

- ## TEXT BOOK EVALUATION

Ans : (b) increases

7. Solubility of NaCl in 100 ml water is 36 g. If 25 g of salt is dissolved in 100 ml of water how much more salt is required for saturation _____.

- a) 12g b) 11g c) 16g d) 20g

Ans : (b) 11g (36–25)

8. A 25% alcohol solution means;

- a) 25 ml alcohol in 100 ml of water b) 25 ml alcohol in 25 ml of water
c) 25 ml alcohol in 75 ml of water d) 75 ml alcohol in 25 ml of water

Ans : (c) 25 ml alcohol in 75 ml of water

9. Deliquescence is due to _____.

- a) Strong affinity to water b) Less affinity to water
c) Strong hatred to water d) Inertness to water

Ans : (a) Strong affinity to water

10. Which of the following is hygroscopic in nature?

- a) ferric chloride b) copper sulphate penta hydrate
c) silica gel d) none of the above

Ans : (c) silica gel

II. Book Exercise – Fill in the blanks

1. The component present in lesser amount, in a solution is called _____. **Ans :** solute
2. Example for liquid in solid type solution is _____. **Ans :** Mercury with sodium
3. Solubility is the amount of solute dissolved in _____ g of solvent. **Ans :** 100
4. Polar compounds are soluble in _____ solvents. **Ans :** polar
5. Volume percentage decreases with increases in temperature because _____. **Ans :** expansion of liquid

III. Book Exercise – Match the following

- | | |
|------------------|---|
| 1. Blue vitriol | (a) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ |
| 2. Gypsum | (b) CaO |
| 3. Deliquescence | (c) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ |
| 4. Hygroscopic | (d) NaOH |

Ans :

1	Blue vitriol	c	$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
2	Gypsum	a	$\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
3	Deliquescence	d	NaOH
4	Hygroscopic	b	CaO

IV. Book Exercise – True or false (If false give the correct statement)

1. Solutions which contain three components are called binary solution.
Ans : False. Solutions which contains two components are called binary solution.
2. In a solution the component which is present in lesser amount is called solvent.
Ans : False. In a solution, the component which is present in higher amount is called solvent.
3. Sodium chloride dissolved in water forms a non-aqueous solution.
Ans : False. Sodium chloride dissolved in water forms a aqueous solution.
4. The molecular formula of green vitriol is $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$.
Ans : False. The molecular formula of epsom salt is $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$.
5. When Silica gel is kept open, it absorbs moisture from the air, because it is hygroscopic in nature.
Ans : True.

V. Book Exercise – Short answer questions

1. Define the term: Solution.

Solution is a homogeneous mixture of two or more substances.

2. What is mean by binary solution.

A solution contains two components is called Binary solution. Eg. Salt in water, Sugar in water.

3. Give an example each.

i) gas in liquid.

Soda water.

ii) solid in liquid.

Sodium chloride in water.

iii) solid in solid.

Copper dissolved in Gold (alloys).

iv) gas in gas.

Mixture of He – O₂ gases.

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

i) **Aqueous solution** : The solution in which water acts as a solvent is called aqueous solution. eg: Common salt in water, sugar in water.

ii) **Non-aqueous solution** : The solution in which any liquid other than water, acts as a solvent is called non-aqueous solution. eg: Sulphur dissolved in carbon di sulphide, iodine dissolved in ccl₄.

5. Define Volume percentage.

Volume percentage is defined as the percentage by volume of solute present in the given volume of the solution.

$$\text{Volume percentage} = \frac{\text{Volume of the solute}}{\text{Volume of the solute} + \text{Volume of the solvent}} \times 100$$

$$\text{Volume percentage} = \frac{\text{Volume of the solute}}{\text{Volume of the solution}} \times 100$$

6. The aquatic animals live more in cold region. Why?

Because, more amount of dissolved oxygen is present in the water of cold regions. This shows that the solubility of oxygen in water is more at low temperature.

7. Define Hydrated salt.

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

8. A hot saturated solution of copper sulphate forms crystals as it cools. Why?

The number of water molecules in blue vitriol is five, so its water of crystallisation is 5. When blue coloured copper sulphate crystals are gently heated, it loses its 5 water molecules and becomes anhydrous copper sulphate. Then add a few drops of water or allow it to cool, the colourless anhydrous salt again turns back into blue coloured hydrated salt.

9. Classify the following substances into deliquescent, hygroscopic.

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

Deliquescent	Hygroscopic
Calcium Chloride	i) conc. H ₂ SO ₄
	ii) Silica gel
	iii) Copper sulphate penta hydrate
	iv) Gypsum salt

VI. Book Exercise – Long answer questions

1. Write notes on;

- Saturated solution.**
- Unsaturated solution.**

Saturated Solution	Unsaturated 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.	A 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 form unsaturated solution.

2. Write notes on various factors affecting solubility.

Factors affecting solubility : There are three main factors which govern the solubility of solute. They are;

- Nature of the solute and solvent.
- Temperature.
- Pressure.

Nature of the solute and solvent :

The nature of the solute and solvent plays an important role in solubility. Although water dissolves an enormous variety of substances, both ionic and covalent, it does not dissolve everything. For example: Common salt is a polar compound and dissolves in polar solvent like water. Non-polar compounds are soluble in non-polar solvents. For example: Fat dissolved in Ether.

Effect of temperature :

Solubility of a solid solute in a liquid solvent increases with increase in temperature.

In endothermic Process :

Solubility increases with increase in temperature.

In exothermic Process :

Solubility decreases with increase in temperature.

Solubility of gases in liquid :

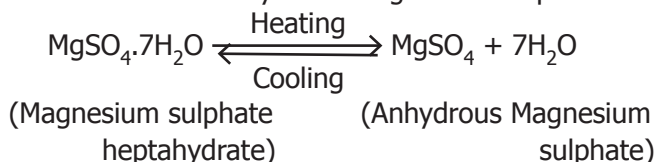
Solubility of gases in liquid decrease with increase in temperature. Generally water contains dissolved oxygen. When water is boiled the solubility of oxygen in water decreases. So oxygen escapes in the form of bubbles.

