

Acid - Base Theories

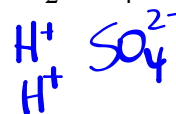
Revised Arrhenius Theory of Acids and Bases

- acids are hydrogen-containing compounds that ionize in aqueous solutions to give H^+ HCl , HBr , CH_3COOH , ...
- bases ionize to give OH^- ions

Monoprotic Acid - one hydrogen will ionize Ex. HNO_3

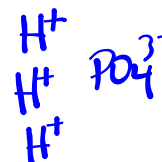


Diprotic Acid - two hydrogens will ionize Ex. H_2SO_4



} poly-protic

Triprotic Acid - three hydrogens will ionize Ex. H_3PO_4

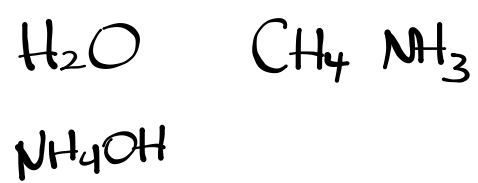


Advantage: it explained neutralization as H^+ and OH^- combining to give H_2O

Disadvantage: not all hydrogen containing substances have acid properties (i.e., CH_4) and not all bases have OH^- (NH_3).

H^+ = proton (1.01)





BRONSTED - LOWRY THEORY OF ACIDS & BASES

Bronsted-Lowry Acids and Bases

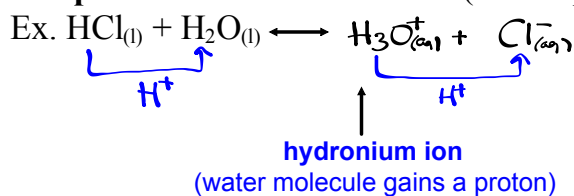
A new theory was needed because:

- (i) not all acid/base reactions involve water.
- (ii) not all bases contain hydroxide ions (Na_2CO_3 , NH_3).

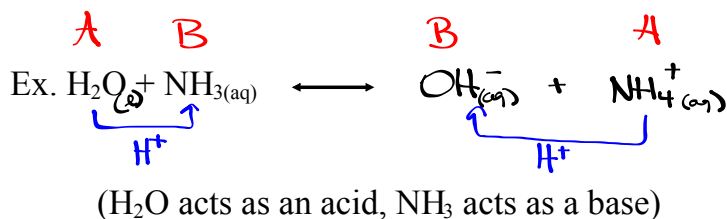
Bronsted - Lowry Acid - a proton (^{H⁺ donor}hydrogen-ion) donor

Bronsted - Lowry Base - a proton (^{H⁺ acceptor}hydrogen-ion) acceptor

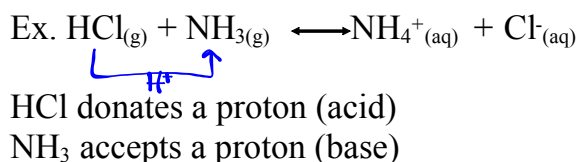
- acids lose a proton to a water molecule (H^+ is a proton!)



- bases gain a proton from a water molecule



However water does not have to be present in order to have a proton exchange.



amphoteric (amphiprotic) - substance that can act as a Bronsted-Lowry acid in some reactions and a Bronsted-Lowry base in other reactions.

