

Macroscopic and vibration spectroscopic evidence for specific bonding of arsenate on gibbsite

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Abstract

The As(V) adsorption onto gibbsite under different experimental conditions was examined. Macroscopic data suggests strong As(V) bonding on gibbsite possibly via a bidentate binuclear complexation mechanism. The As(V) adsorption was quantified with the charge distribution multi-site ions complexation (CD-MUSIC) model distributing the anion charge over 0- and 1-planes according to the modified Pauling's bond valence theory. In the dual-adsorbates system of As(III) and As(V), the As(III) adsorption was predicted up to pH 8 utilizing the binding constants derived for single-adsorbate data. However, with pH > 8, the modeled As(III) adsorption data is overestimating the experimental values.

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