Effect of pressure :

When the pressure is increased, the solubility of a gas in liquid increases. Eg.: Carbonated beverages.

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

Its water of crystallisation is 7. When magnesium sulphate hepta hydrate crystals are heated, it loses seven water molecules and becomes anhydrous magnesium sulphate.



b) Define solubility.

Solubility is defined as the number of grams of solute that can be dissolved in 100 g of a solvent to form its saturated solution at a given temperature and pressure. For example 36 g of sodium chloride need to be dissolved in 100 g of water to form its saturated solution at 25° C. Thus the solubility of NaCl in water is 36 g at 25° C. The solubility is mathematically expressed as,

$$\text{Solubility} = \frac{\text{Mass of the solute}}{\text{Mass of the solvent}} \times 100$$

4. In what way hygroscopic substances differ from deliquescent substances.

Hygroscopic	Deliquescent
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 its 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.

5. A solution is prepared by dissolving 45 g of sugar in 180 g of water. Calculate the mass percentage of solute.

Given : Mass of the solute = 45 g

Mass of the solvent = 180g

$$\begin{aligned}
 \text{Mass Percentage} &= \frac{\text{Mass of the solute}}{\text{Mass of the solute} + \text{Mass of the solvent}} \times 100 \\
 &= \frac{45\text{g}}{45\text{g} + 180\text{g}} \times 100 \\
 &= \frac{45}{225} \times 100 \\
 &= 20\%.
 \end{aligned}$$

6. 3.5 litres of ethanol is present in 15 litres of aqueous solution of ethanol. Calculate volume percent of ethanol solution.

Given : Volume of the solute = 3.5 lit of ethanol.

Volume of the solution = 15 lit.

$$\begin{aligned}
 \text{Volume Percentage} &= \frac{\text{Volume of the solute}}{\text{Volume of the solution}} \times 100 \\
 &= \frac{3.5 \cancel{\text{lit}}}{15 \cancel{\text{lit}}} \times 100 \\
 &= \frac{0.7 \overset{3.5}{\cancel{15}}}{3 \overset{15}{\cancel{22.5}}} \times 100 \\
 &= \frac{70}{3} \\
 \text{Volume Percentage} &= 23.33\%.
 \end{aligned}$$

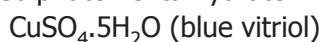
VIII. Book Exercise – HOT question

1. Vinu dissolves 50 g of sugar in 250 ml of hot water, Sarath dissolves 50 g of same sugar in 250 ml of cold water. Who will get faster dissolution of sugar? and Why?

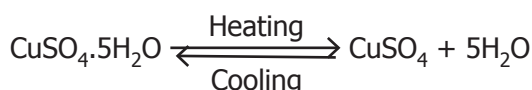
50 g of sugar in 250 ml of hot water. Because heat is expand the molecules of water. So it is easily dissolved.

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

A is a blue coloured crystalline salt => Copper Sulphate Penta hydrate



The equation is,



Copper sulphate penta hydrate (blue colour)	Anhydrous copper sulphate (colourless)
	

3. Will the cool drinks give more fizz at top of the hills or at the foot? Explain.

Cool drinks give more fizz at top of hills because solubility of gas is low at altitude and hence the carbon dioxide less soluble in cool drinks at altitude gives more fizz.

Additional – Choose the best answer

1. Solution is a mixture.

- a) homogeneous b) heterogeneous
c) either homogeneous or heterogeneous d) neither homogeneous nor heterogeneous

Ans : (a) homogeneous

2. is a homogeneous mixture of two or more substances.

- a) solution b) solute c) solvent d) colloid

Ans : (a) solution

3. In a solution that component which is present in lesser amount by weight is called _____.

- a) solution b) solute c) solvent d) colloid

Ans : (b) solute

4. In a solution the component which is present in higher amount by weight is called _____.

- a) solution b) solute c) solvent d) colloid

Ans : (c) solvent

5. The process of uniform distribution of solute into solvent is called _____.

- a) solution b) dissolution c) coagulation d) solvent

Ans : (b) dissolution

6. Solution which are made of one solute and one solvent are called _____.

- a) solutions b) binary solutions c) ternary solutions d) tetranary solutions

Ans : (b) binary solutions

7. A solution contain more than two components are called _____.

- a) solution b) binary solution c) ternary solution d) tetranary solutions

Ans : (c) ternary solution

8. Give an example of solid–solid mixture _____.

- a) Alloys b) Amalgam c) Nacl in water d) None

Ans : (a) Alloys

9. Give an example of liquid–solid mixture _____.

- a) Alloys b) Amalgam c) Nacl in water d) None

Ans : (b) Amalgam

10. Give an example of solid–liquid mixture _____.

- a) Sodium chloride in water
b) ethyl alcohol in water
c) CO_2 dissolved in water
d) methyl alcohol in water

Ans : (a) Sodium chloride in water

11. Give an example of liquid–liquid mixture is _____.

- a) $\text{C}_2\text{H}_5\text{OH}$ in water b) NaCl in water c) CO_2 in water d) none

Ans : (a) C_2H_5OH in water

12. Give an example of gas-liquid mixture is _____.

- a) $\text{C}_2\text{H}_5\text{OH}$ in water b) NaCl in water c) CO_2 in water d) none

Ans : (c) CO_2 in water

13. Give an example of liquid–gas mixture is _____.

- a) Water vapour in air (cloud)
- b) Mixture of helium oxygen gas
- c) CO₂ in water
- d) NaCl in water

Ans : (a) Water vapour in air (cloud)

14. Give an example of gas–gas mixture is _____.

- a) Water vapour in air
- b) CO₂ in water
- c) Mixture of helium oxygen gas
- d) NaCl in water

Ans : (c) Mixture of helium oxygen gas

15. _____ is called as universal solvent.

