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PGT- Chemistry



Atomic energy central
school- 4

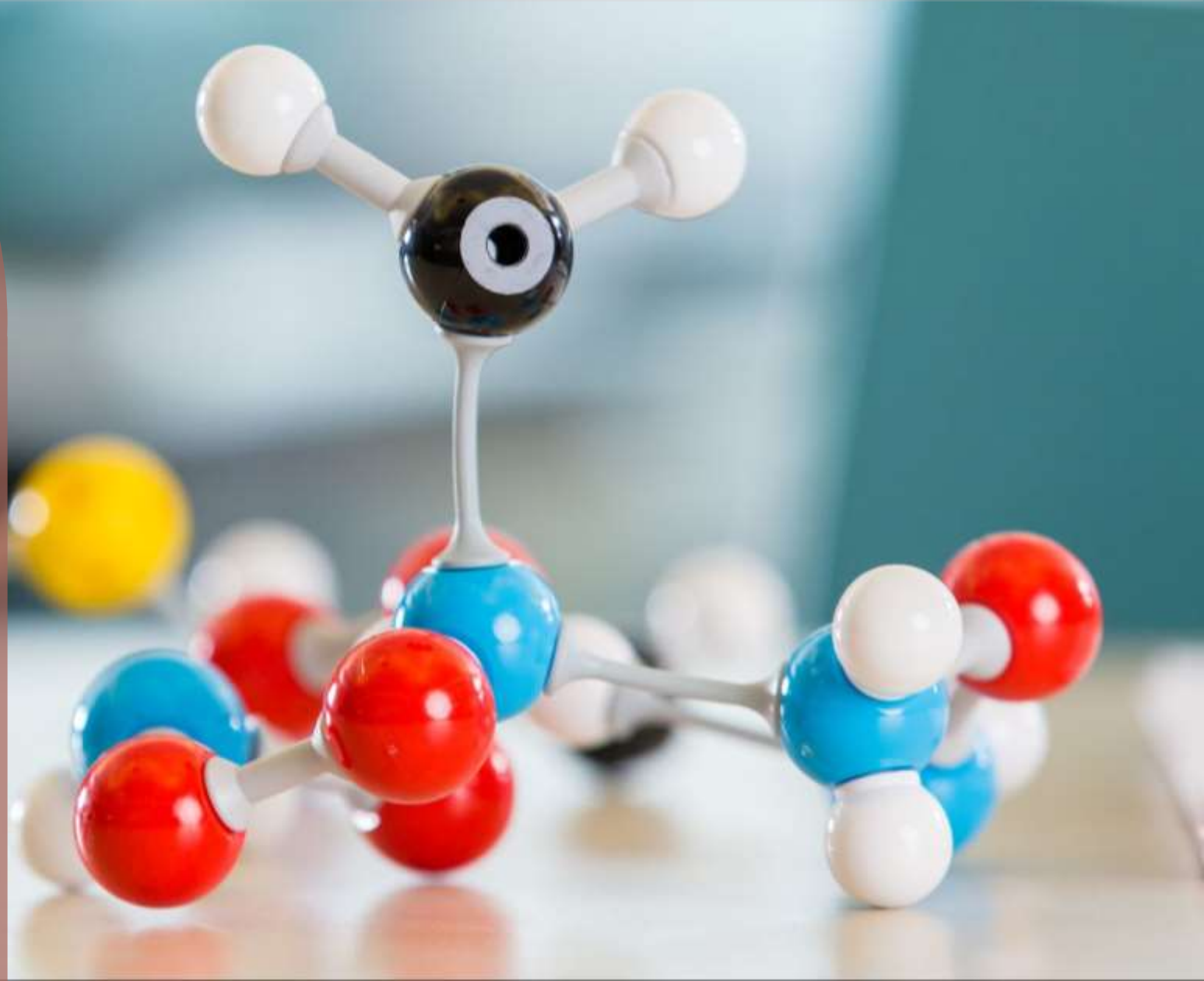


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**Some Basic
concepts of
chemistry**




Objectives

What you will learn from this chapter?



