

Molczan, M., Karpińska-Portela, A.M. Theoretical and Practical Possibilities of Organic Matter Removal from Water by Magnetic Anion Exchange. *Ochrona Srodowiska* 2009, Vol. 31, No. 1, pp. 31–36.

Abstract: The study reported on in the paper aimed at developing the conventional laboratory procedure for magnetic anion exchange by the addition of the repeated kinetic jar test and multiple loading jar test. When such an approach is adopted, the results of laboratory investigations show how the changes in the quality of raw water influence the efficiency of water treatment by the magnetic anion exchange method. The procedure proposed performs certain functions of a pilot study, but can not replace it. In our research riverine water samples (from the Olawa and Nysa Klodzka, taken in for the municipal water supply system of the city of Wroclaw) were made subject to kinetic jar tests and multiple loading jar tests. Kinetic jar tests were used to determine the theoretical efficiency of organic anion exchange, whereas multiple loading jar tests were intended for establishing the efficiency of the process obtainable in practice. The results obtained have revealed a wide spectrum of possibilities for the application of magnetic anion exchange to the removal of organic substances from the riverine water being tested. The extent of theoretical dissolved organic carbon (DOC) removal varied from 56 to 71%, whereas the reduction in color intensity and UV₂₅₄ absorbance fell in the range of 73 to 85% and 75 to 82%, respectively. A decrease was also observed in the specific UV absorbance value, which varied between 14 and 51%. However, the practical efficiency of the method was found to be lower, which is attributable to the partly exhausted exchange capacity of the resin used in technical installations. Thus, at a bed volume ranging between 1000 and 2000, actual removal efficiencies varied from 23 to 50% (DOC), from 33 to 58% (color), from 40 to 57% (UV₂₅₄ absorbance) and from 6 to 33% (specific UV absorbance). Analysis of the results of repeated multiple loading jar tests may be of utility in the preliminary choice of the process parameters for magnetic anion exchange, but primarily in the choice of the range of preferred bed volume values. Moreover, analysis of the multiple loading jar test results provides information not only about the potential response of the treatment train to the variations in raw water quality, but also about the possibility of buffering such changes by the control of the process parameters.

Keywords: Water treatment, ion exchange, anion exchange resin, MIEX[®] resin, kinetic jar test, multiple loading jar test, resin dosage, contact time, bed volume.