- a) Water
- b) Acetone
- c) Benzene
- d) Ether

Ans : (a) Water

16. The solvent in which water acts as a solvent is called _____.

- a) aqueous solution
- b) non–aqueous solution
- c) either a or b
- d) neither a nor b

Ans : (a) aqueous solution

17. The solution in which any liquid other than water acts as a solvent is called _____.

- a) aqueous solution
- b) non–aqueous solution
- c) either a or b
- d) neither a nor b

Ans : (b) non–aqueous solution

18. Give an example of non–aqueous solution.

- a) Water
- b) Iodine dissolved in CCl₄
- c) either a or b
- d) neither a nor b

Ans : (b) Iodine dissolved in CCl₄

19. Give an example of saturated solution.

- a) 16 g of NaCl in 100 g of water
- b) 36 g of NaCl in 100 g of water
- c) 45 g of NaCl in 100 g of water
- d) Iodine dissolved in CCl₄

Ans : (b) 36 g NaCl in 100 g of water

20. Give an example of unsaturated solution.

- a) 16 g of NaCl in 100 g of water
- b) 36 g of NaCl in 100 g of water
- c) 45 g of NaCl in 100 g of water
- d) 100 g of NaCl in 36 g of water

Ans : (a) 16 g of NaCl in 100 g of water

21. Give an example of super saturated solution

- a) 16 g of NaCl in 100 g of water
- b) 36 g of NaCl in 100 g of water
- c) 45 g of NaCl in 100 g of water
- d) 100 g of NaCl in 16 g of water

Ans : (c) 45 g of NaCl in 100 g of water

22. Polar compound is _____.

- a) Sodium chloride is dissolved in water
- b) Fat dissolved in ether
- c) either a or b
- d) neither a nor b

