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Class–9

SCIENCE

Chapter – 2

IS MATTER AROUND US PURE

Part – 2

True Solution

Deeksha Pahilajani

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OVERVIEW



1. Mixture
2. True Solution
3. Suspension and Colloid
4. Elements and Compounds

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TRUE SOLUTION

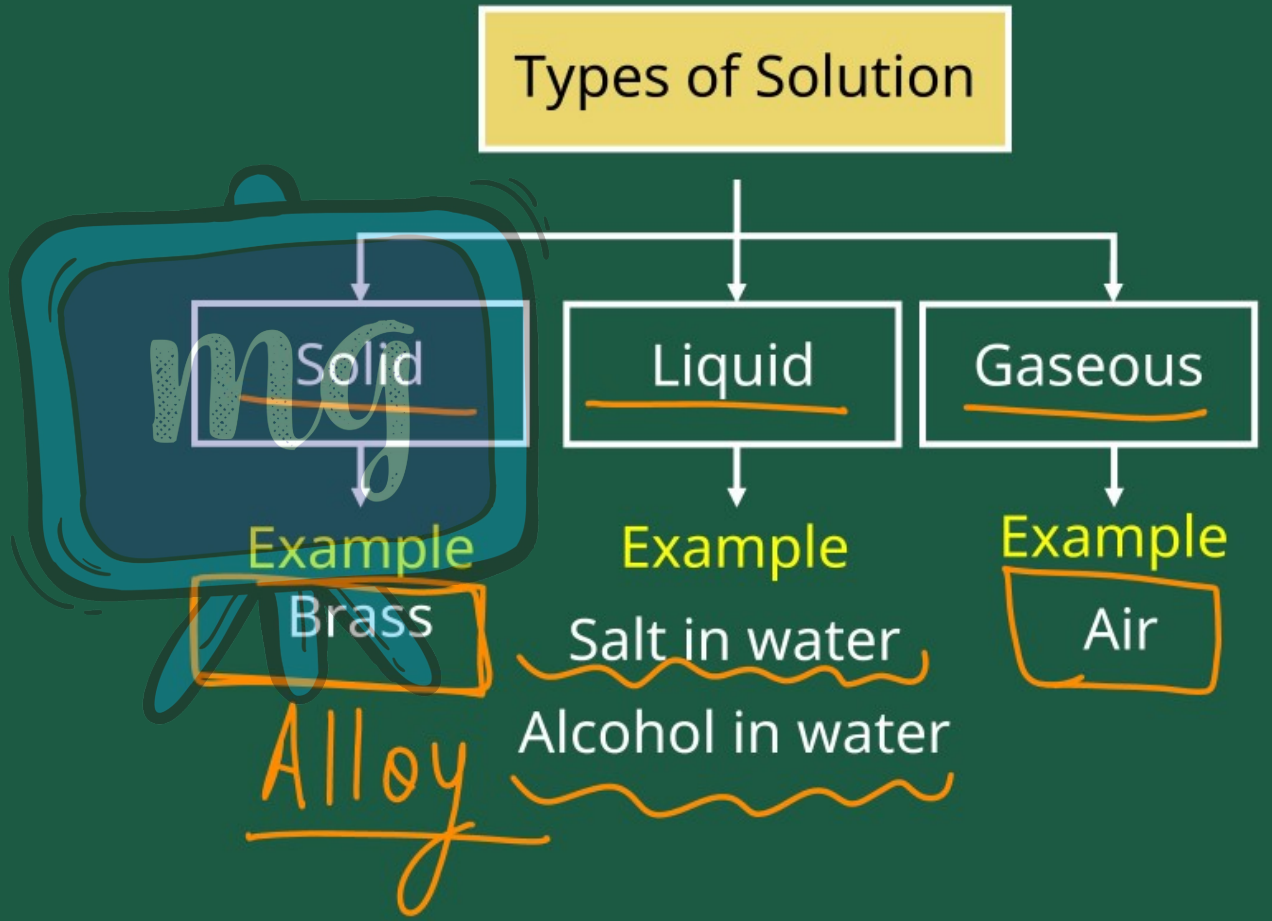
☛ A true solution is a homogeneous mixture of two or more chemically non reactive substances.

