

## Chapter 5

# Exploring Mixtures and their Separation



Understanding mixtures helps us separate, purify, and make the most of resources.



Observe



Think



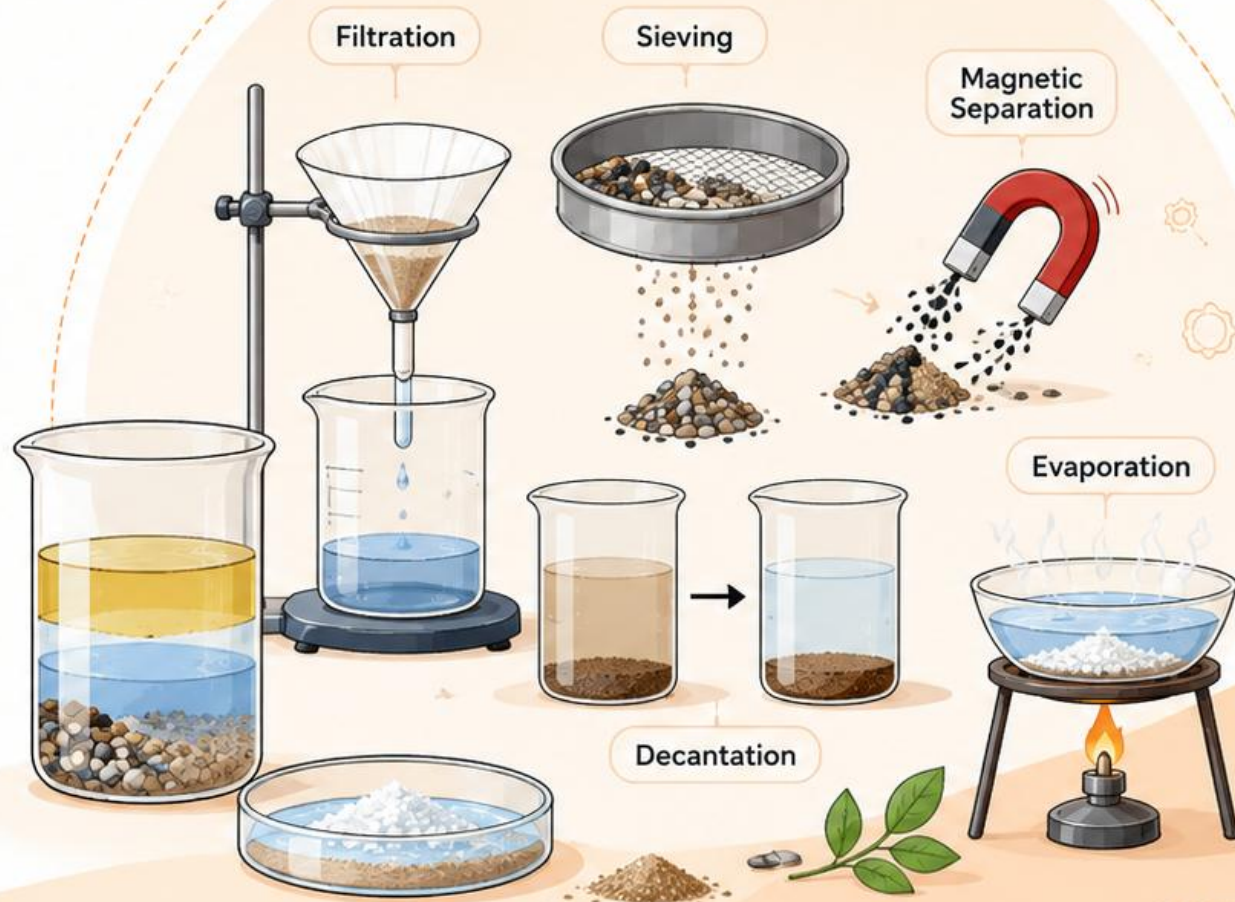
Experiment



Explore



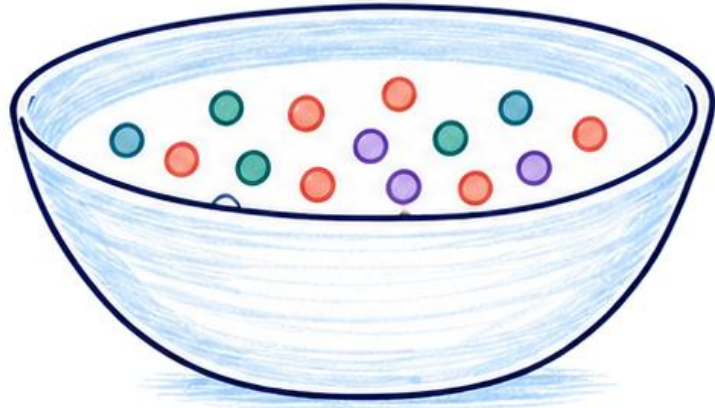
Discover



# EXPLORING MIXTURES AND THEIR SEPARATION

## ① WHAT IS A MIXTURE?

Two or more substances present together, without a chemical change.



