CARBON MONOLITHS AS SORBENTS OF CONTAMINANTS FROM LIQUID AND GAS PHASES – PREPARATION AND ANALYSIS

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Abstract –

Problem Statement. Increasing environmental awareness in recent years has contributed to the development of processes for sorption of pollutants from the gas and liquid phases. For this purpose, the synthesis of porous materials with desirable textural and surface properties that have high sorption capacity seems to be key. A highly developed macroporous structure of the material will ensure efficient mass transfer of gas in both adsorption and desorption processes.
Methods. Carbon monoliths have been identified as a perspective sorbents. Their synthesis involves thorough mixing of powdered carbon material with a proper binder, and then forming the resulting mass into the desired shape. In the present study, monoliths based on activated carbon cured with phenyl-formaldehyde resin and selected polymers were synthesized. Some modifications were also made to the synthesis: the addition of silica in various ratios and its etching with hydrofluoric acid, as well as high-temperature activation with nitrogen or carbon dioxide.
Results. The prepared monoliths were analyzed to determine their surface and textural properties. Among other things, the specific surface areas and pore size and volume were determined. Based on the results, it was found that the initial carbon materials showed well surface parameters. However, a monolithic form is required for efficient sorption of impurities. Phenol-formaldehyde resin was considered as the best of the binders used. There was also a positive effect of activation, which helped to improve surface properties and, above all, to significantly increase the number and availability of pores with diameters below 5 nm. The use of silica additive resulted in positive effects only after the monolith was introduced into the acid.
Conclusion. Based on the synthesis results and analyses carried out, it was concluded that carbon monoliths represent a promising research direction for sorption of pollutants.

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