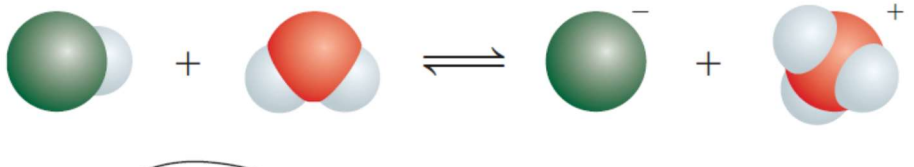
1. BRONSTED-LOWRY ACIDS & BASES

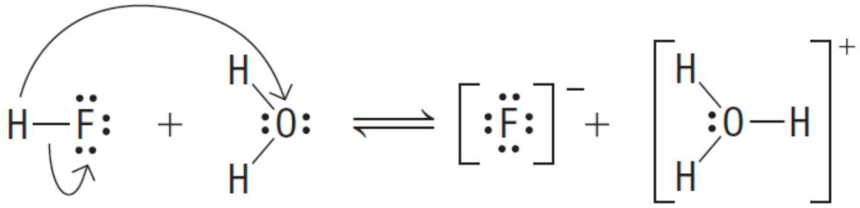
CH40S UNIT 4 – ACID BASE EQUILIBRIUM

1

BRONSTED LOWRY ACIDS

An acid is a hydrogen ion donor.





HF(g) hydrogen fluoride + $H_2O(l)$ water ⇌ $F^-(aq)$ fluoride ion + $H_3O^+(aq)$ hydronium ion

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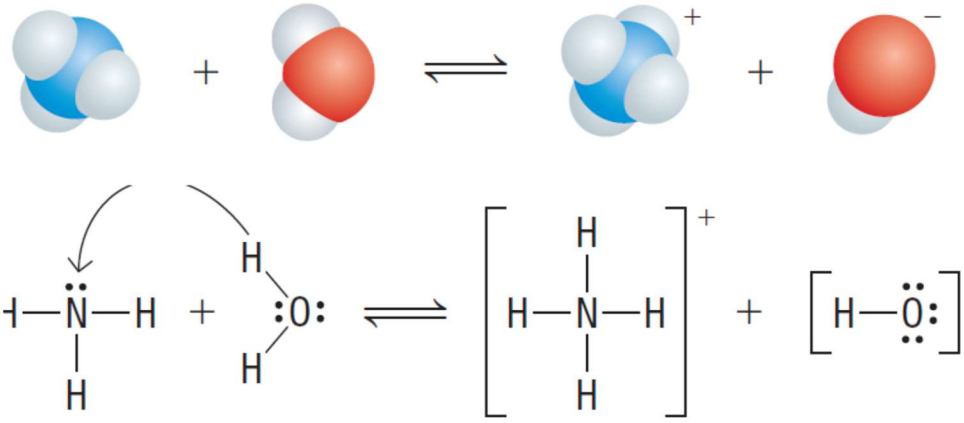
BRONSTED LOWRY BASES

A base is a hydrogen ion acceptor.



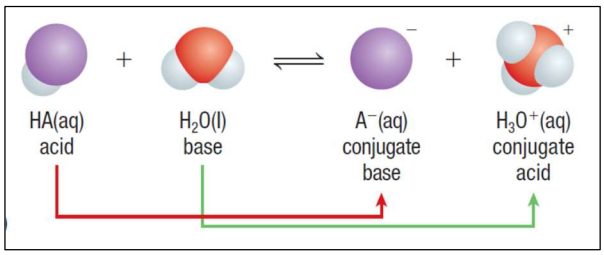
$NH_3(g)$ ammonia + $H_2O(l)$ water ⇌ $NH_4^+(aq)$ ammonium ion + $OH^-(aq)$ hydroxide ion

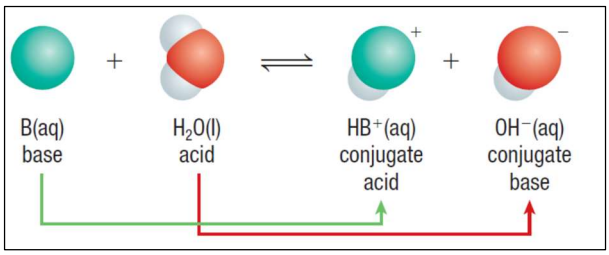
3

CONJUGATE ACID BASE PAIRS

LEARNING TIP

The conjugate acid always contains one more H^+ than the conjugate base.





