | 5.3 | 26.2 |
| Paints, varnishes and lacquers | 435.0 | 633.0 | 45.5 |
| Colors and pigments | 83.9 | 125.6 | 49.7 |
| Cottonseed oil, cake, meal and linters | 171.5 | 168.6 | 1.7 |
| Drugs and medicines (including drug grinding) | 365.0 | 522.3 | 43.1 |
| Perfumes, cosmetics and other toilet preparations | 147.5 | 218.8 | 48.3 |
| Insecticides, fungicides and related industrial and household chemical compounds | 93.4 | 136.9 | 46.6 |
| Soap and glycerin | 302.6 | 373.8 | 23.5 |
| Chemicals not elsewhere classified (including synthetic rubber) | 839.8 | 1,481.1 | 76.4 |
| All other | 501.5 | 741.6 | 47.9 |
| Total chemicals and allied products | $3,733.7 | $5,907.3 | 58.2 |

## *Volunteers Aid in Explosives Control*

More than 4,000 volunteer licensing agents, serving without Federal compensation throughout the nation in cooperation with the Bureau of Mines, have played a vital role in the successful control of the heavy consumption of non-military high explosives during the past three and one-half years of the war, Dr. R. R. Sayers, Bureau Director, recently reported to Secretary of the Interior Harold L. Ickes.

Although hundreds of millions of pounds of explosives have been consumed by American industries since Pearl Harbor, not one clear-cut case of sabotage involving blasting materials has been reported to the Bureau, Dr. Sayers said. This is in contrast to the last World War when there were numerous cases of sabotage involving explosives in this country.

The outstanding record of administering the Explosives Act during the current war has been achieved through a system of licensing makers and users of explosives, supplemented by a small staff of explosives investigators working under the direction of the existing district of-

fices of the Health and Safety Branch of the Bureau of Mines.

In the three and one-half years of administration of the Explosives Act, Bureau investigators, in cooperation with other Federal agencies, have inspected more than 40,000 storage places throughout the 48 states and Alaska and have issued recommendations for safer storage methods in nearly all of them, Dr. Sayers said. Although the investigative program has been directed primarily at preventing the acquisition of high explosives or certain ingredients by hostile or disloyal elements of the population, it has also served to awaken public interest in the need for more careful handling and storage of these highly dangerous materials.

## *PAW Will Share German Oil Data*

Technical information collected from secret records of the German oil industry by the Petroleum Administration for War will be made available immediately to all sections of the American oil industry engaged in the war program, Deputy Petroleum Administrator Ralph K. Davies has announced.

PAW will release through the Technical Advisory Committee of the Petroleum Industry War Council microfilms of documents captured in German refineries and laboratories.

Mr. Davies explained that the microfilms of refinery records and experimental laboratory data were gathered by a mission of technological experts sent to Europe under PAW auspices last year.

It is PAW's desire, Mr. Davies pointed out, to make these technical data freely available to everyone interested as a matter of public information, subject only to such restrictions as are imposed by the military or other responsible authorities of government. It is anticipated that in the near future the present restrictions will be relaxed.

## *Norway Resumes Trade*

During the three months following the liberation of Norway, her trade has made rapid strides toward recovery, both from the point of view of imports of essential supplies and of making available exports needed for the reconstruction of other countries, the Foreign Economic Administration has stated.

Almost $1,000,000 worth of chemicals and drugs has been licensed for export to Norway and the flow is increasing. These commodities are purchased for cash. The metals, minerals and fertilizers that will be available for export from Norway during the balance of the year may run as high as 1,000,000 tons, depending on the availability of coal and other minerals. In any case, 343,000 tons are available for immediate shipment.

In order of tonnage available, they are pyrites, iron ore concentrates, nitrate fertilizers, cyanamid, ilmenite, copper and copper concentrates, ferro-alloys and carbide. In addition, there are substantial quantities of molybdenite, graphite concentrates, nickel, talcum, mica, feldspar and so forth.

# CALENDAR *of* EVENTS

*Scheduled*

*AMERICAN CHEMICAL SOCIETY,* Division of Industrial and Engineering Chemistry. Brooklyn Polytechnic Institute, Brooklyn, N. Y. December 27. Chemical Engineering Symposium.

*AMERICAN GAS ASSOCIATION.* Engineering Societies building, 29 W. 39 St., New York, October 14. Twenty-seventh annual meeting.

*AMERICAN MANAGEMENT ASSOCIATION* Packaging Conference. Hotel New Yorker, New York, September 18-19. First meeting held by the association's packaging division since March 1944.

*ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.* Hotel William Penn, Pittsburgh, Pa. October 22 and 23. Sixth annual water conference.

*OPTICAL SOCIETY OF AMERICA,* Hotel Pennsylvania, New York. October 18 to 20. Thirtieth annual meeting.

*SOCIETY OF RHEOLOGY,* Hotel Pennsylvania, New York. October 26 to 27. Annual meeting.

*Canceled*

*ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS.* Annual 1945 Meeting.

*NATIONAL PEST CONTROL ASSOCIATION,* Netherland Plaza Hotel, Cincinnati, Ohio, October. Thirteenth annual convention.

*TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY.* Buffalo, N. Y. Fall meeting. September 17.

## *Chicago University to Continue Atomic Study*

Research which led to the invention of the atomic bomb will be continued at the University of Chicago through two new institutes devoted to the study of nuclear physics and metals, according to a recent announcement made by Chancellor Robert M. Hutchins.

The institutes will bring two Nobel Prize scientists to the school. They are Enrico Fermi, self-exiled Italian physicist, who becomes professor of physics, and Harold C. Urey, who is named professor of chemistry. Both come from Columbia University and will serve in the Institute of Nuclear Studies to be headed by Samuel K. Allison, professor of physics at the University of Chicago.

A large number of the members of the faculty of the University participated in the fundamental research which led to the development of the atomic bomb conducted under the auspices of the Manhattan District of the Army Corps of Engineers. In addition to the fundamental research work at the university, the university undertook to operate a semi-works or pilot plant at Oak Ridge, Tenn. The university managed this until June 30, 1945.

Chancellor Hutchins stated that "the United States has abandoned both basic research and the training of new scientists. It is essential that we overcome that deficiency. The two new institutes of the University of Chicago, because of the ability of the men who will staff them, will be significant means for remedying our shortsighted policy."

## *Research Project on Peanuts*

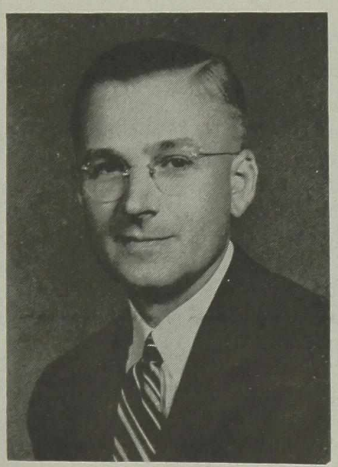
The National Peanut Council with headquarters in Atlanta, Ga., has established a project in Southern Research Institute, Birmingham, Ala., for research on peanuts and peanut products. With the South's peanut crop breaking all previous records, need is felt for expanding the base for peanut products in the food and chemical industries. The program will be under the direction of C. Lewis Wrenshall.

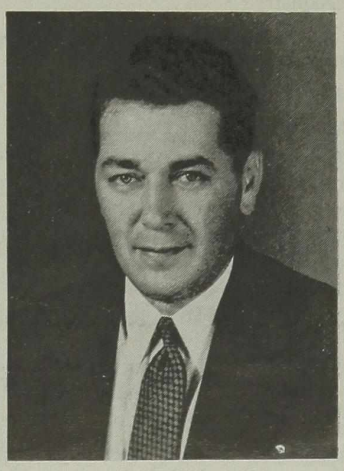
## *Government Closes Helium Plants*

Secretary of the Interior Harold Ickes has announced the suspension of helium-production activities at the Cunningham, Kansas, and Amarillo, Texas, plants which have been operated by the Bureau of Mines for the production of helium for war purposes.

Current and future military needs, the Secretary said, will be met by the Exell,

## *Ord and Kroeger Move Up in Monsanto*





*Robinson Ord (left) recently named general manager of sales for Monsanto's organic division, will be assisted by Arthur P. Kroeger. Mr. Ord, formerly an assistant general manager of sales, succeeds the late Fred C. Renner.*

Texas, and Otis, Kansas, plants, both of which have been constructed during the war and embody the latest designs and the most modern production methods. The Amarillo plant, which is the "parent" plant, will, however, be maintained in standby condition for immediate resumption of production on short notice, and will become the main headquarters for an expanding helium research program. The Cunningham plant, partly because of limited gas reserves in the area, will be dismantled, and some of its personnel and equipment will be utilized in other helium plants and various war projects.

## *Activities of the U. S. Conciliation Service*

Situations Disposed of in the Chemical Industry

| Type of Situation | Number 1945 July | 1945 June | 1944 July |
|---|---|---|---|
| Total | 69 | 82 | 74 |
| Labor Disputes | | | |
| Strikes & Lockouts | 5 | 13 | 11 |
| Threatened Strikes | 11 | 10 | 11 |
| Controversies | 42 | 50 | 47 |
| Other Situations | | | |
| Arbitrations | 9 | 5 | 2 |
| Technical Services | .. | .. | .. |
| Special Services | 2 | 4 | 3 |
| Disputes Certified to National War Labor Board | 20 | 21 | 20 |

## *Geneva Station Creates Food Science Division*

A new division of food science and technology has been created at the New York State Experiment Station at Geneva by merging the divisions of bacteriology and chemistry, according to an announcement by President E. E. Day, of Cornell University.

Elmer H. Stotz was named head of the new division and activities of the new group are to be guided by a committee consisting of members of the former divisions. This committee will consist of Stotz, who was head of the chemistry division, as chairman, and George J. Hucker, and Carl S. Pederson, professors of bacteriology, and Zoltan I. Kertesz, professor of chemistry.

## *General Chemical Builds Savannah, Ga., Plant*

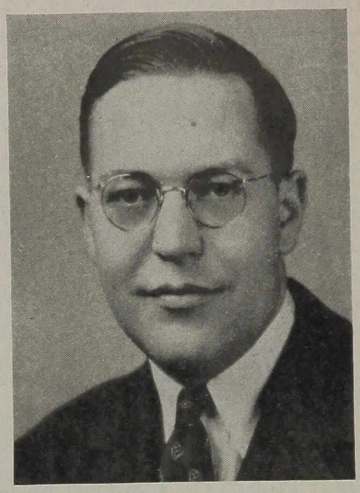
General Chemical Co., a subsidiary of Allied Chemical and Dye Corp., announced today that a chemical plant is under construction by the company at Savannah, Georgia. The plant will produce aluminum sulfate.

According to officials of General Chemical Company, most of the plant's output will be consumed by concerns within the growing Savannah industrial area. The new plant's production unit will occupy part of an eight-acre site located just outside the city limits on Brampton Road.

## *Note*

In the article, "High Vacuum Techniques Open New Fields for Chemical Industry," in the July 1945 issue, the word "imperative" in the ninth line, column three, page 86, should read, "inoperative."

## *Phila. Quartz Appoints R. C. Merrill*



*Dr. Reynold C. Merrill, formerly with the U. S. Dept. of Agriculture Regional Laboratory, Albany, California, recently joined the research staff of the Philadelphia Quartz Company, Philadelphia, Pa. Dr. Merrill's commercial experience has included affiliation with California Cotton Oil Corp. and with Lever Brothers at Cambridge, Mass.*

# COMPANIES

## *Wyandotte Builds New Carbonate Plant*

Ground was broken in mid-July for a new carbonate plant at Wyandotte Chemicals Corp., Wyandotte, Michigan. Production will be increased 50% by this new plant which is scheduled for completion in the early spring of 1946.

## *Standard Oil to Make Chemicals from Petroleum*

Standard Oil Company (Indiana) is organizing a chemical products department, it has been made known by A. W. Peake, president. The immediate duties of the department will be to explore the market for petroleum chemicals, work with research and manufacturing departments in developing and producing marketable derivatives, and manage sales and distribution.

The new department will operate under general direction of Bruce K. Brown, vice president in charge of development, with William B. Plummer as manager. Mr. Plummer was formerly manager of the development and patent department and during the war a lieutenant colonel in the Air Technical Service Command, A.A.F. Howard R. Peterson, a member of the sales technical service will be in charge of sales development. The use of new synthetic and catalytic processes for manufacturing petroleum products has reached a degree of importance overshadowing that of older methods of refining, Mr. Plummer pointed out in a statement in connection with the announcement.

## *Sanders-Eavenson Chemical Company Formed*

James W. Sanders, of the Plastic Moulding Corp., and Marvin S. Eavenson, formerly Chicago manager of Wyandotte Chemicals Co., have joined to form the Sanders-Eavenson Chemical Co., which will act as distributor of sulphonated oils, synthetic detergents and special industrial and household cleaners.

## *Monsanto Subsidiary Builds Adhesives Plant*

Expansion of chemical manufacturing facilities on the West Coast is foreshadowed by the announcement that Monsanto Chemical Co., through its Seattle subsidiary, I. F. Laucks, Inc., has purchased about 29 acres of land south of the city limits of Seattle, Wash.

The company will erect a plywood adhesives plant for the production of synthetic resins for adhesives, and coatings and wood preservatives. It was indicated that offices and research laboratories of the subsidiary, which Montana acquired last year, will eventually be moved to the new location.

## *Du Pont Plan W. Va. Plastics Plant*

Arnold E. Pitcher, general manager of the plastics department of E. I. du Pont de Nemours and Co., has announced that the company is exercising options to purchase a site of about 400 acres at Washington, near Parkersburg, W. Va.

Among the first units to be built at the new location will be greatly expanded facilities for manufacturing of nylon as a plastic in various forms, "Lucite" methyl methacrylate resin, and polythene. Construction on these units with the necessary service facilities will be started just as soon as materials and labor are available.

## *New Firm to License Vulcanization Patents*

Industry Inventions, Inc., an Ohio corporation, has been established to license the use of electronic vulcanization in the manufacture of rubber and plastic products, it has been announced by V. L. Smithers, of V. L. Smithers Laboratories, Akron, Ohio. Mr. Smithers will be vice-president and general manager of the

new company. Incorporation papers were filed August 3.

The B. F. Goodrich Company and The Firestone Tire and Rubber Company jointly hold patents for electronic processing of rubber and plastics and the new company will make the patents available to the rubber and plastics industries on a reasonable basis, Mr. Smithers said.

Other officers of Industry Inventions, Inc., are: W. F. Avery, of B. F. Goodrich, chairman of the board of directors; W. A. Fraser, of Firestone, president; H. S. Woodruff, of B. F. Goodrich, secretary; E. H. Schulenberg, of Firestone, treasurer; and M. J. Moyer, of Smithers Laboratories, assistant secretary.

## *Celanese Forms Mexican Firm*

Celanese Corporation of America has announced the formation of Viscosa Mexicana, S. A., in Mexico City for the purpose of producing and selling viscose rayon yarns in Mexico. Arrangements are now under way for the purchase of land upon which will be erected a large new plant of the company.

Viscosa Mexicana, S. A., is being financed jointly by Celanese Corporation of America, Celanese Mexicana, S. A., and Mexican banking interests.

Dr. Camille Dreyfus, president of Celanese Corporation of America, will hold the same position in the new company. The membership of the board of directors will be equally divided between Celanese Corporation of America and Mexican interests.

## *Crosby Builds Wood Naval Stores Plant*

Crosby Naval Stores, Inc. has been requested by the Chemical Division of the War Production Board to start immediately the construction of its wood naval stores plant at De Ridder, Louisiana, in order to help relieve the shortage of naval stores products. A high priority rating was issued by the WPB on July 24, 1945, for the construction of the plant. Expenditures amounting to $1,833,941.02 were authorized by the WPB for the construction of 11 steel and concrete buildings, equipment and 6,600 feet of plant railroad. The project is contemplated to be completed by March 31, 1946.

The capacity of this plant will be approximately 150,000 520 pound drums of rosin per year which combined with the Picayune plant will give Crosby a total annual capacity of approximately 260,000 520-pound drums of wood rosin.

## *Dow to Produce Lime At Ludington*

A portion of the Defense Plant Corporation plant at Ludington, Mich., has been leased by The Dow Chemical Company of Midland, Michigan. Willard H. Dow, in announcing the signing of the lease recently, said that Dow will use the facilities for producing lime and magnesium chloride liquor. Prior to September, 1944, when it ceased operation on government order, the Ludington plant, operated by Dow Magnesium Corp., produced cell feed for the 72,000,000 pound DPC magnesium plant at Marysville, Michigan.

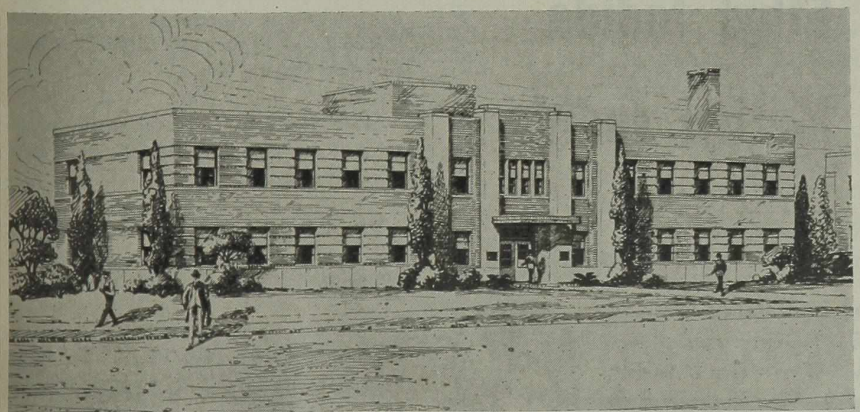
## *Monsanto Asks Government To Take Over Strike-Bound Plant*

Monsanto Chemical Company invited the Federal government on August 1, 1945, to take over operation of its strike-bound Monsanto, Illinois plant to insure production of vital war-needed chemicals for the Army and Navy. In a telegram to President Truman, the company said it was unable to keep the plant operating in the face of "flagrant union irresponsibility."

The chemical plant had been closed down July 26 when approximately 45 pipe fitters walked out in a jurisdictional dispute with the iron workers and immediately established a picket line around the company's gates. Approximately 1,200 workers were thrown out of employment.

No demands have been made on the company in the present dispute, the telegram said. "Instead," the President was told, "it is purely a dispute within union ranks which only the union can settle and only action by the union itself can bring the men back to work."

## *Arco Plans Research Laboratories at Cleveland*



*Plans for the immediate construction of a new two-story research laboratory for the development of improved paints and new industrial coatings have been announced by Howard E. Wise, president of The Arco Company, Cleveland, Ohio. The structure is scheduled for completion early in 1946.*

## *Davison Promotes Waring*

*Dr. C. E. Waring has been appointed by The Davison Chemical Corporation as the technical assistant to Chester F. Hockley, president. Until recently, his duties were supervisor of Frigidaire's main chemical, metallurgical and process engineering laboratories, as well as coordinator of their consultatory assistance to the U. S. Army Ordnance in the development and research on preservation and packaging of military materiel.*

## *Goodrich Chemical Constructs*

Construction contract for the new semi-works plant of The B. F. Goodrich Chemical Company at Avon Lake, Ohio, 15 miles west of Cleveland, has been awarded to John Gill & Son, Cleveland, it has been made public by William S. Richardson, president. Cost is to be around $600,000.