Have a brief idea about the history and importance of chemistry



Various branches in chemistry



Classification of matter



About atoms, molecules and masses

Importance and Scope of chemistry in daily life

Module -1/ 5

A brief history of chemistry

- As old as vedas
- Vedic literature talks about Rasa tantra
- Panchabhut-5 basic elements-Earth, water, air, fire and sky
- Present form of chemistry has emerged from works of western chemists
- First meaningful approach was given by alchemists as they searched for Nectar(makes man young and immortal) and Philosopher's stone(stone which could convert metals into gold) which lead to valuable contributions to chemistry
- During Iatro period and Phlogiston Period lot of research was done on gases by Robert Boyle and others.

History continued

- Period from end of 18th century is the Modern period in which maximum work was done on many aspects of chemistry including work on nuclear chemistry.
- Twentieth century is the Golden period of chemistry.
- With technical and instrumental advancement in other fields, chemists are able to gather much information from nature and in present day no other branch is rich in information as chemistry and its not the end yet.
- picture abhi bakhi hai mere bhai

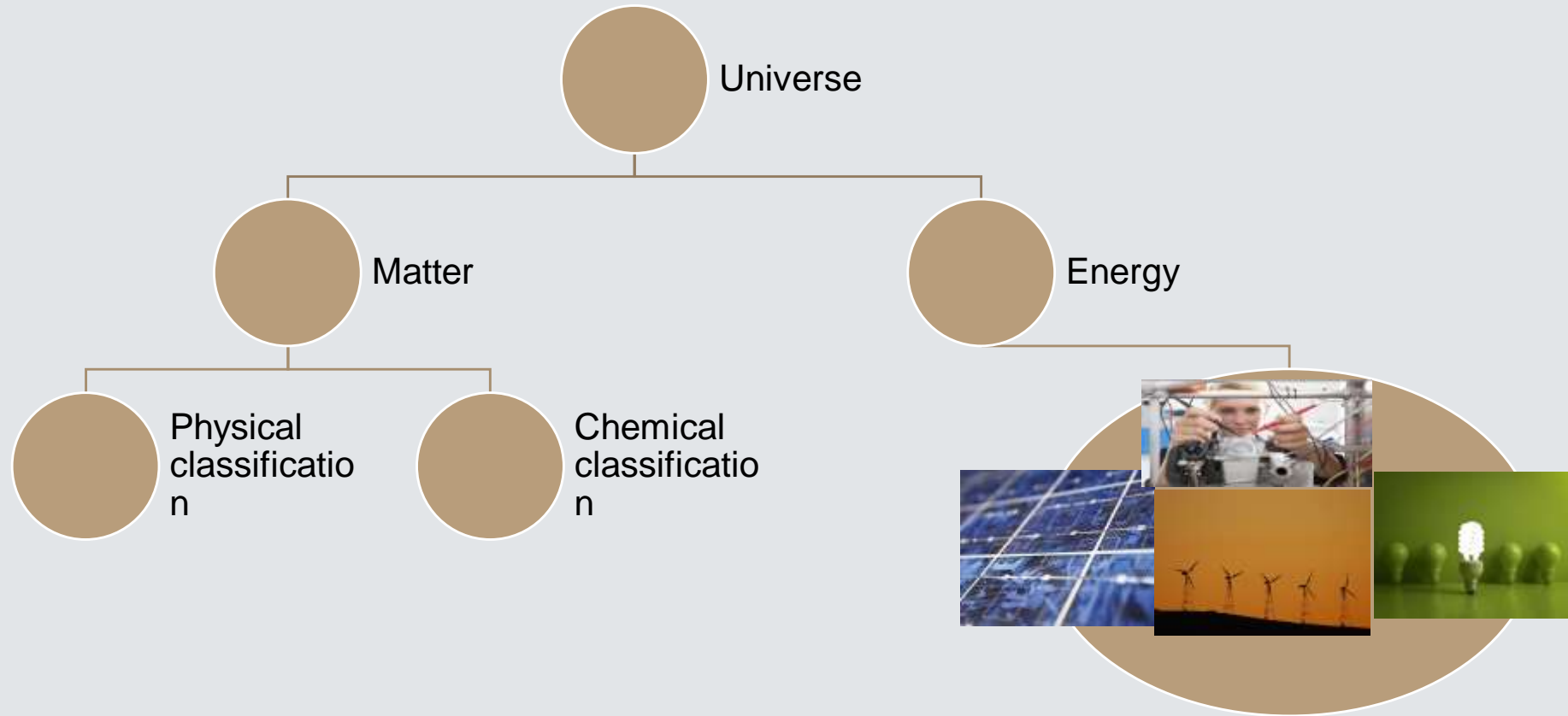
