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Abstract: The aim of the study was to examine the efficiency of removing organic matter fractions from natural water by adsorption onto powdered active carbon (PAC). Dissolved organic carbon (DOC) was adopted as a measure of the dissolved organic matter content in the treated water. When adsorption was conducted simultaneously with the process of volume coagulation, an increased coagulant and adsorbent dose upgraded the efficiency of the water treatment process. However, when adsorption was performed separately, the efficiency of the treatment process depended not only on the size of the PAC dose, but also on the time of contact between the adsorbent and the water being treated. On the basis of the experimental results, the empirical coefficients were determined for the mathematical model describing the efficiency of organic compound adsorption onto the PAC. Within the scope of technological investigations, the efficiency of organic matter removal was related to contact time and PAC dose when adsorption was performed as a single process; when adsorption was conducted in combination with the coagulation process, removal efficiency was additionally related to coagulant dose. Furthermore, technological investigations enabled the coefficient of the adsorbate mass transfer rate to be determined, which was found to depend on the duration of the process and on its efficiency expressed as the ratio of the DOC persisting in the water after the completion of the process to the initial DOC value. The mathematical models presented in the paper will improve the control of the water treatment process and thus enhance the efficiency of dissolved organic matter removal from water.

Keywords: Adsorption, coagulation, dissolved organic carbon, powdered active carbon.