X-rays diffuse scattering by water and amorphous ices

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Water is a unique natural object, since plays the important role in the formation of physical and chemical processes. The uniqueness of water is manifested in the fact that the simple structure of water molecules is in stark contrast to the vast variety of different phases and complex phase diagrams of water. The emergence of the amorphous structure is determined by X-ray diffraction method because the lack of Bragg diffraction in the crystal lattice is a criterion amorphization of substance. The metastable structure of amorphous ice in the conditions of normal pressure was received at a temperature -3^0C. Experimental conditions were described in work [1]. Using Fourier transformation the algorithm of creation of functions of radial distribution was developed for amorphous structure. Functions of radial distribution of amorphous ices have been constructed at temperatures -3^0C and -160^0C comparable to the known functions for water at 1.5^0C [2]. Function of radial distribution of amorphous ice at a temperature -160^0C has been calculated from the diffractogram provided in [3]. Results of such calculations are given on Figure1.

Comparison of radial distribution functions shows that, unlike water, amplitude of electronic density fluctuations of amorphous ices is almost constant. As show calculations, this persistence of amplitude remains on extremely measure to distances 30Å.

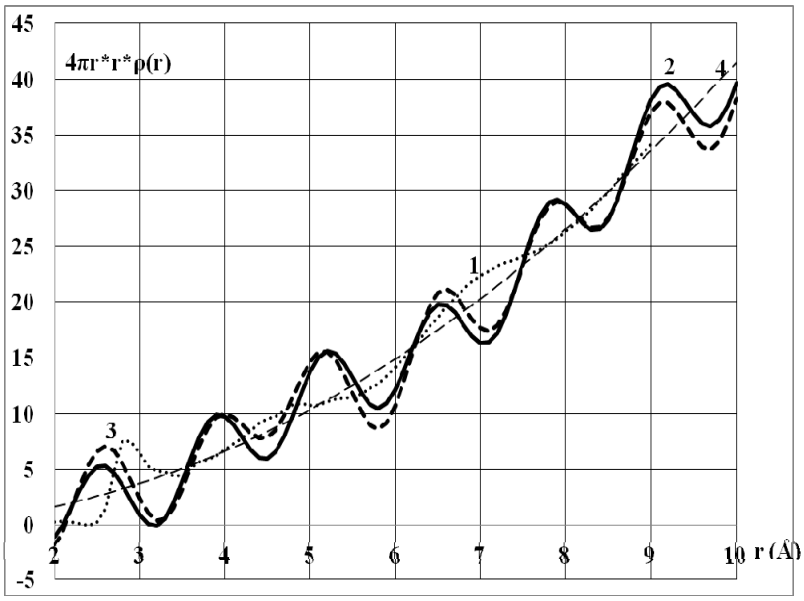

Figure1: Functions of radial distribution: 1) water [2]; 2) amorphous ice -3^0C; 3) amorphous ice -160^0C; 4) $4\pi r*r*\rho_0(r)$ - average value of electron density fluctuations.

References

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[3] L.G.Dowell, A.P.Rinflet. *Low-temperature forms of ice as studied by X-ray diffraction*. Nature, **188**, 1144-1147 (1960)