Unit 10 - Review

1) Properties of water - Like dissolves like

Polar molecules (H_2O) will dissolve Polar compounds/molecules. ($C_6H_{12}O_6$, NaCl)

Table G → make sure to read the question carefully and use the reference table [50 g, 100 g, 200 g of water]

* Solubility of most substances increases with Temp. EXCEPT for gases.

2) Acids and Bases

Arrhenius: H^+ only positive [ACID]
OH^- only negative [BASE]

[Table K, L]

Bronsted: H^+ donor [ACID] → HCl, HBr, acetic acid
H^+ acceptor [BASE] → NH_3

USE THE EQUATIONS GIVEN

Concentration:

Molarity => $M = \frac{\text{moles solute}}{\text{L solution}}$

% Composition = $\frac{\text{part}}{\text{whole}} \times 100$

* whole = solute (+) solvent

ppm = $\frac{\text{mass solute}}{\text{mass solution}} \times 1{,}000{,}000$

$HCl + NaOH \rightarrow NaCl + HOH$

(Double Replacement Reaction)

Titration = $M_A V_A = M_B V_B$ (neutralization)

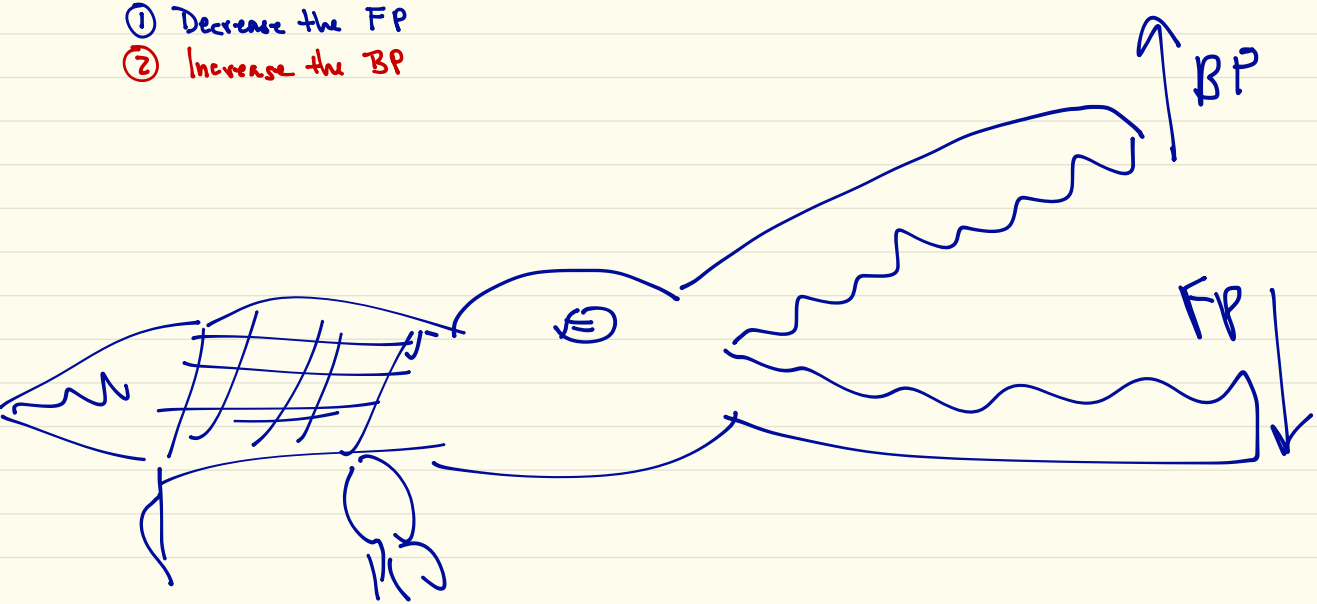
Colligative Properties => CLUTTER

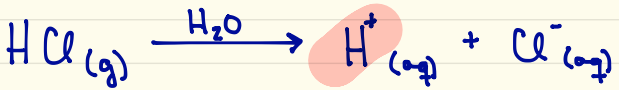
MORE CLUTTER = LARGER EFFECT

$3\ M\ NaCl \longrightarrow 3NaCl \longrightarrow 3Na^{+} + 3Cl^{-}$ 6 ions

$2\ M\ K_3PO_4 \longrightarrow 2K_3PO_4 \longrightarrow 6K^{+} + 2PO_4^{3-}$ 8 ions ***

① Decrease the FP
② Increase the BP





Acid: Arrhenius → H^+ is the ONLY POSITIVE ION in solution.

