

**Konieczny, K., Rajca, M., Bodzek, M., Gembolyś, B. Influence of NOM Properties on the Fouling of Ultrafiltration Membranes. *Ochrona Środowiska* 2008, Vol. 30, No. 3, pp. 3–8.**

**Abstract:** The phenomenon of ultrafiltration (UF) membrane fouling was investigated during treatment of a model water solution which contained natural organic matter (NOM) in the form of humic acids. The experiments were conducted under laboratory conditions, using a Millipore system with a flat cellulose membrane (surface area, 38.5 cm<sup>2</sup>) of 30 kDa cut-off. Water samples were treated in a direct UF process and in a UF process combined with coagulation. On the basis of jar test results, alum (4.1 gAl/m<sup>3</sup>) was chosen as a coagulant and coagulation was conducted at pH=7.0. The model solution that contained dissolved organic substances alone (<0.22 μm) was made subject to fractionation on XAD-7HP/4 resins, and thus hydrophobic (HFO), transphilic (TFI) and hydrophilic (HFI) fractions were obtained. To fractionate the NOM in the model solution according to molecular weight, the UF process was carried out with Nadir membranes of 1 kDa, 3 kDa and 10 kDa cut-offs. The study has produced the following findings: compounds of molecular weights lower than 1 kDa dominated in the NOM (accounting for approx. 78%); among the organic substances, the hydrophobic fraction (the one that largely contributed to membrane fouling) was dominant (approx. 70%); when use was made of coagulation as a prior step, the hydrophobic particles responsible for membrane fouling clustered together to form larger agglomerates, which deposited on the membrane surface and limited the permeate flux to a smaller extent than when coagulation was not applied. During direct UF (with no coagulation) hydrophobic particles (as well as the hydrophilic ones) blocked the pores of the membranes and thus substantially reduced the efficiency of the process.

**Keywords:** Water treatment, organic substances, hydrophobic compounds, hydrophilic compounds, ultrafiltration, coagulation, membrane fouling.