

Remediation of selected heavy metals (Pb, Cd) from fly ash using magnetite nanoparticles

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Magnetite nanoparticles has immense potential for the environmental remediation of inorganic contaminants like heavy metals. In the present research work the commercial magnetite nanoparticles were procured, characterized and it's efficiency was analyzed for the removal of Pb and Cd from the aqueous solutions of fly ash using shake flask method in an incubator shaker at room temperature. The morphological analysis was done by microscopic techniques: SEM-EDS and HRTEM which revealed the cuboidal shaped nanoparticles of size 20–45 nm. The crystallinity and microstructure was analyzed by the XRD, Raman and FTIR. The magnetite nanoparticles were segregate, uniform and crystalline in nature. The SEM-EDS revealed the high purity of the sample as the EDS spectra have peaks for Fe and O only. The 20% fly ash solution have higher Pb and Cd heavy metal concentration than others. Magnetite nanoparticles removed Pb upto 95.32% after 18 h and Cr was removed upto 81.52% after 24 h.

Keywords: Magnetite nanoparticles, fly ash, heavy metal, remediation, adsorption.