

Abstract Submitted
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The Structure and Stability of Aqueous Electrons and Protons¹

EDWARD CHEN, University of Houston, Clear Lake, EDWARD CHEN, Baylor College of Medicine — The fundamental properties of the electron and proton were determined a century ago and ion gas phase clusters with water were observed. However, the structure and stability of aqueous electrons and protons remain uncertain. Before the 1960's the "hydrated" electron was unknown and the hydration enthalpy of the proton at 298K was between 258 to 283 kcal/mol. We report hydration free energies $-dG_{aq}[298]$: H(+), 266(2); e(-), 46(1) (kcal/mol) and ionic radius, r : H(+), 0.443(5); e(-), 2.56(5) angstroms using the ionization potential of the hydrogen atom, the bond dissociation energy of molecular hydrogen, the standard hydrogen electrode potential, and the Born equation. Also reported are simple structures of the mono hydrated proton and hydroxide ion and the radii for the halides from precise Morse potentials for $X_2(-)$ constructed in 2003 following Herschbach and the $-dG_{aq}[X(-)]$ from reduction potentials and electron affinities.

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