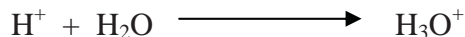


IV.3 - The True Nature of H⁺_(aq): (Background Theory)

- The hydrogen atom consists of a proton surrounded by a single electron. If we remove the electron, so as to create H⁺, we are left with a “naked” proton. Since this tiny nuclear particle has an enormous charge concentration (it has a +1 charge concentrated in a very small region of space - the diameter of the proton is 5X10⁻¹⁴cm), this highly concentrated positive charge is very strongly attracted to any region where negative charges exist.

All the H⁺ present in water will attach itself to water molecules:



- Definitions

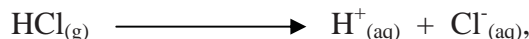
H⁺ is called the **proton**.

H₃O⁺ is called the **hydronium ion**, or the hydrated proton.

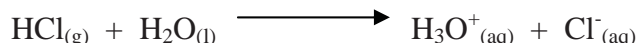
- What we previously have been calling H⁺_(aq) is actually H₃O⁺_(aq). Using H₃O⁺_(aq) instead of H⁺_(aq) will mean that in the future we will have to rewrite the way we show the IONIZATION of an acid.

Example:

When HCl(g) is added to water to produce a hydrochloric acid solution, HCl_(aq), we previously would write:



but we should now write:



Notice that what we have done to our first equation is to add H₂O to both sides of the equation. However, on the right hand side we combined the added H₂O with H⁺ to produce H₃O⁺.

Examples:

1. April 2004

Which of the following is a general characteristic of Arrhenius acids?

- A. They produce H⁺ in solution.
- B. They accept an H⁺ from water.
- C. They turn bromthymol blue a blue colour.
- D. They react with H₃O⁺ ions to produce H₂.

2. June 2002

An Arrhenius base is defined as a substance that

- A. releases H⁺_(aq)
- B. releases OH⁻_(aq)
- C. accepts a proton
- D. donates a proton

*****Do Hebden Questions #10, pg 115*****