Designed as a versatile small-scale chemical plant which can easily be converted to a variety of processes, it will be used to develop manufacturing routines for new synthetic resins and chemicals. The process building is the largest of the three structures in the plant group. It is 50 by 120, three stories, of steel frame covered with composition siding. Utility building will be one-story, 50 by 140; will house laboratory, machine shop, of-

fices and lockers, eventually will be devoted entirely to laboratories. Boiler house is 40 by 50 and will be replaced when better material are available.

## *Company Notes*

RES-N-CHEM, INC., has opened a laboratory and plant in Clinton, Mass. Charles O. Barbre has been appointed chief chemist in charge of control and research. Also announced is the moving of the general offices and accounting departments from the Hawthorne, N. J., plant to Clinton.

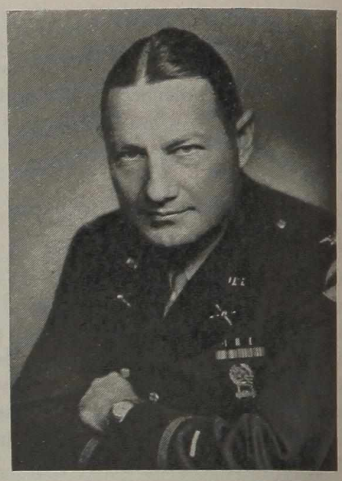
DIVERSEY CORP., a subsidiary of the VICTOR CHEMICAL WORKS, Chicago, has purchased the business and assets of Trojan Products & Manufacturing Co., which specializes in the manufacture of process and maintenance chemicals for the metal working industry.

THE WINTHROP CHEMICAL CO. has announced that women employees of their Rensselaer, N. Y., plant will be given an opportunity to take two-month training courses in chemistry and analytical procedures at the research laboratories. Those who qualify will be given staff positions as laboratory technicians, according to Theodore G. Klumpp, president.

The New York offices of FRANCIS CHILSON, INDUSTRIAL CONSULTANT, were recently moved to 101 Park Avenue. Research offices are in the Harwood Building, Scarsdale, N. Y., and field offices in Chattanooga and Pittsburgh.

THE DIAMOND ALKALI CO. has announced the acquisition of several hundred acres of land at Houston, Texas, adjacent to the Houston Ship Channel.

## *Berle Rejoins Innis, Speiden*



*Colonel Charles H. Berle has been appointed coordinator of sales and manufacturing for Innis, Speiden & Co. Associated with Innis, Speiden & Co. since 1926, Colonel Berle was called to active duty by the Army in 1941 and returned to inactive reserve status in June, 1945.*

THE DU PONT company has made known plans for the construction at its Waynesville, Va., plant of two acetic acid recovery units.

THE HOUDRY PROCESS CORP., Wilmington, Delaware, has announced the opening of New York offices at 115 Broadway, New York City, under the direction of R. B. Cragin, vice president in charge of commercial development.

THE VULCANIZED RUBBER CO. of New York City and Morrisville, Pennsylvania, has changed its name to Vulcanized Rubber and Plastics Co.

HARSHAW CHEMICAL CO. is making arrangements to build $200,000 plant additions at Cleveland.

The name of the PERRY-LEITER, INC., concern has been changed to National Coatings & Chemicals Co., Inc.

## *Educational Notes*

BENZOL PRODUCTS CO., Newark, N. J., has established a research fellowship at Rutgers University. It will be of one year's duration for the study of organic syntheses based on benzyl chloride and other benzyl compounds. Robert B. Tre-

lease, of New Brunswick, N. J., Rutgers, 1944, has been appointed fellow.

COLUMBIA UNIVERSITY, Extension Division, has announced a new evening course, starting October 1, in synthetic textile fibers, yarns and materials, which will be given by Herbert R. Mauersberger, textile consultant and technical editor of *Rayon Textile Monthly*.

POLYTECHNIC INSTITUTE OF BROOKLYN will offer this fall a graduate lecture course on pulp and paper technology, under the department of chemical engineering. The course will be under the direction of Robert S. Aires.

## *American Maize Raises Buchanan*

*B. F. Buchanan, recently promoted to supervisor of research for American Maize Products Co., has been transferred from New York to Roby, Ind. Martha Seastrom has been named his assistant in the New York laboratory.*

## NEWS *of* SUPPLIERS

Harry A. Feldbush, formerly works manager of the Holyoke, Mass. plant of WORTHINGTON PUMP AND MACHINERY CORP., has been named vice president in charge of engineering for the entire corporation. His duties cover engineering activities of all works and domestic subsidiary companies. Headquarters will be at the general offices in Harrison, N. J.

Ralph M. Watson, formerly chief engineer of the centrifugal engineering division has been appointed assistant to Mr. Feldbush.

RELIANCE ELECTRIC & ENGINEERING CO. announces the appointment of two new distributors for Reliance A. C. and D. C. motors, generators, and V*S motor drives. They are Standard Electric Motor Works in Detroit and in Milwaukee, the C & G Sales and Engineering Co.

THE WM. POWELL COMPANY, valve specialists and manufacturers of Cincinnati, Ohio, has announced the appointment of Allen B. Stiles as manager of the Philadelphia and Baltimore territory. Mr. Stiles, whose office is at 1520 Locust Street, Philadelphia 2, Pennsylvania, is well known throughout the eastern section of the country, having represented the Crane Company for the past several years.

Design and construction of a pulp washing plant and power facilities for UNION BAG AND PAPER CORP., to provide for expansion of its Savannah, Ga., plant from 800 to 1000 tons per day, is now under construction by The Rust Engineering Co., Pittsburgh, Pa.

T. D. Slingman has been made manager of industrial sales of BALDWIN-HILL CO., Trenton, New Jersey, manufacturers of thermal insulation products. He was formerly vice president of mechanical sales of The Dayton Rubber Mfg. Co.

THE BRIGGS CLARIFIER COMPANY, Washington, D. C., manufacturers of industrial, automotive and marine oil filtration equipment, has announced the appointment of W. J. Sommers, 505 Delaware Avenue, Buffalo, New York, as distributor covering Western New York State and Northwestern Pennsylvania.

The litigation between F. J. STOKES MACHINE COMPANY, Philadelphia engineers and manufacturers of high vacuum processing equipment, and NATIONAL RESEARCH CORPORATION, of Boston, in which Stokes charged National with infringement of patent No. 2,278,195, has been terminated by the entry of a Consent Decree in which it is held that the patent is valid and has been infringed by National Research Corporation.

New appointents in the Transformer Division of GENERAL ELECTRIC'S Central Station Divisions, have recently been announced by L. R. Brown, manager of the transformer division. H. M. Jalonack has been appointed assistant to manager, Transformer Division, and is succeeded as manager sales, distribution transformer section by C. E. Burke of Fort Wayne, Indiana. D. F. Roloff has been appointed assistant manager sales, succeeding Mr. Burke, and E. V. Dillon, formerly assistant manager sales of regulators, has been appointed manager sales, feeder voltage regulator section.

Harvey Picker, recently returned to inactive status by the Navy, has been elected president of the PICKER X-RAY CORP., manufacturer of x-ray equipment and accessories. Mr. Picker has been with the firm, of which his father, Mr. James Picker, is founder and chairman of the board of directors, since 1938.

Philip H. LePeau has been appointed representative in the state of Louisiana and the eastern part of Texas for the chemical equipment division of GENERAL CERAMIC & STEATITE CORP. His headquarters are at 2015 Second National Bank Building, Houston, Texas.

Frank H. McGraw, Chairman of the Board of F. H. MCGRAW & COMPANY, engineers and

constructors, has announced that at a recent meeting of the directors of the company, Rodman B. Doremus, of Greenwich, Conn., was promoted from vice-president to executive vice-president and Francis J. Tytus, of Farmington, Conn., was promoted from chief engineer to vice-president and chief engineer. At the same meeting, Louis B. Palmer, of West Harttord, Conn., was elevated from assistant treasurer to treasurer.

Election of Henry F. Dever as president of the Brown Instrument Company, a wholly-owned subsidiary of the Minneapolis-Honeywell Regulator Company, has been announced by Harold W. Sweatt, president of the parent company. Mr. Dever, who has been serving as vice president in charge of engineering for Minneapolis-Honeywell, succeeds Charles B. Sweatt as president of Brown. The latter, vice president and director of Minneapolis-Honeywell, has withdrawn from Brown and will henceforth devcte his entire attention to supervision of the expanded sales activities of the Honeywell organization and its subsidiaries.

The removal of H. K. Porter Company, Inc. offices in Rochester to headquarters in the Walbridge Building, Buffalo, N. Y., has been announced by W. W. Calihan, Sales Manager. W. A. Coyle has been appointed district manager in charge of sales for Porter and Devine process equipment. He will also handle sales for Quimby Pumps and Fort Pitt Steel Castings in the territory.

Mr. A. A. Nelson, who for many years was associated with The Nicholson Company, Inc., New York, designers and builders of concrete storage handling facilities, has rejoined the company as a vice-president after an absence of two years. During this time he was engaged in the design and construction of defense plant facilities in the middle west.

D. A. Newton has joined the F. J. Evans Engineering Company, Birmingham, Alabama, as air-conditioning engineer of the heating and air conditioning division. Before joining the F. J. Evans Company, Mr. Newton was chief engineer of Larkin Coils, Inc., Atlanta. Prior to that time he was located in the central engineering division of the U. S. Rubber Company, at New York City.

W. B. Connor Engineering Corp. has recently appointed the following in the districts noted to handle the line of Dorex adsorption equipment and Kno-draft diffusers: Harry A. Pillen Co., 626 Broadway, Cincinnati 2, Ohio, and The Allen, Mitchell & Co., 1053 31st Street, NW., Washington 7, D. C.

Election by the board of directors of three vice presidents to head the treasury, law and patent departments, and lamp manufacturing and lighting equipment divisions of the Westinghouse Electric Corporation has been announced by A. W. Robertson, chairman. They are: L. H. Lund, who has been treasurer since 1941; William E. Miller, who had been general attorney in charge of the law and patent department since 1944, and Ralph C. Stuart, in charge of the Lamp and Lighting Divisions.

Mr. Lund and Mr. Miller have their offices in Pittsburgh, Pa. Mr. Stuart will administer the four plants of the Lamp Division at Bloomfield, Belleville and Trenton, N. J., and Fairmount, W. Va., and the Lighting Division's Cleveland, Ohio, plant from the Lamp Division headquarters at Bloomfield.

## *Joins A. D. Little*

*L. B. Arnold, Jr., has joined the staff of Arthur D. Little, Inc., Cambridge, Mass. Dr. Arnold was previously in the organic chemicals and rayon departments of E. I. du Pont de Nemours & Company, and more recently an assistant director of the chemistry division of the Metallurgical Laboratory at Chicago, Illinois.*

% Proportioneers, Inc. %, Providence, R. I., makers of liquid proportioning equipment and chemical feeders, announce the appointment of % Dosificadores Y Valvulas, S. A. %, Dolores No. 16, Mexico, D. F. to represent the company in that territory. The new organization, headed by Mariano Lara and Manuel Garcia Sands, includes a factory-trained engineering staff and offers complete sales and engineering facilities to handle proportioning problems.

The plant, inventory and uncompleted contracts of the Buffalo Foundry & Machine Company, of Buffalo, were purchased by the Blaw-Knox Company, a Pittsburgh engineering and steel fabricating concern. The newly acquired property will be known as the Buflovak Division of the Blaw-Knox Company. No changes will be made in either management or personnel. The Buffalo property includes an 18-acre site on which are located plants containing a plate fabricating shop, machine shop, foundry, pattern shop, and a well-equipped research and demonstration laboratory.

George H. Woodard, manager of the aviation gas turbine division of the Westinghouse Electric Corporation, Philadelphia, Pa., has received the company's order of merit in recognition of his creative engineering in the development of new products. Previous to his appointment to his present post, Mr. Woodard was manager of the company's new products division at East Pittsburgh.

Arthur Terry, head of The Dorr Company's contract engineering division, has been appointed by the Foreign Economic Administration to administer that agency's rehabilitation activities in Holland and Netherlands East and West Indian possessions. The F.E.A. area sections will be responsible for supplying food, clothing and subsistence to peoples in liberated countries, and will furnish equipment, machinery and parts for the restoration of industry and utilities.

National Research Corporation of Boston announces the opening of its Chicago branch office in the Engineering Building at 205 West

Wacker Drive. Appointed Chicago District Manager is Mr. H. A. Hickey, formerly chief engineer of the vacuum engineering division. Announced personnel changes are as follows: Frank E. Penn, formerly in charge of the research engineering department, has been promoted to chief engineer; E. C. Bowen to sales manager of the vacuum engineering division, and F. C. Brown, formerly production manager, has been named plant engineer of the Plymouth division. He will be replaced by T. W. Lawler.

THE FLUID CONTROLS COMPANY, 18 W. Chelten Avenue, Philadelphia, has been appointed exclusive valve distributors for R-S Products Corporation, also of Philadelphia.

After a meeting of the board of directors following the Annual Stockholders Meeting held in New York, GENERAL AMERICAN TRANSPORTATION CORPORATION announced the following changes of officers: Lester N. Selig, formerly president, was elected to the newly created position of vice-chairman, with Max Epstein continuing as chairman of the board; Sam Laud, a director of the corporation and previously executive assistant to the president, was elected president; W. S. Hefferan, Jr., a director of the corporation and previously secretary, was elected vice-president, and Arthur W. Lissauer, general manager of the corporation's process equipment division, was elected vice-president.

# ASSOCIATIONS

## *NWDA to Hold Skeleton Meeting*

Because of the wartime travel emergency, the National Wholesale Druggists' Association has decided to substitute a skeleton meeting of its officers for the usual annual meeting of the membership in September, according to an announcement by E. Allen Newcomb, secretary. The meeting will be held in New York on September 27, and all special papers prepared for the meeting will be made available to the entire membership as usual.

## *1945 "Convention-at-Home" For N.P.V. & L.A.*

Dates for the 1945 "Convention-at-Home" of the National Paint, Varnish & Lacquer Association will be Oct. 31, Nov. 1, and Nov. 2, President Ernest T. Trigg announced in a letter mailed to members of the industry. This will be the fourth consecutive convention by mail. A "statutory meeting" for the election and other annual business will be held at association headquarters in Washington, as in the past three years, in conformance with the by-laws.

## *Murph Comments on Fertilizer Bills*

"There is neither justification nor necessity for Government production of fertilizers," said D. S. Murph, the executive secretary and treasurer of The National Fertilizer Association, in commenting on some recent proposed national fertilizer programs, including S. 882 and H. R. 2922, companion bills introduced into the Senate by Senators Hill and Bankhead of Alabama, and into the House of Representatives by Representative Flannagan, of Virginia. "The industry under the private enterprise system," said Mr. Murph, "except as temporarily prevented in certain localities by war conditions, has always supplied the entire demand of farmers for fertilizers."

## *Society of Chemical Industry Elects Curtis Chairman*

Francis J. Curtis, St. Louis, vice president of Monsanto Chemical Company, has been elected chairman of the American Section of the Society of Chemical Industry, an English organization of industrial chemists.

He assumed his duties as chairman on July 1, shortly after his return from Europe on a British-American mission to inspect German chemical plants. For the past year he had served as vice chairman.

Mr. Curtis is also vice chairman of the Division of Industrial and Engineering Chemistry, American Chemical Society, and a director of the A.I.Ch.E.

## *Oil Chemists Elect By Mail*

An election by mail ballot, the first in the organization's history, was held by the American Oil Chemists' Society this spring, and members of the governing board met in Memphis, Tenn., on May 10-12 to transact necessary business. New officers, as announced by the retiring president, K. S. Markley, of the Southern Regional Research laboratory, New Orleans, are as follows:

President, Robert R. King, technical director of the Interstate Cotton Oil Re-

fining Company, Sherman, Tex.; first vice-president, S. O. Sorensen, technical director of the Archer-Daniels-Midland Co., Minneapolis; second vice-president, Reid T. Milner, head of the analytical and physical chemical division of the Northern Regional Research laboratory, Peoria, Ill.; third vice-president, Judson H. Sanders, head of the edible process development group of the Chemical division of Procter and Gamble Company, Cincinnati; fourth vice-president, C. P. Long, head of the analytical methods section of the standards department, Chemical division, Procter and Gamble, Cincinnati; secretary, H. L. Roschen, research chemist, Swift and Company, Chicago, and editor of *Oil & Soap,* journal of the A. O. C. S.; and treasurer, John P. Harris, manager, Chicago office, Industrial Chemical Sales division, West Virginia Pulp and Paper Company.

### *Lead Association Chooses Crane*

Clinton H. Crane, president of the St. Joseph Lead Co., has been elected president of the Lead Industry Association. F. W. Rockwell, president of the National Lead Co., and F. H. Brownell, chairman of the board of the American Smelting & Refining Co., have been named vice-presidents. F. E. Wormser, is secretary-treasurer.

### *Crandall to Direct SPI Public Relations*

Barrett L. Crandall has been appointed director of public relations of the Society of the Plastics Industry, Inc., according to an announcement by John Sasso, chairman of the society's public relations committee. Mr. Crandall succeeds Albert Pfaltz, who has resigned.

## PERSONNEL

### *McDonnell of WPB Moves to Schering*

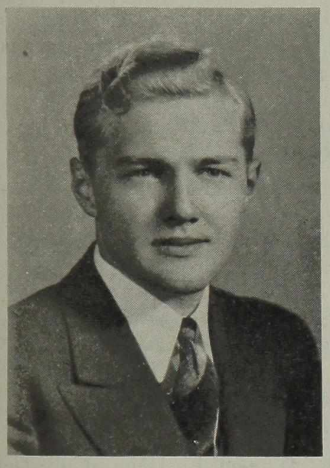
John McDonnell, for the past four years head of research of the Drugs Branch of the War Production Board, and recently national director of civilian penicillin distribution, has joined the Schering Corp., Bloomfield, N. J., in the newly created post of director of domestic sales and promotion. F. Peterson who has been manager of domestic sales division has resigned. Herman W. Leitzow, eastern division manager since 1944, has been made assistant to Dr. McDonnell.

### *Goodrich Names Hager*

Rollin D. Hager has been named general superintendent of the industrial products division of The B. F. Goodrich Co.

He succeeds G. L. Matthias, who has retired because of illness. H. L. Dixon has been appointed to Hager's previous post as production manager of the division, and E. L. Slingluff as manager of reclaim manufacturing to succeed Dixon.

## *Fischer and Rainard Move to ITT*



*Earl K. Fischer (top) and Leo W. Rainard have recently been appointed to the staff of the Institute of Textile Technology, Charlottesville, Va. Dr. Fischer comes from the central research laboratories of the Interchemical Corp. to head the division of physical chemistry, while Mr. Rainard, who was formerly in charge of the research laboratory of General Latex Chemical Corp., will be concerned with high polymers.*

## *Tubize Makes Administrative Changes*

Organizational changes in the Tubize Rayon Corp., designed to mobilize the company's administrative resources, have been announced by J. E. Bassill, president.

