Hydronium Ion Encyclopedia Article

Hydronium Ion

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Hydronium Ion

The Hydronium **ion** is an important participant in the chemical reactions that take place in aqueous (water, H_20) solutions.

Through a process termed self-ionization, a small number of **water** molecules in pure water dissociate (separate) in a reversible reaction to form a positively charged H+ ion and a negatively charged OH- ion. In aqueous **solution**, as one water **molecule** dissociates, another is nearby to pick up the loose, positively charged, **hydrogen proton** to form a positively charged Hydronium ion (H_3O+).

Water molecules have the ability to attract protons and form Hydronium ions because water is a polar molecule.**Oxygen** is more electronegative than Hydrogen. As a result, the electrons in each of water's two oxygen-hydrogen bonds to spend more time near the oxygen **atom**. Because the electrons are not shared equally--and because the bond angles of the water molecule do not cancel out this imbalance--the oxygen atom carries a partial negative charge that can attract positively charged protons donated by other molecules.

In a sample of pure water, the **concentration** of hydronium ions is equal to $1x10^{-7}$ moles per liter (0.0000001 M). The water molecule that lost the hydrogen proton--but that kept the hydrogen **electron**--becomes a negatively charged hydroxide ion (OH-).

The equilibrium (balance) between hydronium and hydroxide ions that results from self-ionization of water can be disturbed if other substances that can donate protons are put into solution with water. Hydrochloric Acid (HCl), for example, is an important acid found in the human stomach transfers a proton to water to form hydronium ions.

The potential hydronium ion concentration (pH) is equal to the negative logarithm of the hydronium ion concentration: **pH**=-log [H_30+].