

4- The text :-

Classification of Matter

Matter is every thing that occupies space and has mass. Matter is classified as pure substances or mixtures. Pure substances, which are elements or compounds, have fixed compositions. Mixtures, which can be homogeneous or heterogeneous, have variable compositions. The substances in mixture can be separated using physical methods.

The Atom

An atom is the smallest particle that retains the characteristics of an element. Atoms are composed of three subatomic particles. Protons have positive charge (+), electrons carry a negative charge (-), and neutrons are electrically neutral. The protons and neutrons are found in the tiny, dense nucleus. Electrons are located outside the nucleus.

Atomic Number and Mass number :-

The atomic number gives the number of protons in all the atoms of the same element. In a neutral atom, there is an equal number of protons and electrons. The mass number is the total number of protons and neutrons in an atom.

Isotopes and Atomic Mass:-

Atoms that have the same number of protons but different numbers of neutrons are called isotopes. The atomic mass of an element is the average mass of all the atoms in a naturally occurring sample of that element.

Most elements have isotopes, some have two, others have several.

The electrons are located in electron clouds or energy levels. The first energy level holds a maximum of two electrons, the second a maximum of eight electrons and the third energy level a maximum of 18 electrons.

The order of filling the orbital's is 1s, 2s, 2p, 3s, 3p, 4s, 3d and do on.

Quiz/1:-

Define

1- Isotopes

2- Atomic Number

Note :-

Check your answer in key answer page at the end of the lecture.

The periodic table :-

The periodic table is an arrangement of the elements by increasing atomic number. A vertical column on the periodic table containing elements with similar properties is called a group. A horizontal row is called a period. Elements in Group 1 A (1) are called the alkali metals. Group 2 A (2), alkaline earth metals; Group 7A (17), the halogens, and Group 8 A (18), the noble gases.

The A- group number indicates the number of electrons in the outer energy level, the B- group elements are called transition elements. They all are metals and usually have two electrons in their outer energy level, the period indicates the number of energy levels.

7/2 write briefly about the periodic table.

Quiz/2:

Write briefly about the periodic table.

Types of chemical Bonds :

1- ionic bond 2- covalent bond 3- coordinate covalent bond
4- metallic bond.

1/ ionic bond : the electrostatic attraction force between the positive ion (of metal) and Negative ion (of non metal)

Exp : KBr , CaCl_2 , AlF_3 , LiF , NaCl .

Exp : $\text{Na}^\bullet + \text{:}\ddot{\text{Cl}}\text{:} \longrightarrow \text{Na}^+ + \text{:}\ddot{\text{Cl}}\text{:}^-$

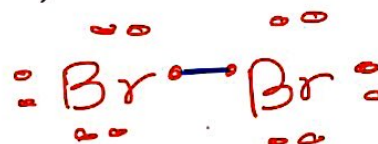
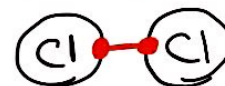


2/ covalent Bond : it is a pair of electron shared between two atom

A- combination between the same atom

$\text{Cl} \cdot + \cdot \text{Cl} \longrightarrow \text{Cl} - \text{Cl}$ (bond non polar)

(Cl_2 , H_2 , N_2 , F_2)



Each atom has a noble gas structure outer electrone.

B- combination between the different atoms

$\text{H} \cdot + \cdot \text{Cl} \longrightarrow \text{H} - \text{Cl}$

Water is covalent bond $\text{H} \begin{array}{c} \diagup \\ \diagdown \end{array} \text{O} \quad \text{polar molecule.}$

3/ coordinat covalent bond :-

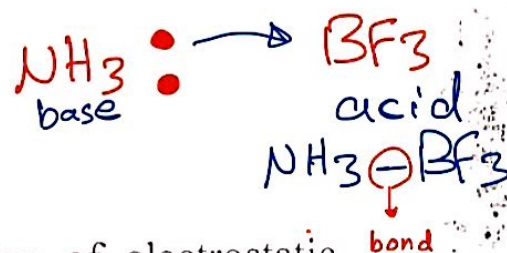
Metal ions can act as electron - pair acceptors reacting with electron donors to form coordination compounds or complex ions

$\text{BF}_3 + \text{:NH}_3 \longrightarrow \text{H}_3\text{N} \longleftrightarrow \text{BF}_3$

Acceptor donor

Electron the electron

Lewis acid Lewis base



4/ Metallic bond :- it is a combination of electrostatic attraction between the electrons and positive Nucleus of the atoms .

The atoms in copper , a typical metal , are held together by metallic bond .