Ans : (a) Sodium chloride is dissolved in water

23. Non–polar compounds are _____ is non–polar solvents.

- a) soluble
- b) insoluble
- c) either a or b
- d) neither a nor b

Ans : (a) soluble

24. In endothermic process, solubility increases with _____ in temperature.

- a) increases
- b) decreases

c) either a or b

d) neither a nor b

Ans : (a) increases

25. In exothermic process, solubility decreases with _____ is temperature.

a) increases

b) decreases

c) either a or b

d) neither a nor b

Ans : (a) increases

26. The pressure is increased, the solubility of a gas in liquid _____.

a) increases

b) decreases

c) either a or b

d) neither a nor b

Ans : (b) decreases

27. Mass percentage is expressed as _____.

a) weight / weight

b) weight / mass

c) mass / weight

d) none

Ans : (a) weight / weight

28. Volume percentage is expressed as _____.

a) volume / mass

b) volume / volume

c) mass / volume

d) mass / mass

Ans : (b) volume / volume

29. Volume percentage _____ with increases in temperature.

a) decreases

b) increases

c) either a or b

d) neither a nor b

Ans : (a) decreases

30. The number of water molecules found in the crystalline substance is called _____.

a) hydrated salts

b) deliquescent salts

c) collidal salts

d) suspension

Ans : (a) hydrated salts

31. Copper sulphate penta hydrate $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ is _____.

a) blue vitriol

b) green vitriol

c) greenish blue vitriol

d) none

Ans : (a) blue vitriol

32. Magnesium sulphate hepta hydrate $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ is _____.

a) blue vitriol

b) green vitriol

c) epsom salt

d) none

Ans : (c) epsom salt

33. Formula for Phosphorus pentoxide is _____.

a) F_2O_3

b) P_2O_5

c) $\text{P}_2\text{H}_4\text{O}_7$

d) none

Ans : (b) P_2O_5

34. Dehydrating agent is _____.

a) Anhydrous calcium chloride

b) Anhydrous potassium chloride

c) hydrous calcium chloride

d) hydrous potassium chloride

Ans : (a) Anhydrous calcium chloride

35. Formula for Silica gel is _____.

a) SiO_2

b) SiO_3

c) SiO_4

d) SiO

Ans : (a) SiO_2

Additional – Fill in the blanks

1. The substances present in a _____ may exist in one or more physical state.

Ans : Mixture

2. When we burn wood, the smoke released is a mixture of solid carbon and gases like _____.

Ans : CO_2 , CO

3. Salt is dissolves in _____.

Ans : water

4. Sand _____ dissolves in water. **Ans : does not**
5. Sand in water can be separated by _____. **Ans : Filtration**
6. Salt is dissolved in water is an example of _____. **Ans : Homogeneous**
7. _____ is a mixture of many dissolved salts. **Ans : Sea water**
8. Most of the liquids found in human body including blood , Lymph and urine are _____. **Ans : Solutions**
9. _____ is a homogeneous mixture of two or more substances. **Ans : Solutions**
10. In a solution the component which is present in a lesser amount by weight is called _____. **Ans : Solute**
11. In a solution the component which is present in a larger amount by weight is called _____. **Ans : Solvent**
12. Solute + Solvent = _____. **Ans : Solution**
13. The _____ gets distributed uniformly throughout the solvent and thus forming the mixture homogeneous. **Ans : Solute**
14. The _____ acts as a dissolving medium in a solution. **Ans : Solvent**
15. The process of uniform distribution of solute into solvent is called _____. **Ans : Dissolution**
16. Solutions in which contains two components are called _____. **Ans : Binary solution**
17. If salt and sugar are added in water, both dissolve in water forming a solution. Here two solutes are dissolved in one solvent. Such kind of solutions which contain three components are called _____. **Ans : Ternary solution**
18. The substances normally exist in _____ physical states. **Ans : Three**
19. The three physical states are _____ , _____ , and _____. **Ans : Solid , Liquid and gas**
20. In _____ solutions both the solute and solvent may exist in any of these physical states. **Ans : Binary**
21. _____ state is the primary factor which determine the characteristics of the solution. **Ans : Physical**
22. An example of Solid – Solid solution is _____. **Ans : Alloys**
23. An example of Liquid-solid solution is _____. **Ans : Amalgum**
24. An example of solid – liquid solution is _____. **Ans : Nacl in water**
25. An example of Liquid – liquid solution is _____. **Ans : Ethyl alcohol in water**
26. An example of Gas – Liquid solution is _____. **Ans : Sodawater**
27. An example of liquid-Gas solution is _____. **Ans : cloud**
28. An example of Gas – Gas solution is _____. **Ans : Mixture of Helium-oxygen gases**
29. Most of the substances are soluble in water. So water is called as _____. **Ans : Universal Solvent**
30. On the basis of type of solvent, solutions are classified into _____ types. **Ans : two**
31. On the basis of type of solvent, solutions are classified into _____ and _____. **Ans : Aqueous and non aqueous solutions**
32. Common salt is dissolved in water is an example of _____. **Ans : Aqueous solution**
33. Sugar in water is an example of _____. **Ans : Aqueous Solution**
34. Copper Sulphate in water is an example of _____. **Ans : Aqueous Solution**
35. The solution in which any liquid other than water, acts as a solvent is called _____. **Ans : Non-aqueous Solution**
36. Sulphur dissolved in Carbondisulphide is an example of _____. **Ans : Non-aqueous Solution**
37. Iodine dissolved in Carbon tetra chloride is an example of _____. **Ans : Non- aqueous solution**
38. Based on the amount of solute, solutions are classified into _____ types. **Ans : 3**
39. Based on the amount of solute, solutions are classified into _____ , _____ and _____. **Ans : Unsaturated, Saturated and Super saturated**
40. A solution in which no more solute can be dissolved in a definite amount of the solvent at a given temperature

- is called _____.
- Ans : Saturated Solution**
41. A solution in which less solute than that of the saturated solution at a given temperature is called _____.
- Ans : Unsaturated Solution**
42. A solution in which more solute than that of the saturated solution at a given temperature is called _____.
- Ans : super saturated solution**
43. Super saturated solutions are _____.
- Ans : Unstable**
44. Concentration of two solutions with respect to their _____ present in the given amount of the solvent.
- Ans : solutes**
45. The solution contains higher amount of solute per the given amount of solvent is said to be _____.
- Ans : concentrated solution**
46. The solution contains lesser amount of solute per the given amount of solvent is said to be _____.
- Ans : dilute solution**
47. _____ is defined as the number of grams of a solute that can be dissolved in 100 g of a solvent to form its saturated solution at a given temperature and pressure.
- Ans : Solubility**
48. Solubility of solid calcium carbonate is _____.
- Ans : 0.0013 g/100g water**
49. Solubility of solid sodium chloride is _____.
- Ans : 36 g/100g water**
50. Solubility of Ammonia gas is _____.
- Ans : 48 g/100g water**
51. Solubility of solid sodium Hydroxide is _____.
- Ans : 80 g/100g water**
52. Solubility of solid glucose is _____.
- Ans : 91 g/100g water**
53. Solubility of solid sodium bromide is _____.
- Ans : 95 g/100g water**
54. Solubility of solid sodium iodide is _____.
- Ans : 184g/100g water**
55. Polar compounds dissolves in polar _____ only.
- Ans : water**
56. Non polar compounds are soluble in _____.
- Ans : Non polar solvents**
57. In exothermic process, _____ decreases with increase in temperature.
- Ans : Solubility**
58. In endothermic process solubility increase with _____ in temperature.
- Ans : increases**
59. Solubility of oxygen in water is _____ at low temperatures.
- Ans : More**
60. When the pressure is increases, the solubility of a gas in liquid _____.
- Ans : Increases**
61. The effect of pressure on the solubility of a gas in liquid is given by _____.
- Ans : Henry's law**
62. Mass percentage is independent of _____.
- Ans : temperature**
63. Volume percentage decreases with increases in _____.
- Ans : Temperature**
64. In Syrups and mouth wash, the concentration of the ingredients is expressed as _____.
- Ans : V/V**
65. In Ointments and antacid , the concentration of solutions are expressed as _____.
- Ans : W/W**
66. The number of water molecules found in the crystalline substance is called _____.
- Ans : water of crystallization**
67. Common name of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ is _____.
- Ans : Blue vitriol**
68. IUPAC Name of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ is _____.
- Ans : Copper(II) Sulphate pentahydrate**
69. Common name of $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ is _____.
- Ans : Epsom Salt**
70. IUPAC name of $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ is _____.
- Ans : Magnesium Sulphatehepta Hydrate**
71. Common Name of $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ is _____.
- Ans : Gypsum**
72. IUPAC Name of $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ is _____.
- Ans : calcium sulphate dehydrate**
73. Common name of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ is _____.
- Ans : Green Vitriol**
74. IUPAC name of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ is _____.
- Ans : Iron(II) Sulphateheptahydrate**
75. Common name of $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ is _____.
- Ans : White vitriol**
76. IUPAC name of $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ is _____.
- Ans : Zinc sulphateheptahydrate**
77. The number of water molecules in blue vitriol is _____.
- Ans : 5**