The newly organized divisions, which will start functioning immediately, are as follows, together with the names of the men who will head them: economics and

management division, Leonard Kuvin; industrial and human relations division, Jack Wolff; yarn division, R. C. Jones; technical division, C. R. Dolmetsch; fabrics division, Harry Gold; controller's division, G. T. Adams, and financial division, F. P. Huff.

In addition, Mr. Bassill has announced the following individual promotions: E. R. Van Vliet, executive vice president, formerly vice president and treasurer, and F. J. Stewart, assistant treasurer and tax specialist, formerly assistant secretary and tax specialist.

## *U. S. Rubber Transfers Carpenter*

F. S. Carpenter, formerly factory manager of the Los Angeles synthetic rubber plant, operated for the Government by United States Rubber Company, is being transferred to the company's plantation division with headquarters in New York City.

Mr. Carpenter will be succeeded at the Los Angeles synthetic rubber plant by Philip E. Rice, formerly factory manager of the Naugatuck, Connecticut chemical plant. Donald L. McCollum, who has been production manager, chemical division, is appointed factory manager of the Naugatuck chemical plant.

## *Mallinckrodt Advances Three*

The Mallinckrodt Chemical Works has announced the promotion to vice president of three of its personnel. They are: former technical director, H. V. Farr; former manager, eastern district, W. D. Barry; and former controller, L. C. Kunz.

## *General Aniline Promotes Barnes*

Dr. William E. Hanford, director of research of General Aniline & Film Corporation, has announced the following changes in the staff at the company's Central Research Laboratory in Easton, Penna.

Dr. C. E. Barnes, a group leader for the past two and a half years, has been appointed a section leader in charge of polymeric research with these chemists reporting to him: C. R. Enyeart, F. H. Gerhardt, F. W. Gray, F. Grosser, G. D. Jones, I. V. Runyan, W. O. Ney and A. O. Zoss. Dr. C. E. Schildknecht has been transferred from the Central Research Laboratory to the Development Division at 247 Park Avenue, New York.

## *Du Pont Appoints Thalheimer*

William H. Thalheimer, who has been assistant manager of the New Brunswick Works of the Du Pont Company, has been appointed assistant manager of the fine chemicals division of the company. Succeeding Mr. Thalheimer at New

Brunswick is Francis T. Alabaster, who has been chief supervisor there. Carl F. Wagner, an area supervisor, has been appointed production superintendent.

C. E. Graves has been appointed manager of the Grasselli Chemicals Department office, Tacoma, Wash., the Du Pont Company has announced. The offices were recently established at Taylor Way and Lincoln Avenue, the site of the former Latimer-Goodwin plant manufacturing lead and calcium arsenate.

Mr. Graves was previously plant pathologist and assistant sales manager of the Du Pont Semesan Company in Wilmington.

## *Midwest Research Increases Staff*

George E. Ziegler, physicist on the staff of the Midwest Research Institute, has been appointed executive scientist in charge of all project production. Dr. Ziegler, formerly chairman of the physics section of the Armour Research Foundation, Chicago, directed the development of the wire sound recorder.

Others appointed to head various departments of the Institute include: George W. Ward, geologist and mineralogist, chairman of inorganic chemistry; C. L. Shrewsbury, chairman of agricultural research; Frank H. Trimble, physicist, chairman of applied physics research; and Carl M. Marberg, chairman of organic chemistry.

## *Ford Joins Houdry*

Robert B. Cragin, vice-president in charge of Commercial Development for Houdry Process Corporation, has announced the appointment of a petroleum engineer as executive assistant. He is John E. Ford, Jr., of Plandome, New York. Mr. Ford joins Houdry after eight years' experience with the M. W. Kellogg Company.

Gordon A. Kessler, patent attorney, will head the corporation's patent division according to A. V. Danner, executive vice-president. Mr. Kessler joins Houdry after being employed as patent attorney with the Texas Company for several years. Mr. Kessler was previously patent attorney with Allied Chemical and Dye Corporation and was an examiner in the U. S. Patent Office.

## *Tucker to Manage Du Pont West Coast Electrochemicals*

Appointment of Albert R. Tucker to the newly created position of West Coast manager of the Electrochemicals Department, E. I. du Pont de Nemours and Company, has been made public by F. S. MacGregor, the department's general manager.

The El Monte plant and sales office and the district sales office at San Fran-

cisco, will be consolidated under Mr. Tucker, who has been Philadelphia district manager for the department since 1936.

Frederick C. Schumacher, former assistant manager of the New York district office, has succeeded Mr. Tucker as manager of the Philadelphia district office.

## *Personnel Notes*

Benjamin S. Garvey, Jr., has been appointed technical service manager on rubber chemicals of the B. F. Goodrich Chemical Company. Dr. Garvey has held many posts in the company's research division, his latest dealing with technical problems on synthetic rubber manufacture.

Robert C. Gibson has recently joined the Tanner Chemical Company, manufacturers of rustproofing chemicals and processes at Ferndale, Detroit, Michigan.

J. N. Taylor, formerly acting chief, Chemical Unit of the Department of Commerce, retired from Government service at the end of August. He plans to do consultation work.

A. B. Greninger, who for the past two years has been associated with special war work in Chicago, has been appointed metallurgist of General Electric's Chemical department.

Thomas P. Brown has been advanced to the position of vice-president in charge of the chemical color division of Reichhold Chemicals, Inc., Brooklyn, New York. For the past two years, Mr. Brown has been general manager of the chemical color division, in which capacity he will continue.

K. B. Stuart has been advanced to the position of manager of sales, chemical division for The Colorado Fuel and Iron Corp. with general offices in Denver, Colorado.

David H. Wood, who was formerly associated with the Foote Mineral Co. Chemical Division, has accepted a position as assistant plant superintendent of the Henry Bower Chemical Mfg. Co.

Philip G. Murdoch has been appointed professor of chemical engineering at the A. and M. College of Texas. He was formerly with the Shell Oil Co.

Fred W. Cox, Jr., Maxine Brogden and Ann E. Perryman have joined the research staff of Southern Research Institute, Birmingham, Ala. Dr. Cox was formerly with the Goodyear Tire and Rubber Company.

Miriam Lauren and Gerald M. Compeau have recently joined the staff of Foster Dee Snell, Inc. Mrs. Lauren, who

## J. T. Baker Promotes Hafer and Slater

*G. B. Hafer (left) and Charles H. Slater have been advanced by the J. T. Baker Chemical Co. to general sales manager of laboratory chemicals division and division sales manager of fine and industrial chemicals, respectively.*

was formerly with the Rockefeller Institute for Medical Research, will have charge of a greatly enlarged micro-analytical laboratory. Mr. Compeau was recently research and analytical chemist with the Colgate-Palmolive Peet Co.

KEMPTON HARRISON has been made Director of Sales of Borden and Remington Co., chemical distributors, of Providence, R. I., and New Bedford, Mass.

MAJOR B. G. FEINBERG has returned to his civilian responsibilities, B. G. Feinberg Chemicals, 112-118 West 44th St., New York City, after four years service with the Army.

Transfer of WENDELL P. METZNER to Monsanto Chemical Company's Central Research Laboratories at Dayton, Ohio, where he will head the flexible-type high polymer group, has been announced. He will be succeeded as a group leader in the organic chemicals division research laboratories by HAROLD L. HUBBARD, who has been a research chemist since August, 1935. Announcement also was made that ALFRED G. ROSSOW is being transferred from Dayton to the St. Louis research laboratories.

PAUL C. JONES has been named field technical manager of the B. F. Goodrich Chemical Co., it has been announced by W. S. Richardson, president. Mr. Jones, with B. F. Goodrich since 1927, had been doing research before he became technical representative on chemical sales, from which he goes to his new post.

Appointment of JAMES L. NAYLOR, as assistant manager of the dyestuff department, Calco Chemical Division, American Cyanamid Co., Bound Brook, New Jersey, has been announced by J. Pfister, manager. Mr. Naylor for the past seven years has been manager of the Providence, Rhode Island, district sales office.

WALTER A. WACHHOLTZ, who was previously connected with the McCloskey Varnish Co., has become affiliated with Arthur C. Trask Co., as technical director.

MARY C. WORSHAM, first woman chemical engineer in the entire Sterling Drug, Inc., organization, has joined the staff of the Frederick Stearns & Co. Division, Detroit.

Graduated last February from the University of Michigan, Miss Worsham is on the factory manager's staff.

FRED MUELLER and W. D. BRAIDWOOD, Corn Products Refining Co., have been elected to the posts of vice-president and director respectively.

G. T. REICH has resigned his position as Technical Director of the Pennsylvania Sugar Company July 1 and is opening an office as consulting engineer at the following address: 1015 Packard Building, Philadelphia 2, Pa.

O. S. DUFFENDACK, director of research of the North American Philips Co., Inc., has been appointed vice-president and director of research. E. J. KELLY, manager of manufacturing, has been promoted to vice-president and general factory manager.

A. G. FRANKENHOFF has been made vice-president and general manager of the Dicalite Co., Chicago. He has been affiliated with the company as manager of the central division and for the past eight years has been manager of the Eastern division.

# CHEMICAL SPECIALTIES NEWS

## *Adhesive Division At Industrial Tape*

In addition to its present activities in the manufacture of pressure-sensitive industrial tapes, Industrial Tape Corporation announces the formation of an Adhesive Cement Division which is producing and servicing a line of rubber-based and resin-based cements. The new cements include special products for use in bonding and combining rubber, metals, plastics, textiles, wood, leather, and glass.

It is the Company's intention to develop and service tailor-made adhesive cements that will best serve manufacturers' individual needs. Industries with special cementing problems may address their inquiries to the Adhesive Cement Division, Industrial Tape Corporation, New Brunswick, N. J.

## *Clow Appointed to Gallowhur Post*

*Allan B. Clow has been appointed to the newly created position of executive vice president and general manager of Gallowhur Chemical Corporation, according to an announcement by George Gallowhur, president. Mr. Clow was formerly assistant to the general manager of Calco Chemical Division of American Cyanamid Company. Prior to his executive position at Calco he was connected with Johnson & Johnson.*

## *Colombia Plans Fertilizer Industry*

Colombia's Instituto de Fomento Industrial is taking steps to establish a fertilizer and lime industry, as an aid to that country's agriculture, according to the Inter-American Development Commission in Washington.

The Instituto has made plans for establishing at least three fertilizer and six lime plants throughout Colombia, it is reported by N. K. Ovalle, an industrial engineer retained by the Inter-American Development Commission, who recently returned from Colombia.

Mr. Ovalle has reported:

The highest yearly consumption of complete fertilizers in Colombia so far recorded is less than 4,000 tons, while it is estimated that the country's annual requirements for potato, sugar cane, wheat and cotton is approximately 138,000 tons.

There appears to be a possible market in Colombia within the next two or three years for approximately 40,000 tons of complete fertilizers per year. The success of developing a local market for complete fertilizers, however, naturally will depend on the intensity and effectiveness of a sales campaign, on the selling prices for the products and on the extent to which financial assistance is given to farmers.

The Instituto de Fomento Industrial has proposed installation of at least three fertilizer plants to utilize national materials, with such concentrated fertilizer materials as it may be necessary to import.

Lime deposits are liberally distributed throughout the country, thus making it possible to locate plants wherever they are needed. The six proposed plants are to have a total capacity of about 50,000 tons annually.

## *Stearns Plans Australian Expansion*

Expansion of the Australian operations of the Frederick Stearns & Co. Division, Sterling Drug, Inc., is planned by Noel F. Leggatt, general manager of the Australian branch upon his return to Sydney headquarters early in September after a two-months visit in this country.

Mr. Leggatt was making his first visit to the United States. He came to confer with James Hill, Jr., president of Sterling Drug, Inc., and with Dr. J. Mark Hiebert, vice-president and general manager of Stearns in Detroit.

## *Kieffer Joins Smith-Douglass*

Dale C. Kieffer, who has been Chief of the Agricultural Chemicals Section of the War Production Board for the past two years, has resigned from that position to join the Smith-Douglass Company, of Norfolk, Va., where he will have overall charge of production, research, and development for that company. He is succeeded in the WPB post by W. F. Corey, formerly Chief of the Phosphorus Unit. Prior to his connection with WPB, Mr. Corey was with the American Agricultural Chemical Co.

## *Bell Vice-President Of Lawrence Leather*

*Kenneth E. Bell, technical director in charge of the company's research and laboratories, has been elected a vice president of A. C. Lawrence Leather Company, of Peabody, Massachusetts. Mr. Bell was graduated from M.I.T. with a degree in chemical engineering. He is a consultant to the Office of Quartermaster General, Washington, D. C., and a member of the Research Laboratory Committee of the National Tanners' Council. Robert Sutherland, who has been with A. C. Lawrence Company since his graduation from M.I.T. in 1929, has been appointed assistant technical director.*

## *USDA Offices Combined*

Two branches of the Office of Materials and Facilities were combined August 1 when Dr. Guy F. MacLeod left his position as chief of the Chemicals and Fertilizers branch to enter private business. This branch became a division of the Farm Machinery and Supplies branch, which is headed by L. B. Taylor.

Dr. MacLeod joined the OMF staff in November 1943 as chief of the Chemicals division and became branch chief early this year. He has been on war leave from the University of California (Berkeley) where he directed research work in agricultural entomology. He has resigned from the University, however, and will join a Fresno firm manufacturing agricultural chemicals and fertilizers.

The Office of Materials and Facilities, under the direction of Frederic B. Northrup, is now composed of three branches: Containers and Packaging Branch, Program Branch, and Farm Machinery and Supplies Branch.

## *Whelan Heads Control At American Ferment*

S. D. Whelan, for the past four years chemist on the staff of the Winthrop Chemical Company, Inc., Rensselaer,

N. Y., has been appointed head of the control laboratory of the American Ferment Company, Inc., Trenton, N. J., it is announced by John D. Hawkins, vice president in charge of this subsidiary of Sterling Drug, Inc., New York. He succeeds Dr. N. F. Blau, resigned, and will have charge of laboratory control over all preparations produced in the Trenton plant.

### *Sinclair & Valentine Expand Coatings Division*

President A. J. Math of Sinclair & Valentine Co., recently announced completion of plans for expansion of manufacturing, research and development facilities of the company's Protective Coatings Division.

Active in the printing and lithographic ink field since 1890, the company is also engaged in the production of primers, coatings, baking enamels, paints, varnishes, lacquers, and compounds designed to meet specialized military requirements.

### *Peterson Joins Heyden Chemical*

Arthur F. Peterson has been appointed sales manager of the biologics department of the Heyden Chemical Corporation, New York. Mr. Peterson was previously associated with the Schering Corporation, Bloomfield, N. J., where he was manager of the domestic sales division and organized the professional service division of that company.

Among his duties with the Heyden organization, Mr. Peterson will have the responsibility of the sale of penicillin.

### *Stauffer Doubles Superphosphate Output*

The Stauffer Chemical Company recently announced that it had entered into long-term contracts for an additional source of phosphate rock and that it expects to double its output of superphosphate early in 1946.

The additional source of phosphate rock is located in Idaho in the heart of the Montana-Idaho phosphate deposit, largest in the world.

The Stauffer Chemical Company's plant facilities at Richmond and Los Angeles, Calif., will be doubled to take care of processing the additional raw material.

## Atomic Bomb

(*Continued from page 452*)

feet long and two-thirds underground. Adjacent to this canyon are the control rooms, analytical laboratories, and a laboratory for further purification of the plutonium after it has been decontaminated to the point of comparative safety.

Uranium slugs that have been exposed in the pile are transferred under water to the first of these cells and are dissolved. Subsequent operations are performed by pumping solutions or slurries from one tank or centrifuge to another.

By March 1, 1944, several grams of plutonium had been delivered by the Clinton plant. Efficiency of recovery from the uranium slugs was about 50 per cent at the start, and was later increased to 90 per cent.

#### THE HANFORD PLANT

Work was begun on the first Hanford production piles on June 7, 1943, and operation of the first pile began in September 1944. The site was originally laid out for five piles. Besides the piles, there are plutonium separation plants, pumping stations and water-treating plants. There is also a low power chain-reacting pile for materials testing. Not only are the piles themselves spaced several miles apart for safety, but the separation plants are well away from the piles and from each other.

"As of early summer 1945," Professor Smyth reports, "the five piles are operating at designed power, producing plutonium, and heating the Columbia River. The chemical plants are separating the plutonium from the uranium and from the fission products with better efficiency than anticipated. The finished product is being delivered."

# WAR REGULATIONS SUMMARY

ACETIC ACID, ACETIC ANHYDRIDE AND ACETALDEHYDE—(WPB) Schedule 26, Order M-300 revoked.

ACETONE AND DIACETONE — (WPB) Schedule 102, Order M-300 revoked.

ACETYLENE BLACK—(WPB) Schedule 28, Order M-300 revoked.

ACRYLIC MONOMER AND ACRYLIC RESIN —(WPB) Schedule 17, Order M-300 revoked.

ADIPIC ACID—(WPB) Schedule 55, Order M-300 revoked.

ALKANOLAMINES—(WPB) Schedule 83, Order M-300 revoked.

ALKYL AMINES—(WPB) Schedule 27, Order M-300 revoked.

ANILINE—(WPB) Schedule 42, Order M-300 revoked.

AMMONIUM SILICOFLUORIDE—(WPB) Schedule 29, Order M-300 revoked.

AROMATIC SOLVENTS—(WPB) Order M-150 revoked.

BARIUM CHEMICALS—(WPB) Schedule 31, Order M-300 revoked.

BENZALDEHYDE—(WPB) Schedule 7, Order M-300 revoked.

BENZENE—(WPB) Schedule 22, Order M-300 revoked.

BENZYL BENZOATE AND BENZYL CHLORIDE—(WPB) Schedule 105, Order M-300 revoked.

BISMUTH—(WPB) Order M-276 revoked.

BISMUTH CHEMICALS—(WPB) Schedule 88, Order M-300 revoked.

BUTYL ACETATE—(WPB) Schedule 65, Order M-300 revoked.

BUTYL ALCOHOL—(WPB) Schedule 66, Order M-300 revoked.

CADMIUM—(WPB) Order M-65 revoked.

CALCIUM CARBIDE—(WPB) Schedule 112, Order M-300 revoked.

CAMELBACK, RESTRICTIONS ON THE PRODUCTION OF—(WPB) Order L-345 revoked.

CARBON BLACK—(WPB) Schedule 32, Order M-300 revoked.

CARBON TETRACHLORIDE — (WPB) Schedule 78, Order M-300 revoked.

CASEIN—(WPB) Schedule 113, Order M-300 revoked.

CELLOPHANE—(WPB) Order L-20 revoked.

CELLULOSE ACETATE AND CELLULOSE ACETATE BUTYRATE MOLDING POWDER—(WPB) Schedule 52, Order M-300 revoked.

CELLULOSE ESTER FLAKE — (WPB) Schedule 50, Order M-300 revoked.

CELLULOSE ESTER SHEETS, RODS AND TUBES—(WPB) Schedule 51, Order M-300 revoked.

CHARCOAL—(WPB) Order M-289 revoked.

CHLORINATED PARAFFINS — (WPB) Schedule 27, Order M-300 revoked.

CHLORINE—(WPB) Order M-19 revoked.

CHROME PIGMENTS—(WPB) Order M-370 revoked.

