- Most salts are strong electrolytes
  - ↳ produces ions when in water (in soln)

$$NaCl \rightleftharpoons Na^+ + Cl^-$$

- ↳ neither acidic or basic because:
  - ① Cl^- is conj. base of HCl (strong acid)
    ∴ Cl^- is NOT a base
  - ② Na^+ is cation of NaOH (strong base)
    ∴ Na^+ is NOT an acid

$$NH_4Cl \rightleftharpoons NH_4^+ + Cl^-$$

- ↳ again, Cl^- is NOT a base
- ↳ but NH_4^+ is the conj. acid of NH_3

- Therefore this solution is slightly acidic

$(NH_4)_2SO_4 \rightleftharpoons \underbrace{2NH_4^+}_{\text{weak acid}} + \underbrace{SO_4^{2-}}_{\text{conj. base of } HSO_4^- \text{ (weak acid)}}$

- in order to determine whether the above rxn is acidic/basic we must compare the K_a and K_b

$K_b(NH_4) = 1.8 \times 10^{-5}$ $\quad K_a(HSO_4^-) = 1.0 \times 10^{-2}$

$K_a = \frac{10^{-14}}{1.8 \times 10^{-5}} = 5.6 \times 10^{-10}$ $\quad K_b = \frac{10^{-14}}{1.0 \times 10^{-2}} = 9.8 \times 10^{-13}$

$\therefore K_a > K_b$

↳ suggests the soln is acidic

$NH_4OA_c \rightleftharpoons \underbrace{NH_4^+}_{\text{weak acid}} + \underbrace{OA_c}_{\text{conj. base of } CH_3COOH \text{ (weak base)}}$ (OA_c: CH_3COO^-)

$K_a = 5.6 \times 10^{-10}$ $\quad K_b = 5.6 \times 10^{-10}$

$K_a = K_b$ = neutral soln

$NaHCO_3 \rightleftharpoons \underbrace{Na^+}_{\text{neutral cation of NaOH}} + \underbrace{HCO_3^-}_{\text{conj. base of } H_2CO_3 \text{ (weak acid?)}}$

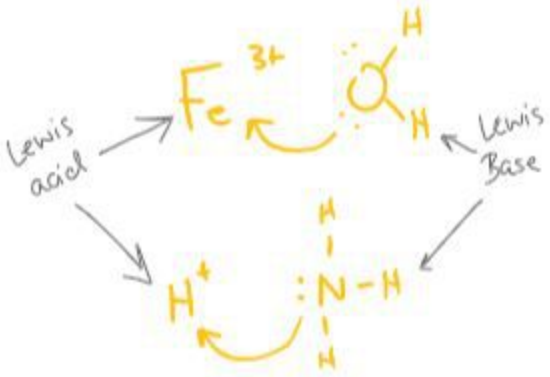
↳ $HCO_3^- \rightleftharpoons H^+ CO_3^{2-}$

$$HCO_3^- + H_2O \rightleftharpoons H_2CO_3 + OH^- \qquad K_b = 2.4 \times 10^{-8}$$

$$HCO_3^- \rightleftharpoons H^+ + CO_3^{2-} \qquad K_a = 4.8 \times 10^{-11}$$

$\therefore HCO_3^-$ acts like a base

Metal Cations acting as a Lewis Acid



Lewis Acid: lone pair acceptor
↳ broader definition of an acid

Lewis Base: lone pair donor

Acid Strength + Structure

Binary Acids = Acids made up of only 2 elements
↳ H + another electronegative element

$$\overset{\delta^+}{H}-\overset{\delta^-}{Cl}$$

① The more polar the H–A bond (w δ^+ on the H) the stronger the acid

EN of Cl > EN of S

H–Cl
more polar
stronger acid

H–S–H
less polar
weaker acid