## ② WHY DO WE SEPARATE MIXTURES?

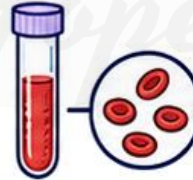
- remove unwanted parts



- get a pure substance



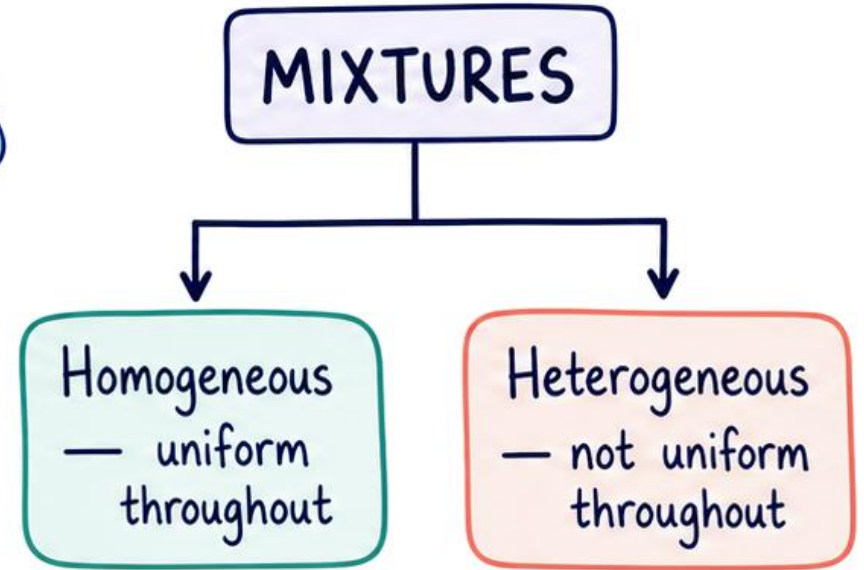
- recover useful parts



- make materials safe to use



## ③ BIG CLASSIFICATION



We will also study:  
solutions, suspensions and colloids.

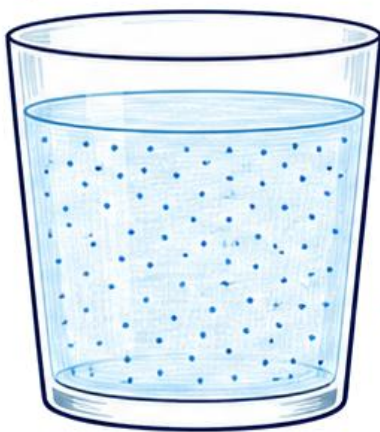


**KEY IDEA:** We choose a separation method by using a difference in size, density, solubility or boiling point.

# HOMOGENEOUS AND HETEROGENEOUS MIXTURES

## HOMOGENEOUS MIXTURE

- Same composition throughout
- Different parts cannot be seen separately
- Usually appears as one phase



← sugar + water

← uniform

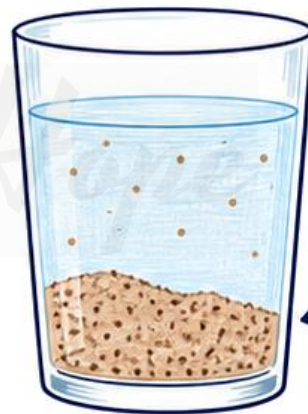
Examples: salt solution • vinegar • air • brass



**REMEMBER:** A homogeneous mixture looks uniform even in a small sample.  
A heterogeneous mixture does not.

## HETEROGENEOUS MIXTURE

- Composition is not uniform
- Different parts or layers may be seen
- May settle or form separate layers



← sand  
settles



← oil layer

← water layer

Examples: muddy water • oil + water • smoke • fog

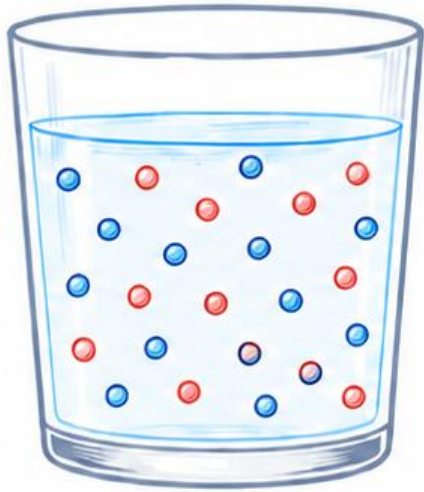


Solutions are always homogeneous.

