Adamski, W., Majewska-Nowak, K. Applications of Multipurpose Reactors in Water Treatment. *Ochrona Srodowiska* 2010, Vol. 32, No. 1, pp. 3–8.

Abstract: The role of multipurpose reactors and the principles of their application were analyzed, taking into account newly constructed water treatment plants and those modernized by imparting additional functions to the reactors being operated there. The results of this analysis have demonstrated that such approach offers a number of benefits, not only reducing the capital costs and space demands, but also enabling a flexible response to any variations observed in the quality of the taken-in water. A multipurpose reactor may become a substitute for an integrated water treatment system or for one of its elements. Also available are reactors where additional functions (such as biological activity) are generated spontaneously (*e.g.* GAC adsorption columns or slow filters). It has, furthermore, been demonstrated that membrane reactors, as well as their modifications, constitute a very attractive alternative to classical multipurpose reactors. The identification of the phenomena occurring in multipurpose reactors makes it possible to construct mathematical models which can be used for the optimization of water treatment trains (such models are shown in the present paper). It has been emphasized that if the models are to be used for engineering applications, their parameters have to be established by analytical methods and laboratory model tests, and the models themselves should be calibrated.

Keywords: Water treatment, multipurpose reactor, hybrid reactor, membrane reactor, coagulation, sedimentation, filtration, adsorption, membrane separation.