



Al-Mustaqbal University College

Department of Medical Physics

First Class

General Chemistry

Lec 2 Introduction to chemistry

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Introduction of Chemistry

Chemistry is the study of matter –its composition ,structure ,properties ,transformation from one form to another and the energy that accompanies its transformation.



The main branches of Chemistry

1-Organic chemistry

2-In organic chemistry

3-Physical Chemistry

4-Biochemistry

5-Anlytic Chemistry



1-Organic Chemistry: it is concerned with the study of most carbon-based compound. Carbon is one of the most abundant elements on Earth and is capable of forming a tremendously vast number of chemicals

2-Inorganic chemistry: Inorganic chemistry is the study of chemicals that do not, in general, contain carbon. Inorganic chemicals are commonly found in rocks and minerals.



3-Physical chemistry: is the study of macroscopic and particulate phenomena in chemical systems in terms of the principles, practices, and concepts of physics such as motion,.

energy, force, time, thermodynamics, quantum chemistry, statistical mechanics, analytical dynamics and chemical equilibria.



4-Biochemistry: it is one of the branches of natural sciences and it is specialized in studying the chemical composition of cell parts, and studying

the different biological reactions that take place within these living cells, in terms of structure and composition or in terms of catabolism and energy production.

5-Analytical chemistry: Analytical chemistry is the study of the composition of matter. It focuses on separating, identifying, and quantifying chemicals in samples of matter. An analytical chemist may use complex instruments to analyze an unknown material in order to determine its various components

Molarity

Molarity (M) is the number of moles of solute dissolved in one liter of solution.

To calculate the molarity of a solution, divide the moles of solute by the volume of the solution.

$$\text{Molarity} = \frac{\text{moles of solute}}{\text{volume of solution in liters}}$$

$$\text{mole} = \frac{\text{Mass}(g)}{\text{molecular weight}(g\backslash\text{mole})}$$

Example

If 5 liters of water is added to two moles of glucose to make a solution, the concentration (molarity) is said to be 0.4 M

Solu:

$$2\text{mole} \backslash 5 \text{ L} = 0.4 \text{ M}$$

Units of molarity are: mol/L = M

A sample of NaNO_3 weighing 8.5 grams is placed in a 500 ml volumetric flask and distilled water was added to the mark on the neck of the flask. Calculate the Molarity of the resulting solution.

Convert the given grams of solute to moles of solute :

$$8.5 \text{ g NaNO}_3 \frac{1 \text{ mole NaNO}_3}{85 \text{ g NaNO}_3} = 0.1 \text{ mole NaNO}_3$$

Convert given ml of solution to liters

$$500 \text{ ml} \frac{1 \text{ liter}}{1000 \text{ ml}} = 0.5 \text{ liter}$$

Apply the definition for Molarity: Molarity = moles NaNO_3 / volume of the solution in liters

$$M = 0.1 \text{ mole} / .500 \text{ liters} = \underline{0.200 \text{ Molar NaNO}_3}$$

Making Dilutions

– Diluting a solution reduces the number of moles of solute per unit volume, but the total number of moles of solute in solution does not change.

• The total number of moles of solute remains unchanged upon dilution, so you can write this equation.

$$M_1V_1=M_2V_2$$

- M_1 and V_1 are the molarity and volume of the initial solution, and M_2 and V_2 are the molarity and volume of the diluted solution.

where M_1 = initial concentration (mol/L) = more concentrated

v_1 = initial volume of more conc. solution

m_2 = final concentration (mol/L) in dilution

final volume of diluted solution $V_d =$

Steps involved in preparing solutions from pure solids



(a)



(b)



(c)



(d)

How many milliliters of a solution of 4.00 M KI are needed to prepare 250 ml of 0.760 M KI

$$M_1V_1=M_2V_2$$

$$4.00 \times V_1 = 0.760 \times 250$$

$$V_1 = 47.5 \text{ ml}$$

Thank
you