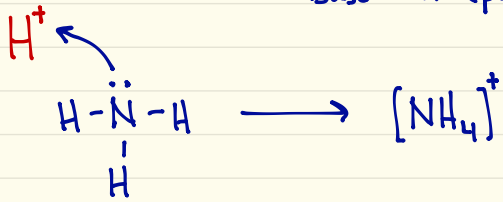
Base: Arrhenius → OH^- is the ONLY NEGATIVE ION in solution.

$NaOH$
KOH
$Ca(OH)_2$

$\ddot{N}H_3$ → no OH^-

Bronsted-Lowry Theory: Acid = H^+ (proton) donor [HCl, H_2SO_4, H_3PO_4]

Base = H^+ (proton) acceptor [$\ddot{N}H_3$]



Electrolyte: Conductive
① Charged particles
② Mobile

Acids [HCl, HNO_3]

Bases [$NaOH$, KOH]

Salt [KNO_3, $NaCl$]

} Electrolytes, - dissociate in H_2O, to form charged particles that are mobile.

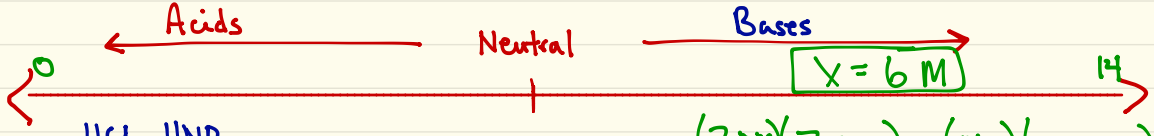
$HCl + NaOH \longrightarrow NaCl + H(OH)$

acid base salt water

DOUBLE REPLACEMENT

8 → 7 (10× more)

10 → 8 (100×)



Titration ⇒ $M_A V_A = M_B V_B$

75 mL of 2.0 M HCl and I titrate that with 25mL of xM NaOH.

25 g 500 mL = 0.5 L

$Ca(NO_3)_2$: GFM = 164 g/mol

① Convert grams to moles
② Convert mL to L.

Find the molarity of the $Ca(NO_3)_2$ solution.

$$\frac{1 \text{ mol } Ca(NO_3)_2}{164 \text{ g}} \times \frac{25 \text{ g}}{1} = \frac{25}{164} = 0.15 \text{ mol } Ca(NO_3)_2$$

$$M = \frac{\text{mol solute}}{\text{L solution}} = \frac{0.15 \text{ mol}}{0.5 \text{ L}} = 0.3 \text{ M } Ca(NO_3)_2$$

- Assume 100 g sample Pb^{2+} = 0.034%

$$ppm = \frac{\text{mass of solute}}{\text{mass of solution}} \times 1{,}000{,}000$$

$$ppm = \frac{0.034\ g}{100\ g} \times 1{,}000{,}000 = 340\ ppm$$

$$\frac{.034}{100.034} \times 1{,}000{,}000 = 339.8 \approx 340$$

35 g $NaNO_3$ in 100 g H_2O $\longrightarrow$ % Comp $NaNO_3$?

$$\frac{\text{Part}}{\text{Whole}} \times 100 = \frac{35}{135} \times 100 = \boxed{25.9\%}$$

④ 3.0 M NaCl

3 mol Na^+ 3 mol Cl^-

6 ions

⑤ 3 M $CaCl_2$

9 ions

3 Ca^{+2} 6 Cl^-

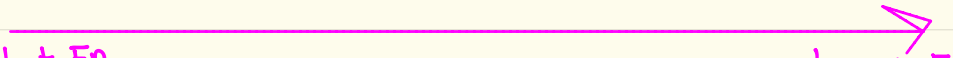
② 1 M NaCl

2 ions

③ 1 M $CaCl_2$

3 ions

① H_2O



Highest FP

Least Clutter

Lowest FP

Most Clutter