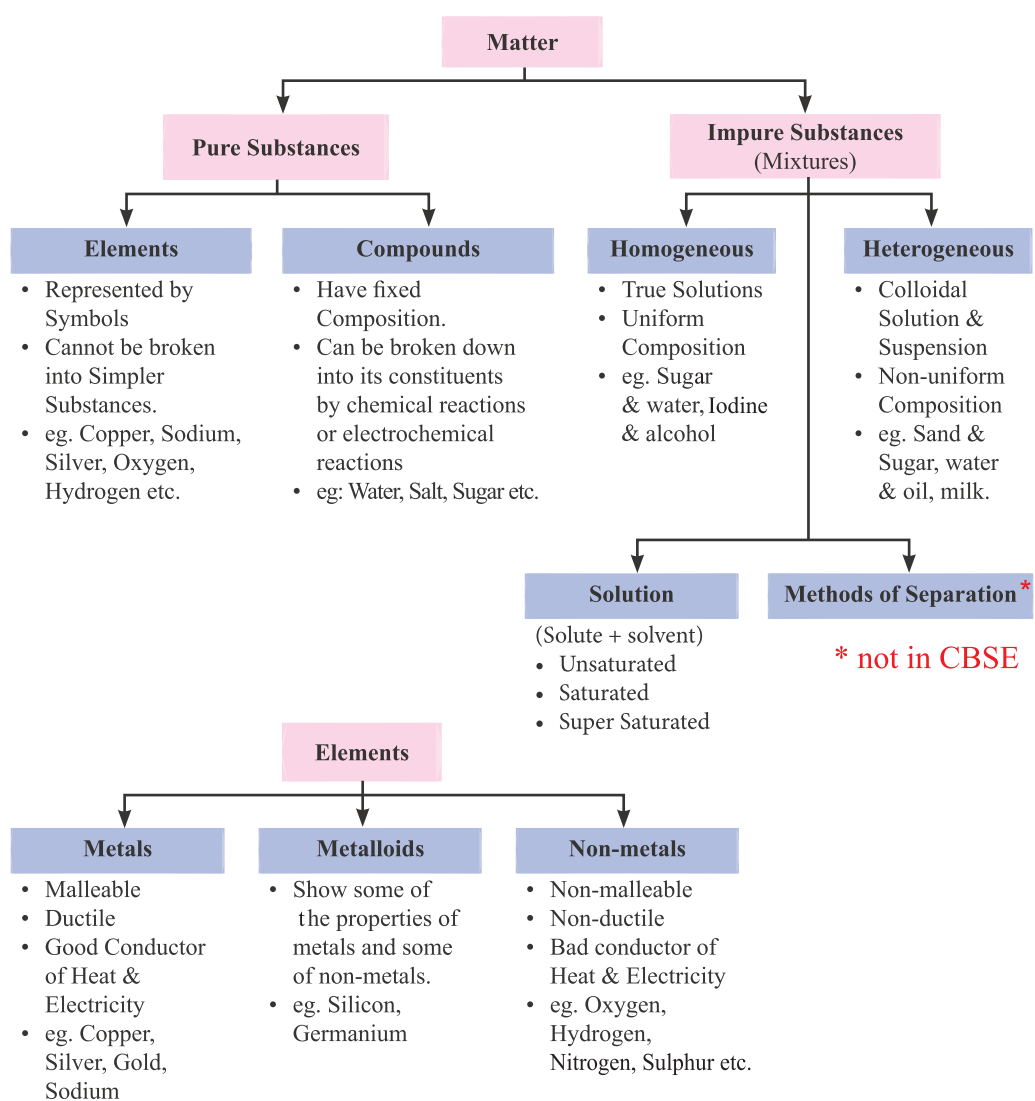




## Chapter - 2

# Is Matter Around Us Pure ?

### CONCEPT MAPPING



'Pure' word means that there is no mixing in a substance. But according to scientific language all things are mixture of so many substances, not of single one. That's why they are not pure.

E.g. Milk, water, fat, etc.

- Pure substances means that all elements have same chemical properties.
- A pure substance is made up of same kind of elements.

**Substance :** A substance is a kind of matter that cannot be separated into other kind of matter by any physical process. A pure substance is made up of same kind of elements.

