

CH 1 SOME BASIC CONCEPTS OF CHEMISTRY

#)CHEMISTRY- It is that branch of science which deals with the study of composition, structure and properties of matter and the changes which the matter undergoes under different conditions and the laws which govern these changes.

#)Importance and Scope of Chemistry

***)Increase in the production of food** -Through use of chemical fertilizer, insecticides, fungicides and pesticides.

#)Contribution to better health and sanitation through use of life saving drugs, e.g., cisplatin and taxol for cancer and AZT for AIDS and also through the use of analgesics, antibiotics, tranquilizers, antiseptics, disinfectants, insecticides and anaesthetics.

#)Saving the environment by use of environment friendly chemicals.

#)Increase in comfort and luxury by use of synthetic fibres, building materials, metals like iron, aluminium, copper, silver, gold etc. and articles of domestic use like soaps, detergents, paper, glass, plastics, etc.

#)Transport which involves use of petrol and diesel and other high quality fuels for aeroplanes etc.

#)Application in industries like glass, paper, cement, textiles, paints etc.

#)Negative role of Chemistry Chemical fertilizers, insecticides etc. used for better yield of the crop have bad effect on health. Polythene bags cause serious threat to sewerage. LSD, cocaine, brown sugar etc. are a curse for humanity. Atom bomb is a big tool of destruction.

#)Matter - It is defined as anything that occupies space, possesses mass and the presence of which can be felt by any of our senses.

#)Physical classification of matter. (i) Solid which has definite volume and definite shape (ii) *Liquid* which has definite volume but no definite shape (iii) **Gas** which has neither definite shape nor definite volume. A substance which is liquid at room temperature, turns gaseous from at higher temperature is called vapour.

#)Chemical classification of matter

A)Homogeneous and heterogeneous.If composition and properties of a material are uniform throughout,it is called [homogeneous.It](#) consists of only one phase.If a material contains a number of phases,it is called heterogeneous.

B)Elements,Compounds and [Mixtures.An](#) element is the simplest form of a pure substance which can neither be divided into nor built up from simpler [substances.It](#) contains only one kind of particles which may be atoms or molecules.A **compound** is a pure substance containing two or more than two elements combined together in a fixed proportion by [mass.It](#) can be decomposed into its constituent elements by chemical method. Its properties are completely different from its constituent elements. A **mixture** is a material consisting of two or more substances in any proportion. Its properties are those of its constituents. It can be separated into its constituents by simple physical methods. A mixture may be homogeneous or heterogeneous.

#)Atoms and Molecules. An atom is the smallest particle of an element which may or may not be capable of free existence. A **molecule** is the smallest particle of an element or compound which can exist freely.

#)International system of units (SI units). A unit is the standard reference chosen to measure any physical quantity.There are seven base units.These are length(metre,m), mass (kilogram ,kg), time (second,s), electric current (ampere,A), *thermodynamics temperature* (kelvin,k), amount of substance (mole,mol) and *luminous intensity* (candela,cd).

#)Some Important Relations/Conversions:

Temperature : $t^{\circ}\text{C} = t + 273\text{ K}$, $^{\circ}\text{C} = 5/9 (^{\circ}\text{F}-32)$, $^{\circ}\text{F} = 9/5 (^{\circ}\text{C})+32$

Volume : $1\text{ L} = 1000\text{ mL} = 1000\text{ cm}^3 = 1\text{ dm}^3$, $1\text{ m}^3 = 10^3\text{ dm}^3 = 10^3\text{ L}$

Length : $1\text{ \AA} = 10^{-10}\text{ m} = 10^{-8}\text{ cm}$, $1\text{ nm} = 10^{-9}\text{ m} = 10^{-7}\text{ cm}$, $1\text{ pm} = 10^{-12}\text{ m} = 10^{-10}\text{ cm}$

#)Some commonly used quantities and their units

Volume = m^3 , density = kg m^{-3} , Velocity = m s^{-1} , Force = Newton = $\text{N} = \text{kg m s}^{-2}$

Pressure = pascal = Pa = N m^{-2} , Work or Energy = Joule = J = $\text{N m} = \text{kg m}^2 \text{s}^{-2}$,
Frequency = Hertz (s^{-1}), Electric current = ampere (A), Charge = Coulomb = C =
A s

#) Precision and Accuracy. If the average value of different measurements is close to the correct value, the measurement is said to be accurate. If the values of different measurements are close to each other and hence close to their average value, the measurement is said to be precise.

#) Significant figures. Total number of digits in a number including the last digit whose value is uncertain is called the number of significant figures.

#) Significant figures of calculated results

Results of addition and subtraction should have same number of decimal places as the term with least number of decimal places.

Results of multiplication and division should have same number of significant figures as that of the least precise term.

#) Laws of Chemical Combination:

I) Law of conservation of mass. Mass can neither be created nor destroyed, i.e., in all physical and chemical changes, total mass of products = total mass of reactants.

II) Law of constant composition / Definite proportions. A chemical compound is always made up of the same elements combined together in a fixed proportion by mass.

III) Law of multiple proportions. When two elements combine to form two or more compounds, then masses of one of the elements which combine with a fixed mass of the other bear a simple ratio to one another.

#) Avogadro's law. Equal volumes of all gases under similar conditions of temperature and pressure contain equal number of molecules.

#) Relation between molecular mass and vapour density of a gas

Molecular mass = 2 * Vapour density