CITRIC ACID—(WPB) Schedule 6, Order M-300 revoked.

COPPER—(WPB) Order M-9 revoked.

COPPER CHEMICALS—(WPB) Schedule 47, Order M-300 revoked.

COTTON LINTERS AND HULL FIBER—(WPB) Order M-12 revoked.

COTTON PULP CHEMICAL—(WPB) Order M-157 revoked.

COUMARONE-INDENE RESIN — (WPB) Schedule 110, Order M-300 revoked.

DDT—(WPB) Schedule 25, Order M-300 revoked.

DIHYDROXY-DICHLORO-DIPHENYL METHANE—(WPB) Schedule 115, Order M-300 revoked.

DIPHENYLAMINE—(WPB) Schedule 39, Order M-300 revoked.

DISTILLED SPIRITS—(WPB) Order M-69 revoked.

DYESTUFF—(WPB) Amendment to Order M-103, retroactive to July 1, permits consumers to increase their Class A and B dye allotment: to 25 per cent of their total Class A and B dye purchases in 1941 period.

ETHYL ACETATE—(WPB) Schedule 76, Order M-300 revoked.

ETHYL ETHER—(WPB) Schedule 91, Order M-300 revoked.

FERRO- AND FERRI-CYANIDES—(WPB) Schedule 40, Order M-300 revoked.

FERRO-CHROME, HIGH CARBON — (WPB) Order M-18-a, its Direction 1 and 2, and Order M-18-a-1 have been revoked. The issuance of Direction 7 to the steel Order M-21 reassumes controls on chrome metal and low-carbon ferrochrome.

FORMALDEHYDE AND PARAFORMALDEHYDE—(WPB) Schedule 9, Order M-300, revoked.

FUMARIC ACID—(WPB) Schedule 104, Order M-300, revoked.

GAS MASKS, MILITARY AND INDUSTRIAL —(WPB) Changes in Amendment 2 to Appendix 1 of Rubber Order R-1 permit masks to be made of either butyl or neoprene.

GASOLINE GUN INHIBITORS—(WPB) Schedule 69, Order M-300, revoked.

GAUZE, CHEMICALLY TREATED—(OPA) Order No. 73 under supplementary Order 94 establishes Special Maximum price of eight cents per square yard for corrosive sublimate gauze, effective July 31, 1945.

GLYCOL ETHERS—(WPB) Schedule 36, Order M-300, revoked.

GLYCOLS—(WPB) Schedule 15, Order M-300, revoked.

GUM ROSIN—(OPA) Ceiling prices have been increased 95 cents per hundred pounds, by Amendment 1 to Revised Maximum Price Regulation 561—Gum Naval Stores—effective August 13, 1945.

HEXAHYDRIC ALCOHOLS — (WPB) Schedule 20, Order M-300, revoked.

HEXAMETHYLENETETRAMINE — (WPB) Schedule 10, Order M-300, revoked.

HIGHER ALIPHATIC ALCOHOLS—(WPB) Schedule 33, Order M-300, revoked.

HIGH TEST CALCIUM HYPOCHLORITE—(WPB) Schedule 93, Order M-300, revoked.

HYDROQUINONE — (WPB) Schedule 101, Order M-300, revoked.

IPECAC AND EMETINE—(WPB) Schedule 86, Order M-300, revoked.

ISOPROPYL ACETATE—(WPB) Schedule 77, Order M-300, revoked.

ISOPROPYL ALCOHOL—(WPB) Schedule 12, Order M-300, revoked.

LEAD AND TINSCRAP—(WPB) Order M-72 revoked.

LEAD CHEMICALS—(WPB) Order M-384 has permitted a liberalization of quota restrictions affecting rubber compounding, gasoline refining and the production of red lead, white lead, decorative ceramics and decorative leaded glassware.

LIME—(OPA) An increase of $1.20 per net ton in northeastern producers' ceiling prices for building, chemical and industrial lime, excluding agricultural lime, effective August 13, 1945, has been brought about by Amendment 1 to Order 1 under Maximum Price Regulation 592.

LIQUID COMMODITIES—(ODT) Special permits to ship liquid commodities, other than petroleum and its products, into six Western States in cars of 8,000 gallons or more capacity, are no longer necessary, according to Special Direction 7—Revised 6.

MALEIC ANHYDRIDE AND MALEIC ACID —(WPB) Schedule 68, Order M-300, revoked.

MALEIC, FUMARIC, "CARBIC" AND PENTAERYTHRITOL OILS AND RESINS — (WPB) Schedule 103, Order M-300, revoked.

MARINE PAINTS, COMPONENTS OF — (WPB) Amendment to Order P-65 assigns AA-1 rating.

MATCHES—(WPB) Schedule 92, Order M-300, revoked.

METALLIC SODIUM—(WPB) Schedule 16, Order M-300, revoked.

METHYL ETHYL KETONE — (WPB) Schedule 64, Order M-300, revoked.

METHYL ISOBUTYL KETONE — (WPB) Schedule 24, Order M-300, revoked.

MICA—(WPB) Order M-101 revoked.

MICA SPLITTINGS—(WPB) Order M-10-A revoked.

MISCELLANEOUS CHEMICALS—(WPB) Order M-340 revoked.

MOLYBDENUM AND TUNGSTEN—(WPB) Orders M-369 and 369-a revoked.

NAPHTHALENE—(WPB) Schedule 38, Order M-300, revoked.

NAPHTHALENIC ACID AND NAPHTHENATES—(WPB) Schedule 117, Order M-300, revoked.

NITROGEN COMPOUNDS, ANHYDROUS AMMONIA—(WPB) For distribution

without allocation will be released monthly starting in September, for shipment to Puerto Rico and into states lying east of Montana, Wyoming, Colorado and Arizona under paragraphs (f) and (g) of Order M-300.

OILS FOR PROTECTIVE COATINGS — (WPB) Order M-332 revoked.

OSMIUM—(WPB) Order M-302 revoked.

PENTAERYTHRITOL — (WPB) Schedule 11, Order M-300, revoked.

PERCHLORETHYLENE—(WPB) Schedule 95, Order M-300, revoked.

PEROXYGEN CHEMICALS — (WPB) Schedule 5, Order M-300, revoked.

PHENOLIC RESIN AND PHENOLIC RESIN MOLDING COMPOUND—(WPB) Schedule 87, Order M-300, revoked.

PHOSPHATE PLASTICIZERS — (WPB) Schedule 61, Order M-300, revoked.

PHOSPHATE ROCK, FLUORIDE HARD, FINELY GROUND SIZE—(OPA) Amendment 3 to Revised Maximum Price Regulation 240, effective August 14, 1945, establishes new prices, 25 cents per ton higher (F.O.B. mines).

PHOSPHORIC ACID, BY-PRODUCT — (WPB) Schedule 81, Order M-300, revoked.

PHOSPHORUS — (WPB) Schedule 30, Order M-300, revoked.

PHTHALATE PLASTICIZERS — (WPB) Schedule 63, Order M-300, revoked.

PHTHALIC ALKYD RESINS — (WPB) Schedule 59, Order M-300, revoked.

PHTHALIC ANHYDRIDE—(WPB) Schedule 67, Order M-300, revoked.

PINE OIL—(WPB) Schedule 73, Order M-300, revoked.

PLATINUM—(WPB) Order M-162 revoked.

POLYETHYLENE—(WPB) Schedule 60, Order M-300, revoked.

POLYSTYRENE AND POLYDICHLOROSTYRENE—(WPB) Schedule 19, Order M-300, revoked.

POTASSIUM CARBONATE — (WPB) Schedule 85, Order M-300, revoked.

PROTECTIVE COATINGS—(WPB) Order 382 revoked.

PYRIDINE—(WPB) Order M-300, Schedule 109, revoked.

QUARTZ CRYSTALS—(WPB) Order M-146 revoked.

QUINACRINE—(WPB) Schedule 111, Order M-300, revoked.

RHODIUM—(WPB) Order M-95 revoked.

ROSIN, GUM AND WOOD — (WPB) Amendment to Order M-387 permits consumers to accumulate five month inventories, instead of three month inventories.

RUBBER PROCESSING MACHINERY AND EQUIPMENT—(WPB) Order L-143-A revoked.

SILICA AEROGEL—(WPB) Schedule 114, Order M-300, revoked.

SILICA GEL AND DESICCANT GRADE BENTONITE—(WPB) Schedule 53 and Schedule 84, Order M-300, revoked.

SILVER—(WPB) Order M-199 revoked.

SLAB ZINC—(WPB) Order M-11 revoked.

SODIUM CYANIDE—(WPB) Schedule 45, Order M-300, revoked.

SODIUM METASILICATE — (WPB) Schedule 106, Order M-300, revoked.

SODIUM PHOSPHATES—(WPB) Schedule 82, Order M-300, revoked.

STEARIC ACID, IMPORTED — (OPA) Maximum prices Amendment 48 to Maximum Price Regulation 53 became effective Aug. 18, 1945, and are the same as ceiling prices already in effect for equivalent grades and quantities of domestic stearic acids.

STYRENE AND DICHLOROSTYRENE — (WPB) Schedule 18, Order M-300, revoked.

SULFURIC ACID—(WPB) Schedule 74, Order M-300, revoked.

SYNTHETIC ORGANIC DETERGENTS — (WPB) Schedule 44, Order M-300, revoked.

TALC—(WPB) Order M-239, revoked.

TAR ACID OIL, CARBOLATES, PHENOLS AND SUBSTITUTED PHENOLS — (WPB) Order M-27 revoked.

THALLIUM CHEMICALS — (WPB) Schedule 107, Order M-300, revoked.

TOLUENE—(WPB) Schedule 21, Order M-300, revoked.

TRICHLORETHYLENE—(WPB) Schedule 94, Order M-300, revoked.

UREA AND MELAMINE ALDEHYDE RESINS—(WPB) Schedule 34, Order M-300, revoked.

VINYL POLYMER — (WPB) Schedule 54, Order M-300, revoked.

VITAMIN A — (WPB) Order M-373 revoked.

WHITE AMMONIUM CHLORIDE—(WPB) Schedule 116, Order M-300, revoked.

XYLENE (XYLOL) — (WPB) Schedule 23, Order M-300, revoked.

YELLOW IRON OXIDE — (WPB) Schedule 90, Order M-300 revoked.

ZINC OXIDE — (WPB) Order M-11-A revoked.

### *Supplementary Late Revocations*

AMMONIA, SYNTHETIC — (WPB) Schedule 79, Order M-300, revoked.

CHLORATE CHEMICALS—(WPB) Schedule 97, Order M-300, revoked.

CHROMIUM CHEMICALS, PRIMARY — (WPB) Schedule 62, Order M-300, revoked.

GLUE, HIDE, EXTRACTED BONE, AND GREEN BONE—(WPB) Schedule 8, Order M-300, revoked.

LIQUEFIED PETROLEUM GAS EQUIPMENT —(WPB) Order L-86 revoked.

NITROGEN COMPOUNDS — (WPB) Schedule 80, Order M-300, revoked.

PENICILLIN — (WPB) Schedule 58, Order M-300, revoked.

POTASH—(WPB) Schedule 98, Order M-300, revoked.

PYRETHRUM — (WPB) Schedule 48, Order M-300, revoked.

ROTENONE—(WPB) Schedule 49, Order M-300, revoked.

RESINS, NATURAL—(WPB) Schedule 96, Order M-300, revoked.

NOTE: Most of the above revocations were effective as of August 31. A few of them, however, do not take effect until September 30.

### *Personnel Shifts*

Edgar Pitzer, formerly head of the inorganic research group, Foote Mineral Company, has been elevated to director of research. Dr. Pitzer, before joining Foote Mineral Company last February, served several years as research engineer with Standard Oil Company of N. J.

# CANADIAN NEWS

*by W. A. JORDAN*

## *Canada a Major Uranium Source*

*With output increased 300 per cent by conversion from batch to continuous operation, the government-expropriated Eldorado Mining and Refining Co. provided much of the processed raw material for the atomic energy program.*

AFTER two years of ironclad censorship which expressly forbade any reference to, or discussion of, atomic explosive research by this column, a few of the highlights of Canada's work in this field may now be chronicled.

Basically, Canada's contribution to the atomic energy research was chiefly the supplying of the raw material—uranium—and the furnishing of research facilities for the most distinguished group of scientists ever assembled for a single investigation in any British country. Although the Dominion's part did not equal in money the hundreds of millions of dollars spent in the U. S. A. on the project, it did involve substantial expenditures — in research maintenance, expropriation and expansion of Eldorado Mining and Refining Co., and the construction of the Chalk River, radio-active materials plant.

In January, 1944, the government expropriated Eldorado Mining and Refining Co., which owned radium-uranium deposits in the Northwest Territories and the only refinery in Canada. Upon taking over the Eldorado refinery, which until a few years ago was the only such refinery in the United Nations, and is the world's second largest source of uranium, steps were taken to convert the plant from batch to continuous process, with a resultant 300 percent increase in output. Tailings piles were also thoroughly culled, for prior to 1937 uranium had been a comparative drug on the market and the refinery had been engaged essentially in the recovery of radium—in a ratio of 100 milligrams of radium to 800 pounds of uranium. The uranium output of the Eldorado project was shipped to the U. S. A. "for further processing."

Thereafter the Chalk River pilot plant, 100 miles north of Ottawa, was constructed by Defence Industries, Ltd., on a 10,000-acre site expropriated for the purpose. This unit is at present just coming into production. In addition, heavy water producing facilities were established at Trail, B. C., to provide supplies of the chemical to serve as a control for the release of the energy in the bomb.

*Canada is the chief present source of pitchblende, principal radium and uranium ore. An armed guard stands by as the ore is unloaded and checked at Fort Smith, Northwest Territory.*

Of major significance, now, is the fact that Reconstruction Minister C. D. Howe states that the Chalk River plant for the production of atomic bomb materials will continue to operate "as a permanent institution, and is expected to be the source of new radio-active material which will be valuable for the study of chemical and biological processes and for application in medicine."

### *Naugatuck to Make 2-4-D Weedkiller*

Naugatuck Chemicals, Ltd., Canadian subsidiary of U. S. Rubber Co., has begun pilot plant production of 2,4-dichlorophenoxyacetic acid, more popularly known as 2-4-D weedkiller, and according to Manager M. F. Anderson it is anticipated that small scale commercial output will be realized early next year. This chemical has not been manufactured in Canada heretofore, and such relatively small quantities as have been used experimentally to date have been imported from the U. S. A.

At the present time pilot plant studies are progressing on novel process modifications, and on the finalization of this work will depend the exact character of the equipment to be installed. Incidentally, the 2-4-D which is to be offered by Naugatuck will differ in some respects from that which is presently being offered on the U. S. market, and it is claimed that it will prove to be more attractive to the user as a result of some of these improvements. Experimental quantities are available to organizations interested in horticultural and agricultural research, colleges and schools, and other societies.

Current plans call for limited production in 1946 so that field tests may be checked carefully, and to permit the public to become acquainted with both its advantages and disadvantages. The chemical will probably be marketed as a liquid concentrate requiring water dilution, through established weedkiller distributors.

Although much publicity has been accorded 2-4-D in the past as a weedkiller for use on lawns, golf courses, parks, etc., major attention will be devoted by Naugatuck to the potential market volume existing in the suppression of weeds in field crops such as wheat, oats, barley, and other narrow leaf grains, in Canada's vast, basically agricultural, Western provinces.

### *B. F. Goodrich Chemical Co.*

The formation of the B. F. Goodrich Chemical Co as a division of the long-established B. F. Goodrich Rubber Co. of Canada, Ltd., has been announced recently by President G. W. Sawin. In his statement Mr. Sawin said: "Our expansion into the fields of chemistry, plastics, and synthetic rubbers, has made it desirable to establish this new company. Its present responsibilities include the sale in raw material form of Geon polyvinyl

resins, plastics, latices, and various rubber chemicals." H. P. Hawkins has been appointed general manager of the company.

Although Goodrich has in the past been marketing U. S. produced Geon resins in the increasingly competitive Canadian market, the formation of the new chemical division lends support to unofficial reports that Goodrich contemplates entering the Canadian field more aggressively in the future, with the construction of resin and chemical manufacturing facilities.

## *Swift Byproduct Program*

Swift Canadian Co., Ltd., subsidiary of Swift, Chicago, is completing a $700,000 unit for the manufacture of bone glues, as a primary step in its program for the further utilization of byproducts. Initial production, utilizing a process novel to Canada, is scheduled for October, with output to be sold mainly in the domestic market.

In addition, Swift plans the construction of a $250,000 chemical fertilizer mixing unit near Toronto for the production of its 4-12-4 Vigoro plant food. Rated capacity of the plant is placed at 10,000 tons per annum, with modified ammonium nitrate to be employed as one of the basic components.

Marketing plans call for extended distribution of both small package and bulk fertilizer, with initial operation of the new unit scheduled for January.

## *DDT Not for Export*

Production of DDT by Naugatuck Chemicals, Ltd., is being stepped up substantially as a result of increasing demand and prospective easing of restrictions on its sale. However, although it is probable that Canadian DDT may enter the export picture in the future, virtually all the augmented Canadian production will be sold domestically, for the present.

To date DDT has been made available to Canadian farmers in the form of stable and barn spray, but it is apparent that it will reach the public, in quantity and in more suitable form, by next season. Experimental work is being conducted by both Naugatuck and insecticide distributors on the preparation of DDT household sprays compounded with deodorized solvents, dusting powders, and aqueous emulsions, for 1946 distribution.

## *Woburn Expands*

Plans for expansion and diversification of product lines of Woburn Chemicals, Ltd., Toronto subsidiary of the Woburn Chemical Corporation, Harrison, N. J., were revealed recently by A. G. H. Reimold, president of both the companies.

Developments at the Toronto plant include the construction of two factory buildings and an extended laboratory, at a cost of about $100,000, for the production of a general line of oil chemicals for soap, paint, and varnishes. Hitherto, Woburn has confined its Canadian operations to dehydrated castor, blown castor, and other oils.

In commenting on its Canadian plans, Mr. Reimold predicted that fatty acids esterified with the higher alcohols such as pentaerythritol and sorbitol will play an important part in future paint developments, with a fair demand anticipated in the Dominion market.

Part of the new facilities will be operating by January, with Dr. Henry Strauss, formerly in charge of technical development at the Harrison unit, in charge of all manufacturing under Clifford Smith, Canadian general manager.

## *Canadian Aniline Purchases Hamilton Cotton Property*

Canadian Aniline & Extract Co., Ltd., has purchased the West Hamilton properties of the Hamilton Cotton Co. The plant is being modernized and newly equipped for production of synthetic resins, ethanolamines, oxalic acid and other of the company's line of textile chemicals.

# CHEMICAL ECONOMICS & STATISTICS

## *Soda Ash Sales Set Record*

Sales of natural sodium sulfates and carbonates increased in 1944 over 1943, carbonate sales establishing a new record, according to the Bureau of Mines, United States Department of the Interior. Sodium sulfate is used principally in the manufacture of kraft paper, glass, in stock feeds, and as a flux in metallurgy. Sodium carbonate is used on the Pacific coast mostly in glass making and in alkali cleansers. Sales data are given in the following table.