#### What is a mixture ?

It is a substance in which two or more substances (element or compound) are simply mixed together in any proportion. Examples : The air is a mixture of oxygen, nitrogen, carbon dioxide and water vapour.

**Types of Mixture : Mixture is of two types :**

- Homogenous mixture
- Heterogenous mixture

**Homogenous Mixture :** These types of mixtures have no visible boundaries of separation between the various constituents.

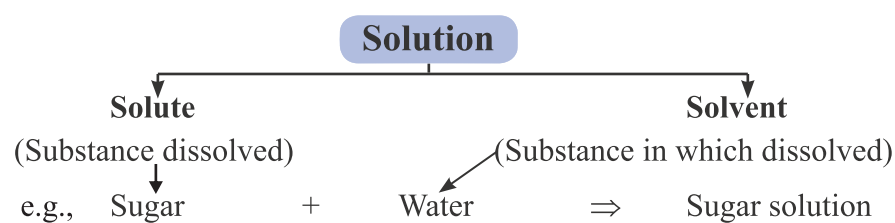
**Example :** Sugar in water. It has a uniform composition throughout its mass.

**Heterogenous Mixture :** These types of mixtures have visible boundaries of separation between the various constituents.

**Example :** Mixture of sugar and sand. It does not have a uniform composition throughout its mass.

**Solution :** A solution is a homogenous mixture of two or more substances. E.g., Nimboo pani, soda water.

**Solution :** A solution has a solvent and a solute as its components. The component of the solution that dissolves the other component in it is called the solvent. The component of the solution that is dissolved in the solvent is called the solute.



### Types of Mixtures

True Solution	Colloidal	Suspension
1. Size of solute particles is smallest. $< 10^{-9}$ m.	1. Size of solute particles bigger than true but smaller than suspension. In between $10^{-9}$ to $10^{-6}$ m.	1. Size of particles biggest. $> 10^{-6}$ m.
2. Solute particles can't be seen with naked eye.	2. Solute particles can't be seen with Naked eye.	2. Can be seen with naked eye.
3. Homogenous mixture.	3. Seems homogenous but actually heterogenous mixture.	3. Heterogenous mixture.
4. Particles can't be separated by filtration.	4. Particles can't be separated by filtration.	4. Can be Separated by filtration.
5. Transparent	5. Translucent	5. Opaque
6. Stable solutions - i.e., solute particles do not settle on keeping.	6. Stable solutions.	6. Unstable solution – solute particles settle upon keeping.
7. Do not show tyndall effect.	7. Show tyndall effect.	7. May or may not show tyndall effect.
8. Solution diffuse rapidly through filter paper as well as parchment paper.	8. Colloid particles pass through filter paper but not through parchment paper.	8. Suspension particles do not pass through filter paper as well as parchment paper.
9. e.g., Sugar in water.	9. e.g., Milk, blood.	9. e.g., Sand/mud in water.

#### Common examples of colloids :

	Dispersal Phase (Solute)	Dispersion Medium (Solvent)	Type	Example
1.	Liquid	Gas	Aerosol	Fog, cloud
2.	Solid	Gas	Aerosol	Smoke

3.	Gas	Liquid	Foam	Shaving Cream
4.	Liquid	Liquid	Emulsion	Milk, face cream, emulsion paint
5.	Solid	Liquid	Sol	Mud, digene
6.	Gas	Solid	Foam	Foam, rubber sponge
7.	Liquid	Solid	Gel	Jelly, cheese
8.	Solid	Solid	Solid sol	Coloured gemstones, glass (milky, coloured)

- Gas in gas is not a colloidal solution – it is called a mixture.

**Saturated Solution :** Solution in which no more solute can be dissolved without raising its temperature is called saturated solution.

**Unsaturated Solution :** Solutions in which more solute can be dissolved without raising its temperature is called Unsaturated solution.