78. The number of water molecules in Epsom salt is _____. **Ans : 7**
79. Conc.sulphuric acid is a _____. **Ans : Hygroscopic substance**
80. Phosphorus Pentoxide is a _____. **Ans : Hygroscopic substance**
81. Quick lime is a _____. **Ans : Hygroscopic substance**
82. Silica gel is a _____. **Ans : Hygroscopic substance**
83. Anhydrous calcium chloride is a _____. **Ans : Hygroscopic substance**
84. Calcium chloride is a _____. **Ans : Deliquescent substance**
85. Caustic Soda is a _____. **Ans : Deliquescent substance**
86. Caustic potash is a _____. **Ans : Deliquescent substance**
87. Ferric chloride is a _____. **Ans : Deliquescent substance**
88. Hygroscopic substances may be _____. **Ans : amorphous solids or liquids**
89. Deliquescent substances are _____. **Ans : Crystalline Solids**
90. Sand in water can be separated by _____. **Ans : filtration**
91. _____ is a mixture of many dissolved salts. **Ans : Sea water**
92. _____ is a mixture of many gases like nitrogen, oxygen, carbon dioxide and other gases. **Ans : Air**
93. On the basis of type of solvent solutions are classified into _____ types. **Ans : 2**
94. _____ is an example for aqueous solution. **Ans : Copper sulphate in water**
95. Sugar in water is an example of _____. **Ans : aqueous solution**
96. 36 g of Sodium chloride in 100 g of water at 25° C forms _____. **Ans : saturated solution**
97. 10 g (or) 20 g (or) 30 g of Sodium chloride in 100 g of water at 25° C form _____. **Ans : unsaturated solution**
98. 40 g of Sodium chloride in 100 g of water at 25° C form _____. **Ans : super saturated solution**
99. _____ is defined as the number of grams of a solute that can be dissolved in 100 g of solvent to form its saturated solution at a given temperature and pressure. **Ans : Solubility**
100. _____ do not dissolve in polar solvents, _____ do not dissolve in non-polar solvents. **Ans : Non-polar compounds, Polar compounds**
101. A _____ amount of sugar will dissolve in warm water than in cold water. **Ans : greater**
102. The effect of pressure on the solubility of a gas in liquid is given by _____. **Ans : Henry's law**
103. _____ may be defined as the amount of solute present in a given amount of solution or solvent. **Ans : Concentration of a solution**
104. The number of water molecules in blue vitriol is _____. **Ans : 5**
105. On heating, copper sulphate pentahydrate _____ its five water molecules and becomes _____ anhydrous copper sulphate. **Ans : loses, colourless**
106. The number of water molecules in Epsom salt is _____. **Ans : 7**
107. Hygroscopic substances are used as _____. **Ans : drying agents**
108. _____ lose their crystalline shape and ultimately dissolve in the absorbed water forming a saturated solution. **Ans : Deliquescent substances**
109. _____ is an example of deliquescent substances. **Ans : FeCl_3**

Additional – Match the following

- | | |
|-------------------|------------------------------------|
| 1. Solid – solid | (a) Mixture of helium – oxygen gas |
| 2. Liquid – solid | (b) Alloys |
| 3. Gas – gas | (c) Mercury with Amalgam |
| 4. Solid – liquid | (d) NaCl in water |

Ans :

1	Solid – solid	b	Alloys
2	Liquid – solid	c	Mercury with Amalgam
3	Gas – gas	a	Mixture of helium – oxygen gas
4	Solid – liquid	d	NaCl in water

2.	Name of the solute	Formula of the solute	Solubility 8/100 g water
1.	Calcium carbonate	NaOH	36
2.	Sodium chloride	NH ₃	124
3.	Ammonia	CaCO ₃	48
4.	Sodium hydroxide	C ₆ H ₁₂ O ₆	0.0013
5.	Glucose	NaBr	95
6.	Sodium bromide	NaI	91
7.	Sodium Iodide	NaCl	80

Ans :

S.No.	Name of the solute	Formula of the solute	Solubility 8/100 g water
1	Calcium carbonate	CaCO ₃	0.0013
2	Sodium chloride	NaCl	36
3	Ammonia	NH ₃	48
4	Sodium hydroxide	NaOH	80
5	Glucose	C ₆ H ₁₂ O ₆	91
6	Sodium bromide	NaBr	95
7	Sodium Iodide	NaI	184

3.	Common Name	IUPAC Name	Molecular Formula
1.	Blue vitriol	Copper (II) sulphate penta hydrate	CaSO ₄ .2H ₂ O
2.	Epsom salt	Magnesium sulphate hepta hydrate	FeSO ₄ .7H ₂ O
3.	Gypsum	Calcium sulphate di dyhydrate	ZnSO ₄ .7H ₂ O
4.	Green vitriol	Iron (II) sulphate hepta hydrate	MgSO ₄ .7H ₂ O
5.	White vitriol	Zinc sulphate hepta hydrate	CuSO ₄ .5H ₂ O

Ans :

S.No.	Common Name	IUPAC Name	Molecular Formula
1	Blue vitriol	Copper (II) sulphate penta hydrate	CuSO ₄ .5H ₂ O
2	Epsom salt	Magnesium sulphate hepta hydrate	MgSO ₄ .7H ₂ O
3	Gypsum	Calcium sulphate di dyhydrate	CaSO ₄ .2H ₂ O
4	Green vitriol	Iron (II) sulphate helta hydrate	FeSO ₄ .7H ₂ O
5	White vitriol	Zinc sulphate hepta hydrate	ZnSO ₄ .7H ₂ O

Additional – Assertion and Reason

1. **Assertion :** Salt water is a Homogeneous solution.

