

## ◆ What Do We Mean by Pure Substance?

■ Definition: In everyday life, we often say something is “pure” if it has no dirt or unwanted substance in it.

But in science, a substance is called “pure” when it contains only one kind of particle — all its atoms or molecules are chemically identical.

✓ For example:

- Distilled water contains only  $\text{H}_2\text{O}$  molecules → pure
- Air contains nitrogen, oxygen, carbon dioxide → not pure (it's a mixture)



📷 Fig. 2.1 shows common materials like milk, ghee, butter which may look pure but are actually mixtures.

## ◆ What is a Mixture?

■ Definition: A mixture is a combination of two or more substances that are mixed physically, not chemically. This means the individual substances retain their original properties and can be separated by physical means.

✓ Examples:

- Salt in water
- Sand in soil
- Air (oxygen, nitrogen, etc.)


There are 2 types of mixtures:

1 Homogeneous Mixture: The composition is uniform throughout. (e.g. sugar in water)

2 Heterogeneous Mixture: The components remain separate and can be seen. (e.g. oil in water)



## Activity 2.1: Observe Different Mixtures

 What to do: Mix different solids in water in groups — e.g., copper sulphate + water, chalk powder + water

✓ Observation:

- Copper sulphate dissolves completely → homogeneous
- Chalk remains visible → heterogeneous

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## ◆ Types of Mixtures

### ◆ Solution

■ Definition: A solution is a homogeneous mixture of two or more substances. One is a solute (dissolves), and the other is a solvent (does the dissolving).

✓ Examples:

- Salt in water (solute = salt, solvent = water)
- Sugar in milk
- Lemonade

■ Properties:

- Clear appearance
- No residue or settling
- Particles cannot be seen
- Does not scatter light


■ **Concentration:** The amount of solute present in a fixed quantity of solvent.

 Formula:

Mass % of solute =  $(\text{mass of solute} / \text{mass of solution}) \times 100$

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## Activity 2.3: Check Saturation

 What to do: Keep adding salt to water till it stops dissolving. Heat and check if more dissolves.

■ Saturated Solution: No more solute dissolves at that temperature

■ Unsaturated Solution: More solute can still dissolve

■ Solubility: Maximum amount of solute that can dissolve in 100g water at a particular temp

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## ◆ Suspension

■ Definition: A suspension is a heterogeneous mixture where solid particles are dispersed in a liquid but do not dissolve. These particles are large and settle down over time.

✓ Examples:

- Mud in water
- Sand in water

■ Properties:

- Cloudy appearance
- Visible particles
- Can be filtered
- Shows Tyndall effect (scatters light)

## ◆ Colloid

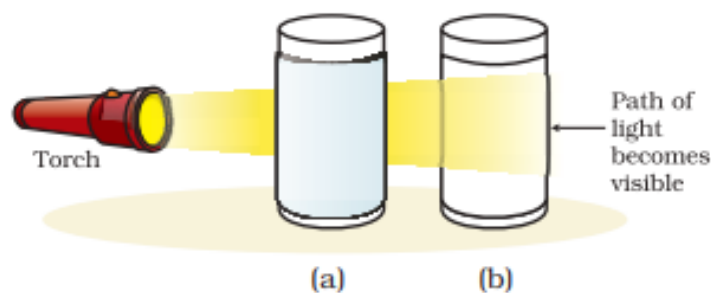
■ Definition: A colloid is a heterogeneous mixture where the particles are evenly distributed but not dissolved. They are small enough to not settle, yet big enough to scatter light.

✓ Examples:

- Milk
- Smoke
- Fog

■ Properties:

- Stable (doesn't settle)
- Cannot be separated by filtering
- Shows Tyndall effect
- Appears uniform but isn't



📷 Fig. 2.3 demonstrate Tyndall Effect

 Table 2.1 explains types of colloids (foam, aerosol, emulsion etc.)

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## ◆ Difference Between Mixtures and Compounds

 Mixture:


- Made by physical mixing
- No fixed proportion
- Components retain properties
- Can be separated

 Compound:

- Made by chemical combination
  - Fixed proportion of elements
  - New properties formed
  - Cannot be separated by physical means
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## Activity 2.4: Mixture vs Compound (Iron + Sulphur)

 What to do: Mix iron + sulphur in one bowl  
Heat iron + sulphur in another bowl to form iron sulphide

 Observation:

- Mixture: Magnetic, separate particles
- Compound: Non-magnetic, new substance

 A compound has new properties and behaves differently from its elements.

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## ◆ Physical vs Chemical Change

 Physical Change:

- Change in form or appearance
- No new substance formed
- Reversible

 Examples:

- Melting ice
- Boiling water

### ■ Chemical Change:

- A new substance is formed
- Properties change
- Usually irreversible

### ✓ Examples:

- Rusting iron
- Burning paper

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## ◆ Elements and Compounds

◆ Element: A substance made of only one type of atom and cannot be broken down.

### ■ Examples:

- Metals (e.g., copper, gold): Shiny, good conductors
- Non-metals (e.g., carbon, oxygen): Dull, poor conductors
- Metalloids (e.g., silicon): Have properties of both

◆ Compound: A substance formed when two or more elements combine chemically in a fixed ratio.

### ■ Examples:

- Water ( $\text{H}_2\text{O}$ )
- Carbon dioxide ( $\text{CO}_2$ )
- Salt ( $\text{NaCl}$ )