E2-51 Quantification of surface iron sulphide by indirect experimental methods

Muditha P Liyanagedara
(*Dept. of Environmental Sciences, Institute of Fundamental Studies, Kandy*)

The present work forms a part of a broader project dealing with the surface complexation of metal sulphide systems, in order to provide mineral-induced water decontamination methodologies to degrade chloro-organic pollutants from aquatic systems. The objective of this research is focused on characterization of the FeS-solution interface conditions. The chemical data thus generated will provide the essential first step required for the understanding of degradation mechanisms of chloro-organic pollutants in pyrite mediated environmental systems. The specific reasons for selecting FeS in this investigation are (1) FeS as well as other iron sulphides (i.e. pyrite) are ubiquitous in nature, and are known to have a major impact on the transport and fate of various solutes, particularly in anoxic environments; (2) it provides an attractive starting material to facilitate abiotic electron transfer process largely due to its dual properties, namely hydrophobicity and hydrophilicity and (3) the interaction of both Fe^{2+} and S^{2-} sites on FeS with various oxidants and reductants in the aqueous phase. Of the 5 complexation models the modified triple layer model has been used to quantitate the interfacial properties of FeS-solution.

The specific surface area of FeS was 6.59 m^2/g by the polar liquid retention method and that by the permeation method was 1.1 m^2/g. As observed by scanning electron micrograph the size distribution of FeS was in the range of 5-10um. The pH_{pzc} was observed at pH 4.66. Intrinsic acidity constants, pK_{al}^{int} and pK_{a2}^{int}, of surface reaction sites of FeS were 0.29 and 8.56 respectively.

The dependence of titration curves on background ionic strength is not very significant as they are very closely spaced although there is a tenfold difference in the background ionic strength.