

المحاضر الأولى اهم القوانين في الكيمياء العملي

Concentration

1- W/W:

$$\frac{\text{Weight of solute (gm)}}{\text{Weight of solution (gm)}}$$

2- W/V:

$$\frac{\text{Weight of solute (gm)}}{\text{Volume of solution (mL)}}$$

3- V/V:

$$\frac{\text{Volume of solute (mL)}}{\text{Volume of solution (mL)}}$$

4- ppm: parts per million

$$\text{ppm: } \frac{\text{weight of solute (mgm)}}{\text{Volume of solution (L)}}$$

*mgm*: mille gram  
L: Litter

5- ppb: part per billion

$$\text{ppb: } \frac{\text{weight of solute (Mgm)}}{\text{Volume of solution (L)}}$$

*Mgm*: microgram :  $1 \text{ mgm} = 1000 \text{ Mgm}$   
 $1 \text{ gm} = 1000 \text{ mgm}$

Molarity (M) المولارتي

$$M = \frac{W(\text{gm})}{M.Wt} * \frac{1000}{V(\text{ml})}$$

W = weight in gram

M.W = molecular weight

V = Volume in (ml)

Normality (N) النورمالي

$$N = \frac{W(\text{gm})}{\text{Eq. Wt}} * \frac{1000}{V(\text{ml})}$$

Eq. W = Equivalence weight

$$\text{Eq. W: } \frac{M.Wt}{\text{No. of units activity}}$$

## Examples الامثلة

1. 10% w/w

$$\text{An} = \frac{10 \text{ of (solute)}}{100 \text{ of solution}}$$

2. Prepare 50 ml of 10 % w/v NaCl

Answer

$$\text{W/V} = \frac{\text{Weight of solute (gm)}}{\text{Volume of solution (ml)}}$$

$$\frac{10 \text{ gm}}{100 \text{ ml}} = \frac{X}{50}$$

$$X = 5 \text{ gm}$$

5 gm + water = 50 ml % w/v

3. Prepare 5% V/V H<sub>2</sub>SO<sub>4</sub>

Answer

$$\frac{5 \text{ ml (H}_2\text{SO}_4\text{)}}{100 (5+95)}$$

$$= 5 \% \text{ H}_2\text{SO}_4$$

4. 5% ppm of NaCl

$$\text{Answer} = \frac{5 \text{ (mgm ) NaCl ( المادة الصلبة)}}{100\text{L of solution}}$$

يعني نأخذ 5 mgm من NaCl المادة الصلبة ونضيف لها الماء ليكون الحجم الكلي للمحلول  
100L 100 لتر

5. ppb prepare 6% ppb of NaCl

$$6 \text{ (Mgm)}$$
$$= \frac{\quad}{100 \text{ L}}$$

يعني نأخذ ٦ مايكرو غرام من المادة الصلبة NaCl ونضيف لها الماء ليكون الحجم الكلي للمحلول ١٠٠ لتر

لتحويل صيغة تركيز مئوية الى المولارتي تستخدم القانون التالي

$$M = \frac{\% * \text{spr. gm} * 1000}{M.Wt}$$

M = المولارتي

% = النسبة المئوية مثل

w/w

w/v

v/v

Spr.gm = الكثافة النوعية

M.Wt = الوزن الجزيئي

مثال / لدينا حامض الخليك بتركيز ٣٧% v/v نريد تحويل الى المولارتي سوف نستخدم القانون

$$\text{Spr.gm} = 0.018$$

$$M.Wt = 60$$

$$M = \frac{37 * 0.018 * 1000}{60} = 11.1 M$$

Calculate Molarity (M) 4g of NaOH dissolved in 500mL of solution

$$M = \frac{\text{wt. (g)}}{\text{Mo. wt}} \times \frac{1000}{V_{\text{mL}}}$$

$$M = \frac{4}{40} \times \frac{1000}{500}$$

$$= 0.2$$

Calculate the Normality HCl solution which contains 4.01 g / L

$$N = \frac{\text{wt. (g)}}{\text{eq. wt.}} \times \frac{1}{V_L}$$

$$N = \frac{4.01}{36.45} \times \frac{1}{1}$$

$$= 0.11$$

Prepare the sodium chloride dissolving 6g of it in 600mL of distilled water solution, across from the concentration of the solution to

1- g / L

2- ppm

3- ppb

$$\text{Conc. (g/L)} = \frac{\text{wt. (g)}}{V_L}$$

$$= 10 \text{ g/L} \quad \text{Conc. (g/L)} = \frac{6}{0.6}$$

$$= 10000 \text{ mg/L}$$

$$= 10000 \text{ ppm}$$

$$= 10^7 \mu\text{g /L}$$

$$= 10^7 \text{ ppb}$$

prepare the following solution:

- 1- (100 ml) of (10 M)  $\text{H}_2\text{SO}_4$
- 2- (200 ml) of (1N)  $\text{Ca}(\text{OH})_2$
- 3- (500 ml) of (5 M)  $\text{NaCl}$