# SOLUTIONS: SOLUTE, SOLVENT & CONCENTRATION

## WHAT IS A SOLUTION?

A solution is a homogeneous mixture.



## TWO PARTS

SOLUTE

+

SOLVENT



SOLUTION

Solute: the substance that gets dissolved

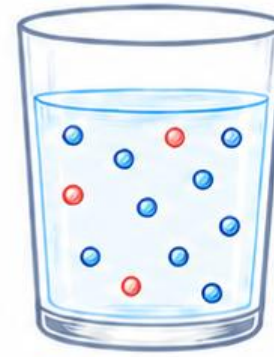
Solvent: the substance that dissolves the solute

Sugar + water → sugar solution

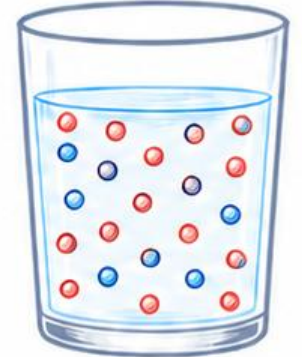
↑                      ↑  
sugar = solute      water = solvent

## CONCENTRATION

The amount of solute dissolved in a given amount of solvent or solution.



dilute —  
less solute



concentrated —  
more solute

## WHY THE RIGHT AMOUNT MATTERS



ORS: exact amounts of salt, sugar and water



Pesticide spray: too little may not work; too much may cause harm.



## KEY IDEA:

Concentration tells us how much solute is present.

# MASS BY MASS PERCENTAGE (% m/m)

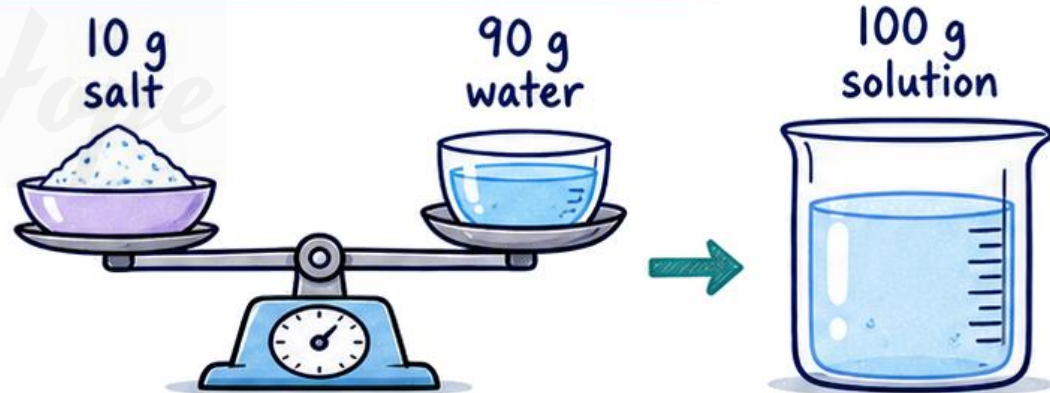
It tells us how many grams of solute are present in 100 g of solution.

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

$$\text{Mass of solution} = \text{Mass of solute} + \text{Mass of solvent}$$

**EXAMPLE:** 10 g of salt is dissolved in 90 g of water.

- Mass of solute = 10 g
- Mass of solvent = 90 g
- Mass of solution = 10 g + 90 g = 100 g
- $\% \text{ m/m} = \left( \frac{10 \text{ g}}{100 \text{ g}} \right) \times 100 = 10\% \text{ m/m}$



**MEANING:** Every 100 g of this solution contains 10 g of salt.



Use examples: food labels • milk powder • spice mixtures

**!** Use the total mass of the solution in the denominator — not the mass of water alone.

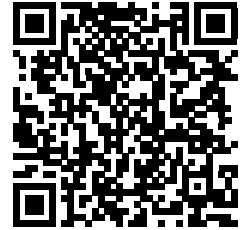


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