Acids and Bases – 1- Introduction

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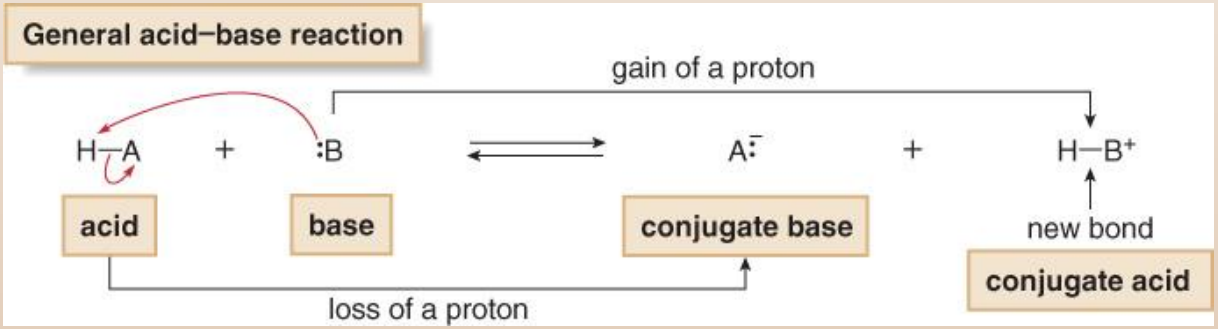
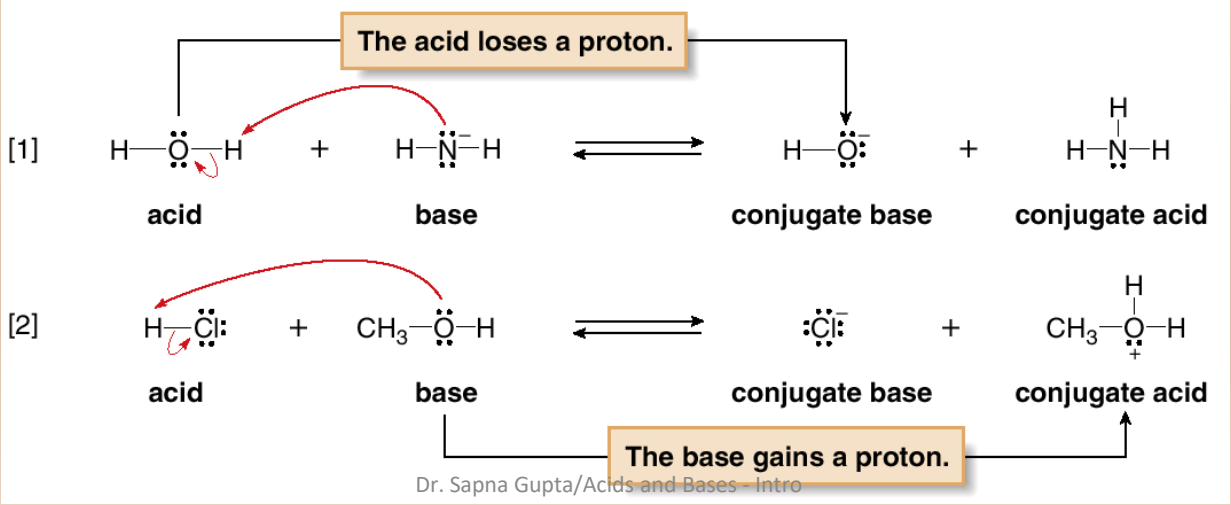
Acids and Bases

- A Brønsted acid donates a hydrogen cation (H^+)
- A Brønsted base accepts the H^+
  - "proton" is a synonym for H^+ - loss of an electron from H leaving the bare nucleus—a proton
  - Full headed arrows indicate transfer of electrons.

