

## Element Compound and Mixture

### 1. What is Element?

Ans. An element is a pure substance which is made up with identical atom and cannot be split into simple substances.

- Currently we know of 118 elements. Of these 92 occur in nature, while the remaining 26 are synthetic

### 2. Write the classifications of elements.

Ans. Elements can be classified as

- a. Metals
- b. Non-metals
- c. Metalloids
- d. Noble gases or Inert Gases

### 3. Write the basic structure of elements

Ans. The basic unit of element is atom. It is the smallest particle of an element. It is divided into Nucleus, which contains Proton (Positively charged) and Neutron (No charge) and Orbits, which contains Electrons (Negatively Charged).

### 4. What is Atom?

Ans. Atom is the smallest invisible unit of elements which exhibits all the properties of the elements and may or may not have independent existence.

It is divided into Nucleus and Orbits.

Nucleus is the centre of an atom which contains Proton and Neutron. Proton is a positively charged particle and Neutron has no charge.

Orbits are surrounded the nucleus in which Electrons which are negatively charged are revolved.

### 5. What are the properties of Metals?

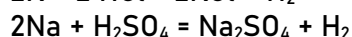
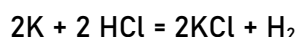
Ans. The properties of Metals are

- a. Metals are usually Lustrous.
- b. Metals are solid in Room temperature (Except Mercury, which is Liquid)
- c. Most metals are Sonorous, i.e. they produce a ringing sound when struck.
- d. Most metals are Malleable and Ductile.
- e. Metals are good conductors of heat and electricity.
- f. Most metals have high melting and boiling point.

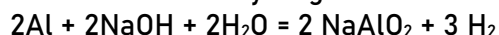
### 6. What are the Chemical Properties of Metals?

Ans. The chemical properties of metals are

- a. Metals can react with oxygen under different conditions to produce Metal Oxides. Some of these reactions are vigorous while some are very slow. Based on their reactivity the metals are arranged in a series called Activity Series.
- b. Metals are lying above hydrogen in the activity series displace hydrogen from water to form oxides and hydroxides of the metals and hydrogen gas.
- c. Metals react with dilute hydrochloric acid or dilute sulphuric acid to form corresponding salt and hydrogen gas.



- d. Only metals react with the alkalis Sodium Hydroxide and Potassium Hydroxide to form Salt and Hydrogen Gas.



**7. What are the properties of Non-metals?**

Ans. The properties of Non-metals are

- Non-metals may be solid (Carbon), Liquid (Bromine) or Gases (Oxygen)
- Solid Non-metals are not lustre (Except Diamond and Graphite which are form of Carbon.)
- Non-metals are Non-sonorous.
- Non-metals are not ductile or malleable.
- Most non-metals have low melting and boiling points.

**8. What are Metalloids?**

Ans. Metalloids are the elements which show the properties of both metals and non-metals.

Ex: Boron, Silicon, Arsenic etc.

**9. What are Inert Gases?**

Ans. Inert gases are the elements which are not react with other elements.

Ex: Helium, Neon, Argon, Krypton, Xenon etc.

**10. What are the differences between Metals and Non-Metals?**

Ans.

Metals	Non-metals
Have Lustre	Do not have Lustre.
Are malleable.	Are not Malleable.
Are ductile.	Are not Ductile
Are good conductor of Heat and electricity	Bad conductor of heat and electricity.
Have high density	Have low density

**11. What is the difference between Metalloids and Noble Gases?**

Ans.

Metalloids	Noble Gases
These elements show the properties of both metals and non-metals	These elements exist in the gaseous state in the atmosphere.
These are chemically reactive.	These are chemically inert.
These elements are monoatomic, i.e. contain one type of atoms.	These elements are also monoatomic.

**12. What is called Symbol.**

Ans. A chemical symbol is a notation of one or two letters representing a chemical element.

**13. What is Periodic Table?**

Ans. It is a Table in which elements are arranged in increasing order of their atomic number.

**14. What is atomic number**

Ans. It is the number of protons or electrons in an atom of an element

Ex: Hydrogen Atom has 1 electron so its atomic number is 1.

**15. What are Molecules?**

Ans. Molecule is the smallest unit of an element or compound which shows all the properties of that element or compound and has independent existence.

They are divided into atoms.

They can take part in Chemical Reaction.

**16. What is Atomicity?**

Ans. It is the number of an element that combine together to form a molecule of that element.

**17. What are monoatomic molecules?**

Ans. The elements which are made up of single atoms are known as monoatomic molecules.

Ex: Sodium (Na), Magnesium (Mg), Potassium (K), Helium (He), Neon (Ne), Argon (Ar) etc.

**18. Which are Diatomic Molecules?**

Ans. The molecules which contain two atoms in the same type are called Diatomic Molecules.

Ex: Hydrogen ( $H_2$ ), Oxygen ( $O_2$ ), Chlorine ( $Cl_2$ ), Nitrogen ( $N_2$ ) Etc.

**19. Which are Tri-atomic Molecules?**

Ans. The molecules which contain three atoms in the same type are called Triatomic Molecules.

