Magnetic Effects on Aqueous Solutions

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Various magnetic effects, such as those on living organisms, the scale deposition on a pipeline surface, the corrosion of a metal surface, the solidification of cement and others, have been reported. The characteristics of these effects are summarized as follows: (i) the effects arise from the exposure of nonmagnetic materials to a magnetic field of low flux density, (ii) the effects remain even after the magnetic exposure is completed, which we call “Memory Effect”, and (iii) there exist conflicting data. These phenomena are not rationalized by the simple electromagnetic principle and so have been regarded as mysterious.

We have carried out a series of simple but well-controlled experiments of the magnetic effects on aqueous solutions, and reported quantitative data of the effects on the rapid coagulation rate, the zeta potential and diffusivity of colloids, the formation of CaCO3 crystals, and the emission intensity of fluorescent probes in solutions. A series of molecular-scale measurements on surface properties in electrolyte solutions by using the Atomic Force Microscope (AFM) were also carried out.

We found that all these macroscopic and microscopic results were consistent each other, and a possible mechanism was proposed to explain the phenomena observed. In the present talk, I will also review the recent works on magnetic effects on aqueous solutions done by the other researchers.