homogenous



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Components of Solution

Solute

Less Quantity

Example : Sugar

Solvent

More Quantity

Example : Water



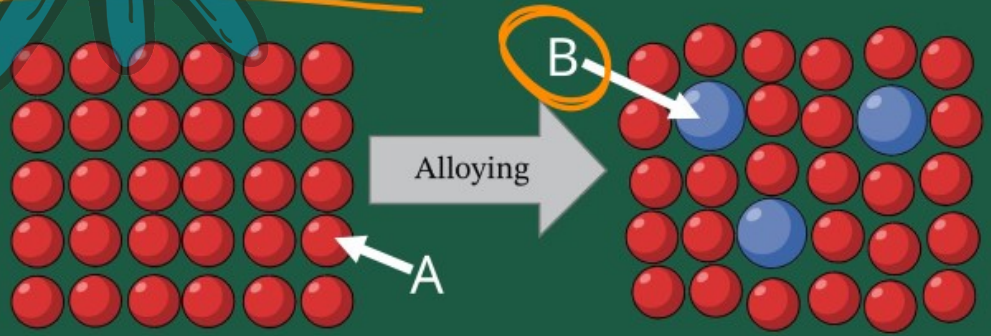
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SOLID SOLUTION

Alloys –

- Alloys are the homogeneous mixture of two or more metals or a metal and a non-metal.
- Components cannot be separated by physical means.

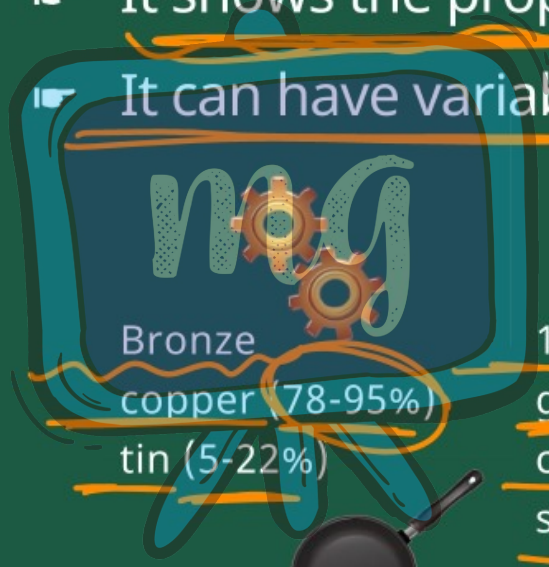


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Then why is it considered as a mixture?

- It shows the properties of its constituents.
- It can have variable composition.







Bronze
copper (78-95%)
tin (5-22%)

18K Gold
gold (75%)
copper (12.5%)
silver (12.5%)

Brass
copper (60-90%)
zinc (10-35%)

Cast Iron
iron (96-98%)
carbon (2-4%)



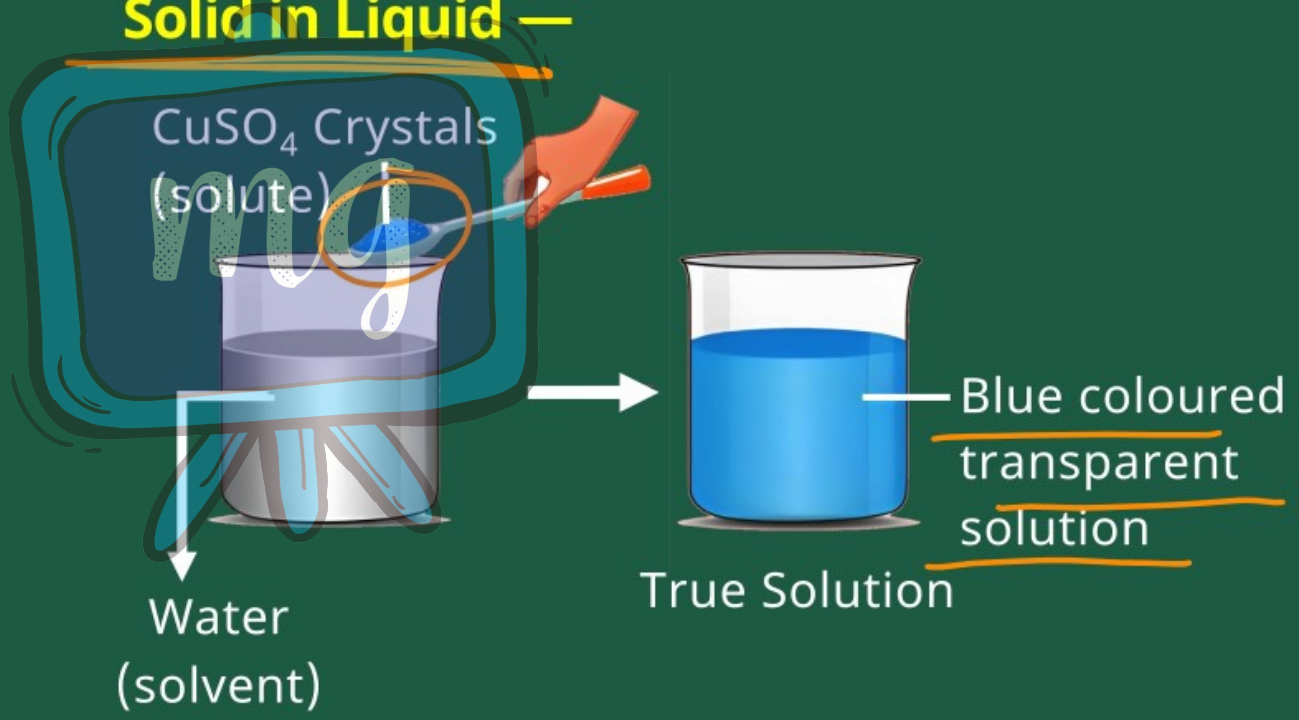
Sterling Silver
silver (92.5%)
copper (7.5%)

