

Treatment of arsenic-contaminated groundwater by a low cost activated alumina adsorbent prepared by partial thermal dehydration

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ABSTRACT

Experimental investigations were carried out to remove arsenic from contaminated groundwater by low cost activated alumina based adsorbent prepared by partial thermal dehydration. Activated alumina based adsorbent with high surface area was prepared following partial thermal dehydration of gibbsite precursor and an attempt was made to study the effects of dehydration temperature, residence time, rate of increase of temperature and particle size on development of active surface area of the adsorbent. The operating parameters were found to have significant effect on active surface area development. BET Surface area (by nitrogen adsorption) and ignition losses were determined for all the samples. It was found that an adsorbent of surface area of around 335–340 m²/g could be developed when dehydrated at 500°C for a residence time of 30 min in a rapid heating system (rate of increase of temperature 200°C/min) with particle size of 200 mesh (85%). The arsenic adsorption capacity of this adsorbent was determined both in batch and column studies. The adsorbent was found to be very effective in removing arsenic. The adsorbent placed in column could successfully remove arsenic from water up to a level below 10 µg/L for more than 6000 bed volume water.

Keywords: Activated alumina; Arsenic adsorption; Adsorption surface; Thermal dehydration

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