**Natural Sodium Sulfates and Sodium Carbonates Sold or Used by Producers in the United States, 1940-44**

| | *Sodium sulfates*[1] | | *Sodium carbonates*[2] | |
|---|---|---|---|---|
| *Year* | *Short tons* | *Value* | *Short tons* | *Value* |
| 1940 | 184,571 | $1,528,633 | 130,034 | $1,629,283 |
| 1941 | 154,327 | 1,443,137 | 146,677 | 1,822,986 |
| 1942 | 169,870 | 1,669,983 | 150,619 | 2,145,289 |
| 1943 | 160,622 | 1,553,549 | 165,993 | 2,544,086 |
| 1944 | 168,923 | 1,577,982 | 184,826 | 2,869,243 |

[1] Tonnage figures for sulfates include Glauber's salt converted to 100% $Na_2SO_4$ basis. In earlier mineral market reports of this series the figures given for sulfates include those for Glauber's salt not so converted and were as follows—1940: 187,233 tons; 1941: 157,524 tons; 1942: 175,033 tons; and 1943: 165,908 tons. Figures for 1940-42 include some burkeite.
[2] 1940-41: Soda ash, bicarbonate, and trona; 1942-44: Soda ash and trona.

The American Potash & Chemical Corporation increased its output of soda ash and desiccated sodium sulfate from its expanded facilities at Trona, Calif., using the brines of Searles Lake. The Arizona Chemical Co., 30 Rockefeller Plaza, New York City, continued its production of desiccated sodium sulfate from well brines at O'Donnell and Brownfield, Tex., for the sulfate pulp market. The Desert Chemical Co., 4031 Goodwin Avenue, Los Angeles 26, Calif., shipped desiccated sodium sulfate from stocks produced at its Dale Lake plant near Twentynine Palms, Calif. The Iowa Soda Products Co., Council Bluffs, Iowa (plant at Rawline, Wyo.), continued its production of Glauber's salt for stock feed. The Natural Soda Products Co., 405 Montgomery Street, San Francisco, recovered sodium carbonate at Keeler, Calif., from the brines of Owens Lake, Inyo County. The Ozark Chemical Co., Mid-Continent Building, Tulsa, Okla., recovered sodium sulfate at its Monahans (Tex.) plant, largely for sale to sulfate pulp mills. W. E. Pratt, Casper, Wyo., mined Glauber's salt near Casper for stock feed. Pacific Alkali Co., 1223 Pacific Mutual Bldg., Los Angeles 14, Calif., produced soda ash and trona from the brines of Owens Lake. The firm was purchased on December 1, 1944, by Pittsburgh Plate Glass Co., Columbia Chemical Division, 1223 Pacific Mutual Bldg., Los Angeles 14, Calif., which continued production. West End Chemical Co., 608 Latham Square Bldg., Oakland 12, Calif., increased its production of sodium carbonate from Searles Lake. Nearly all the producers were affected by a severe labor shortage, and the maintenance of production at such high levels represented a real achievement.

## *Sulfur Production Up in April*

Production of native sulfur in April slightly exceeded the high levels reached in previous months in 1945 according to figures released by the Bureau of Mines, United States Department of the Interior. Mine shipments were 24 per cent greater than in April, 1944, and as sales exceeded production, producers' stocks were reduced by 39,515 tons.

**Production, Mine Shipments, Apparent Sales, and Producers' Stocks of Native Sulfur in the United States in Selected Periods, 1944-45, in Long Tons**

| *Period* | *Production* | *Fine shipments* | *Apparent sales** | *Producers' stocks*** |
|---|---|---|---|---|
| March 1944 | 229,779 | 296,672 | 280,492 | 4,251,744 |
| April 1944 | 271,903 | 278,311 | 278,820 | 4,244,827 |
| March 1945 | 290,268 | 285,543 | 363,327 | 3,923,373 |
| April 1945 | 292,229 | 344,673 | 331,744 | 3,883,858 |

* Calculated from production and change in stocks during the period.
** Producers' stocks at mines, in transit, and in warehouses at end of period.

## *Lithium Output Sets All-Time High*

Domestic production of the lithium minerals and compounds, spodumene, amblygonite, lepidolite and dilithium sodium phosphate reached an all-time high in 1944, according to the Bureau of Mines, United States Department of the Interior. The chief gain in tonnage was in spodumene, the output of which increased 87 percent over the previous year's total. However, percentagewise the largest gain was in dilithium sodium phosphate, which increased 187 percent. The output of amblygonite and lepidolite were respectively 30 and 38 percent below the previous year's total. With the exception of lepidolite for the glass making industry, for which we were largely dependent on material from Southwest Africa, the 1944 output of lithium minerals was adequate for all requirements.

The Solvay Process Company plant at Kings Mountain, N. C., although not reaching maximum output, was the major producer, followed by the Black Hills Tin Co. at Tinton, S. Dak. The latter plant operated only from February through August of 1944. A new lepidolite producer, the Hayden Mining Company of Colorado Springs, Colo., began operations on the Brown Derby Claims in Gunnison County in June 1944. The increase in output of dilithium sodium phosphate is attributed to the installation of a flotation process at Searles Lake, Calif., by the American Potash & Chemical Corporation. Most of the Army contracts expired December 31, 1944, and have not been renewed; as a result the Solvay Process Company plant at Kings Mountain, N. C., ceased production temporarily in February 1945.

Shipments of lithium ores and compounds from 1940 through 1944 are shown in the following table. An approximate figure for the total $Li_2O$ content, obtained from the average $Li_2O$ percent of the ore reported by the producers is also included.

Markets for lithium ores and compounds are expanding rapidly. However, because of wartime restrictions on purchase of machinery, which have prevented the Solvay Process Company from completing its milling unit at the Kings Mountain, N. C., plant, and as many of the postwar uses will be new, it is not possible at this time to forecast post-war prices and markets for lithium minerals.

**Shipments of Lithium Ores and Compounds from Mines in the United States, 1940-44**

| *Year* | *Ore (short tons)* | *Value* | *$Li_2O$ (short tons)* | *Year* | *Ore (short tons)* | *Value* | *$Li_2O$ (short tons)* |
|---|---|---|---|---|---|---|---|
| 1940 | 2,011 | $80,679 | 113 | 1943 | 8,155 | $314,660 | 463 |
| 1941 | 3,832 | 115,718 | 209 | 1944 | 13,319 | 552,977 | 848 |
| 1942 | 5,405 | 243,516 | 299 | | | | |

## *Talc, Pyrophyllite Production Lower*

Mined production and sales of talc, pyrophyllite, and ground soapstone declined in 1944 from the high levels of 1943, according to reports from the pro-

ducers to the Bureau of Mines, United States Department of the Interior. The total value of sales was likewise slightly less than the record high value of 1943. Only sales of crude material increased either in quantity or value.

Pyrophyllite resembles talc in certain physical properties and is interchangeable with talc in some uses, although during recent years certain specialized uses for pyrophyllite have developed. It is a hydrous aluminum silicate, whereas talc is a hydrous magnesium silicate. Production and sales figures for pyrophyllite for 3 years are now available.

**Salient Statistics of the Talc, Pyrophyllite[1], and Ground-Soapstone Industries in the United States, 1943-44**

| | 1943 | | 1944 | |
|---|---|---|---|---|
| | Short tons | Value | Short tons | Value |
| Mined: | | | | |
| Total | 436,249 | (2) | 418,228 | (2) |
| Used by producers | 382,668 | (2) | 353,209 | (2) |
| Sold by producers: | | | | |
| Crude | 30,200 | $289,563 | [3]45,654 | [3]$514,476 |
| Sawed and manufactured | 1,669 | 316,973 | 938 | 223,924 |
| Ground | 380,999 | 4,514,878 | 352,271 | 4,279,062 |
| | 412,868 | 5,121,414 | 398,863 | 5,017,462 |

[1] In 1943: Mined, 64,198 short tones. Sold crude, 5,432 tons, $34,306; ground, 56,710 tons, $460,485; total, 62,142 tons, $494,791. In 1944: Mined, 67,252 short tons. Sold—crude, 5,683 tons, $52,343; ground, 60,560 tons, $504,739; total, 66,243 tons, $557,082.
[2] Data not available.
[3] Includes pinite from Nevada.

Pyrophyllite was in short supply early in 1944 due to the increased demand for it as an insecticide carrier, but increased production facilities relieved the situation later in the year.

The return to peacetime conditions after the cessation of World War II undoubtedly will reduce the domestic demand for talc, pyrophyllite, and ground soapstone. There will also be changes in importance of the relative sources of supply. Domestic production may be expected to be less, and imports greater, but probably not sufficiently so as to offset the decline in domestic production. Sales for certain war-stimulated uses—such as for non-reflecting paints for ship camouflage, for insecticides for foreign service, for foundry facing and for metal-workers' crayons for the iron and steel industry—may drop considerably. Other newly-developed wartime uses applicable to peacetime conditions may help to maintain sales. War-developed extruded talc metal workers' crayons, however, although supplementing sawed crayons in wartime could cut into the peacetime demand for crayons of that type.

According to Newcomb (Newcomb, Rexford, Jr., The Ceramic Industry: New and Postwar: *Bull. Am. Ceram. Soc.*, Vol. 24, No. 2, Feb. 15, 1945, pp. 46-55) "Steatite may replace mica in electronic equipment. Improved production methods in civilian industries will find many new applications for electronic controls, so that postwar demand for steatite may reasonably be expected to exceed the prewar

## Chemicals: United States Production, Consumption, and Stocks, April 1945

The data given in the following table supplement the figures released beginning March 1, 1944, in the Facts for Industry Series 6-2-1 to 6-2-16. Information concerning the limitations of the data, the completeness of coverage, and the selection of items were given in the Series 6-2-1 report.

In the table, production (except as noted in footnote 10) includes material produced whether consumed in the producing plants or sold. Consumption represents consumption at producing plants only; it includes material produced in such plants, or material purchased or transferred from other plants. Stocks are company stocks, as of the last day of the year or month, located at plant, in transit, or in warehouse, and include purchase as well as produced material.

(In pounds, except that creosote oil is expressed in gallons.)

| Item | April 1945 Production | April 1945 Consumption | Stocks |
|---|---|---|---|
| Acetanilide (technical and U.S.P.) | 627,308 | [4] | 235,822 |
| Acetic acid (synthetic)[1] | 22,564,074 | 22,774,619 | 5,879,194 |
| Acetic acid (natural, including that from calcium acetate)[2] | 3,081,745 | [4] | 1,672,396 |
| Acetic anhydride[3] | 948,074 | Published quarterly | 995,869 |
| Acetysalicylic acid (Aspirin) | 6,479,005 | [4] | 2,315,653 |
| n-Butyl acetate | 11,152,804 | 757,748 | 10,675,836 |
| Creosote oil, tar distillers[5] | 3,111,764 | 27,453 | 958,558 |
| Creosote oil, byproducts[6] | 815,613 | [4] | 407,210 |
| Cresols, meta-para[7] | [4] | [4] | 11,543 |
| Cresols, ortho-meta-para[7] | 2,379,958 | [4] | 812,032 |
| Cresylic acid, crude | 2,730,465 | [4] | 1,323,607 |
| Cresylic acid, refined[7] | 8,296,693 | [4] | 2,843,322 |
| Diethyl ether (all grades) | 9,793,282 | 1,345,603 | 4,785,283 |
| Ethyl acetate (85 percent) | 380,755 | [4] | 214,150 |
| Lactic acid (edible) | 375,396 | 7,389 | 242,804 |
| Lactic acid (technical) | 2,366,809 | [4] | 848,243 |
| Methyl chloride (all grades) | 8,000,052 | [4] | 2,319,868 |
| Naphthalene, less than 79° C. (coke-oven operators)[8] | [10]17,359,596 | [4] | 7,202,370 |
| Naphthalene, less than 79° C. (tar distillers)[9] | 6,157,904 | 3,471,044 | 2,904,859 |
| Naphthalene, refined (79° C. and over) | 1,703,315 | [4] | 265,728 |
| Oxalic acid (technical) | 16,652 | [4] | 33,593 |
| Phenobarbital and sodium salts | 11,582,105 | 2,929,477 | 2,355,535 |
| Phthalic anhydride | [4] | 3,302 | 25,836 |
| Riboflavin (for human use) | 553,497 | 61,558 | 544,486 |
| Sulfa drugs (total)[11] | | | |

[1] Excludes statistics on recovered 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 Economic 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.

## Chemicals: United States Production, Consumption, and Stocks, April 1945

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.**

| Chemical and Basis | Unit | April (Preliminary) Production | Consumption in producing plants | Stocks at producing plants, end of month |
|---|---|---|---|---|
| Acetylene: | | | | |
| For use in chemical synthesis | M cu. ft. | (1) | (1) | (1) |
| For commercial purposes | M cu. ft. | (1) | | |
| Aluminum chloride: | | | | |
| Anhydrous and crystal (100% $AlCl_3$) | M pounds | 4,982 | (2) | 2,799 |
| Solution (32° Be') | M pounds | 1,096 | ... | 462 |
| Aluminum sulfate: | | | | |
| Commercial (100% $Al_2(SO_4)_3$) | M pounds | (3) | (3) | (3) |
| Iron free (100% $Al_2(SO_4)_3$) | M pounds | (3) | (3) | (3) |
| Synthetic anhydrous ammonia (100% $NH_3$)[4] | Short tons | 45,581 | 22,406 | 4,301 |
| Ammonium chloride (100% $NH_4Cl$) | M pounds | 5,734 | ... | 1,652 |
| Barium sulfate (Blanc fixe') (100% $BaSO_4$) | M pounds | 5,249 | 3,736 | 4,558 |
| Bleaching powder (35-37% Available $Cl_2$) | M pounds | 2,662 | ... | 485 |
| Calcium acetate (80% Ca $(C_2H_3O_2)_2$) | M pounds | 519 | ... | 153 |
| Calcium arsenate (100% $Ca_3(AsO_4)_2$) | M pounds | 1,566 | (2) | 14,679 |
| Calcium carbide (Commercial) | Short tons | (1) | (5) | (1) |
| Calcium hypochlorite (true) (70% Available $Cl_2$) | M pounds | 1,254 | (2) | 853 |
| Calcium phosphate: | | | | |
| Monobasic (100% $CaH_4(PO_4)_2$) | M pounds | 4,722 | (2) | 4,965 |
| Dibasic (100% $CaHPO_4$) | M pounds | 4,020 | (2) | 2,518 |
| Carbon, activated[6] | M pounds | 5,105 | (2) | 4,611 |
| Carbon black (Channel): | | | | |
| Rubber grade | M pounds | 38,511 | ... | 8,125 |
| Other than rubber grade | M pounds | 2,658 | ... | 11,909 |

## Chemicals: United States Production, Consumption, and Stocks, April 1945 (cont'd)

| Chemical and basis | Unit | April (Preliminary) Production | Consumption in producing plants | Stocks at producing plants, end of month |
|---|---|---|---|---|
| **Carbon dioxide:** | | | | |
| Liquid and gas | M pounds | (1) | (1) | (1) |
| Solid (dry ice) | M pounds | (1) | ... | (1) |
| **Chlorine** | Short tons | 103,478 | 60,350 | 5,875 |
| **Chrome green (C. P.)** | M pounds | 407 | 34 | 997 |
| **Chrome yellow and orange (C. P.)** | M pounds | 3,552 | 286 | 2,004 |
| **Copper acetoarsenite (Paris green)**[6] | M pounds | (1) | (2) | (1) |
| **Hydrochloric acid (100% HCl)** | Short tons | 37,597 | 23,461 | 2,984 |
| **Hydrogen** | Millions of cubic feet | (1) | (1) | (5) |
| **Hydrogen peroxide (100 volumes)** | M pounds | 2,779 | (2) | 1,352 |
| **Lamp black** | M pounds | 1,156 | (2) | 485 |
| **Lead arsenate (acid and basic)** | M pounds | (1) | (1) | (1) |
| **Iron blue (C. P.)** | M pounds | 813 | 103 | 791 |
| **Lead oxide:** | | | | |
| Red (C. P.) | M pounds | 7,845 | 325 | 3,953 |
| Yellow (C. P.) | M pounds | 27,404 | 8,943 | 8,263 |
| **Methanol:** | | | | |
| Natural (80% $CH_3OH$) | M gallons | 293 | (5) | 446 |
| Synthetic (100% $CH_3OH$) | M gallons | 6,378 | (2) | (2) |
| **Molybdate chrome orange (C. P.)** | M pounds | 135 | (2) | 152 |
| **Nitric acid (100% $HNO_3$)** | Short tons | 40,053 | 34,096 | 5,788 |
| **Nitrous oxide** | M gallons S.T.P. | (1) | ... | (1) |
| **Oxygen** | M cu. ft. | (1) | (1) | (7) |
| **Phosphoric acid (50% $H_3PO_4$)** | Short tons | 59,502 | 50,509 | 13,985 |
| **Potassium bichromate and chromate (100%)** | M pounds | 516 | ... | 411 |
| **Potassium hydroxide (caustic potash) (100% KOH)** | Short tons | 4,759 | 784 | 1,672 |
| **Soda ash (Commercial sodium carbonate):** | | | | |
| Ammonia soda process— | | | | |
| Total wet and dry (98-100% $Na_2CO_3$)[8] | Short tons | 378,385 | | |
| Finished light (98-100% $Na_2CO_3$)[9] | Short tons | 210,130 | 53,526 | 37,284 |
| Finished dense (98-100% $Na_2CO_3$) | Short tons | 114,133 | 1,815 | 12,510 |
| Natural[10] | Short tons | (3) | ... | (3) |
| **Sodium bicarbonate (refined) (100% $NaHCO_3$)** | Short tons | 15,407 | (2) | 4,073 |
| **Sodium bichromate and chromate (100%)** | Short tons | 6,852 | (2) | 847 |
| **Sodium bisulfite (100% $NaHSO_3$)** | M pounds | 3,486 | (2) | 1,139 |
| **Sodium hydrosulfide (100% NaSH)** | M pounds | 1,959 | (2) | 491 |
| **Sodium hydrosulfite (100% $Na_2S_2O_4$)** | M pounds | 3,174 | (2) | 904 |
| **Sodium hydroxide (caustic soda):**[11] | | | | |
| Electrolytic process— | | | | |
| Liquid (100% NaOH) | Short tons | 97,440 | 52,369 | 57,037 |
| Solid (100% NaOH) | Short tons | 18,577 | | |
| Lime-soda process— | | | | |
| Liquid (100% NaOH) | Short tons | 64,021 | | |
| Solid (100% NaOH) | Short tons | 19,862 | | |
| **Sodium phosphate:** | | | | |
| Monobasic (100% $NaH_2PO_4$) | Short tons | (1) | (2) | (1) |
| Dibasic (100% $Na_2HPO_4$) | Short tons | (1) | (2) | (1) |
| Tribasic (100% $Na_3PO_4$) | Short tons | (1) | (1) | (1) |
| Meta (100% $NaPO_3$)[6] | Short tons | (1) | (2) | (1) |
| Tetra (100% $Na_4P_2O_7$) | Short tons | (1) | (1) | (1) |
| **Sodium silicate:** | | | | |
| Soluble silicate glass, liquid and solid (anhydrous) | Short tons | 36,796 | 3,311 | 43,455 |
| **Sodium sulfate:** | | | | |
| Anhydrous (refined) (100% $Na_2SO_4$) | Short tons | (1) | (2) | (1) |
| Glauber's salt (100% $Na_2SO_4.10H_2O$)[10] | Short tons | (1) | (2) | (1) |
| Salt cake (crude) (commercial)[10] | Short tons | (1) | (2) | (1) |
| **Sulfur dioxide** | M pounds | (1) | (1) | (1) |
| **Sulfuric acid:**[10] | | | | |
| Total (100% $H_2SO_4$) | Short tons | 834,152 | ... | ... |
| Chamber process (100% $H_2SO_4$) | Short tons | 262,387 | ... | ... |
| Contact process (100% $H_2SO_4$)[12] | Short tons | 571,765 | ... | 230,858 |
| Net, contact process (100% $H_2SO_4$)[12 13] | Short tons | 475,590 | ... | ... |
| **White lead:** | | | | |
| Basic lead carbonate (C. P.) | Short tons | 3,432 | 989 | 2,566 |
| Basic lead sulfate (C. P.) | Short tons | 781 | ... | 79 |
| Zinc yellow (zinc chromate) (C. P.) | Short tons | 1,514 | (2) | 430 |

[1] Data by months are collected on a quarterly report form and are presented in releases in this "Facts for Industry" series covering the months of March, June, September and December.
[2] Data cannot be published without disclosing operations of individual establishments.
[3] Not yet available.
[4] Data for a small amount of aqua ammonia are included in the figures reported by one company.
[5] Not available; see "Facts for Industry," Series 6-1-1.
[6] Revised figures for earlier months will be shown in a subsequent release of this series.
[7] Data for oxygen stocks are no longer collected.
[8] 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.
[9] Not including quantities converted to finished dense soda ash.
[10] Natural soda ash, Glauber's salt, crude salt cake and sulfuric acid data collected in cooperation with Bureau of Mines.
[11] Production figures represent total production of liquid material, including quantities evaporated to solid caustic and reported as such. Consumption figures represent quantities of both liquid and solid caustic consumed in producing plants exclusive of quantities of ligid caustic evaporated to solid. Stocks figures include quantities on hand of liquid and solid material.
[12] Includes sulfuric acid of oleum grade.
[13] Excludes spent acid. For detailed explanation, see "Facts for Industry," Series 6-1-1.
[r] Revised.

rate of production. An annual demand for 6 or 7 million dollars worth of steatite is a realistic estimate."

