

Silver Nanoparticles Impregnated Zeolitic Composites: Effect of the Silver Loading on Adsorption of Mercury (II)

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Abstract : Removal of mercury (II) from aqueous phase is of utmost importance, as it is highly toxic and hazardous to the environment and human health. One way of removal of mercury (II) ions from aqueous solutions is by using adsorbents derived from coal fly ash (CFA), such as synthetic zeolites. In this work, we present the hydrothermal production of synthetic zeolites from CFA with conversion rate of 75%. In order to produce silver containing nanocomposites, synthetic zeolites are subsequently impregnated with various amounts of silver nanoparticles, from 0.2 to 2wt.%. All produced zeolites and parent materials are characterized by XRD, XRF, BET, SEM, and TEM to obtain morphological and microstructural data. Moreover, mercury (II) ions removal from aqueous solutions with initial concentration of 10 ppm is studied. According to results, zeolites and Ag-nanocomposites demonstrate much higher removal than parent CFA (up to 98%). In addition to this, we could observe a distinct adsorption behavior depending on the loading of Ag NPs in nanocomposites. A possible reaction mechanism for both zeolites and Ag-nanocomposites is discussed.

Keywords : coal fly ash, mercury (II) removal, nanocomposites, silver nanoparticles, synthetic zeolite

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