Ex: Ozone ( $O_3$ )

**20. Which are Polyatomic Molecules?**

Ans. The molecules which contain more than three atoms in the same type are called Polyatomic Molecules.

Ex: Phosphorus ( $P_4$ )

**21. What is Compound?**

Ans. A compound is a pure substance that consists of two or more elements chemically combined in a fixed proportion by mass.

Ex: Water ( $H_2O$ ), combines with Hydrogen ( $H_2$ ) and Oxygen ( $O_2$ )

Sulfuric Acid ( $H_2SO_4$ ) Combines with Hydrogen ( $H_2$ ) and Oxygen ( $O_2$ )

**22. Write the characteristics of Compound.**

Ans. The characteristics of compound are:

**a. Compound is formed chemically from two or more elements.**

Ex: Water is made of hydrogen and Oxygen.

**b. A compound is made of molecules of only one kind.**

Ex: Pure water has only water molecules

**c. The molecules of a compound are made up of atoms of two or more different elements that have combined in a fixed proportion.**

Ex: Carbon Dioxide has one atom of Carbon and two atoms of Oxygen. If the proportion changes to one atom of Carbon and one atom oxygen, a different compound called Carbon Monoxide is formed.

**d. The elements that form a compound cannot be separated easily.**

Ex: Water cannot be split into hydrogen and oxygen by boiling it or filtering it. It can only be split by passing electricity through it.

**e. Energy is either absorbed or evolved when a compound is formed.**

**f. The properties of compound are different from those of the combining elements.**

Ex: Water is a liquid, whereas hydrogen and oxygen are gases.

**23. What are the differences between Atom and Molecule?**

Ans.

Factor	Atoms	Molecules
Definition	Most fundamental and smallest part that can exist of an element.	Two or more atoms chemically bonded together.
Example	Oxygen – O Phosphorus – P  Sulphur – S  Hydrogen – H	Oxygen – O <sub>2</sub> Phosphorus – P <sub>4</sub>  Sulphur – S <sub>8</sub>  Water – H <sub>2</sub> O
Structure	The smallest particle with properties of an element.	Combination of two or more atoms.
Stability	An atom may not always be stable in nature due to the presence of electrons in the outer shells.	Molecules are formed to attain stability.
Constituent Elements	Protons, Electrons & Neutrons	Two or more atoms of the same or different elements
Reactivity	Except for the noble elements, atoms of all elements showcase a certain level of reactivity.	Compared to a molecule, the level of reactivity is less as some of the valence points are filled by electrons of combined elements.

**24. What are the differences between Element and Compound?**

Ans.

Element	Compound
An element is a pure chemical substance made of same type of atom.	A compound contains atoms of different elements chemically combined together in a fixed ratio.
An element is represented using symbols.	A compound is represented using its chemical formula that represents the symbols of its constituent elements
Elements contain only one type of atom. Each atom has the same atomic number.	Compounds contain different elements.
Elements cannot be broken down into simpler substances by chemical reactions.	A compound can be separated into simpler substances by chemical methods/reactions.

**25. What is Formula?**

Ans. A formula is a short way of representing the molecule of an element or a compound.

**26. What should be known to write a chemical formula?**

Ans. For writing a chemical formula the following should be known

- Symbols
- The combining capacity of an element with hydrogen.

**27. What is Valency?**

Ans. The combining capacity of an element is called its valency.

**28. What are the rules to write Chemical Formulae with an example?**

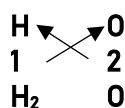
Ans. Let us take the example of water. Water molecules are made of hydrogen atoms and oxygen atoms. The combining capacity of oxygen is 2 and that of hydrogen is 1.

The basic rules to write the Chemical Formulae are

- i. Write the symbols of the elements that form the compound, with their valency under them.



- ii. Interchange the valences and write them as subscripts.

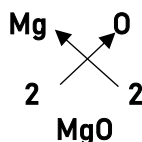


- iii. Omit 1 as subscript.



- iv. If the subscripts of the elements are the same, they may be generally be omitted.

Ex: MgO



**29. What is Acid?**

Ans. Acids are chemicals which are sour in taste.

Acids are two types

- Plants: Citric Acid
- Minerals: Hydrochloric Acid

**30. What are Bases?**

Ans. Bases are chemicals which are bitter in taste.

Ex: Sodium Hydroxide (NaOH)

**31. What are Salts?**

Ans. Salts are chemicals formed on reaction of a base with and acid.

Base + Acid = Salt + Water

**32. What is Chemical Equation?**

Ans. A chemical Equation is a shorthand form representing the result of a chemical change

**33. What is Chemical Reaction?**

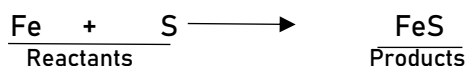
Ans. A chemical reaction is a process that leads to the chemical transformation of one set of chemical substances to another.

**34. What are Reactants?**

Ans. The substances which take part in the chemical reaction are called Reactants.

**35. What are Products?**

Ans. The substances which are formed as a result of the chemical reaction are called Product.



**36. What is mixture?**

Ans. A mixture is the combination of two or more elements or compounds or both that do not react chemically.

