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MAGNETIC NANOPARTICLES USED IN ENVINRONMENTAL ENGINEERING FOR Pb AND Zn REMOVAL

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Abstract

Maghemite nanoparticles (γ-Fe_2O_3) were synthesized in order to be used as magnetic adsorbent for two heavy metals, Pb(II) and Zn(II), from aqueous solutions. γ-Fe_2O_3 was prepared from magnetite nanoparticles and was tested for single and binary aqueous solutions. Efficiency removal (%) for single solutions appears only after 10 minutes and was higher than 80%. In case of binary solutions, same results regarding efficiency removal were registered after 60 minutes, being almost 90% for Pb(II) and only 70% for Zn(II). In this case, the experimental data for single solutions were correlated with the Langmuir, Freundlich and Dubinin-Radushkevich adsorption models in order to evaluate the adsorption capacity of the magnetic adsorbent. Level of the metals concentration removed with these types of particles can be assumed as satisfactory. The maximum adsorption capacity was found at 19.23 mg/g for Zn(II) and 9.89 mg/g for Pb(II) in case of single solution (at 25°C) according to the Langmuir model. The results obtained in case of Dubinin-Radushkevich model indicate a good adsorption in terms of ion-exchange process. Also, recovery for Pb(II) and Zn(II), after acidic washing, was studied. The results suggest that magnetic nanomaterial can be used as efficient adsorbents of heavy metals also from aqueous environments.

Key words: heavy metals, magnetic materials, nanomaterials, water treatment

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