

→ الله از ص →

⊕ Stoichiometry Chapter 3

⊕ The ratio of the mass of an isotope to that of C^{12} is found by an instrument called mass spectrometer

→ Carbon = 98.89% C^{12}
 1.14% C^{13}
 <0.01% C^{14}

⊕ Avogadro's = 6.022×10^{23}

⊕ Number moles = $\frac{\text{mass (g)}}{\text{molar mass (g/mole)}}$

⊕ mass % = $\frac{\text{mass of element in compound}}{\text{mass of compound}}$

⊕ Limiting Reactants

مصدر التفاعل

lim → في الماء المتصلب سائاً (الذوق)

ex → بيوت فانين (الأكتر)

يقسم عدد المولات على المعاملات

lim ← الأقل

ex ← الأكتر

⊕ Stoichiometric mixing

→ all reactants are consumed and converted into products

⊕ None-stoichiometric mixing (limiting reactant)

yield = $\frac{\text{actual yield}}{\text{theoretical}} \times 100\%$

actual yield → يعطى بالوزن

theoretical → يتوقع من ذاك

⊕ Reactions in Aqueous Solution Chapter 4

- ⊕ water:
 - most important sub on Earth
 - dissolve many different sub
 - polar

⊕ Aqueous Solution

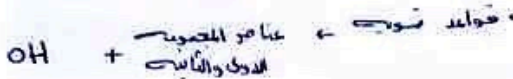
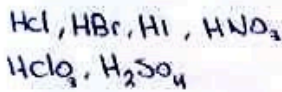
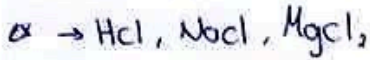
⊕ solute: sub being dissolved

⊕ solvent: liquid water

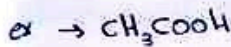
⊕ electrolyte: that sub when dissolved in water produces a solution that conducts electricity.

Types of materials

1) Strong electrolytes : strong elec
100% dissociation



2) weak electrolytes : weak elec
• small degree of ionization in water
• weak salt, weak acids, bases



3) Non electrolytes : no current flows.
• Like sugar.

$$\text{molarity} = \frac{\text{moles of solut}}{L}$$

$1 \text{ml} \xrightarrow{10^{-3}} 0.001 \text{L}$

$$M_f V_f = M_i V_i$$

$$M = \text{Molarity} \times \text{Volume}$$

Acid Base Reactions:

→ Reactions in which hydrogen H^+ and hydroxide OH^- ions combine together to produce water

Oxidation Number

- +1 ← المحيطة الهيدروجين
- +2 ← الحديد
- +3 ← الألمنيوم
- 3 ← النيتروجين
- 2 ← الأكسجين
- 1 ← الهالوجين

① ذرات الهالوجين في المركبات الأيونية
تتواجد الهالوجين والفلورين والكلور والبروم واليود في حالة -1
② ذرات الأكسجين في بيروكسيدات -2
-1 في بيروكسيدات
③ ذرات الهالوجين في المركبات الأيونية
في وسط قاعدي أملاح OH^- الأيونية

precipitation reaction.

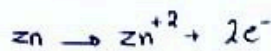
→ **Rule for solubility** : المركبات الذائبة

- ① عناصر المحيطة الهيدروجين
 $\text{NH}_4^+, \text{NO}_3^-, \text{HClO}_4, \text{ClO}_4^-$
- ② عناصر المحيطة الهالوجين في بيروكسيدات
 $\text{Pb}^{2+}, \text{Hg}_2^{2+}, \text{Ag}^+$
- ③ مركبات تحتوي على SO_4^{2-} باستثناء
 $\text{Ba}^{2+}, \text{Hg}_2^{2+}, \text{Pb}^{2+}, \text{Ag}^+$
 $\text{Ca}^{2+}, \text{Sr}^{2+}$
- ④ مركبات ذائبة
 $\text{Pb}^{2+}, \text{Ca}^{2+}, \text{S}^{2-}, \text{CrO}_4^{2-}$
- ⑤ تحتوي OH^- باستثناء
 $\text{Sr}^{2+}, \text{Ca}^{2+}, \text{Ba}^{2+}$

oxidation reaction

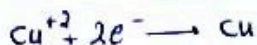
تفقدت إلكترونات

→ lose elec



Reduction reaction

تفقدت إلكترونات



Reduction agent :

عاجل يختزل

oxidation agent :

عاجل يتأكسد

Gases chapter 5

Properties of gases

- uniformly fill any container and take it's shape
- Easily compressed
- mixes completely with any other gas
- Exerts pressure on its surroundings.

