

A.Fazil M.Sc., B.Ed., PGT CHEMISTRY  
(Jaisakthi Mt., Hr., Sec., School, Palacode)

## 9. Solutions

### I. Short answer questions:

#### 1. Define the term Solution.

- A solution is a homogeneous mixture of two or more substances.

#### 2. What is mean by binary solution?

- Solutions which are made of one solute and one solvent, then it is called binary solution.

#### 3. Give an example each

1. gas in liquid
2. solid in liquid
3. solid in solid
4. Gas in gas.

### Answer:

1. Carbon – di – oxide dissolved in water (Soda water).
2. Sodium chloride dissolved in water.
3. Copper dissolved in gold (Alloy).
4. A mixture of Helium – Oxygen gases.

#### 4. What is aqueous and non-aqueous solution? Give an example.

##### Aqueous solution:

- The solution in which water acts as a solvent.

##### Non-aqueous solution:

- The solution in which any liquid other than water acts as a solvent.
- Eg: Alcohol, benzene, CS<sub>2</sub> acetone.

#### 5. Define Hydrated salt.

- The number of water molecules found in the crystalline substance or salts is called water of crystallization.
- Such salts are called hydrated salts.

#### 6. Classify the following substances into deliquescent, hygroscopic.

**Conc. Sulphuric acid, Copper sulphate penta hydrate, Silica gel, Calcium chloride, and Gypsum salt.**

- Deliquescent substances: Calcium chloride
- Hygroscopic substances: Conc Sulphuric acid, Copper sulphate penta hydrate, Silica gel and Gypsum salt.

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**7. Define solute and solvent.**

- In a solution, the component present in a lesser amount by weight is called solute and the component present in a large amount by weight is called solvent.

**8. What is a supersaturated solution?**

- A solution which contains more solute than the saturated solution at a given temperature.

**9. Why water is known as a universal solvent?**

- Most of the solutes (substances) are soluble in water and so it is called universal solvent.

**10. What is meant by the ternary solution?**

- Solutions which contain three components are called ternary solutions.
- E.g. If salt and sugar are added to water, both dissolve in water forming a solution. Here two solutes are dissolved in one solvent. Therefore it is a ternary solution.

**11. Name the type of solution formed in the following cases;**

1. 20 g of NaCl in 100 g of water at 25°C
2. 36 g of NaCl in 100 g of water at 25°C
3. Nitrogen in soil
4. Sulphur in CS<sub>2</sub>.

**Answer:**

1. Unsaturated
2. Saturated
3. Saturated
4. Non-aqueous solution

**12. What are concentrated and dilute solutions?**

- Two solutions having the same solute and solvent, the one which contains a higher amount of solute per the given amount of solvent is said to be concentrated solution and the other is said to be dilute solution.

**13. What are hygroscopic substances?**

- Certain substances, when exposed to the atmospheric air at ordinary temperature, absorb moisture without changing their physical state.
- Such substances are called hygroscopic substances and this property is called hygroscopic.

**14. What are the Deliquescent substances?**

- Certain substances which are so hygroscopic, when exposed to the atmospheric air at ordinary temperatures, absorb enough water and get completely dissolved.
- Such substances are called deliquescent substances and this property is called deliquescence.

**15. What is called Concentrated and dilute solution?**

- When we compare two solutions having same solute and solvent, the one which contains higher amount of solute per the given amount of solvent is said to be 'Concentrated solution' and the another is said to be 'dilute solution'

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## II. Long Answer questions

### 1. Write notes on

(i) saturated solution

(ii) unsaturated solution

#### (i) Saturated solution:

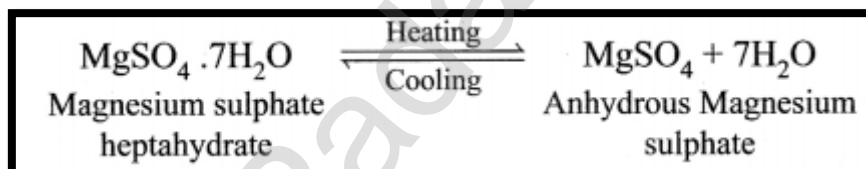
- A solution in which no more solute can be dissolved in a definite amount of the solvent at a given temperature is called saturated solution.
- Eg: 36 g of sodium chloride in 100 g of water at 25°C forms saturated solution.

#### (ii) Unsaturated solution:

- Unsaturated solution is one that contains less solute than that of the saturated solution at a given temperature.
- Eg: 10 g or 20 g or 30 g of Sodium chloride in 100 g of water at 25°C forms an unsaturated solution.

### 2. What happens when $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ is heated? Write the appropriate equation.

- $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$  has a water of crystallization is 7.
- When magnesium sulphate heptahydrate crystals are gently heated, it loses seven water molecules and becomes anhydrous magnesium sulphate.



### 3. Write the difference between hygroscopic substances and deliquescence

Hygroscopic Substances	Deliquescence Substances
When exposed to the atmosphere at ordinary temperature, they absorb moisture and do not dissolve.	When exposed to the atmospheric air at ordinary temperature, they absorb moisture and dissolve.
Hygroscopic substances do not change their physical state on exposure to air.	Deliquescent substances change its physical state on exposure to air.
Hygroscopic substances may be amorphous solids or liquids.	Deliquescent substances are crystalline solids.

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**4. Distinguish between the saturated and unsaturated solution**

Saturated Solution	Unsaturated Solution
1. A solution in which no more solute can be dissolved in a definite amount of the solvent at a given temperature is called a saturated solution.	1. A solution in which the solute is lesser in the amount in the solvent is called unsaturated solution.
2. In this solution, no more solute can be dissolved. If more of solute is added, it will not dissolve to give a supersaturated solution.	2. More of solute can be dissolved to get a saturated solution.

**5. Write a note on the type of solution based on the amount of solute present in a solution.**

- Based on the amount of solute, in the given amount of solvent, solutions are classified into the following types.

**(i) Saturated solution:**

- A solution in which no more solute can be dissolved in a definite amount of the solvent at a given temperature is called saturated solution.
- Eg: 36 g of sodium chloride in 100 g of water at 25°C forms saturated solution.
- Further addition of sodium chloride, leave it undissolved.

**(ii) Unsaturated solution:**

- Unsaturated solution is one that contains less solute than that of the saturated solution at a given temperature.
- Eg: 10 g or 20 g or 30 g of Sodium chloride in 100 g of water at 25°C forms an unsaturated solution.

**(iii) Super saturated solution:**

- Supersaturated solution is one that contains more solute than the saturated solution at a given temperature.
- Eg: 40 g of sodium chloride in 100 g of water at 25°C forms super saturated solution.
- This state can be achieved by altering any other conditions like temperature, pressure.

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- Super saturated solutions are unstable, and the solute is reappearing as crystals when the solution is disturbed.

**III. HOT questions:**

1. 'A' is a blue coloured crystalline salt. On heating, it loses a blue colour and to give 'B'. When water is added, 'B' gives back to 'A'. Identify A and B, write the equation.

- Blue coloured crystalline salt is copper sulphate pentahydrate (A)
- On heating Copper sulphate pentahydrate it loses blue colour and to give anhydrous copper sulphate (B).
- When water is added to the anhydrous copper sulphate (B) gives back to copper sulphate pentahydrate (A).