Scope of chemistry

- Practically unlimited in all walks of life- adds colour to life
- Penetrated in life to such extent that we cannot imagine life without it.
- Food stuffs, drugs, dyestuffs, agriculture, polymers, metals and non-metals, fuels, glass, ceramics and many more.
- Both at level of necessities and at level of luxuries chemistry has proved itself as best friend of man
- Electronics and electrical industries lean on chemistry for basic materials
- Green chemistry is now trying to provide alternatives to prevent pollution and protect environment

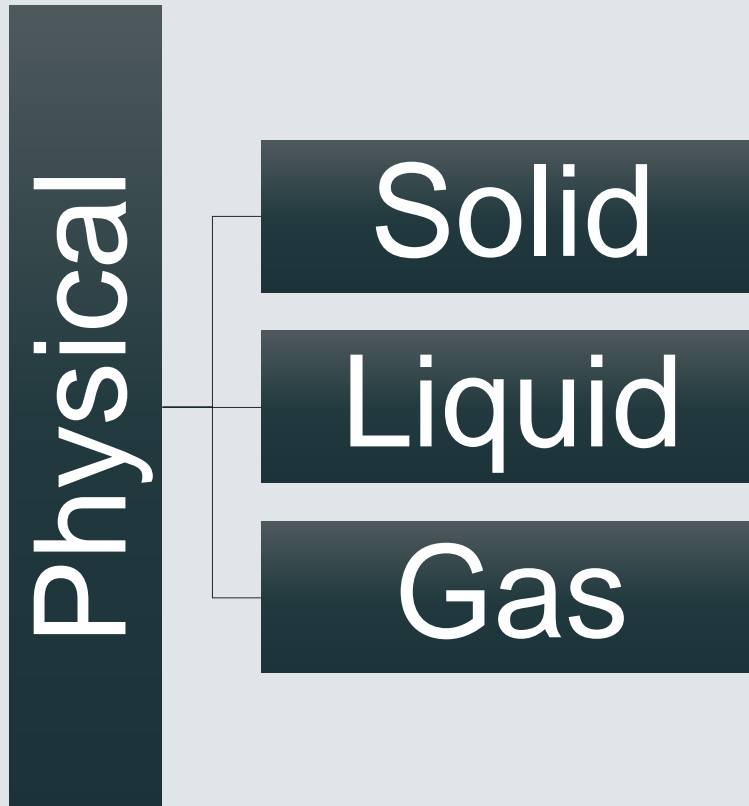
Classification of matter

- The entire universe is made up of only 2 things- Matter and Energy
- Matter is anything which has mass and occupies volume whereas energy can be felt not seen. Several forms of energy are known to us
- Elucidation of particular nature of matter dates back to 800 years before Buddha.it was postulated by an Indian saint and philosopher Kanada.
- Matter is made up of simple unalterable particles called paramanus(atoms)
- Universe is made up of 4 different eternal substances- earth, water, air, and fire and each is made up of different type of paramanus
- This theory was further developed by Buddhist and Jain philosophers
- In present day we know it as Dalton's theory

