WORKSHEET 1

CHAPTER 3 – WATER

A. Tick (✓) the correct option.

1. Which of the following is a deliquescent salt?
   a. $Na_2CO_3 \cdot 10H_2O$ b. KOH c. CaO d. H_2SO_4
2. The water which gives lather with soap is called
   a. distilled water. b. potable water. c. filtered water. d. soft water.
3. If 20 mL of ethyl alcohol is mixed with 60 mL of petrol, the volume percentage of the solution is
   a. 35%. b. 24%. c. 15%. d. 10%.
4. Which of the following substances is efflorescent in nature?
   a. $Zn(NO_3)_2$ b. $CuSO_4 \cdot 5H_2O$ c. P_4O_{10} d. Na_2SO_4
5. Permanent hardness of water can be removed by adding
   a. Calcium chloride. b. Sodium bicarbonate. c. Calcium carbonate. d. Sodium carbonate.

B. Fill in the blanks from the choices given within the brackets.

1. Boiled off air contains a _____ (lower/higher) percentage of oxygen than normal air.
2. In ferrous sulphate crystal, $FeSO_4 \cdot 7H_2O$, '$7H_2O$' represents _____ (water molecules/water of crystallisation)
3. The amount of solute present in a given amount of solution is called _____ (solubility/concentration) of a solution.
4. A saturated solution can be converted to an unsaturated solution by _____ (decreasing/increasing) the amount of the solvent.
5. Temporary hardness of water is due to the presence of _____ (carbonates/hydrogen carbonates) of calcium and magnesium.

C. Define the following terms.

a. Efflorescence
b. Supersaturated solution
c. Hygroscopic substances
d. Desiccants
e. Aqueous solution

D. Match the following.

1. Gypsum	$Ca(NO_3)_2 \cdot 4H_2O$
2. Glauber's salt	$ZnSO_4 \cdot 7H_2O$
3. Epsom salt	$Na_2SO_4 \cdot 10H_2O$
4. White vitriol	$MgSO_4 \cdot 7H_2O$
5. Lime saltpetre	$CaSO_4 \cdot 2H_2O$

Name: ..... Teacher's signature: .....

Class: IX Date: .....

E. Answer the following questions.

1. 'Water is considered as a universal solvent'. Comment upon the statement.
2. To make a saturated solution, 36 g of sodium chloride is dissolved in 100 g of water at 293 K. What would be its concentration at this temperature?
3. What is the effect of temperature on the solubility of potassium nitrate and calcium sulphate in water?
4. Differentiate between
   a. solubility and solubility curve
   b. permanent hardness and temporary hardness of water.
5. Why is hard water disadvantageous?

ANSWERS

WORKSHEET 1

A. Tick (✓) the correct option.

1. b 2. d 3. c 4. b 5. d

B. Fill in the blanks from the choices given within the brackets.

1. higher
2. water of crystallisation
3. concentration
4. increasing
5. hydrogen carbonates

C. Define the following terms.

1. The phenomenon in which a substance, on exposure to air, loses a part or whole of their water of crystallisation is called **efflorescence**.
2. A solution that contains more solute than is present in the saturated solution for the same quantity of the solvent is called **supersaturated solution.**
3. The substances which when exposed to the atmosphere at ordinary temperature absorb moisture from atmosphere without dissolving in it are called **hygroscopic substances.**
4. Substances which can readily absorb moisture from other substances without reacting chemically with them are called **desiccants**.
5. A solution in which a substance is dissolved in water is called an **aqueous solution.**

D. Match the following.

1. Gypsum — $CaSO_4 \cdot 2H_2O$
2. Glauber's salt — $Na_2SO_4 \cdot 10H_2O$
3. Epsom salt — $MgSO_4 \cdot 7H_2O$
4. White vitriol — $ZnSO_4 \cdot 7H_2O$
5. Lime saltpetre — $Ca(NO_3)_2 \cdot 4H_2O$

E. Answer the following.

1. Water is considered as a universal solvent. It dissolves most of the known substances due to its polar nature and high dielectric constant.
2. Mass of sodium chloride (solute) = 36 g

   Mass of water (solvent) = 100 g

   Mass of the solution = Mass of solute + Mass of solvent

   = 36 + 100 g

   = 136 g

   Concentration of solid in liquid solution is usually expressed in mass percentage.

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

   $$= \frac{36}{136} \times 100 = 26.4\%$$

3. The solubility of potassium nitrate increases with the increase in temperature. But for calcium sulphate, solubility first increases with the increase in temperature and then decreases after attaining a maximum value at a particular temperature with further increase in temperature.

4.

a. **Solubility:** The number of grams of the solute required to saturate 100 g of the solvent at a particular temperature is called solubility of a solid in a given solvent.	**Solubility curve:** A line graph that plots changes in solubility of a solute in a solvent against changing temperature is called **solubility curve.**
b. **Temporary hardness of water:** It is due to the presence of soluble hydrogen carbonates of calcium and magnesium. It can be removed by boiling the hard water.	**Permanent hardness of water:** It is due to the presence of soluble chlorides and sulphates of calcium and magnesium. It can be removed by treating hard water with washing soda.

5. Hard water is disadvantageous because
   a. hard water forms scums or precipitates with soap and hence, it is unsuitable for laundry.
   b. hard water is harmful for boilers as it causes deposition of salts in the form of scale on the inner surface of the boiler which reduces the efficiency of the boiler.