Only one producing company is as yet handling talc by flotation processes to increase the grade of the product, but other companies are reported as showing an interest in flotation, and the beneficiation of domestic talcs to make them suitable for radio insulators may yet form an important source of steatite talc.

Pyrophyllite is reported to be an ideal carrier or diluent for the chemical DDT for insecticides in typhus areas, and for rotenone, pyrethrum, and nicotine in the manufacture of agricultural insecticides. Its use in this application probably will increase when the active ingredients become available.

With the end of the war in Europe, import trade in talc of steatite and cosmetic grades from various European countries undoubtedly will revive further. Stoppage of the Asiatic phase of the war will likewise release Manchurian and other Asiatic talcs for importation into the United States.

## *Vermiculite Output Higher*

Sales of cleaned and screened vermiculite in 1944 as reported by producers to the Bureau of Mines, United States Department of the Interior, reached 54,116 short tons valued at $541,744. This represents an increase of 16 percent above the 46,645 tons valued at $471,595 produced in 1943, and approaches very closely the all-time high of 57,848 tons in 1942.

The bulk of the production in 1944, as in previous years, came from the Universal Zonolite Insulation Company's mine at Libby, Mont. Several new companies carried on development work in Colorado in 1944, and expected to produce early in 1945.

Screened vermiculite brings $8 to $12 a short ton, f.o.b. mine. However, most of the material reaches the consuming market in the exfoliated form. The price for exfoliated vermiculite is quoted at 70 cents to $1.25 per bag, each bag containing 4 cubic feet weighing 25 pounds, or $56 to $100 a short ton, f.o.b. works. Assuming a value of $75 a ton for exfoliated material, and a 10 percent loss in volume on exfoliating, the value of sales in 1944 would be approximately $3,652,800.

Two new agricultural uses have been reported for exfoliated vermiculite—as a seed starter in place of peat-moss, and as an agricultural mineral admixture that acts as a sub-irrigation and mulching agent, to improve garden and lawn soil.

Wartime conservation of fuel has not only increased the uses and value of insulating materials, but has also been instrumental in lowering the weight specifications for these materials. It seems probable, therefore, in view of the lighter

weight of glass wool and some rock wool insulation products, that the postwar market for exfoliated vermiculite will be largely in the field of light weight aggregate for concrete and structural and refractory uses.

## *Refractories' Output Deficient of Demand*

Domestic production of refractory and low-iron glass grade kyanite in 1944 did not meet requirements, according to the Bureau of Mines, United States Department of the Interior, because of the complete shut down on January 5, of the Yancey Cyanite Company operations at Burnsville, N. C., the sole producer of the low-iron material; and equipment and manpower shortages at the Kyanite Products Corporation plant near Farmville, Va. The latter corporation, the only large domestic producer of refractory grade kyanite, was purchased in February 1945, by the Kyanite Mining Corporation of Cullen, Va. Spodumene and topaz have been used as substitutes for glass grade kyanite.

Production of andalusite at White Mountain, Mono County, Calif., by Champion Sillimanite, Inc., Merced, Calif., decreased slightly from the 1943 level. The production of dumortierite at Oreana, Pershing County, Nev., by the same company—the only domestic producer of either mineral in 1944, also decreased. This material was shipped to the parent firm, Champion Spark Plug Co., Detroit, Mich., for use in spark plug cores, and other electrical porcelains.

**Shipments of Domestic Kyanite 1940-44**

| *Year* | *Short tons* | *Value* |
|---|---|---|
| 1940 | 4,241 | $ 93,716 |
| 1941 | 8,335 | 175,581 |
| 1942 | 8,708 | 190,750 |
| 1943 | 9,561 | 238,649 |
| 1944 | [1] | [1] |

[1] Not available for publication.

The Bureau of Mines is investigating the possibilities of the domestic production of sillimanite from deposits in Georgia, South Carolina, New Hampshire, and Utah. The deposits in the southern States consist of twenty bodies of sillimanite schist, ranging in width from a few feet to 200 feet, which extend in a northeasterly direction from Talbotton, Georgia, to Spartanburg, South Carolina, and appear more promising than the deposits in the Monadnock region of New Hampshire and those near Troy, Latah County, Idaho.

The market for domestic kyanite may show an increase because of improvements in mining and milling technique, and because of the trend toward mixing kyanite and topaz to obtain a refractory product with a high pyrometric cone rating. Prices should be steady but will be influenced by the change in southern freight rates. This effect, however, will not be considerable.

## Factory Consumption of Primary Animal and Vegetable Fats and Oils, by Uses, During the First Quarter of 1945

According to the report on animal and vegetable fats and oils released recently by J. C. Capt, Director of the Census, about 55 percent of total factory consumption, other than crude oils refined, was used in the production of soap and shortening, followed in order of importance by oleomargarine, and paint and varnish. Primary oils winterized constituted eight percent of the total.

Oils subjected to hydrogenation have been reported as used in the products for which they were intended. Considerable quantities of oils and fats shown as being used in refining and subjected to sulphonation also have been included in the totals shown for the various classes of products. For example, refined cottonseed oil reported as used in shortening was derived from crude oil previously reported as used in refining. Oils and fats shown as used in fat splitting do not include those oils and fats used for fat splitting for the production of soap during a later period. The data given pertaining to the factory consumption of animal and vegetable fats and oils do not include consumption in homes, hotels, bakeries, or by local contractors.

(Quantities in thousands of pounds)

| *Item* | *Total* | *Used in refining* | Processed in— *Total* | *Fat splitting (hydrolysis)* | *Winterising and pressing except for salad oil manufacture* | *Sulphonation* | Used in Production of— *Soap* | *Paint & varnish* | *Linoleum & oilcloth* | *Printing inks* | *Lubricants & greases* | *Other* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | | 881,849 | 1,602,055 | 98,091 | 30,941 | 9,998 | 519,920 | 126,640 | 20,089 | 9,626 | 26,061 | 117,521 |
| *Vegetable Oils* | | | | | | | | | | | | |
| Cottonseed, crude | 440,734 | 440,495 | 239 | ..... | ..... | ..... | 125 | 1 | ..... | ..... | 56 | 57 |
| Cottonseed, refined | 330,886 | ..... | 330,886 | ..... | ..... | 207 | 124 | 14 | ..... | 1 | 58 | 616 |
| Peanut, crude | 35,359 | 35,343 | 16 | ..... | ..... | 3 | ..... | ..... | ..... | 1 | ..... | 12 |
| Peanut, refined | 16,244 | ..... | 16,244 | ..... | ..... | 651 | 37 | ..... | ..... | ..... | ..... | 844 |
| Cocoanut, crude | 41,205 | 19,583 | 21,622 | 11,001 | ..... | 33 | 9,532 | ..... | ..... | ..... | 1 | 1,055 |
| Cocoanut, refined | 17,683 | ..... | 17,683 | 9,107 | ..... | 1 | 8,397 | ..... | ..... | ..... | ..... | 70 |
| Corn, crude | 56,955 | 56,329 | 626 | ..... | ..... | 100 | 201 | 2 | ..... | ..... | ..... | 323 |
| Corn, refined | 8,450 | ..... | 8,450 | ..... | ..... | 113 | 20 | 1 | ..... | 2 | ..... | 148 |
| Soybean, crude | 325,395 | 321,524 | 3,871 | ..... | ..... | 118 | 767 | 567 | ..... | ..... | 20 | 2,399 |
| Soybean, refined | 247,927 | ..... | 247,927 | ..... | ..... | 133 | 416 | 4,722 | ..... | 6 | 75 | 6,624 |
| Olive, edible | 49 | ..... | 49 | ..... | ..... | ..... | 13 | ..... | ..... | ..... | ..... | 8 |
| Olive, inedible | 103 | ..... | 103 | ..... | ..... | 2 | 91 | ..... | ..... | ..... | ..... | 10 |
| Olive, sulphur oil or olive foots | 511 | ..... | 511 | ..... | ..... | ..... | 511 | ..... | ..... | ..... | ..... | ..... |
| Palm kernel, crude | 5,597 | 3,591 | 2,006 | ..... | ..... | ..... | 2,004 | ..... | ..... | ..... | ..... | 2 |
| Palm kernel, refined | 2,177 | ..... | 2,177 | ..... | ..... | ..... | 2,138 | ..... | ..... | ..... | ..... | ..... |
| Palm, crude | 14,394 | 52 | 14,342 | ..... | ..... | ..... | 4,445 | ..... | ..... | ..... | 41 | 9,856 |
| Palm, refined | 59 | ..... | 59 | ..... | ..... | ..... | 54 | ..... | ..... | ..... | ..... | 5 |
| Babassu, crude | 3,431 | 1,198 | 2,233 | ..... | ..... | ..... | 2,233 | ..... | ..... | ..... | ..... | ..... |
| Babassu, refined | 1,284 | ..... | 1,284 | ..... | ..... | ..... | 1,282 | ..... | ..... | ..... | 1 | 1 |
| Rapeseed | 5,699 | ..... | 5,699 | ..... | ..... | 14 | ..... | 1 | ..... | 5 | 4,242 | 1,437 |
| Linseed | 124,145 | ..... | 124,145 | 269 | ..... | 61 | 229 | 77,443 | 16,923 | 8,865 | 1,347 | 19,008 |
| China wood, or tung | 4,138 | ..... | 4,138 | ..... | ..... | ..... | ..... | 3,370 | 250 | 19 | ..... | 499 |
| Perilla | 78 | ..... | 78 | ..... | ..... | ..... | ..... | 67 | ..... | 10 | ..... | 1 |
| Castor No. 1, crude | 29,610 | ..... | 29,610 | 39 | ..... | 1,085 | 237 | 2,399 | 18 | 238 | 117 | 25,477 |
| Castor No. 3, crude | 13,658 | 10 | 13,648 | 5,655 | ..... | 2,514 | 357 | 202 | 185 | 180 | 70 | 4,485 |
| Castor, dehydrated | 18,241 | ..... | 18,241 | 26 | ..... | ..... | ..... | 16,783 | 292 | 78 | 45 | 1,017 |
| Castor, sulphonated | 1,604 | ..... | 1,604 | ..... | ..... | ..... | 134 | 93 | ..... | 4 | 97 | 1,276 |
| Sesame | 417 | 99 | 318 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 252 |
| Oiticica | 3,641 | ..... | 3,641 | ..... | ..... | ..... | ..... | 3,079 | 86 | 89 | ..... | 387 |
| Other vegetable | 15,934 | 849 | 15,085 | ..... | ..... | 222 | 1,670 | 182 | ..... | 4 | ..... | 1,258 |
| *Animal Fats* | | | | | | | | | | | | |
| Lard, rendered (including neutral lard and rendered pork fat) | 49,730 | ..... | 49,730 | ..... | 423 | ..... | 36,798 | ..... | ..... | 1 | 74 | 26 |
| Stearin, animal, edible | 6,425 | ..... | 6,425 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 45 |
| Olee oil | 3,999 | ..... | 3,999 | ..... | ..... | ..... | 867 | ..... | ..... | ..... | 6 | 15 |
| Tallow, edible | 27,120 | ..... | 27,120 | ..... | ..... | 74 | 7,932 | ..... | ..... | 1 | 86 | 237 |
| Tallow, inedible | 328,757 | ..... | 328,757 | 39,452 | 4,173 | 1,352 | 270,914 | 2 | ..... | 2 | 8,725 | 4,137 |
| Neat's-foot oil | 1,499 | 8 | 1,491 | ..... | 45 | 141 | ..... | ..... | ..... | 2 | 76 | 1,227 |
| *Fish and Marine Mammal Oils* | | | | | | | | | | | | |
| Cod oil | 2,888 | ..... | 2,888 | ..... | ..... | 519 | ..... | ..... | ..... | ..... | 8 | 2,361 |
| Cod-liver oil | 2,817 | ..... | 2,817 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2,817 |
| Other liver oil | 2,469 | ..... | 2,469 | 52 | ..... | 154 | ..... | ..... | ..... | ..... | 8 | 2,255 |
| Marine mammal oils | 4,242 | ..... | 4,242 | ..... | ..... | 558 | 2 | ..... | 2 | 1 | 1,901 | 1,779 |
| Fish oil | 92,186 | ..... | 92,186 | 5,328 | ..... | 1,882 | 41,027 | 17,711 | 2,333 | 45 | 504 | 21,559 |
| *Greases* | | | | | | | | | | | | |
| Greases, other than wool | 189,408 | 125 | 189,283 | 27,162 | 26,300 | 61 | 127,234 | ..... | ..... | 34 | 7,001 | 1,490 |
| Wool grease | 6,756 | 2,643 | 4,113 | ..... | ..... | ..... | 129 | 1 | ..... | 38 | 1,501 | 2,444 |

# MARKET OUTLOOK



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## *Chemical Production Will Slack During Reconversion*

The output of the chemical industry in the months of reconversion that lie ahead will follow general industrial production. It is certain that there will be a substantial curtailment of production of chemicals while the customers of the chemical industry are retooling for production of civilian consumer goods.

Many chemicals will be available in unlimited quantities by the time the customers of the industry are ready to receive shipments. It is also expected that some manufacturers will place substantial orders for chemicals for stockpiling during the period of their plant reconversion in order to have the necessary raw materials on hand to start production of consumer goods as quickly as their machinery is ready.

## *End of War Changes Supply Picture*

A War Production Board statement released on August 13 went into considerable detail to explain the continued shortage of critical chemicals. It spoke of increasing military requirements and the approval of expanded facilities with the frequent comment that supplies would be insufficient to meet demands until 1946.

Only a week later, on August 20, allocation of most of these chemicals was revoked.

It is too early at this writing to predict the results of Japan's sudden collapse on chemical markets, but a few generalizations can be made with reasonable assurance:

The industrial demand for heavy chemicals is great, and the backlog of orders will maintain tight markets for some time. Materials will move in a free market now that priorities and directives have been virtually eliminated.

The fertilizer industry can expect a better flow of inorganic chemicals into agricultural uses, and lifting of manpower restrictions may permit a larger output of the relatively scarce organic fertilizer materials.

Benzene is one of the critical materials the restrictions on which have been abolished. Coal-tar chemical supplies depend on the volume of steel production, of course, and a decline in the demand for steel may keep the coal-tar chemical market tight.

Importations from the Far East will eventually relieve the shortages of natural oils and waxes, but it will be at least six months before any effect is felt. Destruction of many plantations by Japanese troops will prevent the restoration of normal imports for some time to come.

Among the fine chemicals, glycerine will find a larger export market, while mercury will become a competitive pawn among Spain, Italy, and China. The same situation will obtain with mentrol, Chinese and Japanese production competing with the Brazilian product.

Drugs and botanicals will also be received in greater quantity from foreign producing areas.

## *High Demand for Cheap Fats and Oils*

During the postwar years a strong industrial demand will prevail for most of the cheaper fats and oils entering world trade, although many will be available only in limited quantities until 1947 or later.

The low cost and general usefulness of palm oil assures an upward trend in world trade of that product, when it is again available in substantial quantities.

During the postwar years, cultivation of the oil palm is expected to spread to new areas stimulated by improved transportation facilities and the use of higher yielding varieties. Possible new areas for expansion are in South and Central American countries, particularly in Brazil, as well as undeveloped areas in Malaya and the Netherlands Indies.

Industrial use of inedible tallow and its derivatives has been expanding, and, in view of its low price, use will probably continue large. Another favorable factor is the long-term upward trend in soap consumption, which is tallow's chief outlet.

Babassu oil, always in heavy demand for soap and food purposes, faces an uncertain postwar outlook. Although a machine was invented recently to break babassu nuts, the relative inaccessibility of the Brazilian growing areas, as well as the large amount of labor involved in gathering the nuts, are factors operating against expanded use.

Brazil's industrialization, moreover, will provide other and more competitive occupations for its workers unless machines are used extensively.

## *U. S. Finds Chemical Market in Peru*

A predominant position in Peru's chemical market is now held by the United States and careful consideration of the requirements of that country and the prevailing methods of distribution will do much to maintain the trend toward use of American-made products, according to report of the Department of Commerce.

Based on a survey made by Charles D. Mitchell, economic analyst, American Embassy at Lima, the report states that Europe has lost its prewar dominant position in the Peruvian chemical market. It is estimated that in 1943 approximately 75 per cent of Peru's chemical imports came from the United States. This contrasts with about 30 per cent in 1935.

Peruvian imports include industrial chemicals, synthetic organic chemicals, fertilizers, insecticides, disinfectants, germicides, industrial gases, dyes, gums, rosins, plastic materials, and the basic materials for the manufacture of any of those chemical products.

It is reported that Switzerland still offers some competition in dyestuffs. Argentina and Canada are wartime newcomers in the Peruvian chemical market but the total volume from those sources in 1943 was small compared with shipments from the United States.

"It is likely that in the immediate postwar chemical market in Peru, Great Britain and Canada will become of increasing importance due to the strong trade position here of those two nations," the report says.