Pressure

atmospheric pressures → barometer

$$Pressure = \frac{force}{area}$$

torr mmHg ← atm

$$torr = atm \times 760$$

$$mmHg = atm \times 760$$

P_a ← atm

$$P_a = atm \times 101.325$$

$$PV = nRT$$

$$T = K^{\circ} = C + 273$$

$$V = \frac{nRT}{P}$$

P

$$P_1 V_1 = P_2 V_2$$

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

$$\frac{V_1}{n_1} = \frac{V_2}{n_2}$$

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

at STP

$$P = 1 \text{ atm}$$

$$T = 0^{\circ}C = 273K$$

$$R = 0.0821$$

$$\text{molar volume} = 22.41$$

$$\frac{PV}{T} = \frac{PV}{T}$$

$$\frac{P}{nT} = \frac{P}{nT}$$

$$Density = \frac{mm \times P}{RT}$$

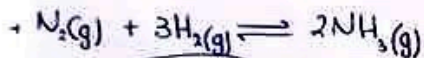
+ Chemical Equilibrium chapter 13

* The equilibrium constant (K)



$$K = \frac{[C]^l [D]^m}{[A]^j [B]^k}$$

⊕ K's always has the same value at a given temp



$$K_p = \frac{(P_{NH_3})^2}{(P_{N_2})(P_{H_2})^3}$$

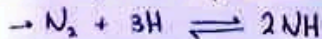
$$\frac{\text{المول}}{\text{الكمية}} = \frac{\text{الرقيم}}{\text{الكمية}}$$

$$K_p = K_c (RT)^{\Delta n_g}$$

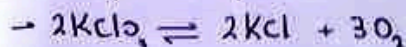
Δn_g = عدد المولات الغازية الناتجة - عدد المولات الغازية المتفاعلة
 = 2 - (1 + 3) = -2

* $K_c > K_p$ anis negative

⊕ Homogeneous Equilibria



⊕ Heterogeneous Equilibria



المولات الغازية
التي تدخل في التفاعل
في طور الغازات

* if the equilibrium lies to the **right** (toward the products) the value for **K** large than 1

⊕ " / " / " / " / " **left** (toward the reactants) the value **K** smaller than 1.

⊕ $Q > K$ left

⊕ $Q < K$ right

⊕ $Q = K$ equilibrium

+ Acids and Bases chapter 14

⊕ Arrhenius: Acids produce H^+ in solution
Bases produce OH^-



⊕ Bronsted-Lowry:

Acids are proton **H^+ donors**

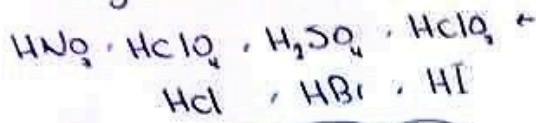
bases are proton **acceptors**



⊕ HCl : H^+ donor

→ H_2O → amphoteric
accept and donate

→ strong acid



سليم و اشد

→ weak acid

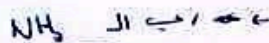
ضعيف

→ strong base



سليم و اشد

→ weak base



ضعيف

→ conjugate Base ← H^+ ← Acid

→ conjugate Acid ← H^+ ← Bases

كلما كان الحمض قويا ، يكون قاعدته المرافقة اضعف

كلما كانت القاعدة قوية ، يكون الحمض المرافق اضعف

والعكس صحيح

→ $H^+ = OH^-$ neutral

→ $H^+ > OH^-$ acidic

→ $H^+ < OH^-$ basic

$$K_a = \frac{[H_3O^+][A^-]}{[HA]}$$

$K_a \uparrow \rightarrow H^+ \uparrow \rightarrow pH \downarrow$
 $OH^- \downarrow \rightarrow pOH \uparrow$

$$pH = -\log[H^+]$$

$$pOH = -\log[OH^-]$$

$pH = 7$, neutral

$pH > 7$ basic

→ The Higher the pH the more basic

→ Lower the pH, more acidic

$pH < 7$ acidic

$$pK_w = pH + pOH$$

$$pOH = pH - pK_w$$

$$pK_w = 14$$

