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Removal of Pb^{2+}, Ni^{2+}, Cd^{2+}, Zn^{2+} from wet process phosphoric acid by mueroxide impregnated activated bentonite

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The harmful inorganic impurities in wet process phosphoric acid are essentially removed by a simple and inexpensive method for environment applications. In this work, the highly efficient removal of Pb^{2+}, Ni^{2+}, Cd^{2+} and Zn^{2+} cations (>99%) from WPPA were investigated through a batch technique using mueroxide impregnated activated bentonite. The used adsorbent was prepared within a dry method. The experimental data showed high adsorption capacity of mueroxide impregnated activated bentonite toward Pb^{2+}, Ni^{2+}, Cd^{2+}, and Zn^{2+} cations into its active sites as 170, 115, 143 and 190 mg/g at 5 M acid concentration, respectively. Moreover, most of the heavy metals were completely adsorbed from WPPA (>98%) at 5 M acid concentration. The providing data indicated that the batch sorption technique retained its functionality to effectively remove Pb^{2+}, Ni^{2+}, Cd^{2+} and Zn^{2+} cations even after six reuse/cycles, where the mueroxide impregnated activated bentonite can be regenerated using HCl. The real impurities removal from the Abu Zabaal wet process phosphoric acid using the adsorbent was assessed through the proposed protocol under optimum conditions.

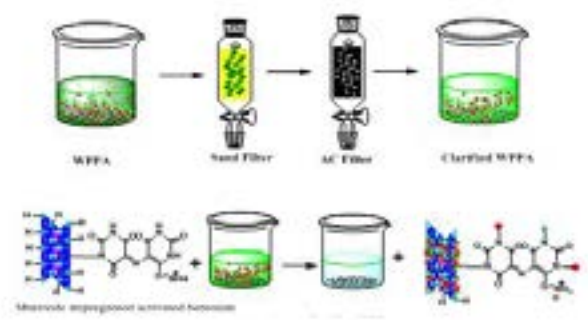

Figure 1: Mechanism of removal of metal ions impurities from WPPA using mueroxide impregnated activated bentonite.

Recent Publications

1. Cheira M F (2015) Characteristics of uranium recovery from phosphoric acid by an aminophosphonic resin and application to wet process phosphoric acid. European Journal of Chemistry 6(1):48-56.
2. Cheira M F, Zidan I H and Manaa E A (2014) Potentiality of white sand for the purification of wet process phosphoric acid from some metallic elements (U, Zn, Cd). Chemical Technology 9(6):224-233.
3. Abdien H G, Cheira M F, Abd-Elraheem M A, Saef El Naser T A and Zidan I H (2016) Extraction and pre-concentration of uranium using activated carbon impregnated trioctyl phosphine oxide. Applied Chemistry 100:43462-43469.
4. Gomaa H, Shenashen M A, Yamaguchi H, Alamoudi A S, Abdelmottaleb M , Cheira M F, Seaf El-Naser T A and El-Safty S A (2018) Highly-efficient removal of AsV, Pb^{2+}, Fe^{3+} and Al^{3+} pollutants from water using hierarchical, microscopic TiO_2 and $TiOF_2$ adsorbents through batch and fixed-bed columnar techniques. Journal of Cleaner Production 182:910-925.
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Biography

Mohamed F Cheira has eighteen years of diverse experience in Applied Research, Management, as well as hands-on experience in the areas of Materials Synthesis, Mineral Processing, and Chemical Hydrometallurgy. He is an Associate Professor of Inorganic Chemistry and Head of Uranium and Thorium, Analysis Lab Member of Technical Office of the Labs and Member of Scientific Office, Nuclear Materials Authority.

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