
Anion Interactions with Freshly Prepared Hydrous Iron Oxides¹

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¹ Journal series No. 3011.

Abstract: Infrared analysis showed that the bonding habit of oxyanions with freshly precipitated hydrous ferric oxides depends upon the nature of the anion and its hydration level. Monovalent oxyanions adsorb through an electrostatic interaction with the hydrated hydrous oxide surface. All divalent oxyanions, with the exception of tellurate, coordinate directly with surface iron cations. Tellurate, an octahedral anion, apparently penetrates and incorporates in the hydrous oxide structure. The symmetry of the free anion has a significant role in determining the configuration of the resultant complex. For anions of the same charge, those with tetrahedral geometry (in uncoordinated states) show a higher degree of specificity for the surface than the trigonal planer anions. Without exception, each bidentate bridging complex forms by replacement of protonated and unprotonated hydroxyls. With the anion geometry and the charge being equal, the suspension pH determines the adsorption capacity of the hydrous oxide.

Key Words: Anion adsorption • Bidentate bridging • Infrared spectroscopy • Iron oxide

Clays and Clay Minerals; April 1982 v. 30; no. 2; p. 97-102; DOI: [10.1346/CCMN.1982.0300203](https://doi.org/10.1346/CCMN.1982.0300203)

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