## *Surplus Chemicals Among RFC Listings*

Approximately 3,000 items of Government-owned surplus property which the Reconstruction Finance Corporation handles, as a disposal agency designed by the Surplus Property Board for capital and producers' goods, are listed in a booklet, "How To Do Business With RFC," which has just been published by RFC.

Any individual or company interested in acquiring RFC-handled property is advised in the booklet to contact the nearest RFC Agency. There are 31 located strategically throughout the United States.

The RFC is geared for action, Mr. Henderson said, and its surplus activities are under the direction of Mr. Hans A. Klagsbrunn, Executive Director of Surplus Property.

brunn, Executive Director of the Office of Surplus Property, RFC.

"No one will be creating unnecessary work by addressing an inquiry by telephone, telegraph or mail to the local agency, because our salesmen are on the job six days a week—and, as a seller, RFC is most anxious to hear from potential buyers," Mr. Klagsbrunn said. "We have a large stock of goods, including industrial plants; gliders and aircraft; producers' goods such as ferrous and non-ferrous metals; paints, varnishes and other protective coatings; chemicals; lumber, leather and other categories including non-metallic basic materials; various kinds of machine tools and production equipment, and a wide variety of other surplus items too numerous to mention."

## *Domestic Manganese by Electrolytic Process*

A large body of manganese ore, a proved process for the manufacture of high-purity metal, and numerous other economic factors combine to favor the full-scale promotion of electrolytic manganese from the ore of the Three Kids mine in Clark County, Nevada, according to a report by Dr. R. R. Sayers, Director of the Bureau of Mines.

More than 3,000,000 tons of usable manganese ore is known to exist in this property as the result of exploration by the Bureau of Mines and others, and the complete development of the mine by the Manganese Ore Company. In addition, there are 30,000 tons of stock-piled ore available for immediate use.

Electrolytic manganese production from low-grade domestic ores now is a fully-developed and economically feasible manufacturing technique, the Director pointed out, primarily because of long-range experiments by Bureau of Mines metallurgists.

The opinions of cooperating firms with regard to electrolytic manganese are summarized in the report, and virtually all are favorable. They indicate an adequate potential market for this material, for the steel industry consumes the bulk of all manganese used in the United States. Small-scale production to date has kept the cost of electrolytic manganese high and thus has restricted the market, but a plant producing as much as 40 tons of metal daily could attain the low costs necessary, the report adds.

## *Market Review*

*Heavy Chemicals.*—The aluminum sulfate market was weak, prices declining about 10c per 100 lb. Calcium chloride demands remain high, and show no immediate prospect of easing. The material has found new industrial applications, and postwar improvement of secondary roads will consume large quantities. Increased soap production will require greater quantities of soda ash, sodium silicate, and borax since the sodium phosphates normally employed are scarce and will continue to be. Increased inventories of acetic acid are building up on account of a slackening in demand. The present shortages of copperas, oxalic acid, and sal ammoniac will not be immediately eased as a result of war's end.

*Fine Chemicals.*—Carbide and carbon has increased its facilities for producing ethanolamine and diethanolamine. Du Pont announced price reductions, averaging 30 per cent, for neoprene latex. Penicillin has also declined further in price, and the drop in price of mercury over the past month is almost spectacular. Imports of peroxygen chemicals are increasing, easing the strain on domestic supplies. Brazil is said to be expanding its production of caffiene. Importations of cream of tartar have exerted some pressure on the domestic price. Butyl alcohol and acetate advanced slightly in price; the rise, averaging 2 to 3 per cent, is due to higher production costs. The scarcity of saccharin and glucose will continue in spite of the end of the war; they are in great demand to replace sugar, the supply of which will be insufficient for at least ayear.

*Specialties.*—Innis, Speiden & Co. has made public a letter to its customers explaining the shortage of carnauba and ouricury waxes. The company contends that, despite Department of Commerce figures showing that imports are in line with those of previous years, there is a real shortage among the suppliers. That this situation cannot be relieved under present circumstances is evident from the fact that European countries are willing to pay 5 to 10 cents per lb. above U. S. ceiling prices to Brazilian shippers.

# CURRENT PRICES

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f.o.b. works are specified as such. Import chemicals are so designated.

Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f.o.b., or ex-dock. Materials sold f.o.b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both.

*Purchasing Power of the Dollar: 1926 Average—$1.00*
*August, 1943, $0.910 August, 1944, $0.884*
*August, 1945, $0.870*

| | | Current Market | 1944 Low | 1944 High | 1943 Low | 1943 High |
|---|---|---|---|---|---|---|
| Acetaldehyde,99%,drs.wks. | lb. | .11 | .14 | .11 | .14 | .14 |
| Acetic Anhydride, drs, | lb. | .11½ | .13 | .11½ | .13 | .13 |
| Acetone, tks, delv. | lb. | ... | .07 | ... | .07 | .07 |
| **ACIDS** | | | | | | |
| Acetic, 28%, bbls | 100 lbs. | 3.38 | 3.63 | 3.38 | 3.63 | 3.38 | 3.63 |
| glacial, bbls. | 100 lbs. | 9.15 | 9.40 | 9.15 | 9.40 | 9.15 | 9.40 |
| tks, wks. | 100 lbs. | 6.93 | 7.25 | 6.93 | 7.25 | ... | 6.93 |
| Acetylsalicylic, Standard USP | lb. | .40 | .54 | .40 | .54 | .40 | .54 |
| | lb. | .43 | .47 | .39 | .47 | .39 | .47 |
| Benzoic, tech, bbls. | lb. | ... | .54 | ... | .54 | ... | .54 |
| USP, bbls, 4,000 lbs. up | lb. | ... | 109.00 | ... | 109.00 | ... | 109.00 |
| Boric tech, bbls, c-l, | tons *a* | ... | 109.00 | ... | 109.00 | ... | 109.00 |
| Chlorosulfonic, drs, wks. | lb. | .03 | .04½ | .03 | .04½ | .03 | .04½ |
| Citric, USP, crys, gran, | lb. *b* | .20 | .21 | .20 | .21 | .20 | .24 |
| bbls. | | | | | | | |
| Cresylic 50%, 210-215° HB, drs. wks. frt. equal | gal. | .81 | .83 | .81 | .83 | .81 | .83 |
| Formic, 85%-90% cbys. | lb. | .10 | .11½ | .10 | .11½ | .10½ | .11½ |
| Hydrofluoric, 30% rubber, | lbs. | .08 | .09 | .08 | .09 | .08 | .09 |
| dms. | | | | | | | |
| Lactic, 22%, lgt, bbls wks | lb. | .039 | .0415 | .039 | .0415 | .039 | .0415 |
| 44%, light, bbls wks | lb. | .073 | .0755 | .073 | .0755 | .073 | .0755 |
| Maleic, Anhydride, drs. | lb. | .25 | .26 | .25 | .26 | .25 | .26 |
| Muriatic, 18° cbys | 100 lb. | 1.50 | 2.45 | 1.50 | 2.45 | 1.50 | 2.45 |
| 20° cbys, c-l, wks | 100 lb. | ... | 1.75 | ... | 1.75 | ... | 1.75 |
| 22° cbys, c-l, wks | 100 lb. | ... | 2.25 | ... | 2.25 | ... | 2.25 |
| Nitric,36°,cbys, wks | 100 lbs. *c* | 5.00 | 5.25 | 5.00 | 5.25 | 5.00 | 5.25 |
| 38°, c-l, cbys, wks | 100 lbs. *c* | ... | 5.50 | ... | 5.50 | ... | 5.50 |
| 40°, c-l, cbys, wks | -100 lbs. *c* | ... | 6.00 | ... | 6.00 | ... | 6.00 |
| 42°, c-l, cbys, wks | 100 lbs. *c* | ... | 6.50 | ... | 6.50 | ... | 6.50 |
| Oxalic, bbls, wks | lb. | .11¼ | .12½ | .11¼ | .12½ | .11¼ | .12½ |
| Phosphoric, 100 lb. cbys, USP | lb. | .10½ | .13 | .10½ | .13 | .10½ | .13 |
| Salicylic, tech, bbls | lb. | .26 | .42 | .26 | .42 | .26 | .44 |
| Sulfuric, 60°, tks, wks | ton | ... | 13.00 | ... | 13.00 | ... | 13.00 |
| 66°, tks, wks | ton | ... | 16.50 | ... | 16.50 | ... | 16.50 |
| Fuming 20% tks. wks | ton | ... | 19.50 | ... | 19.50 | ... | 19.50 |
| Tartaric, USP, bbls | lb. | .70½ | .71 | .70½ | .71 | ... | .70½ |
| Alcohol, Amyl (from Pentane) tks, delv | lb. | ... | .131 | ... | .131 | ... | .141 |
| Butyl, normal, syn, tks | lb. | ... | .10¾ | ... | .10¾ | .10¾ | .14¼ |
| Denatured, CD 14, c-l drs | gal. *d* | ... | .57 | ... | .57 | ... | .54½ |
| Denatured, SD, No. 1, tks. | *d* | ... | .50 | ... | .50 | ... | .50 |
| Ethyl, 190 proof tks | gal. | ... | 17.60 | ... | 17.60 | .. | 11.90 |
| Isobutyl, ref'd, drs | lb. | ... | .086 | ... | .086 | ... | .086 |
| Isopropyl ref'd, 91%, dms | gal. | .37½ | .41 | .37½ | .66½ | .39 | .66½ |
| Alum, ammonia, lump, bbls, wks | 100 lb. | ... | 4.25 | ... | 4.25 | ... | 4.25 |
| Aluminum, 98-99% | 100 lb. | 15.00 | 16.00 | 15.00 | 16.00 | 15.00 | 16.00 |
| Chloride anhyd l.c.l. wks | lb. | .09 | .12 | .08 | .12 | .08 | .12 |
| Hydrate, light, bgs. | lb. | ... | .14½ | ... | .14½ | .14½ | .15 |
| Sulfate, com'l. bgs, wks, c-l | 100 lb. | 1.15 | 1.25 | 1.15 | 1.25 | 1.15 | 1.25 |
| Sulfate, iron-free, bgs, wks | 100 lb. | 1.75 | 2.10 | 1.85 | 2.50 | 1.75 | 2.50 |
| Ammonia anhyd, cyl | lb. | ... | .14½ | ... | .14½ | ... | .16 |
| Ammonium Carbonate, USP, lumps, dms | lb. | .08¼ | .09¼ | .08½ | .09¼ | .08¼ | .09¼ |
| Chloride,whi,bbls,wks, | 100 lb. | 4.45 | 5.15 | 4.45 | 5.15 | 4.45 | 5.15 |
| Nitrate, tech. bags, wks. | lb. | .0435 | .0450 | .0435 | .0850 | .0435 | .0851 |
| Oxalate pure, grn. bbls. | lb. | ... | .23 | .27 | .33 | .27 | .33 |
| Perchlorate, kgs | lb. | No stocks | | .55 | .65 | .55 | .65 |
| Phosphate, dibasic tech. bgs | lb. | .07 | .07¾ | .07 | .07¾ | .07¼ | .08¼ |
| Stearate, anhyd. dms. | lb. | ... | .34 | ... | .34 | ... | .34 |
| Sulfate, dms, bulk | ton | 28.20 | 29.20 | 28.20 | 29.20 | 28.20 | 30.00 |
| Amyl Acetate (from pentane) c-l, drs, delv | lb. | ... | .15½ | ... | .15½ | ... | .15½ |
| Aniline Oil, drs | lb. | .11½ | .12½ | .11½ | .12½ | .11½ | .12½ |
| Anthraquinone, sub, bbls. | lb. | ... | .70 | ... | .70 | ... | .70 |
| Antimony Oxide, bgs | lb. | .15 | .15½ | .15 | .15½ | .15 | .15½ |
| Arsenic, whi, kgs—powd. | lb. | .04 | .04¾ | .04 | .04¾ | .04 | .04¾ |

USP $25 higher; Prices are f.o.b. N. Y., Chicago, St. Louis, deliveric ½c higher than NYC prices; y Price given is per gal; c Yellow grade 25c per 100 lbs less in each case; *d* Prices given are Eastern schedul *a* Powdered boric acid $5 a ton higher; *b* Powdered citric acid is ½ higher.

| | 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%, 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 | 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 | ... | 45.00 | ... | 45.00 | ... | 45.00 |
| Bordeaux Mixture, drs lb. | .11 | .11½ | .11 | .11½ | .11 | .11½ |
| Bromine, cases lb. | .21 | .23 | .21 | .30 | .25 | .30 |
| Butyl, acetate, norm. drs, lb. | .1860 | .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 | 22.00 | 18.00 | 22.00 | 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 | 34.50 | 18.00 | 34.50 | 18.00 | 31.50 |
| Gluconate, U.S.P., drs. lb. | .57 | .59 | .57 | .59 | .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 | .05¾ | .05 | .05¾ | .05 | .05¾ |
| Dioxide, cyl lb. | .06 | .08 | .06 | .08 | .06 | .08 |
| Tetrachloride, Zone 1, 52½ gal. drms lb. | .78 | .80 | .73 | .80 | .73 | .80 |
| Casein, Acid Precip, bgs, 100 or more lb. | ... | .24 | ... | .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. | ... | .66 | ... | .61 | ... | .61 |
| Dibutylphthalate, drs lb. | .1900 | .2359 | .1780 | .2659 | .2060 | .2300 |
| Diethylaniline, lb drs lb. | ... | .40 | ... | .40 | ... | .40 |
| Diethyleneglycol, drs, wks lb. | .14 | .15 | .14 | .15½ | .14 | .15½ |
| Dimethylaniline, dms,cl.,lcl lb. | .21 | .22 | .21 | .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 | .37 | ... | .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. | .0842 | .0941 | .0842 | .0941 | ... | .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, bbls, cl & lcl 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 | 1.45 | 1.05 | 1.25 | 1.05 | 1.25 |
| Glycerin dynamite, dms, c-l, lb. | ... | .16½ | ... | .14½ | ... | .18¾ |
| Crude Saponification, 80% to refiners tks lbs. | ... | .11½ | .09½ | .10 | ... | .12¾ |

## GUMS

| | | | | | | |
|---|---|---|---|---|---|---|
| Gum Arabic, amber sorts bgs lb. | .11 | .12¼ | .11¾ | .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. | ... | .53⅛ | ... | ... | ... | ... |
| Macassar dust lb. | ... | .07⅜ | ... | .07⅜ | .07⅜ | .11¾ |
| Copal Manila, | .13½ | .15½ | .13½ | .15½ | .13½ | .15½ |
| Copal Pontianak, bold c-l lb. | ... | .23⅜ | ... | .23⅜ | ... | .23⅜ |
| 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.

y Price given is per gal.

# *Current Prices*



| | | Current Market | 1944 Low | 1944 High | 1943 Low | 1943 High |
|---|---|---|---|---|---|---|
| Kauri, N. Y. | | | .65¾ | | .65¾ | .65¼ |
| Superior Pale XXX | lb. | | | | | |
| No. 3 | lb. | 1.75 | 2.10 | 2.00 | 2.10 | 2.00 2.10 |
| Sandarac, cs | lb. | | .99½ | | .99½ | 1.40 nom. |
| Tragacanth, No. 1, cases | lb. | 3.90 | 4.10 | 4.00 | 5.25 | 4.00 5.25 |
| No. 3 | lb. | 2.15 | 2.50 | 1.10 | 3.50 | 1.10 1.20 |
| Yacca, bgs | lb. | .06 | .07¼ | .06 | .07¼ | .06 .07¼ |
| Hydrogen Peroxide, cbys | lb. | .15½ | .18½ | .15½ | .18½ | .15½ .18½ |
| Iodine, Resublimed, jars | lb. | 1.75 | 2.10 | 2.00 | 2.10 | 2.00 2.10 |
| Lead Acetate, cryst, bbls. | lb. | | .12½ | | .12½ | .12½ |
| Arsenate basic, bg, lcl | lb. | .11½ | .12 | .11½ | .12 | .11½ .12 |
| Nitrate, bbls | lb. | | .12½ | | .12½ | .12½ |
| Red, dry, 95% $Pb_3O_4$ bbls. | lb. | .09 | .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 | .11¼ | .09½ | .11¼ | .09½ .11¼ |
| White, bbls | lb. | .08¼ | .08¾ | .08¼ | .08¾ | .08¼ .08¾ |
| Basic sulfate, bbls, lcl | lb. | .07¼ | .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 | .04½ | .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 | 79.75 | | 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. | .26½ | .28 | .25 | .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, ampules per 100,000 units | | .59 | .95 | .95 | 4.50 | |
| Pentaerythritol, tech | lb | .29 | .33 | .29 | .33 | .29 .35½ |

## 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 | .09½ |
| Phenol, U.S.P., drs | lb. | .10½ | .11¼ | .10½ | .11¼ | .10½ .13¼ |
| Phthalic Anhydride, cl and lcl, wks | lb. | .13 | .14 | .13 | .14 | .13 .15½ |
| Potash, Caustics, 88-92%, wks, sol. | lb. | .06¼ | .06¾ | .06¼ | .06¾ | .06¼ .06¾ |
| flake, 88-92% | lb. | .07 | .07½ | .07 | .07½ | .07 .07½ |
| liquid, 45% basis, tks | lb. | | .02¾ | | .02¾ | .0275 |
| dms, wks | lb. | .03½ | .03½ | .03 | .03½ | .03 .03½ |
| Carbonate, hydrated 83-85% | lb. | | .05½ | .05½ | .05¾ | .05½ .05¾ |
| 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 | .03¾ |
| Pyridine, ref., drms | lb. | .45 | .45½ | .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 | 8.20 | 8.60 | 8.20 | 8.60 |
| Shellac, Bone dry, bbls lb. r | .42½ | .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, bgs.wks l.c.l. lb. | .07⅞ | .08⅛ | .07⅞ | .08⅛ | ... .07¾ |
| Bisulfite 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, kgs, 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% bbl. cl. lb. | ... | .06¾ | ... | .06¾ | ... .06¾ |
| Phosphate, di anhyd. bgs. 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 | 1.95 | 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 |
| Starch, 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. lb. | no stocks | | .07½ | .09¼ | ... .07½ |
| Sulfur, crude, mines ton | ... | 16.00 | ... | 16.00 | ... 16.00 |
| Flour, USP, precp, bbls, kgs lb. | .18 | .30 | .18 | .30 | .18 .30 |
| Roll, bbls 100 lb. | 2.40 | 2.90 | 2.40 | 2.90 | 2.40 2.90 |
| Sulfur Dioxide, liquid, cyl lb. | .07 | .08¼ | .07 | .09 | .07 .08 |
| tks, wks lb. | ... | .04 | .04 | .06 | .04 .06 |
| Talc, crude, c-l, NY ton | ... | 13.00 | ... | 13.00 | ... 13.00 |
| 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 |
| Metal 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. | ... | .49 | ... | .49 | ... .47 |
| Trichlorethylene, dms, wks lb. | .08 | .09 | .08 | .09 | .08 .09 |
| Tricresyl phosphate tks. lb. | ... | .24 | ... | .24 | ... ... |
| Triethylene glycol, dms lb. | .18½ | .19½ | .18½ | .26 | ... .26 |
| Triphenyl Phos, bbls lb. | .31 | .32 | .31 | .32 | .31 .32 |
| Urea, pure, cases lb. | ... | .12 | ... | .12 | ... .12 |
| Wax, Bayberry, bgs lb. | no stocks | | .25 | nom. | .25 .26 |
| Bees, bleached, cakes lb. | ... | .60 | ... | .60 | ... .60 |
| Candelilla, bgs crude ton | .35 | .36 | .34½ | .48 | .38 .48 |
| Carnauba, No. 1, yellow, bgs, ton lb. | ... | .83¼ | ... | .83¼ | ... .83¼ |
| Xylol, Indus. frt all'd, tks, wks gal. | ... | .27 | ... | .27 | ... .27 |
| Zinc Chloride tech fused, wks lb. | .05 | .0535 | .05 | .0535 | .05 .0535 |
| Oxide, Amer, bgs, wks lb. | .07¼ | .07½ | .07 | .07½ | .07 .07½ |
| Sulfate, crys, bgs 100 lb. | 3.40 | 4.15 | 3.40 | 4.35 | 3.60 4.35 |

## *Oils and Fats*

| | | | | | | |
|---|---|---|---|---|---|---|
| Babassu, tks, futures lb. | ... | .111 | ... | .111 | ... | .111 |
| Castor, No. 3, bbls lb. | .13¾ | .14¼ | .13¾ | .14¼ | .13¾ | .14¼ |
| China Wood, drs, spot NY lb. | .39 | .41 | .39 | .41 | ... | .39 |
| Coconut, edible, drs NY lb. | ... | .0985 | ... | .0985 | ... | .0985 |
| Cod Newfoundland, dms gal. | .85 | .88 | .85 | .90 | ... | .90 |
| Corn, crude, tks, wks lb. | ... | .12¾ | ... | .12¾ | ... | .12¾ |
| Linseed, Raw, dms, c-l lb. | ... | .1550 | .1510 | .1560 | ... | .1530 |
| Menhaden, tks gal. | ... | .1225 | ... | .1225 | ... | .1225 |
| Light, pressed, drs l.c.l. lb. | ... | .1300 | ... | .1200 | .1305 | .1307 |
| Palm, Niger, dms lb. | ... | .0865 | ... | .0865 | ... | .0865 |
| Peanut, crude, tks, f.o.b. wks lb. | .12⅞ | .13⅞ | .12⅞ | .13⅞ | ... | .18 |
| Perilla, crude dms, NY lb. | no stocks | | ... | .245 | ... | .245 |
| Rapeseed, New Orleans, bulks lb. | ... | .1156½ | ... | .1156½ | ... | .1150 |
| Refined, dms lb. | .13¼ | .14¼ | .13¼ | .14¼ | ... | ... |
| Soy Bean, crude, tks, wks lb. | ... | .1175 | ... | .1175 | ... | .1175 |
| Tallow, acidless, bbls lb. | ... | .14¼ | ... | .14¼ | ... | .14¼ |

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2—New Stainless Steel Tanks 100 Gal. cap.