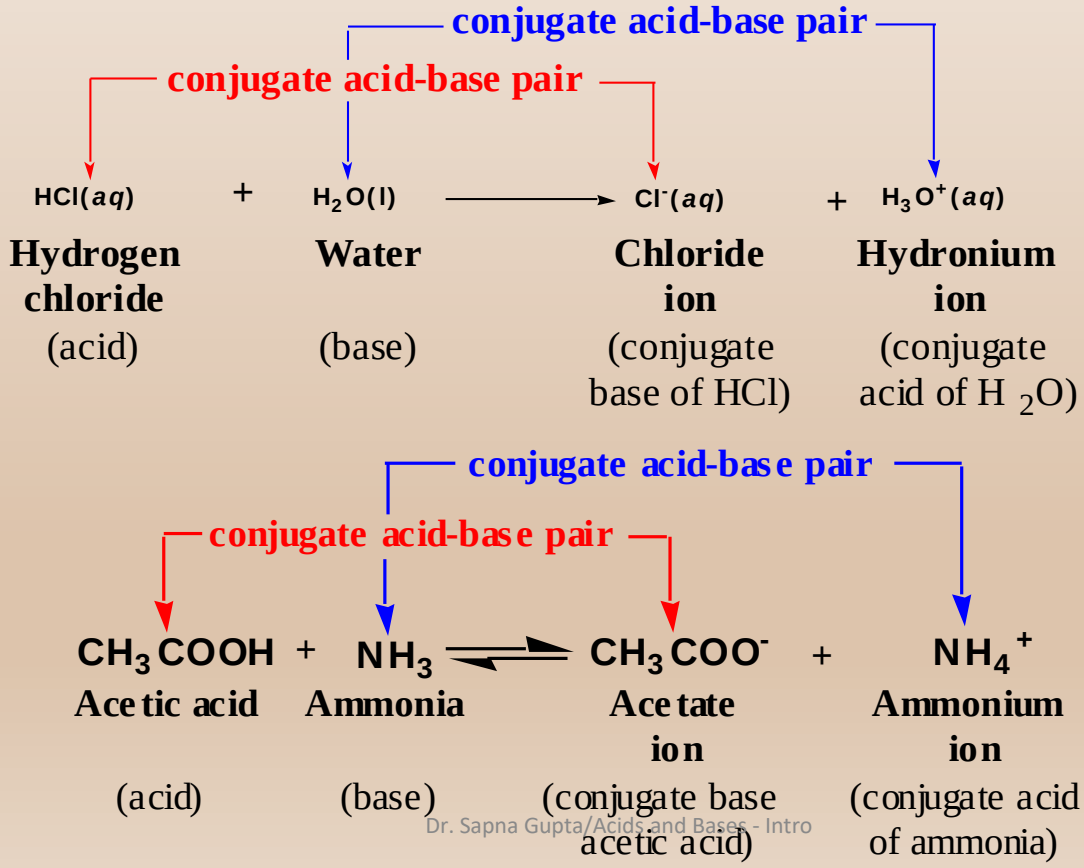


Example



Conjugate Acid Base Pairs

- Conjugate base: formed from an acid when it donates a proton to a base. A **strong acid** gives **a weak conjugate base** and vice versa.
- Conjugate acid: formed from a base when it accepts a proton from an acid. A **strong base** gives a **weak conjugate acid** and vice versa.



Examples of Acids and Bases

- There are inorganic (mineral) and organic acids and bases.

Brønsted–Lowry acids [H – A]		Brønsted–Lowry bases [B:]	
Inorganic	Organic	Inorganic	Organic
HCl H_2SO_4 HSO_4^- H_2O H_3O^+	CH_3CO_2H acetic acid $HO_2CCH_2-C(OH)(COOH)-CH_2CO_2H$ citric acid	$H_2\ddot{O}:$ $:NH_3$ $:\ddot{O}H^-$ $:\ddot{N}H_2^-$	$CH_3\ddot{N}H_2$ $CH_3\ddot{O}:^-$ methylamine methoxide $CH_2=CH_2$ ethylene acetone
• All Brønsted–Lowry acids contain a proton. • The net charge may be zero, (+), or (–).		• All Brønsted–Lowry bases contain a lone pair of electrons or a π bond. • The net charge may be zero or (–).	

Solved Problems

1) What is conjugate acid of NH_3?

a) NH_2
b) NH_2^+
c) NH_2^-
d) NH_4
e) NH_4^+

2) What are the conjugate bases in the reaction below?

$$CO_3^{2-} + HSO_4^- \longrightarrow HCO_3^- + SO_4^{2-}$$

a) HCO_3^- and HSO_4^-
b) HSO_4^- and CO_3^{2-}
c) CO_3^{2-} and OH^-
d) SO_4^{2-} and HSO_4^-
e) CO_3^{2-} and **SO_4^{2-}**

3) For the reaction below which two substances which are both acids

$$CH_3NH_3^+ + H_2O \longrightarrow CH_3NH_2 + H_3O^+$$

a) H_2O and H_3O^+
b) $CH_3NH_3^+$ and H_2O
c) $CH_3NH_3^+$ and CH_3NH_2
d) $CH_3NH_3^+$ and H_3O^+
e) CH_3NH_2 and H_2O

4) A strong acid leads to a

a) weak conjugate acid
b) strong conjugate base
c) weak conjugate base
d) strong base
e) pure water