**Solubility :** It is the amount of solute in a saturated solution at a given temperature.

**Concentration of Solution**

1. Mass by mass percentage =  $\frac{\text{mass of solute}}{\text{mass of solution}} \times 100$
2. Mass by volume percentage =  $\frac{\text{mass of solute}}{\text{volume of solution}} \times 100$

## Physical Vs Chemical Changes

Chemical	Physical
<ul style="list-style-type: none"> <li>• Not easily reversible</li> <li>• New Product(s) formed</li> <li>• Reactants used up</li> <li>• Often heat/light/sound/ fizzing occurs</li> <li>• Electricity may be produced</li> <li>• A precipitate may form e.g., Wood burning</li> </ul>	<ul style="list-style-type: none"> <li>• Easily reversible</li> <li>• No new products</li> <li>• Often just a state change e.g., ice melting</li> </ul>

### Elements

Made of same type of atoms

S.No.	Metals	Non-metals	Metalloids
1.	Lustrous	Non-lustrous	Metalloids have intermediate properties between metals and non-metals.
2.	Malleable, ductile	Non-malleable, non-ductile	E.g., Boron, Germanium, Silicon
3.	Sonorous	Non-sonorous	
4.	Good conductors of heat & electricity	Bad conductors	
5.	e.g., Gold, iron etc.	e.g., Oxygen, Phosphorus	

Element	Compound
1. Can not be broken into simpler substance by chemical reaction.	Can be separated into simpler substance by chemical reactions.
2. Consists of similar kind of atoms.	Consist of atoms of different element in fixed mass ratio.
3. It can be represented by using symbols	Represented by using chemical formula.
4. Ex.: Iron, Copper etc.	Ex.: Water, Sodiumchloride, etc.

Mixture	Compound
1. Elements or compounds are simply mixed so no new substance is formed.	1. Substances are reacted together with each other to make a new substance.
2. Elements do not combine in a fixed ratio.	2. Composition of the components is fixed i.e., they combine together in a fixed ratio according to their masses.
3. A mixture shows the properties of its components.	3. Compound doesn't show the properties of component elements.
4. Components can be easily separated by any mechanical method which is suitable.	4. Components can't be separated from each other by simple mechanical methods.
5. e.g., sugar in water, oil in water	5. e.g., Iron and sulphur react to form iron sulphide.

## QUESTIONS

### VERY SHORT ANSWER TYPE QUESTIONS

1. Classify the following into homogenous and heterogenous mixtures :
  - (a) Ice
  - (b) Soil
  - (c) Wood
  - (d) Air
2. Name the type of mixture formed by mixing sulphur and carbon disulphide.
3. Justify the statement that: 'Rusting of iron is corrosion and it is a chemical change'.
4. How can you change an unsaturated solution to an saturated solution without adding any more solvent to it?
5. Identify solute and solvent in 'tincture of Iodine'.
6. Sea water can be classified as heterogenous mixture. Comment.
7. A hard substance produces a tinkling sound when beaten. Is it metal or a non metal?
8. What type of solution is an alloy?
9. Classify the following as physical change or chemical change.
  - (a) Burning of magnesium ribbon in air
  - (b) Burning of sulphur in air
  - (c) Electrolysis of water.
10. Which component of the mixture (Iron & sulphur) reacts with dil HCl and gives hydrogen gas?

## SHORT ANSWER TYPE QUESTIONS

1. What is meant by concentration of a solution?
2. List the two conditions essential for using distillation as a method for separation of the components from a mixture.
3. Smoke and fog both are aerosols. In what ways are they different?
4. Salt can be recovered from its solution by evaporation can you suggest any other method also?
5. "Air is a mixture not a compound." Justify this statement.
6. Define Tyndall effect with example.
7. Alloys can not be separated by physical methods, though it is considered mixture. Why?
8. Name two properties of a substance to check its purity?

## LONG ANSWER TYPE QUESTIONS

1. Why the interconversion of states of matter is considered as a physical change? Give three reasons to justify your answer.
2. During an experiment the students were asked to prepare a 20% (mass/mass) solution of sugar in water. Ram dissolved 20 gm of sugar in 100 gm of water while Sohan prepared it by dissolving 20 gm of sugar in water to make 100 gm of solution.
  - (a) Are the two solutions of the same concentration.
  - (b) Compare the mass% of the two solutions.
  - (c) Whose solution contain less amount of solute.
3. When a fine beam of light enters a room through a small hole, Tyndall effect is observed, Explain, why does this happen? Give one more example where this effect can be observed.
4. Differentiate :
  - a) Elements and compounds.
  - b) Homogeneous and Heterogeneous mixtures.
  - c) Compounds and mixtures.
5. How properties of true solutions differ from that of colloids. Explain?