*Many more desirable units available. Send us your inquiries and lists of surplus.*

**MACHINERY & EQUIPMENT CORPORATION (of N. Y.)**
533 West Broadway . New York 12, N. Y.
Gramercy 5-6680

# Realize Large Tax Benefits

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## INDUSTRIAL PLANTS, MFG. DIVISIONS, UNITS

We are Principals, and act only in strictest confidence, retaining personnel wherever possible. Address

BOX 1210 — 1474 BROADWAY, NEW YORK 18, N. Y.

**1 — Practically new Hardinge Conical Mill for sale.**

**Box 1885**

Chemical Industries, 522 Fifth Ave., New York 18, N. Y.

## WANTED TO BUY

We Buy and Sell at Any Point New and Used Tight and Slack Barrels; Steel Drums and Cans.

**BUCKEYE COOPERAGE CO.**
**3800 Orange Avenue**
**Cleveland 15, Ohio**

# WANTED

Autoclave 50-75 ga. capacity, with agitator and bottom drain. Steam-jacketed, 100 lb. steam pressure; internal pressure 200 lbs. per sq. in.

**TOPPS CHEWING GUM**
136 BROADWAY
Brooklyn, N. Y.

# WANTED

*(from manufacturers only)*

**CHEMICALS**
**DRUGS**
**VITAMINS**
**HORMONES**

**CORN CHEMICAL CO.**
505 Fifth Ave., New York City
VAnderbilt 6-2689

**Wanted—Surplus**
**RAW MATERIALS**
**Wastes—By-Products—Residues of All Kinds.**
**BOX No. 2014**
Chemical Industries, 522 Fifth Ave., New York 18, N. Y.

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**Overstocks** **Job Lots**
**Obsolete Goods**

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Tel. CANAL 6-5643

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**DRUGS**
**GUMS**
**OILS**
**SOLVENTS**
**WAXES**

## BARCLAY

**CHEMICAL COMPANY**
**75 VARICK ST., NEW YORK 13, N.Y.**
**WOrth 4-5120**

**WANTED**

To manufacture on a small scale some chemical requiring high temperature, high pressure, hydrogenation equipment which we have available. Box 2026.

Chemical Industries, 522 Fifth Ave., New York 18, N. Y.

Saccharin powder (sol.) wanted in any quantity. Arrow Products Co., Box 933, Buffalo, N. Y.

## HELP WANTED

**PHYSICAL CHEMIST**

Research and development. Specialist in resin, emulsions, and colloids. Should have experience in natural and synthetic latex. Plant located in Middle West. State qualifications. Address Box 2043, Chemical Industries, 522 5th Ave., New York 18, N. Y.

**CHEMIST WANTED**

A leading Eastern manufacturer of Industrial Finishes — Lacquers, Synthetics, Varnishes, etc. — offers an excellent opportunity to a chemist who is looking for a position in the finish manufacturing industry. Experience in the field is desirable but not essential. The position is in the vicinity of Newark, New Jersey.

Send an outline of your experience, a photograph and salary expectations to Box 2036, Chemical Industries, 522 Fifth Avenue, New York 18, N. Y.

All replies will be held confidential.

**CHEMICAL SALESMAN WANTED**

Permanent position for salesman with technical background, old, established manufacturer of fine chemicals. Graduate in Chemistry or Chemical Engineering preferred. Excellent opportunity for ambitious man under 35. State draft status. Enclose snapshot.

Address BOX 2044, care of

CHEMICAL INDUSTRIES
522 Fifth Avenue
New York 18, N. Y.

**SALESMEN**
with technical training
wanted to handle
**SHELL CHEMICAL**
products
Several territories open
Apply
**R. W. GREEFF & CO., INC.**
10 Rockefeller Plaza
New York 20, N. Y.

**CHEMICAL ENGINEERS—PRODUCTION**

in new, fine organic chemical plant of well known chemical manufacturer. Location, one hour from New York City. Production is 100% for U. S. armed forces for the duration, with large postwar market. Write, giving complete background, availability, salary expected, etc. Prompt action is assured. Box 2041, Chemical Industries, 522 Fifth Ave., New York 18, N. Y.

**WANTED:** Thoroughly experienced Chemist for Glass Analysis. Write or contact Adamston Flat Glass Company, Clarksburg, W. Va.

CHEMIST familiar with synthetic coating materials and organic colors. Production and development. Excellent opportunity. New York City. Box 2042, Chemical Industries, 522 Fifth Avenue, New York, N. Y.

**WANTED**

Chemist for research on Photographic sensitizing dyes and allied compounds. Good opportunity for man capable of initiating research in this field. Apply, stating age, previous experience and salary desired, to R.S.P., Box 3, Newton, N. J.

**TABLET PRODUCTION MAN**

—real future and $100 per week to start for an efficient, experienced man to take full charge of tablet production in modern Chicago plant, producing in big volume. Permanent position and fine opportunity for advancement. Give age, experience and full details in first letter. Box 2046, Chemical Industries, 522 Fifth Ave., New York 18, N. Y.

**CHEMICAL ENGINEER OR CHEMIST**
**for**
**MARKET RESEARCH**

Opportunity for a man who likes outside contact work and has an interest in the economic side of the chemical industry, as well as the technical. Work involves the collection and presentation of technical and economic facts which will aid our management in planning the company's expansion program on new chemicals and specialties. Write giving age, draft status, training, experience, salary expected, and photo to Box 2045, Chemical Industries.

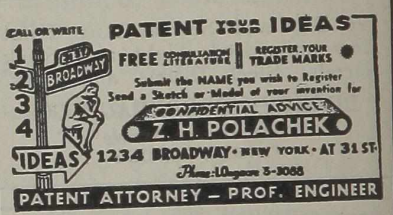
## BUSINESS OPPORTUNITIES

**BRASS TACKS DEPARTMENT**

**No bush-beater-about, well-known chemical merchant with connections is busy but could be busier. Facilities and time for several additional lines. Prefer chemical specialties and pharmaceuticals. Can handle New York, New England and exports.**

**BOX 2035**
**Chemical Industries, 522 Fifth Ave.**
**New York 18, N. Y.**

## PATENTS




## PROFESSIONAL DIRECTORY

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## Alkaloid Recovery

(*Continued from page 455*)

bodies taken up from the crude extract are removed from the ion exchangers and flow to waste, while the insoluble cinchona alkaloids remain in the bed. The subsequent solvent treatment provides a much better quality of alkaloid than obtainable with the one-step process.

This cation exchange process was subsequently investigated in connection with the quinine research program of the Foreign Economic Administration[2] and more recently has been adapted by the Cinchona Research Unit of the Engineer Board, U. S. Army, to the field recovery of crude totaquine from South American cinchona bark using portable equipment.[1]

The one-step recovery process using Zeo-Karb has been successfully applied to other alkaloids such as recovery of scopolamine from datura plants by the Debruille Chemical Corp. at Brownsville, Texas.

The equipment used for alkaloid recovery by ion exchange is basically the same as that employed for water treatment or other ion exchange processes[8] and equipment costs are about the same, but will vary somewhat in individual cases depending upon capacity requirements, use of corrosion-resistant materials, and use of special features, such as observation ports, level controls, pumps, recovery and regenerant tanks, etc.

This process employs the organic cation exchangers, such as Zeo-Karb, a sulfonated coal product which has a capacity for quinine and nicotine of about 8% by weight (dry basis) or about 2.4 lbs. per cubic foot. Complete recovery of the alkaloid in the first few runs has not been achieved because of a residual "storage" capacity. However, consistent recoveries of 97% or more of the adsorbed alkaloid have been realized after the ion exchanger has been in use for about three cycles. While there is not sufficient experience to date to prove the precise life of these ion exchangers for various alkaloids, there are clear indications that the costs of ion exchange replacements are not out of line for several of the processes.

In a typical case, the chemical cost per cycle for the one-step recovery process was $0.88 for alkali plus solvent and $0.06 for regenerant acid or a total of $0.94 per cubic foot of Zeo-Karb. This cost was equivalent to $0.39 per pound of recovered alkaloid. The costs for purification of the alkaloid, labor, and investment vary for individual installations.

It should be pointed out that a great deal of work remains to be done with individual alkaloids, but it is now clear that these ion exchange recovery processes have great potentialities and their practical applications are receiving much attention for the post-war period.

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## Acetylene—Aldehyde

(*Continued from page 458*)

crotonaldehyde, dodecylaldehyde, and benzaldehyde.

### ALKYNEOLS FROM KETONES

The reaction of ketones and acetylene to form alkyneols is apparent by the following series of reactions.

$$R\text{-}CO\text{-}R_1 + HC\equiv CH \longrightarrow R_1\text{-}C(R)(OH)\text{-}C\equiv CH \quad (6)$$

$$R_1\text{-}C(R)(OH)\text{-}C\equiv CH + R\text{-}CO\text{-}R_1$$

$$\longrightarrow R_1\text{-}C(R)(OH)\text{-}C\equiv C\text{-}C(R)(OH)\text{-}R_1 \quad (7)$$

In the catalytic preparation of alkyneols from ketones and acetylene, the use of heavy metal acetylides offers no advantage, as alkalis, alkaline earths or alcoholates have proven to be the best catalysts. Merling's work has shown that, for example, sodium acetone, i.e., acetone and sodamide, reacts with acetylene to form 2-methylbutyne-3-ol-2 or 2-dimethyl-3-diol-2,5. From Russian work it is also known that the same reaction takes place in organic solvents with calcium carbide in the presence of caustic potash. For both methods, the use of stoichiometric quantities of alkali compounds with the complete exclusion of water is characteristic. However, if acetylene is used under elevated pressure the formation of alkyneol from ketones and acetylene takes place with catalytic amounts of alkalies, alkaline earths, or alcoholates, even in aqueous solutions.

The above data are taken from a translation of an address, "Methods of Organic Chemistry," delivered by Director Dr. Reppe, I. G. Farbenindustrie, on July 26, 1940. The translation was provided by the Research and Development Section, Office of Rubber Reserve, Reconstruction Finance Corporation.—Editor.

## *Personnel Note*

Dean E. Carson has been appointed director of business research for the B. F. Goodrich Co. He succeeds Ward Keener, who has become assistant to the president. Mr. Carson became connected with the rubber industry when he joined the Miller Rubber Co. in 1920.

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# "WE" – EDITORIALLY SPEAKING

WE'RE SITTING here in our office in midtown Manhattan looking southward through the window towards the Empire State Building. The city looks much the same as it did a month ago; lights are twinkling down below (yes, editors work at night) and from the streets rises a mingled sound of taxicab brakes, impatient horns, engine knocks, and the occasional yell of a newsboy. Yes, everything is pretty much the same—yet.

But there is a difference not perceptible to an observer six floors up: *This is the postwar world! S*ee that man hurrying along down there on 44th Street? Is he worrying about high taxes and sixty million jobs? Nosiree, he's reflecting on the magic of radar and the incredible destructiveness of the atomic bomb.

His imagination has been set afire by the marvels of science, and he's going to save his money, by gosh, for a new plastic combination airplane-automobile-trailer-houseboat with a uranium-powered jet-propulsion supercharged motor. Seventy miles an hour?—hah! He'll do seven hundred in the best little crate on the high-sky-waterways.

One teaspoon of atomic fuel in his multi-convertible and he'll be off to Calcutta for lunch. He doesn't know anyone in Calcutta, of course, but it offers a potential market for 6½ times the present production of his thingumbob factory. China, too. Four hundred million people, and *everyone* in the postwar world will want at least two thingumbobs in every whoozis. O joy unconfined! Business will surely be 14 times as good in 1953.

Office work should be simpler, too. Wasn't someone predicting a machine which would automatically record thoughts? Have to figure out some way of regulating it, though—wouldn't want the customers to read some of the things he thinks. Maybe he can think unbusiness-like thoughts on a different frequency. It's asking too much of science to eliminate malevolent musings.

That woman down there on Fifth Avenue is complaining to her companion—as women have been complaining since the invention of the fig leaf—that she doesn't have a *thing* to wear to the Smith's party tonight. But ah, she muses, we shall soon have wondrous new fabrics—from aluminum fiber, from peanut shells, from old newspapers, from anything these amazing chemists can lay their hands on. Of course they'll still cost $100 in the better shops, but *chic* is one of those intangibles which are not susceptible to technological economy.

It will be nice, too, not to have to lift a finger. Remote control of everything from eggbeaters to television is practically on its way from the factory. Who said so? Why, just look at the advertisements! Here's a combination washer-ironer-dryer-vacuum cleaner [illegible] and baling wire. Still in the drawing-board stage, to be sure, but soon available at $75 down and $5 a week.

But she's most excited about the new medicines. She's been starving herself for years, denying herself the good things of life to keep a perfect 36. If the scientists are smart enough to figure out penicillin, though, they're certainly smart enough to find something so that you can eat whatever you want whenever and as often as you want it. What's this new drug, iodothrysoglobuloformin? Maybe that will do it. Science still has some of the biggest problems of life confronting it.

There's a kid down there running for the subway to the Polo Grounds. He knows about television, for his teacher took the class to the Museum of Science and Industry and he didn't get a chance to sneak away.

The Postwar World isn't going to make too much difference to him, though. He doesn't want to sit in the living room and see the Giants on a screen; if he can't be there yelling in person, he'd rather be out in the vacant lot playing ball. He'll still have to do his homework; you can't learn long division by mesmeric absorption and electronic tubes.

There may be a cataclysmic upheaval of political thinking during the next few decades. If so, perhaps he wont' have to slog through the mud of some farflung outpost of defense; if not, war will be more scientifically inhuman than ever. (Science hasn't made mud less muddy nor blood less bloody.)

He's not worrying about that now. His world is not 8,000 miles in diameter with an average density of 5.517 ± 0.004 g./cm.$^3$ (science again!). It's a little area bounded by his home, his school, and the Polo Grounds. The rebellions, the crimes—all the ills of the Postwar World, are either unknown or incomprehensible to him—yet.

* * * *

PERHAPS we've been too hard on this indestructible and incorrigible old world. We've laughed at the man who'll fly to Calcutta to drink the same Scotch-and-soda and talk the same business he drank and talked of at home. We've smiled at the rosy optimism which fondly believes that every Chinaman will buy two thingumbobs. We've pitied the woman who must still watch her diet—until medicine has licked the more important problems of cancer and poliomyelitis.

But we take comfort in the thought that the boy, and millions like him, can surely increase the material comfort and convenience of life through the advances of science—even though they're not so spectacular as those we've described. Whether he and his contemporaries can bring about peace and contentment and true brotherhood, so that this will be the final Postwar Period, we don't venture to guess. We can only hope.

## Fifteen Years Ago
### From Our Files of Sept., 1930

*Announcement is made by the American Chemical Society president, Prof. William McPherson, Ohio State University, of membership increase from 3,079 to 18,000 during the preceding 25 years.* (EDITOR'S NOTE: *Present membership is 42,496.*)

*U. S. Civil Service Commission will open competitive examinations for senior chemist, chemist and associate chemist, October 1, 1938.*

*U. S. helium plant, near Amarillo, Texas, produces 9,881,050 cubic feet of helium in first fiscal year of operation.*

*Coal research laboratory at Carnegie Institute of Technology is made possible by gifts totalling $425,800 from the Buhl Foundation of Pittsburgh, United States Steel Corp., General Electric Co., Koppers Co., N. Y. Edison Co., Standard Oil Co. of N. J., and Westinghouse Electric and Manufacturing Co.*

*Colgate-Palmolive-Peet Co. is ordered to pay approximately $350,800 in income taxes to Wisconsin Tax Commission, which according to decision cover taxes from 1924 to 1930, which were charged to have been avoided by reporting incomes based on arbitrary or fictitious arrangements between affiliated companies. Officials of the company state that the case will be appealed.*

## Thirty Years Ago
### From Our Files of Sept., 1915

*First National Exposition of Chemical Industries opens in Grand Central Palace, New York.*

*E. I. du Pont de Nemours & Co., Inc., is incorporated with $240,080,008 capital stock to succeed the E. I. du Pont de Nemours Powder Co. Incorporators are Pierre S. du Pont, John Raskob, and J. P. Laffey.*

*Godfrey L. Cabot, Boston, purchases controlling interest in the Monarch Carbon Co., Charleston, W. Va.*

*Federal Chemical Co. is incorporated with $4,800,000 capital to develop Tennessee phosphate rock deposits.*

*W. D. Huntington is elected vice-president of Davison Chemical Co.*


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