Reason : It contains two or more substances.

a) A is right R is wrong

b) A is wrong R is right

c) R explains A

d) R does not explain A

Ans : (c) R explain A

- 2. Assertion :** Solution which contain three components are ternary solution.
Reason : Salt and sugar are dissolved in water.

a) A is right R is wrong c) A and R are correct	b) A is wrong R is right d) Both are not correct
---	--

Ans : (c) A and R are correct
- 3. Assertion :** Copper is dissolved in Gold is an example of Solid-liquid.
Reason : Mercury with sodium is an example of Liquid – liquid.

a) A is right R is wrong c) A and R are correct	b) A is wrong R is right d) Both are not correct
---	--

Ans : (d) Both are not correct
- 4. Assertion :** Deep sea divers used helium-oxygen mixture.
Reason : Helium and oxygen mixtures are weightless.

a) A is right R is wrong c) A and R are correct	b) A is wrong R is right d) Both are not correct
---	--

Ans : (c) A and R are correct
- 5. Assertion :** Hygroscopic substances do not change its physical state on exposure to air.
Reason : Deliquescent substances change its physical state on exposure to air.

a) A is right R is wrong c) R explains A	b) A is wrong R is right d) R does not explain A
--	--

Ans : (a) A is right R is wrong

- 1. Sea water is a mixture of many dissolved salts. Air contains mixture of gases.**
Ans : True.
- 2. Cloud is an example of Liquid – liquid mixture.**
Ans : False. Cloud is an example of liquid – gas mixture.
- 3. 16 g of Sodium chloride dissolved in 100 g of water is an example of saturated solution.**
Ans : False. 16 g of Sodium chloride dissolved in 100 g of water is an example of unsaturated solution.
- 4. Aquatic animals live more in cold regions because less amount of dissolved oxygen is present in the water cold regions.**
Ans : False. Aquatic animals live more in cold regions because more amount of dissolved oxygen is present in the water cold regions.
- 5. Certain substances, when exosed to the atmospheric air at ordinary temperature, absorb moisture without changing their physical state. Such substances are calld Hygroscopic substances.**
Ans : True.
- 6. Certain substances which are so hygroscopic, when exposed to the atmospheric air at ordinary temperature, absorb enough water and get completely dissolved. Such substances are called Hygroscopic substances.**
Ans : False. Certain substances which are so hygroscopic, when exposed to the atmospheric air at ordinary temperature, absorb enough water and get completely dissolved. Such substances are called Deliquescent substances.
- 7. Deliquescence is maximum when the temperature is high.**
Ans : False. Deliquescence is maximum, when the temperature is low.
- 8. Calcium oxide is example of Hygroscopic.**
Ans : True.

9. **Calcium chloride is an example of Deliquescence substance.**

Ans : True.

10. **Deliquescence substances gain their crystalline shape.**

Ans : False. Deliquescence substances lose their crystalline shape.

Additional – Spot the error

1. **Sulphur dissolved in Carbon disulphide is an example of aqueous solution.**

Ans : Sulphur dissolved in Carbon disulphide is an example of Non-aqueous solution.

2. **10 g of Sodium chloride in 100 g of water at 25° C forms a super saturated solution.**

Ans : 10 g of Sodium chloride in 100 g of water at 25° C forms an unsaturated solution.

3. **36 g of Sodium chloride need to be dissolved in 100 g of water to form its saturated solution at 25° C. This is an example of solubility of copper sulphate.**

Ans : 36 g of sodium chloride need to be dissolved in 100 g of water to form its saturated solution at 25° C. This is an example of solubility of Sodium Chloride.

4. **When red coloured copper sulphate crystals are gently heated, it loses its five water molecules and becomes colourless anhydrous copper sulphate.**

Ans : When blue coloured copper sulphate crystals are gently heated, it loses its five water molecules and becomes colourless anhydrous copper sulphate.

Additional – Short answer questions

1. **Define solution.**

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

2. **What are the different kind of solution present in our body?**

- ✦ Blood.
- ✦ Lymph.
- ✦ Urine.

3. **Define solute and solvent.**

Solute : In a solution, the component which is present in lesser amount by weight is called solute.

Solvent : In a solution, the component which is present in larger amount by weight is called solvent.

4. **Define Ternary solution.**

A solution may contain more than two components. Two solutes are dissolved in one solvent. This type of solution is called Ternary solution.

5. **Why water acts as a universal solvent?**

Most of the substances are soluble in water. So water acts as a universal solvent.

6. **Define aqueous solution.**

The solution in which water acts as a solvent is called aqueous solution.

7. **Write the other solvents except water.**

- ✦ Ethers.
- ✦ Benzene.
- ✦ Alcohols.

8. **Based on the amount of solute, solutions are classified into how many types? What are they?**

Solutions are classified into 3 types. They are;

- ✦ Saturated solution.
- ✦ Unsaturated solution.
- ✦ Super saturated solution.

9. Define Super saturated solution.

Super saturated 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.

10. Define concentration of the solution.

Concentration of two solutions with respect to their solutes present in the given amount of the solvent.

11. Define concentrated and dilute solution.

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

12. Do you know why is it bubbling when water is boiled?

Solubility of gases in liquid decrease with increase in temperature. Generally water contains dissolved oxygen. When water is boiled the solubility of oxygen in water decreases, so oxygen escapes in the form of bubbles.

13. Define Henry's law.

The solubility of a gas in a liquid is directly proportional to the pressure of the gas over the solution at a definite temperature.

14. Define concentration of a solution.

It may be defined as the amount of solute present in a given amount of solution or solvent.

15. Define Mass percentage.

It is defined as the percentage by mass of the solute present in the solution. It is mostly used when solute is solid and solvent is liquid.

$$\text{Mass percentage} = \frac{\text{Mass of the solute}}{\text{Mass of the solvent}} \times 100$$

(or)

$$\text{Mass percentage} = \frac{\text{Mass of the solute}}{\text{Mass of the solute} + \text{Mass of the solvent}} \times 100$$

16. Define hydration.

When ionic substances are dissolved in water to make their saturated aqueous solution, their ions attract water molecules which then attached chemically in certain ratio. This process is called hydration.

17. Define Hygroscopy.

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 their property is called Hygroscopy.

18. Write the examples hygroscopic substances.

- ✦ Conc. H_2SO_4 (Sulphuric Acid).
- ✦ Phosphorous pentoxide (P_2O_5).
- ✦ Quick lime (CaO).
- ✦ Silica gel (SiO_2).
- ✦ Anhydrous calcium chloride (CaCl_2).