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LIQUID SOLUTION

Solid in Liquid —

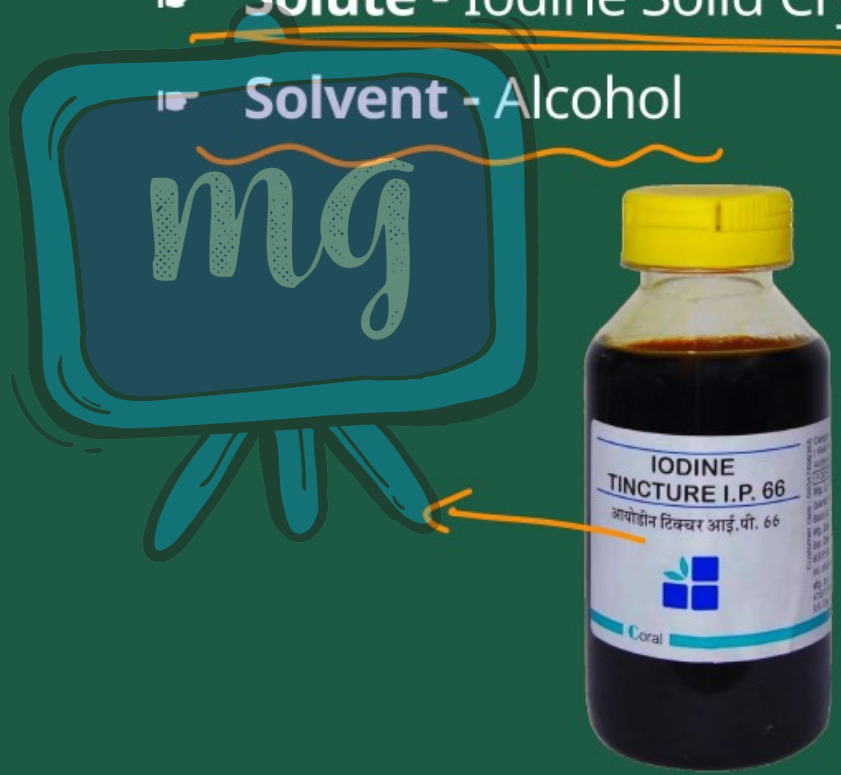


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Tincture of Iodine —

- **Solute** - Iodine Solid Crystals
- **Solvent** - Alcohol



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Gas in Liquid Solution —

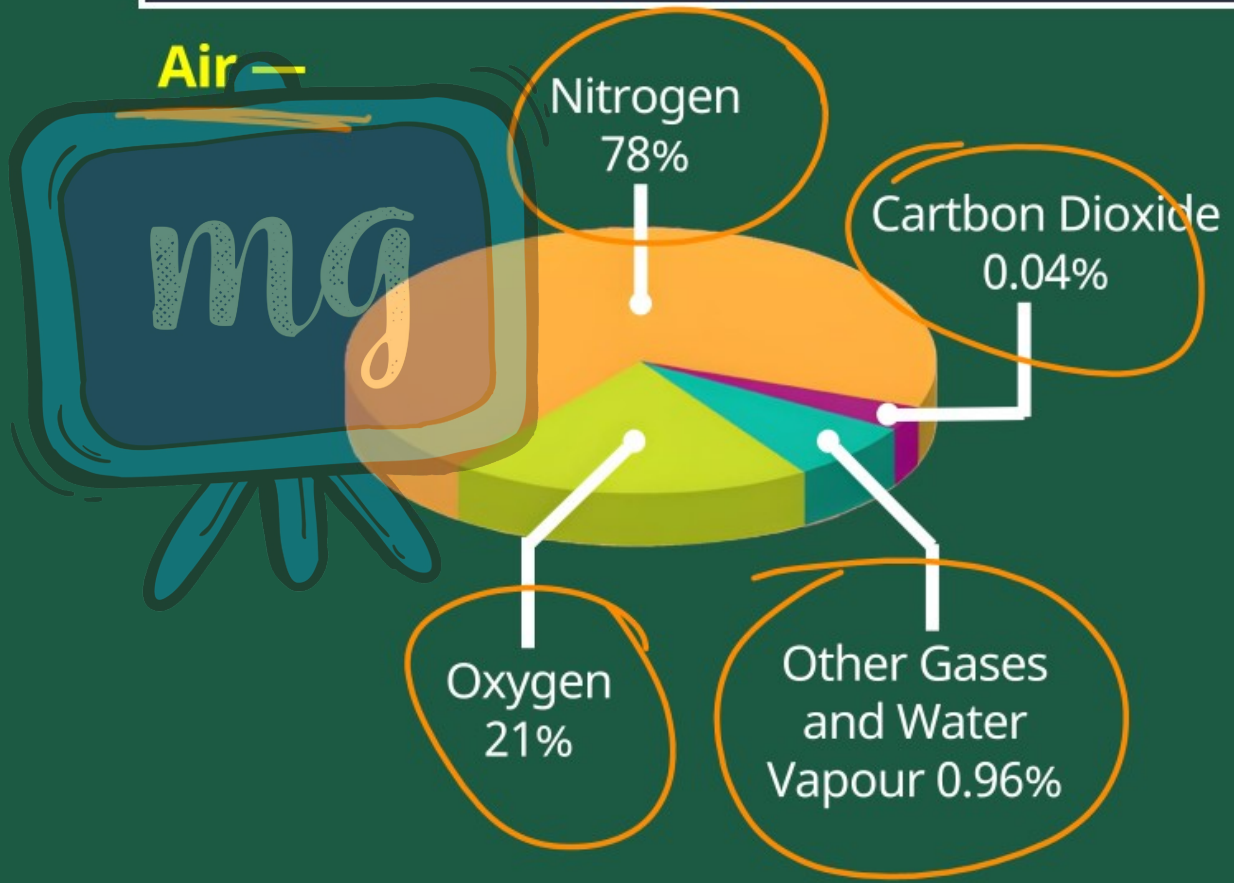
☛ **Soda Water** - Carbon Dioxide Gas + Water



