The space expression of nuclide transport in GIS environment

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Because of the radioactive pollution source diffusion process has the characteristics of timeliness and extensity, the uranium tailings impoundment deposit always makes the circumjacent ground water disperse and further result in the ground water's nuclear pollution. The safe disposal of High Level radioactive Waste (HLW), such as uranium tailings impoundment, is a key problem in the development of nuclear energy, and the radionuclide transport in the ground water is a core research contents in the geological disposal of HLW.

In this paper, the Geographic Information System (GIS) is used in researching of nuclide transport regulation, the main contents include: in virtue of space analysis technology, the dispersing process and distribution of nuclide were simulated by time and space scale, respectively. Areal geology and ground water hydrology were investigated by the establishment of three-dimensional areal hydrogeology model. Space information of nuclide transport could be extracted and transmit from the space model of nuclide transport. Dynamic simulation of space dispersing process of uranic pollution (nuclide) would be achieved.

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Protonation enthalpy of magnetite from high temperture electrophoresis

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Surface protonation of metal oxide surface is acknowledged to be a crtical step in mineral-water interactions in geothermal environments. We used a special high temperture microelectrophoresis cell [1] to investiagte the zeta potential of magnetite (Fe_3O_4) in aqueous solution at temperatures up to 200°C. From the obtained data, isoelectric pH points (IEP) for magnetite surface were determined (Fig. 1).

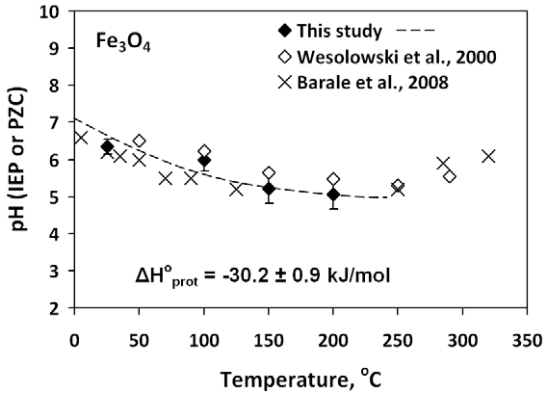

Figure 1: Isoelectric points of magnetite *versus* temperature compared to surface and mass titration PZC data [2,3].

Approximation of the obtained IEP data with the 1-pK_a thermodynamic model [4] and Crystal Chemistry and Solvation Theory [5] allowed us to estimate the standard enthalpy of protonation ($\Delta H°_{prot}$) of the magnetite surface. The obtained $\Delta H°_{prot}$ values closely agree with those derived from surface titration data [2]. The relatively high protonation enthalpies suggest that temperature should have a pronounced effect on the constants of surface reactions on magnetite.

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