19. What are called deliquescent substances?

Certain substances which as so hygroscopic, when exposed to the atmospheric air at ordinary temperature, absorb enough water to get completely dissolved. Such substances are called deliquescent substances.

20. What are important characters of the deliquescent substances?

Deliquescent substances lose their crystalline shape and ultimately dissolve in the absorbed water forming a saturated solution.

21. When, deliquescent substance is maximum?

- ✦ The temperature is low.
- ✦ The atmosphere is humid.

22. Write the example of deliquescent substances.

- ✦ Calcium chloride – CaCl_2 .
- ✦ Caustic soda – NaOH .
- ✦ Caustic potash – KOH .
- ✦ Ferric chloride – FeCl_3 .

Additional – Problems

- 1. 1.5 g of solute is dissolved in 15 g of water to form a saturated solution at 298K. Find out the solubility of the solute at the temperature.**

Solution : Mass of the solute = 1.5 g

Mass of the solvent = 15 g

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

$$\begin{aligned}\text{Solubility of the solute} &= \frac{1.5}{15} \times 100 \\ &= 10 \text{ g.}\end{aligned}$$

- 2. Find the mass of potassium chloride would be needed to form a saturated solution in 60 g of water at 303 K? Given that solubility of the KCl is 37/100 g at this temperature.**

Solution :

Mass of Pottasium chloride in 100 g of water in saturated solution = 37 g.

$$\begin{aligned}\text{Mass of Pottasium chloride in 60 g of water in saturated solution} &= \frac{37}{100} \times 60 \\ &= 22.2 \text{ g.}\end{aligned}$$

- 3. What is the mass of sodium chloride that would be needed to form a saturated solution in 50 g of water at 30° C. Solubility of sodium chloride is 36 g at 30° C?**

Solution : At 30° C, 36 g of sodium chloride is dissolved in 100 g of water.

∴ Mass of sodium chloride that would be need for 100 g of water = 36 g.

$$\begin{aligned}\therefore \text{Mass of sodium chloride dissolved in 50 g of water} &= \frac{36 \times 50}{100} \\ &= 18 \text{ g.}\end{aligned}$$

- 4. The Solubility of sodium nitrate at 50° C and 30° C is 114 g and 96 g respectively. Find the amount of salt that will be thrown out when a saturated solution of sodium nitrate containing 50 g of water is cooled from 50° C to 30° C?**

Solution : Amount of Sodium nitrate dissolved in 100 g of water at 50° C is 114 g.

$$\begin{aligned}\therefore \text{Amount of Sodium nitrate dissolving in 50 g of water at 50° C is} &= \frac{114 \times 50}{100} \\ &= 57 \text{ g.}\end{aligned}$$

$$\begin{aligned}\text{Similarly amount of Sodium nitrate dissolving in 50 g of water at 30° C is} &= \frac{96 \times 50}{100} \\ &= 48 \text{ g.}\end{aligned}$$

Amount of Sodium nitrate thrown when 50 g of water is
cooled from 50° C to 30° C is = 57 – 48 = 9 g.

- 5. A solution was prepared by dissolving 25 g of sugar in 100 g of water. Calculate the mass percentage of solute.**

Solution : Mass of the solute = 25 g

$$\text{Mass of the solvent} = 100 \text{ g}$$

$$\text{Mass Percentage} = \frac{\text{Mass of the solute}}{\text{Mass of the solvent}} \times 100$$

$$\begin{aligned}\text{Mass Percentage} &= \frac{\text{Mass of the solute}}{\text{Mass of the solute} + \text{Mass of the solvent}} \times 100 \\ &= \frac{25}{25 + 100} \times 100 \\ &= \frac{25}{125} \times 100 \\ &= 20\%.\end{aligned}$$

6. 16 grams of NaOH is dissolved in 100 grams of water at 25°C to form a saturated solution. Find the mass percentage of solute and solvent.

Solution : Mass of the solute (NaOH) = 16 g

Mass of the solvent H₂O = 100 g

- i) Mass Percentage of the solute

$$\begin{aligned}\text{Mass percentage of solute} &= \frac{\text{Mass of the solute}}{\text{Mass of the solute} + \text{Mass of the solvent}} \times 100 \\ &= \frac{16 \times 100}{16 + 100} \\ &= \frac{1600}{116}\end{aligned}$$

Mass percentage of the solute = 13.79%.

- ii) Mass percentage of solvent = 100 – (Mass percentage of the solute)
= 100 – 13.79
= 86.21%.

7. Find the amount of urea which is to be dissolved in water to get 500 g of 10% w/w aqueous solution?

Solution : Mass percentage (w/w) = $\frac{\text{Mass of the solute}}{\text{Mass of the solvent}} \times 100$

$$10 = \frac{\text{Mass of the area}}{500} \times 100$$

Mass of area = 50 g.

8. A solution is made from 35 ml of Methanol and 65 ml of water. Calculate the volume percentage.

Solution : Volume of the ethanol = 35 ml

Volume of the water = 65 ml

$$\text{Volume percentage} = \frac{\text{Volume of the solute}}{\text{Volume of the solution}} \times 100$$

$$\text{Volume percentage} = \frac{\text{Volume of the solute}}{\text{Volume of the solute} + \text{Volume of the solvent}} \times 100$$

$$\text{Volume percentage} = \frac{35}{35 + 65} \times 100$$

$$\begin{aligned}\text{Volume percentage} &= \frac{35}{100} \times 100 \\ &= 35\%.\end{aligned}$$

9. Calculate the volume of ethanol in 200 ml solution of 20% v/v aqueous solution of ethanol.

Solution : Volume of aqueous solution = 200 ml.