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GAS IN GAS MIXTURE

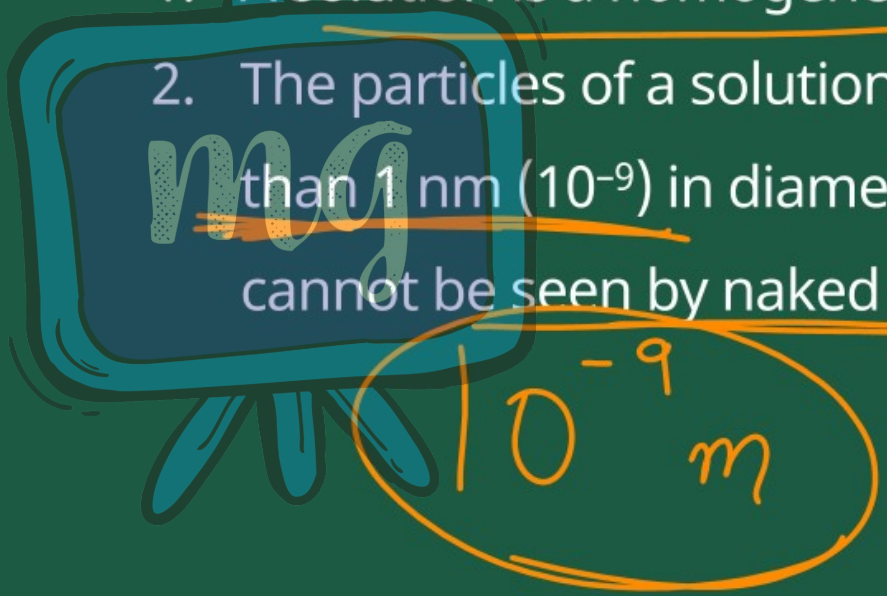


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PROPERTIES OF TRUE SOLUTION

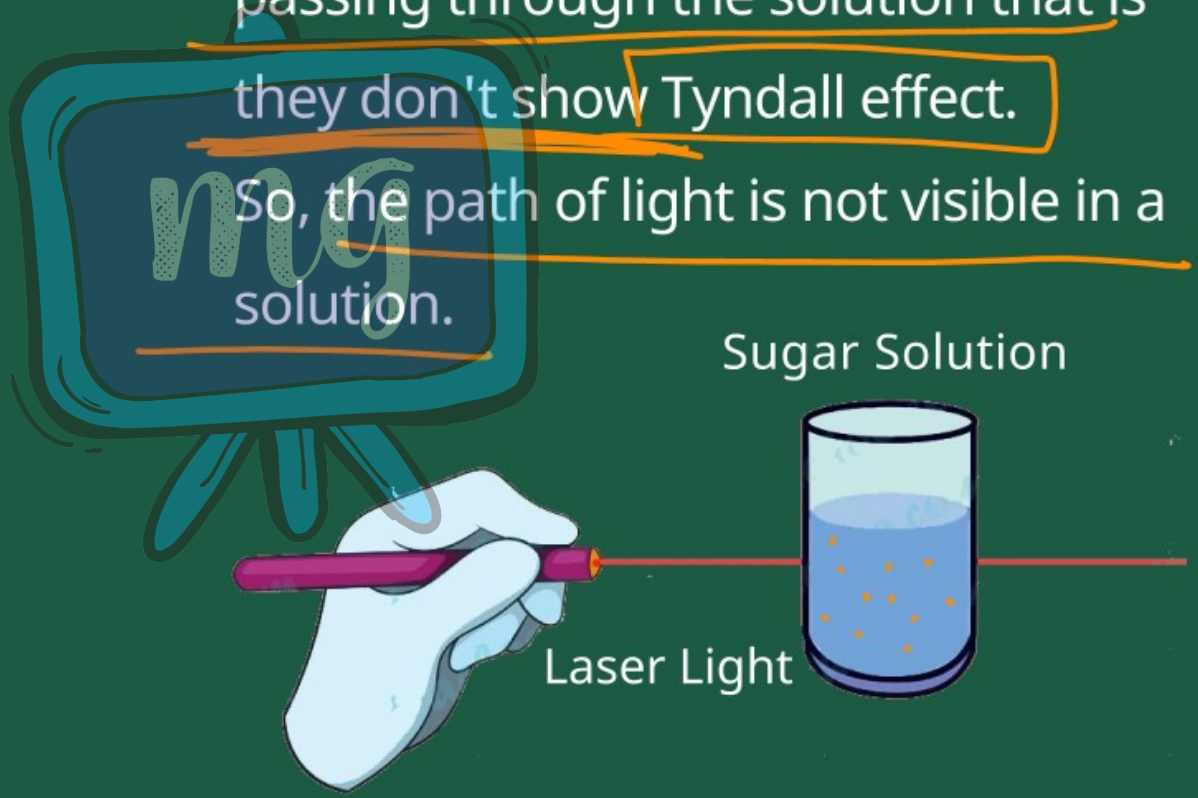
1. A solution is a homogeneous mixture.
2. The particles of a solution are smaller than 1 nm (10^{-9}) in diameter which cannot be seen by naked eyes.



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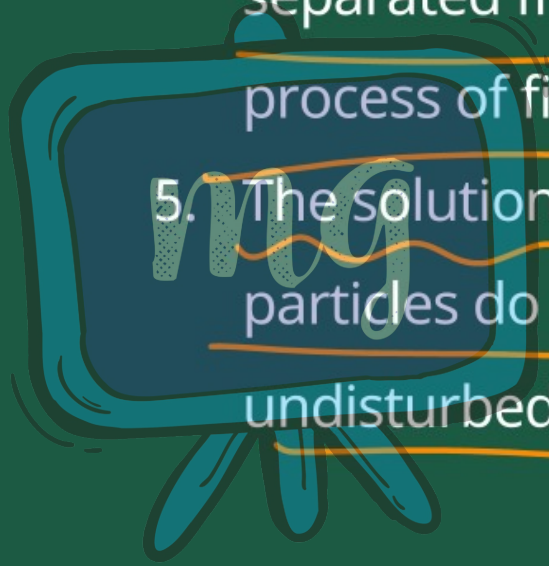
3. They do not scatter a beam of light passing through the solution that is they don't show Tyndall effect. So, the path of light is not visible in a solution.



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4. The solute particles cannot be separated from the mixture by the process of filtration.
5. The solution is stable and solute particles do not settle down when left undisturbed.