## OBJECTIVE TYPE QUESTIONS :

1. Complete the sentence by choosing the correct words given in the bracket:
  - a. Pure substances are ..... and have the same ..... throughout.
  - b. Mixture of sulphur and carbon disulphide is. .... and does not show ..... (homogenous, heterogeneous, Tyndall effect).
  - c. Tincture of iodine has antiseptic properties. This solution is made by dissolving ..... in ..... (potassium iodide, iodine, water, alcohol)
2. Which of the following are homogeneous in nature ?

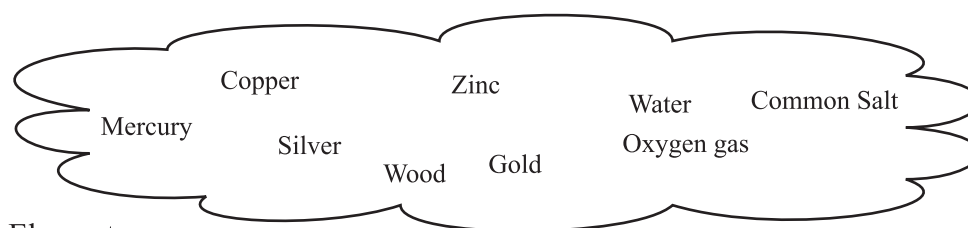
(i) ice.	(ii) wood.	(iii) soil	(iv) air
(a). (i) and (iii)	(b). (ii) and (iv)		
(c). (i) and (iv)	(d) (iii) and iv)		
3. Which of the following are physical changes ?

(i) Melting of iron metal.	(ii) Rusting of iron
(iii) Bending of an iron rod.	(iv) Drawing a wire of iron metal

  - a. (i), (ii) and (iii),
  - b. (i), (ii) and (iv)
  - c. (i), (ii) and (iv)
  - d. (ii), (iii) and (iv)
4. Which of the following are chemical changes ?

(i) Decaying of wood.	(ii) Burning of wood
(iii) Sawing of wood.	(iv) Hammering of a nail into a piece of wood
5. Name the process associated with the following:
  - a. Dry ice is kept at room temperature and at one atmospheric pressure.
  - b. A drop of ink placed on the surface of water contained in a glass spreads throughout the water.
  - c. A potassium permanganate crystal is in a beaker and water is poured into the beaker with stirring.

- d. An acetone bottle is left open and the bottle becomes empty.
  - e. Settling of sand when a mixture of sand and water is left undisturbed for some time.
  - f. Fine beam of light entering through a small hole in a dark room, illuminates the particles in its paths.
6. (i) Is water is an element or a compound. Give two reasons to support your answer.
- (ii) Heating of Calcium Carbonate is an example of a chemical change. Justify.
- (iii) Write three properties of colloids.
7. Which of the following are not compounds ?
- a. Chlorine gas
  - b. Potassium chloride
  - c. Iron.
  - d. Iron sulphide
  - e. Aluminum
  - f. Iodine
  - g. Carbon
  - h. Carbon monoxide
8. Classify the substances given in the cloud into elements and compounds :



Elements :

Compounds:

9. Sugar crystals obtained from sugarcane and beetroot are mixed together. Will it be pure substance or a mixture? Yes or No

**Assertion-Reason Type Questions:-**

Two statements are given one labelled assertion (A) and the other labelled Reason (R). Select the correct answer to the question from the codes (a), (b), (c), (d) as given below:

- (a) Both A and R are true and R is the correct explanation of A.
  - (b) Both A and R are true but R is not the correct explanation for A.
  - (c) A is true but R is false.
  - (d) A is false but R is true.
1. Assertion (A) : A mixture of Ammonium chloride and sodium chloride can be separated by sublimation.  
Reason (R) : Sodium chloride sublimes on heating.
2. Assertion (A) : A mixture of kerosene and water cannot be separated by a separating funnel.  
Reason (R) : Kerosene oil and water have different densities and are insoluble

**Answers :**

1. (a)  
2. (d)