

Abstract Submitted
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Proton Transports in Pure Liquid Water Characterized by Melted Ice Lattice Model. BINBIN JIE, CHIHTANG SAH, Department of Physics, Xiamen University, China — Basic water properties have not been understood for 200 years. Our Melted Ice Lattice model accounts for the 2 basic properties of pure water, the ion product (pH) and mobilities. It has HCP primitive unit cells, each with $4\text{H}_2\text{O}$, based on the 1933 Bernal-Fowler model, verified by 1935 Pauling residual entropy theory of 1928-1935 Giauque experimental low temperature specific heat measurements. Our 2 ion species are point-mass protons $p+$ and $p-$, for mass and electricity transport. Three protonic thermal activation energies are obtained from pH and $p+$ and $p-$ mobilities vs T (0-100 $^{\circ}\text{C}$). Proton transport is analyzed in 3 proton-phonon collision steps: proton detrapping by protonic phonon absorption, proton scattering by oxygenic (water) phonons, and proton trapping with protonic phonon emission. Distinction between Potential and Kinetic Energy Bands of protons (Fermions) and phonons (Bosons) is noted. Experimental protonic activation energies are the phonon energies given by the spring-mass vibration frequencies of lattice, $w_n = (k_n/m_n)^{1/2}$. n is the proton-mass unit of the synchronized vibrating particles in the primitive unit cells.

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