**37. What are the characteristics of Mixture?**

Ans. The Characteristics of Mixture are:

- Components in a Mixture are Present in a varying proportion.
- Mixtures have no definite set of properties.
- Components in a mixture can be separated by physical methods.
- It does not have definite melting or boiling points.
- Mixtures can be separated into these components by using physical methods like decantation, distillation, evaporation, crystallization, sublimation and filtration.

**38. What is Homogeneous Mixture?**

Ans. Homogeneous Mixture are the mixtures in which two or more elements or compounds or both are uniformly distributed mixed.

Ex: Homogeneous mixture of salt and water, homogeneous mixture of alcohol and water, air, brass etc.

**39. What is Heterogeneous Mixture?**

Ans. Heterogeneous Mixture the mixtures in which two or more elements or compounds or both uniformly mixed,

Ex: Oil and water, sand and water, iron and sulphur etc.

**40. What are the differences between Homogeneous and Heterogeneous Mixture?**

Ans.

Homogeneous Mixture	Heterogeneous Mixture
Constituents are uniformly distributed	Constituents are not uniformly distributed.
The properties and composition are same throughout the mixture.	The properties and composition change throughout the mixture.
Examples: (i) Brass [Alloy of Cu + Zn] (ii) Salt solution (iii) Air	Examples: (i) Iron and sulphur (ii) Sand and water (iii) Oil and water

**39. Why the separation of components of Mixture is necessary?**

Ans. The separation of components of a mixture is necessary to:

- get pure and useful substances for manufacturing other useful products.
- remove undesirable and harmful substances.

**40. On which factors the separation of mixture depends?**

Ans. Separation of mixture used to separate the components of a mixture depends on the following factors:

- The physical static of the components of the mixture and
- The difference in the physical properties (i.e., density and solubility, melting and boiling points, volatile nature, sublime nature, magnetic nature etc.) of the components of the mixture.

**41. What is Sublimation?**

Ans. The process in which a solid change into its vapour on heating is called Sublimation.

**42. What is Sedimentation?**

Ans. The settling down of suspended, insoluble, heavy solid particles in a solid liquid mixture when left undisturbed is called Sedimentation.

**43. What are Sediment and supernatant Liquid?**

Ans. The solid which settles at the bottom is called Sediment and the clear liquid above it is called Supernatant Liquid.

**44. What is Decantation?**

Ans. The process of pouring put the clear liquid without disturbing the sediment is called Decantati

**45. Write down the methods which are used to separate the components of mixture.**

Ans.

Type of Mixture	Process	Definition
Solid - Solid	Sublimation	we can separate one sublimate solid from non-sublimely Solid.
	Magnetic Separation	We can separate magnetic solid from non-magnetic solid.
	Solvent Extraction	We can separate soluble solid from an insoluble solid.
	Fractional Crystallization	This method involves the separation of two soluble solids
Solid - Liquid	Filtration	It involves the separation of insoluble solid from liquid
	Sedimentation and Decantation	By this method the insoluble solid is separated from liquid.
	Evaporation	Soluble solid is separated from liquid component.
	Distillation	This is the best method for separating a liquid from a solution of the soluble solid.
Liquid - Liquid	Separating Funnel	Separating funnel finds its use in separating the immiscible lighter liquid heavier liquid.
	Fractional Distillation	Mixture of two miscible liquids with different boiling points are separated by Fractional Distillation
Complex Mixture	Chromatography	It is the method to separate the various components of mixture
	Centrifugation	It is a process of separating finely suspended particles in a liquid by rotating it at a high speed in a closed container.

**46. Write the differences between compound and mixture.**

Ans.

Sl. No.	Differentiating Property	Compound	Mixture
1	Definition	Compound are substances which are formed by chemically combining two or more elements.	Mixtures are substances that are formed by physically mixing two or more substances.
2	Types	Compounds are three types which are covalent compounds, metallic compounds and ionic compounds.  Note: Compounds can also be classified as organic or inorganic compounds based on the	Mixtures are mainly of two types i.e. homogenous mixtures and heterogeneous mixtures.
3	Substance Category	Compounds fall under pure substances.	Mixtures fall under impure substances.
4	Composition Details	The chemical composition of compounds is always fixed.	A mixture can have a variable composition of the substances forming it.
5	Nature	Compounds are always homogeneous in nature	Mixtures can either be homogeneous or heterogeneous
6	Separation of Constituents	The constituents of a compound can only be separated by either chemical or electrochemical methods (like extraction).	The constituents of a mixture can be easily separated by physical methods (like filtration).
7	Properties	The properties of compounds are peculiar to itself as the constituents of a compound lose their original properties.	The constituents of a mixture do not lose their properties and so, the properties of a mixture are generally the sum of the properties of its constituents.
8	New Substance	A new substance is formed after the constituents are chemically combined. So, a compound has different properties from its constituents.	No new substance is formed in mixtures and its properties depends upon the properties of its constituents.
9	Melting and Boiling Points	The melting and boiling points of a compound is always defined.	The melting and boiling points of a mixture is not defined.
10	Example	Water, salt, baking soda, etc.	Oil and water, sand and water, smog (smoke + fog), etc.