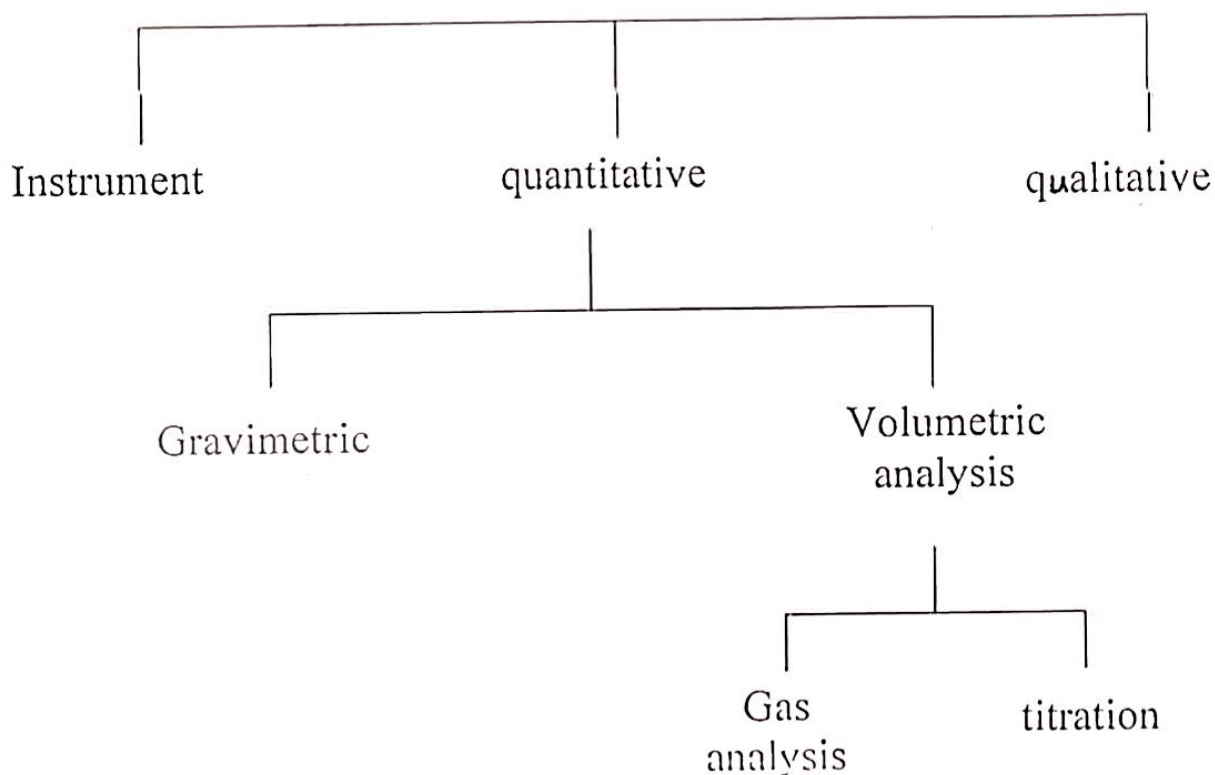
(Mn , Al , Fe , Cr)

Quiz 3

What are the types of chemical bonds with example

4/ the text :-

Methods of Analysis



- Analytical chemistry deals with methods and devices that identify substances and measure their quantities in sample

Quiz1/ What are the methods of quantitative analysis .

Note :- check your answer in key answer.

A solution:- is a homogeneous mixture of two or more substances evenly distributed in each other.

solute + solvent $\longrightarrow$ solution.

Solubility : the quantity of solute that will dissolve in a definite quantity of solvent, the solubility of a substance is measured by the concentration of its saturated solution.

Standard solution:-

Solution which is exactly known concentration.

Requirement of a primary standard substance:-

- 1- It must be of the highest purity .
 - 2- A primary standard substance should be stable it should not be attacked by constituent of the atmosphere .
 - 3- A primary standard should be readily available and not too expensive.
 - 4- The compound should not be hygroscopic .
 - 5- finally, it should have a reasonably high equivalent weight .
- A high equivalent weight will tend to minimize weighing errors.

Quiz/2 :- Define the following 1) solubility 2) standard solution

Note :- check your answer in key answer page at the end of the lecture.

lecture Methods of expression concentration:-

- 1- percentage concentration
- 2- formality or formal concentration. (g/L)
- 3- Normality or Normal concentration. (g/L)
- 4- Molarity or molar concentration. (mol/L)
- 5- parts per Million (ppm) .

Percentage solutions

Three kinds of percentage solution are used .

1- percentage weight to weight w/w% :- is the number of grams of solute dissolved in 100 grams of solution.

$$w/w\% = \frac{\text{weight of solute} \times 100}{\text{weight of solution}}$$

2- percentage weight to volume w/v%:-

Is the number of grams of solute dissolved in 100ml of solution.

$$w/v\% = \frac{\text{weight of solute}}{\text{volume of solution}} \times 100$$

3-percentage volume to volume v/v% :-

the number of mls of solute dissolved in 100 mls of solution.

$$v/v\% = \frac{\text{volume of solute}}{\text{volume of solution}} \times 100$$

Dilution Law $C_1V_1 = C_2V_2$

Formal solution:-

Solute dissolved in sufficient water to give 1L of solution

$$F = \frac{\text{no. fw}}{\text{Liter of solution}}$$

$$F = \frac{\text{gram solute}}{\text{liter of solu.} \times \text{gfw}}$$

$$F = \frac{\text{no. mfw}}{\text{ml of sol}}$$

$$F = \frac{\text{gram solute} \times 1000}{\text{ml of solu.} \times \text{gfw}}$$

Equivalent weight (eq. wt)

1- Acid

$$\text{eq.wt of acid} = \frac{\text{M.wt of acid}}{\text{No. of H (atoms) in a molecule.}}$$

$$\text{H}_2\text{SO}_4 = \frac{98}{2} = 49$$

2- alkaline

$$\text{Eq.wt} = \frac{\text{M.wt}}{\text{No. of hydroxy group}}$$

$$\text{Na OH} = \frac{40}{1} = 40$$

3- Salt

$$\text{Eq.wt} = \frac{\text{M.wt}}{\text{No. of metal} \times \text{oxidation number of metal}}$$

$$\text{NaCl} = \frac{23 + 35.5}{1} = 58.5$$