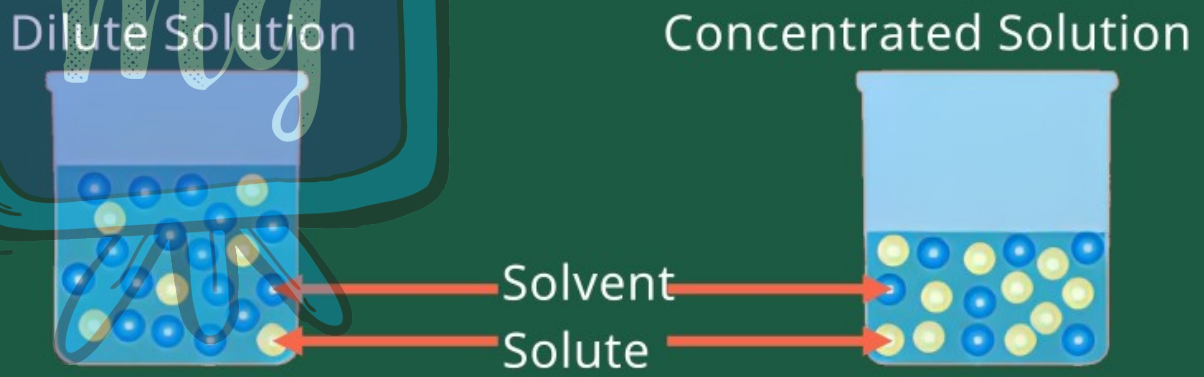


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TYPES OF SOLUTION BASED ON THE AMOUNT OF SOLUTE PRESENT

Dilute and Concentrated Solutions



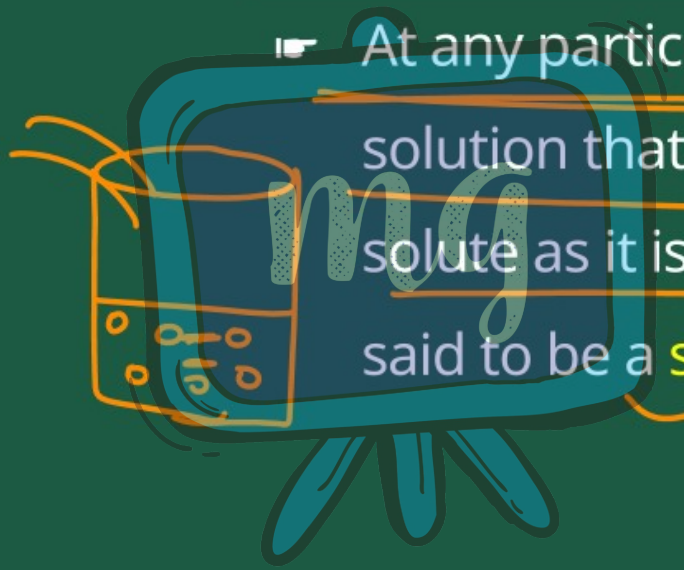
A less amount of solute in a more amount of solvent

A more amount of solute in a less amount of solvent

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SATURATED SOLUTION



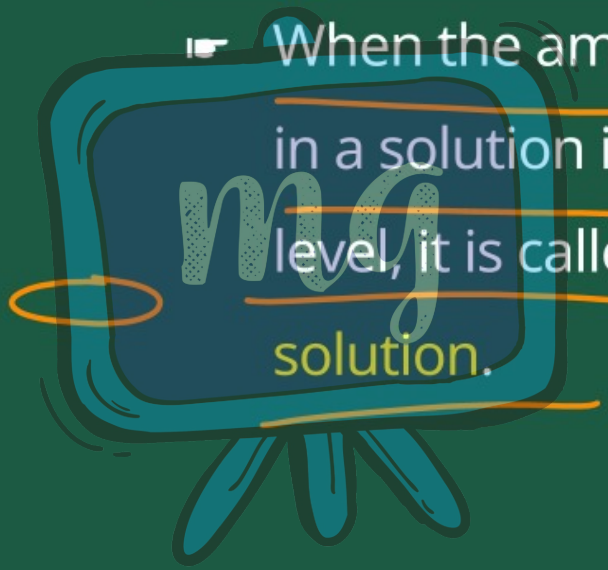
- At any particular temperature, a solution that has dissolved as much solute as it is capable of dissolving, is said to be a saturated solution.

