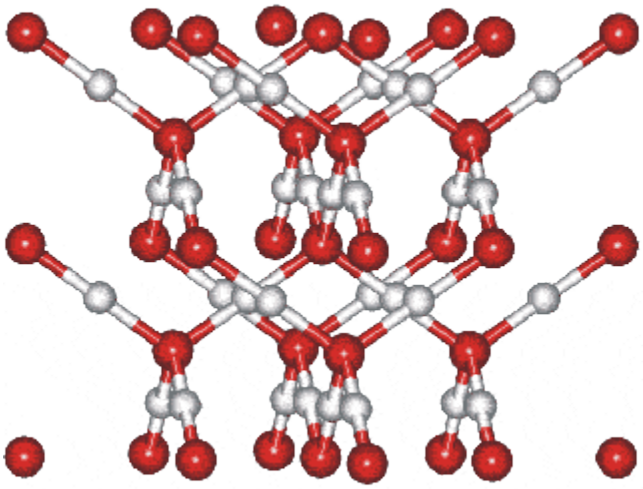
Ice-ten (Ice X)



As the pressure is raised and the O···O distance contracts, ice-seven appears to undergo a continuous transition into cubic ice-ten (ice X) (still $Pn\bar{3}m$ space group, a, b, c = 2.78 Å at 62 GPa, 300 K [719]) where the ice protons are equispaced (and equally bonded) between the oxygen atoms in a molecular crystal [1621]. The oxygen atoms are arranged in a body-centered cubic arrangement (8 neighbors) and the hydrogen atoms in a body-centered truncated cubic arrangement (12 neighbors). It is likely that ice-ten is at least partially ionized with both hydrogen atoms and oxygen atoms fully ionized. Also, some protons are likely to occupy the octahedral cavities as this behavior has been seen to develop in ice-seven at lower pressures [2027]. These dissociations have not been shown in the cartoons here.

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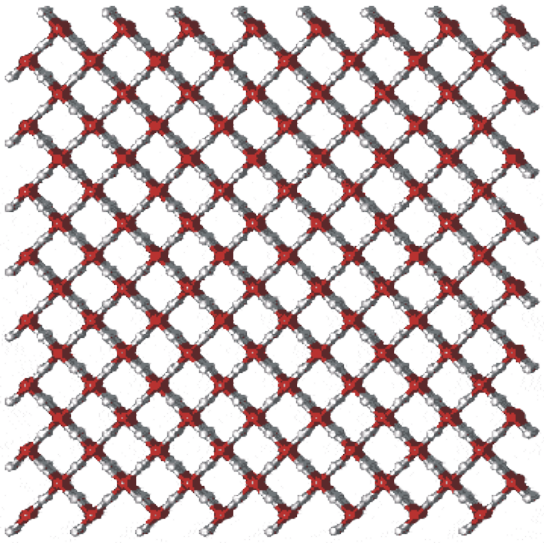

The melting curve for ice-ten has been proposed at high temperatures (1000-2400 K) [612a]. As ice X is approached with increasing pressure from very hot liquid water and the O-H energy minima draw near to each other, the protons rapidly swap positions giving many short-lived OH^- and H_3O^+ ions [612b]. In the ice X, however, protons are less mobile than in ice VII as there is only one energy minimum for each O-H-O bond,

Ice-ten looks identical as seen from the x, y or z direction.

Ice-ten has triple points with ice-seven and ice-eight (100 K, 62 GPa) and ice-seven and water (~1000 K, ~47 GPa) [612b].

Interactive Jmol structures are given.

Source:http://www1.lsbu.ac.uk/water/ice_x.html