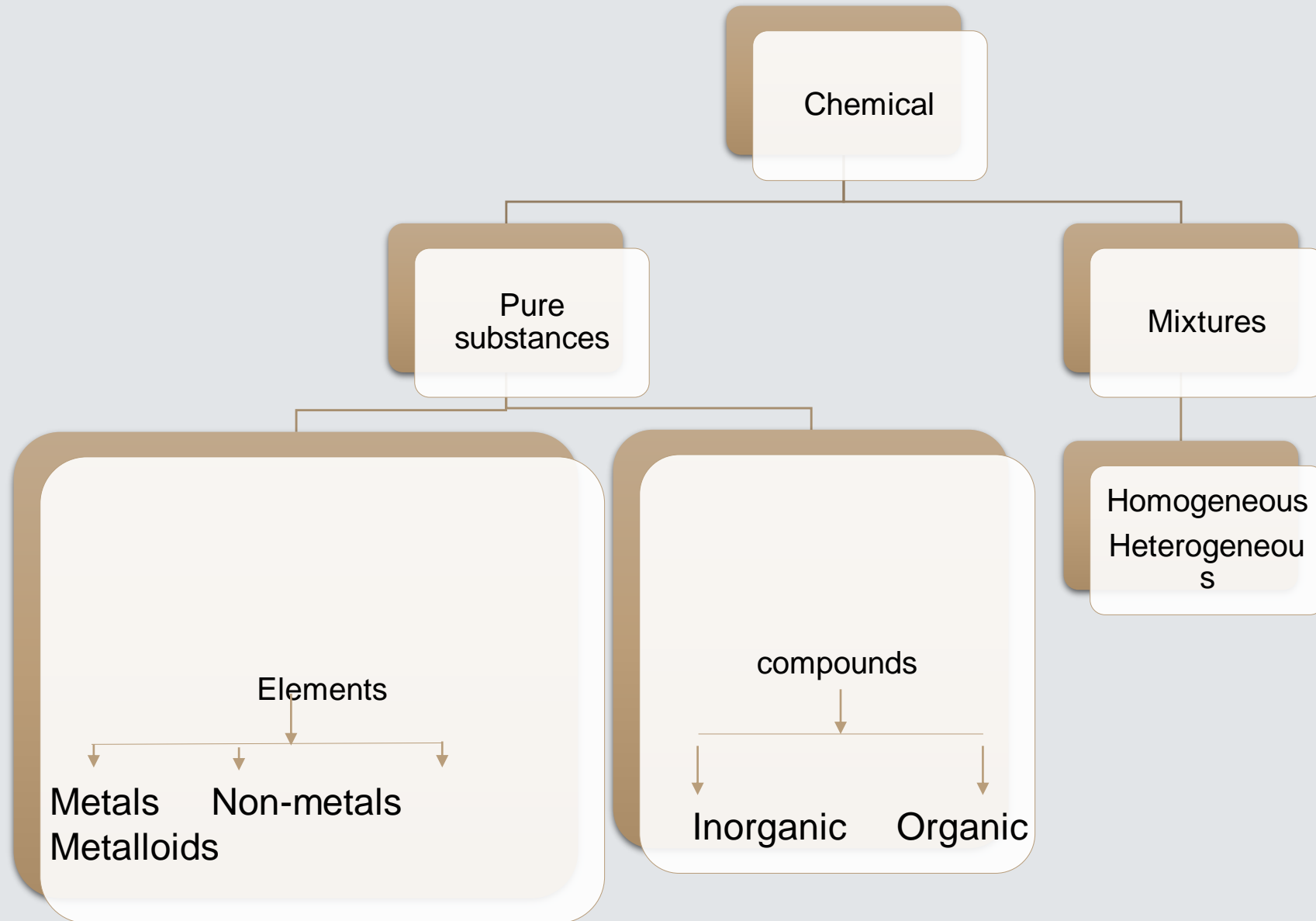
Classification- Concept map



Physical classification



Chemical classification



Atoms and Molecules

Atoms - smallest particle of matter which may or may not exist independently

Molecules smallest particle of a substance (element or compound) which can exist independently

Atomicity- number of atoms present in a molecule

Molecules can be homo atomic or hetero atomic depending on the type of atoms present in them.