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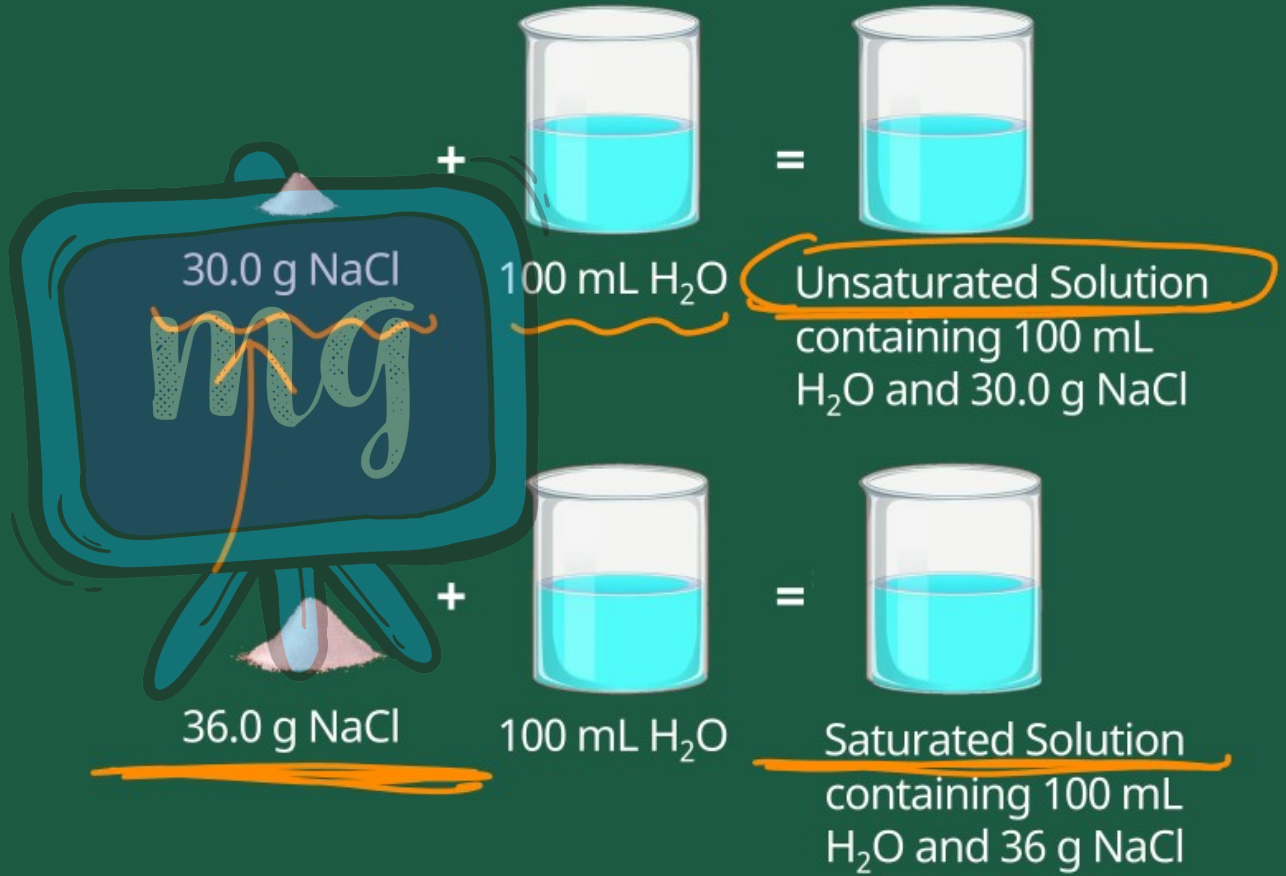
UNSATURATED SOLUTION

- When the amount of solute contained in a solution is less than the saturation level, it is called an unsaturated solution.



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SOLUBILITY

- The maximum amount of solute that can be dissolved in a specified amount of solvent at a given temperature is called solubility of that substance.
- Temperature ↑ Solubility ↑.

25°C

NaCl 100 ml H_2O

36 g

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- Different substances in a given solvent have different solubilities at the same temperature.

In 100 g of water	Temperature in K and Solubility				
	283 K	303 K	323 K	343 K	363 K
Potassium Nitrate	21	42	82	102	128
Sodium Chloride	36	46	56	57	57
Ammonium Chloride	24	47	61	71	81
Potassium Chloride	35	45	60	66	74

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CONCENTRATION OF A SOLUTION

Concentration of the Solution —

- The amount of solute present in a given amount (mass or volume) of solution.

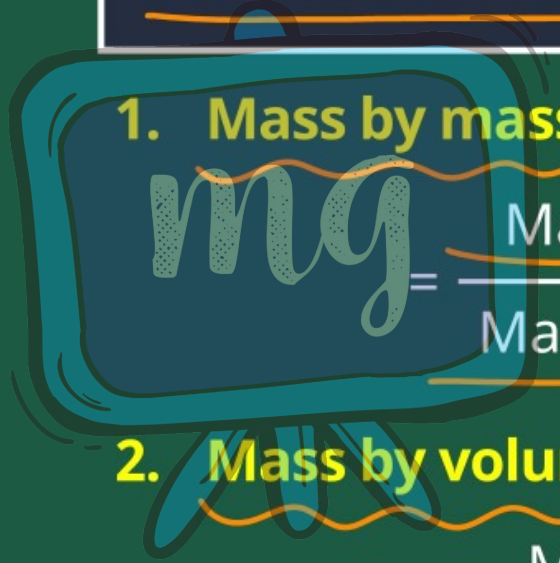
OR

- The amount of solute dissolved in a given mass or volume of solvent is called concentration of solution.