$$\text{Volume percentage} = \frac{\text{Volume of the solute}}{\text{Volume of the solution}} \times 100$$

$$20 = \frac{\text{Volume of ethanol}}{200} \times 100$$

$$\text{Volume of ethanol} = \frac{20 \times 200}{100}$$

$$= 40 \text{ ml.}$$

Additional – Long answer questions

1. Tabulate the different types of binary solutions.

S.No.	Solute	Solvent	Example
1	Solid	Solid	Alloys
2	Liquid	Solid	Amalgam
3	Solid	Liquid	NaCl dissolved in water
4	Liquid	Liquid	Ethyl alcohol dissolved in water
5	Gas	Liquid	Soda water
6	Liquid	Gas	Cloud
7	Gas	Gas	Mixture of Helium, oxygen gases

2. Explain the classification of based on the amount of solvent.

i) Aqueous Solutions :

The solution in which water acts as a solvent is called aqueous solution. In general, ionic compounds are soluble in water and form aqueous solutions more readily than covalent compounds. E.g. Common salt in water, Sugar in water, Copper sulphate in water etc.

ii) Non-aqueous Solutions :

The solution in which any liquid, other than water, acts as a solvent is called non-aqueous solution. Solvent other than water is referred to as non-aqueous solvent. Generally, alcohols, benzene, ethers, carbon disulphide, acetone, etc., are used as non-aqueous solvents. Examples for non-aqueous solutions: Sulphur dissolved in carbon disulphide, Iodine dissolved in carbon tetrachloride.

3. Explain the classification of based on the amount of solute.

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. e.g. 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. e.g. 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 solutions :

Supersaturated solution is one that contains more solute than the saturated solution at a given temperature. e.g. 40 g of sodium chloride in 100 g of water at 25°C forms super saturated solution.

UNIT TEST - 9

Time : 1.15 Hrs.

Marks : 50

I. Choose the best answer

$$(5 \times 1 = 5)$$

- A solution is a _____ mixture.**
 - Homogeneous
 - Heterogeneous
 - Homogeneous and Heterogeneous
 - Homogeneous or Heterogeneous
- The number of components in a binary solution is _____.**
 - 2
 - 3
 - 4
 - 5
- When pressure is increased at constant temperature the solubility of gases in liquid _____.**
 - no change
 - increases
 - decreases
 - no reaction
- Deliquescence is due to _____.**
 - Strong affinity to water
 - Less affinity to water
 - Strong hatred to water
 - Inertness to water
- Which of the following is hygroscopic in nature?**
 - Ferric chloride
 - Copper sulphate $5H_2O$
 - Silica gel
 - sodium chloride

II. Fill in the blanks

$$(5 \times 1 = 5)$$

6. An example of Solid – Solid solution is _____.
7. An example of Liquid – solid solution is _____.
8. An example of solid – liquid solution is _____.
9. An example of Liquid – liquid solution is _____.
10. An example of Gas – Liquid solution is _____.

III. State whether the statements are true or false. Correct the false statement

$$(4 \times 1 = 4)$$

11. 16g of Sodium chloride dissolved in 100 g of water is an example of Saturated solution.
12. Aquatic animals live more in cold regions because less amount of dissolved oxygen is present in the water cold regions.
13. Certain substances, when exposed to the atmospheric air at ordinary temperature, absorb moisture without changing their physical state. Such substances are called Hygroscopic substances.
14. Deliquescence is maximum when the temperature is High.

IV. Match the following

$$(4 \times 1 = 4)$$

- | | |
|-------------------|--------------------------------------|
| 15. Blue vitriol | (a) Calcium Sulphate . Di hydrate |
| 16. Gypsum | (b) Calcium Oxide |
| 17. Deliquescence | (c) Calcium Sulphate . penta hydrate |
| 18. Hygroscopic | (d) Sodium hydroxide |

V. Assertion and Reasoning

$$(3 \times 1 = 3)$$

Direction: In each of the following questions, a statement of Assertion is given and a corresponding statement of Reason is given just below it. Of the statements given below, mark the correct answer as

- If both A and R are true and R is the correct explanation of A.
- If both A and R are true but R is not the correct explanation of A.
- If A is true but R is false.
- If both A and R are false.

19. **Assertion:** Salt water is a Homogeneous solution.
Reason: It contains two or more substances.
20. **Assertion:** Solution which contain three components are ternary solution.
Reason: Salt and sugar are dissolved in water.
21. **Assertion:** Deep sea divers used helium-oxygen mixture.
Reason: Helium and oxygen mixtures are weightless.

VI. Write the answer for the following questions in word or sentence

(3 × 1 = 3)

22. Define solute.
23. Define solvent.
24. Define solution.

VII. Find the odd one out

(3 × 1 = 3)

25. Hygroscopy : quicklime , caustic soda, caustic potash , ferric chloride.
26. Deliquescence: phosphorous pentoxide, sulphuric acid, silica Gel, calcium chloride.
27. Gypsum: Copper II sulphate. Penta hydrate, Calcium sulphate. dihydrate, Zinc sulphate. Heptahydrate.

VIII. Correct the mistakes

(3 × 1 = 3)

28. Solutions which contains three components are called binary solution.
29. Sodium chloride dissolved in water forms a non – Aqueous solution.
30. Sodium chloride dissolved in water forms a non- Aqueous solution.

IX. Write the short answer for ANY 5 of the following questions.

(5 × 2 = 10)

31. Define the term Solution.
32. Define volume percentage.
33. Define Hydrated Salt.
34. What is mean by binary solution?
35. What is aqueous and non aqueous solution?
36. Define solubility.
37. A solution is prepared by dissolving 45g of sugar in 180g of water. Calculate the mass percentage of solute.

X. Write long answer for the following questions

(2 × 5 = 10)

38. Write notes on various factors affecting solubility.
[OR]
39. Write notes on saturated and unsaturated solution.
40. Explain the types of chemical reactions.
[OR]
41. Tabulate the different types of Binary solutions.

