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ROZPRAWA DOKTORSKA

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Obniżanie zawartości siarki w benzynie krakingowej metodą perwaporacji próżniowej

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ABSTRACT

Nowadays a lot of attention is being paid to the reduction of sulfur content in transportation fuels what should satisfy higher ecological expectations, leading to the improved air quality. In order to adapt to the new and more rigorous environmental requirements, which demand the reduction of sulfur level up to 10 mg/kg, a lot of effort is being spent on developing novel and more efficient desulfurization hydrogen and non-hydrogen technologies.

Limits of sulfur content in gasoline that are currently in force in most developed countries and undoubted further tightening of fuel requirements entail an urgent task of modernizing existing or developing new technologies which will allow not only efficient, but also economical gasoline desulfurization. One of the newly emerged non-hydrogen technologies is pervaporation, was already transferred beyond the laboratory scale.

The aim of this work was to investigate the potential applicability of both, commercial hydrophobic composite membranes based on poly(ether-b-amide), poly(dimethylsiloxane) and poly(octylmethylsiloxane) as well as self-prepared homogeneous membranes in vacuum pervaporation process applied to organosulfur compounds removal from gasoline.

Fluxes for both membranes increased with an operating temperature rise for all binary mixtures investigated. Simultaneously, separation factors decreased though thiophene partial fluxes were increasing with temperature. At the constant temperature, the change of sulfur concentration in the tested range produced insignificant impact on the solvent partial flux for all tested mixtures. Furthermore, the separation factors values were also not influenced by the variation of sulfur compound level in the feed. Conducted experiments with chosen thiophenes confirmed, that the structure of a component and the resulting differences in the affinity toward PEBA and PDMS membranes and physico-chemical properties, can influence the membrane performance. Variations in separation factor values with the branching of the structure of hydrocarbon molecule and type of the membrane were also observed. Tested membranes exhibited different transport properties in contact with chosen

hydrocarbons confirming, that above mentioned hydrocarbon groups have different interactions with both membranes.