conjugate acid the substance that forms when a base, according to the Brønsted–Lowry theory, accepts a hydrogen ion (proton)

conjugate base the substance that forms when an acid loses a hydrogen ion (proton)

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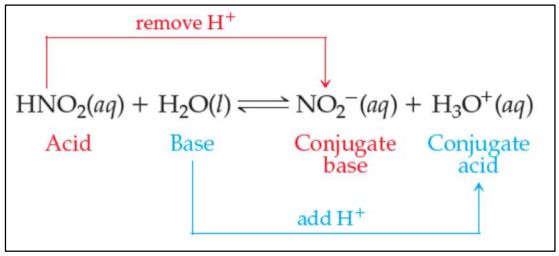
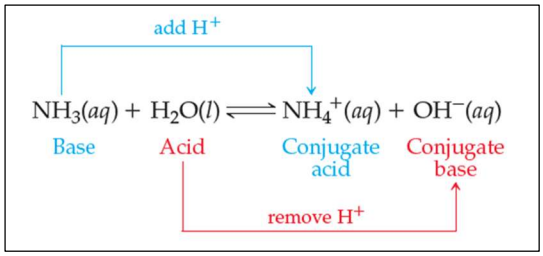
CONJUGATE ACID BASE PAIRS

LEARNING TIP

The conjugate acid always contains one more H^+ than the conjugate base.





- Conjugates act as the acid and base for the reverse reaction.
- The bases that are the best at taking protons dictate eq'm position.

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A SUBSTANCE CAN BE BOTH?

amphiprotic (amphoteric) able to donate or accept a hydrogen ion (proton) and thus act as both a Brønsted–Lowry acid and a Brønsted–Lowry base

$$HCO_{3(aq)}^- + H_2O_{(l)} \rightleftharpoons H_2CO_{3(aq)} + OH_{(aq)}^-$$

base acid

$$HCO_{3(aq)}^- + H_2O_{(l)} \rightleftharpoons CO_{3(aq)}^{2-} + H_3O_{(aq)}^+$$

acid base

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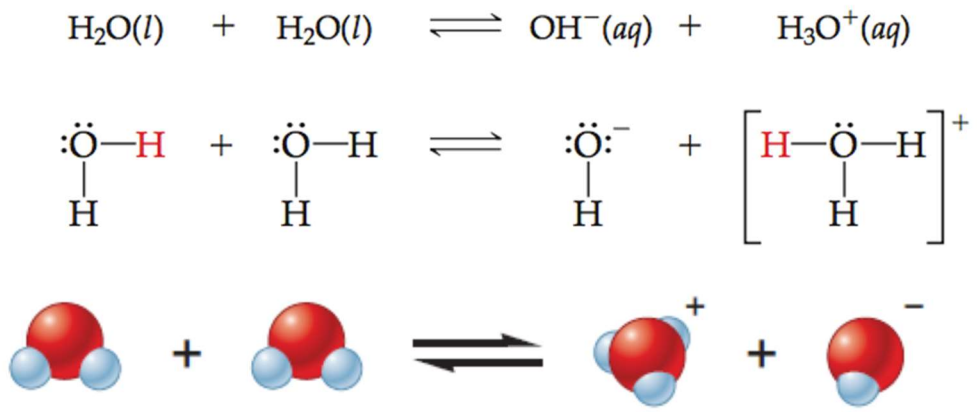
AMPHOTERIC CHEMICALS

Water is amphoteric



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FOR EXAMPLE

Write the Bronsted-Lowery equations for the following acids in aqueous solution and identify the conjugate acid-base pairs:

Hydrochloric acid (HCl)

Acetic acid (CH_3COOH)

Anilinium ion ($C_6H_5NH_3^+$)

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FOR EXAMPLE

Write the Bronsted-Lowery equations for the following bases in aqueous solution and identify the conjugate acid-base pairs:

Methylamine (CH_3NH_2)

Ammonia (NH_3)

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