

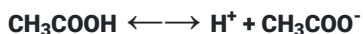
2.3.1

Acids and Bases

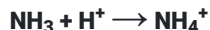
In pure water at 25° C, the concentration of H^+ is always equal to the concentration of OH^- . Both have a concentration of 1.0×10^{-7} Molar. (Placing the symbol for a chemical in brackets $[H^+]$ is chemical shorthand for “concentration of.” Therefore, $[H^+]$ is read “the concentration of hydrogen ion.”) If we add a substance that results in an increase in $[H^+]$, we say that substance is an **acid**. If we add a substance that results in a decrease in $[H^+]$, we say that substance is a **base**. An acid is any substance that, when added to an aqueous solution, increases the $[H^+]$ of the solution, and a base is any substance that, when added to an aqueous solution, decreases the $[H^+]$ of the solution. A common acid, for example, is hydrochloric acid, HCl. When HCl reacts with water, it dissociates into an H^+ and a chloride ion (Cl^-), thus increasing the $[H^+]$. HCl is considered a strong acid because when placed in water, it completely dissociates into its two ions.



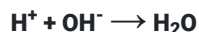
A weak acid, such as **acetic acid** (CH_3COOH), dissociates into H^+ and CH_3COO^- (acetate). However, most remains intact as acetic acid, and there is a chemical equilibrium between the CH_3COOH and the $H^+ + CH_3COO^-$. The **conjugate base** is the name given to the now unprotonated compound (acetate). Thus, the disassociation of acetic acid (weak acid) produces acetate (conjugate base) and a hydrogen ion:



An example of a base is ammonia (NH_3), which will combine with H^+ to form an ammonium ion (NH_4^+), thus removing H^+ from the solution.



Another common base is sodium hydroxide (NaOH). How is this a base? When it dissolves, it dissociates into a sodium ion (Na^+) and OH^- , no change in $[H^+]$, right? However, the OH^- will combine with H^+ to form water, thus removing H^+ from the solution.





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