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WAYS OF EXPRESSING THE CONCENTRATION OF SOLUTION



1. Mass by mass % of a solution :

$$\text{mg} = \frac{\text{Mass of Solute}}{\text{Mass of Solution}} \times 100$$

2. Mass by volume % of a solution :

$$= \frac{\text{Mass of Solute}}{\text{Volume of Solution}} \times 100$$

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Mass by mass %

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

$= \frac{40\,g}{360\,g} \times 100$

$= \frac{1}{9} \times 100$

$= 11.1\,\%$

Example :

☛ A solution contains 40 g of common salt in 320 g of water. Calculate the concentration in terms of mass by mass percentage of the solution.

NaCl

Soln. Mass of solute = 40 g

Mass of solvent = 320 g

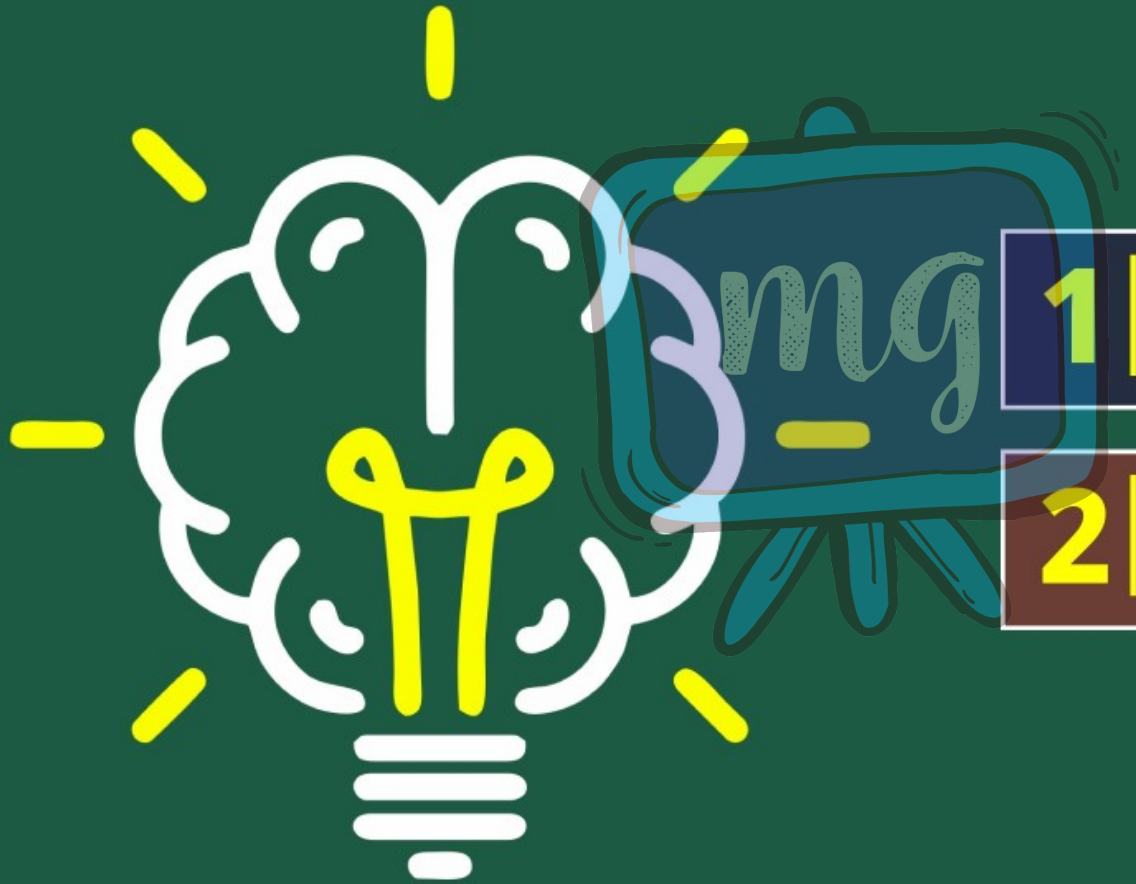
Mass of solution = 320 + 40

= 360 g

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LEARNING OUTCOMES



1. Solution and its properties
2. Concentration of a solution

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ASSESSMENT



Alloy

1 | Brass is a solution of molten copper in —

A molten gold

B molten zinc

C molten aluminium

D molten tin

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ASSESSMENT

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Solute? Solvent?

2 In tincture of iodine —

A iodine is solute, water is solvent

B iodine is solvent, water is solute

C iodine is solute , alcohol is solvent

D iodine is solvent, alcohol is solute

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ASSESSMENT

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Mixture

3 Air shows the property of —

A Nitrogen gas only

B Oxygen gas only

C Both (A) and (B)

D None of these.