



A comparison study of granular activated carbon modification by FeCl_3 under the acidic and basic condition for arsenic removal from water

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ABSTRACT

The present study deals with the effect of two different conditions for modification of raw granular activated carbon (GAC) with FeCl_3 under acidic granular activated carbon (AGAC) and basic granular activated carbon (BGAC) conditions for removal of arsenic – As(V) – from aqueous solution. X-ray diffraction, scanning electron microscopy, and Brunauer–Emmett–Teller (BET) were used for structural properties. Obtained images show that for raw GAC most of the peaks are related to SiO_2 and graphite, but, for AGAC related to Fe_2O_3 , Fe_3O_4 , and SiO_2 , and for BGAC related to Fe_3O_4 and hydrogen aluminum silicate. Surface area and total pore volume of raw GAC > AGAC > BGAC. Kinetics study for arsenic removal by raw GAC and BGAC obeyed pseudo-first-order model, but, AGAC obeyed pseudo-second-order model. Isotherm study showed that raw GAC has a good fit with Langmuir model, and AGAC and BGAC have a good fit with Freundlich model. The adsorption capacity of AGAC, BGAC, and raw GAC (As(V) concentration = 0.3 mg/L) was 22.7, 18.33, and 14.35 mg/g, respectively. It was concluded that modified raw GAC under the acidic condition had better than basic condition.

Keywords: GAC; Modified GAC; Arsenic removal; Adsorption; Iron oxide/GAC

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