

Szlachta, M., Adamski, W. Effect of Powdered Active Carbon on the Removal of Low- and High-molecular-weight Organic Compounds by Alum Coagulation. *Ochrona Srodowiska* 2008, Vol. 30, No. 4, pp. 39–43.

Abstract: Experiments were conducted to assess the efficiency of the coagulation–adsorption process in removing low- and high-molecular-weight organic compounds from natural water. The extent of removal achieved in the combined process, where alum coagulation was aided by adsorption on powdered active carbon (PAC), was related to the quantity of the coagulant dose applied. The study has produced the following findings. The increase in the coagulant dose was concomitant with an enhancement of the removal efficiency; when the quantity of the coagulant dose increased, this led to an improvement in the quality of the treated water; the combined process of alum coagulation and PAC adsorption made it possible to reduce substantially the coagulant dose and attain a high efficiency of organic matter removal; the removal efficiency of the combined process was not only comparable with that of the conventional coagulation, but had been achieved with a notably lower coagulant dose than the one required for the conventional process. The removal of organic substances expressed in terms of dissolved organic carbon (DOC) and UV absorbance also depended on the quantity of the PAC dosed; as the PAC dose increased, so did the efficiency of the process. Over the entire range of the PAC doses tested, a substantial decrease in the SUVA value was observed after the process. This is an indication that the proportion of the reactive DOC forms has been reduced and, consequently, the risk that disinfection by-products will form. A comparison of the removal efficiency of the alum coagulation–PAC adsorption process with that of the coagulation conducted without an adsorbent has revealed that coagulation as a single process provides efficient removal of high-molecular-weight organic substances (2.1 to 5.3 kDa); an enhanced extent of low-molecular-weight fraction removal (1.0 to 1.5 kDa) was only observed during coagulation combined with PAC adsorption.

Keywords: Surface water, natural organic matter, coagulation, alum, adsorption, powdered active carbon, molecular weight.