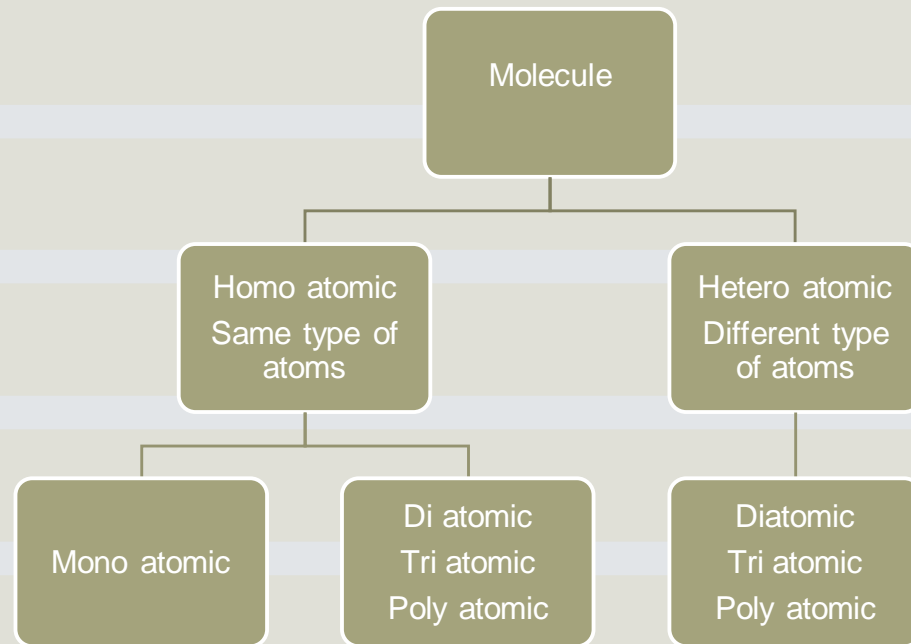
Mono atomic like- Noble gases

Di atomic- H_2 , Cl_2 , CO , HCl , O_2 , etc

Tri atomic- O_3 , CO_2 , NO_2 , SO_2 etc

Poly atomic- P_4 , S_8 , SO_3 , HNO_3 , PCl_5 , C_2H_6 etc

Types of Molecules



Atomic mass and Molar mass

- Atomic mass unit (amu) - Quantity of mass equal to 1/12 of mass of an atom of C-12 isotope
- Relative atomic mass- Relative mass of an element as compared to 1/12 the mass of an atom of C-12 isotope
- Unified mass (u)
- Gram atomic mass/ Gram atom- Quantity of element whose mass in grams is numerically equal to the atomic mass of that element
- Average relative atomic mass-
- Example- Chlorine occurs in 3:1 ratio by mass in 2 forms Cl-35, Cl-37
- Average mass = $35 \times \frac{3}{3+1} + 37 \times \frac{1}{3+1} = 35.5$

Equivalent weight

- Equivalent mass/weight (EW)– Number of parts by mass of a given substance which combines with or displaces directly or indirectly 1.008 parts by mass of hydrogen, or 8 parts by mass of oxygen, or 35.5 parts by mass of chlorine
- Gram equivalent weight (GEW)- mass in grams of a substance numerically equal to its equivalent weight
- Equivalent weight of element= atomic mass of element / valency
- Equivalent weight/mass of a normal salt= Formula weight of the salt/ Total charge on cationic part
- Equivalent weight/mass of an acid salt= Formula weight of the salt/ Number of replaceable H atoms present
- Equivalent weight/mass of an acid= Molecular weight of acid/ Basicity of acid
- Equivalent weight/ mass of a base= Molecular weight of acid/ Acidity of base
- Equivalent weight/mass of an oxidant or reductant= Formula mass/ Number of electrons lost or gained by one molecule
- Relation between GEW, GAM and Valency $GAM = GEW \times Valency$

Molar mass and Formula mass

- Molar mass- Is an average relative mass of a single molecule of the given substance be it a molecule or an element as compared to $1/12$ mass of an atom of C-12
- Gram molecular mass/ Gram molecule- Quantity of substance whose mass in grams is numerically equal to the molecular mass of the given substance
- Formula mass- In case of ionic compounds

Acknowledgment

- NCERT Chemistry textbook for class XI Part-1
- ISC Chemistry –XI by Dr. H. C. Srivastava
- Pradeep's New Course Chemistry-XI Volume-1
- Comprehensive Chemistry – XI Volume-1