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Surface Properties of Aqueous Fluorapatite and Maghemite with Reference to the Dephosphorization of Magnetite

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Abstract

The success of the dephosphorization by reverse flotation of fluorapatite is heavily depending on the proper control of surfaces and interfaces in the mixture of several solid phases suspended in the aqueous solution through which the air bubbles are being dispersed.

The different surface properties of fluorapatite and iron ore minerals with respect to surface hydration and surface charge (i.e.pH_{zpc}), protolytic surface properties, surface site density and function, surface area etc will strongly influence the separation.Maghemite (γ-Fe_2O_3) and Fluorapatite ($Ca_5F(PO_4)_3$) were synthesized and characterised by means of SEM, XRD, BET, FT-IR, Raman , single-pulse ^{31}P and ^{1}H MAS NMR as well as ^{31}P CP/MAS NMR spectroscopy and the protolytic properties of the individual minerals and of mineral mixtures in aqueous suspensions were studied by potentiometric titrations and surface complex modelling. The flotation reagents used are a modified fatty acid in combination with sodium silicate. The adsorption mechanism of the collector on the calcium sites of fluorapatite is discussed.