

Nanotechnology and nanomaterials

Pyrolox application in heavy metal ions removal

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Ion exchange technology is currently the best way to remove and recovery metal ions from water and wastewater. However, underground water generally contains iron and manganese compounds. As for manganese removal its transformation from the soluble into the insoluble form and separation of the generated oxides can be proposed. The most commonly method used is also chemical oxidation combined with filtration or aeration combined with filtration by the materials containing MnO₂ [1, 2]. One of them is Pyrolox[®]. It is the manganese dioxide sorbent suitable for iron, manganese and arsenic removal. It is well known that it works extremely well between a pH range of 5 to 9 pH, however, the higher the pH the higher the oxidation capabilities. A 6.5 pH or higher is considered ideal. A lower pH than 6.5 may require extra media for contact time.

In the paper the studies on the use of Pyrolox[®] for the removal of Cu(II), Zn(II), Cd(II) and Pb(II) as well as Hg(II) ions will be presented. Their concentrations were analyzed using the atomic absorption spectrometer SpectrAA 240 FS (Varian). For this aim the batch mode kinetic and equilibrium studies were carried out. The effect of solution pH, shaking time, initial metal ion concentrations, sorbent dosage and temperature was investigated. Equilibrium data were analyzed by sorption isotherm models. The results of kinetic models showed that the pseudo second order kinetic model was found to correlate the experimental data well.

1. *Michel M.M, Kiedrzyńska L.* Modelling equilibrium data for manganese(II) sorption onto manganese dioxide modified chalcadonite using the nonlinear regression method // *Ann. Warsaw Univ. of Life Sci. – SGGW, Land Reclam.* -2011. -**43 (2)**, -P 155-163.
2. *Brown G.E., Henrich V.E., Casey W.H.* Metal oxide surface and their interactions with aqueous and microbial organisms, *Chem Rev.* -1999, -**99**, -P 77-174.