

Q.6. 12M H₂SO₄ solution is available in the laboratory. We need only 500cm³ of 0.1M Solution, how it will be prepared?

Ans.

Given data

Molarity of H₂SO₄ solution (concentrated) M₁ = 12M volume of H₂SO₄ solution (concentrated) V₁ = ?

Molarity of H₂SO₄ solution (dilute) M₂ = 0.1M

Volume of H₂SO₄ solution (dilute) V₂ = 500cm³ Solution

Concentrated Solution = Dilute solution

$$12 \times V_1 = 0.1 \times 500$$

$$V_1 = \frac{0.1 \times 500}{12}$$

$$= 4.16 \text{ cm}^3$$

We take 4.16 cm³ of concentrated H₂SO₄ solution with the help of graduated pipette and

put in a measuring flask of 500cm³. Add water of the mark present at the neck of flask. Now it is 0.1 molar solution of H₂SO₄

Short Answer Questions

Q1. Define solution

Ans. A homogeneous mixture of two or more substances is called solution e.g. sugar dissolved in water is an example of solution.

Q2. What are physical states of solutions?

Ans. Solutions are found in three physical states depending upon the physical state of solvent e.g. brass is a solid solution of Zn and Cu, sea water is liquid solution and air is a gaseous solution. Liquid solutions are the most common solutions because of the most common solvent water.

Q3. How a solution and a pure liquid is distinguished?

Ans. A solution is distinguished from a pure liquid by evaporation the pure liquid leaves no residue, while a liquid which leaves behind a residue on evaporation is solution.

Q4. Brass and bronze cannot be separated by physical means, yet it is considered a mixture why?

Ans. Because Brass or bronze shows the properties of its components and it has a variable composition.

Q5. Why suspension and solutions do not show tyndall effect while colloids do?

Ans. Because particles of colloids are big enough to scatter the beam of light but there is no scattering of light by particles of solution because they are so small they cannot scatter the rays but particles of suspensions are so big that light is blocked.

Q6. What is the reason for the difference between solutions, colloidal and suspensions?

Ans. In solution particles are very small. In colloidal solution particles are larger than solution but not enough larger as in suspension.

Q7. Why does not the suspension form a homogeneous mixture?

Ans. Particles in suspension remain un-dissolved and settle down after some time. Therefore suspension does not form a homogeneous mixture.

Q8. How will you test whether given solution is colloidal solution or not?

Ans. If there is scattering of light inside the solution, is colloidal solution. If solution does not show the Tyndall effect. Then it is not colloidal solution.

Q9. Classify the following into true solution and colloidal solution. Glucose solution, copper sulphate solution, silver nitrate solution, Blood, starch solution, toothpaste.

Ans.

True solution


Glucose solution, copper sulphate solution,

Colloidal solution

Blood, starch solution, toothpaste.

Q10. Why we stir paints thoroughly before using?

Ans. Because paint is suspension. In suspension particles remain undissolved and settle down.

Q11. Which of the following will scatter light and why? 

(Sugar solution, Soap solution, Milk of Magnesia).

Ans. Sugar solution

Sugar solution will not scatter light because particles of solution are so small they cannot scatter light.

Soap solution

Soap solution scatters the light because it is a colloidal solution and its particles are enough large they can scatter light.

Milk of magnesia

Milk of magnesia cannot scatter the light because it is a suspension and its particles are so big that light is blocked.

Q12. What do you mean, like dissolves like? Explain with examples.

Ans. Like dissolves like means polar substances are soluble in polar solvents and non-polar substances are soluble in non polar solvents.

Ionic solids and polar covalent solids are soluble in water e.g. KCl and sugar is soluble in water. Non polar substances are soluble in non-polar substances e.g. grease is soluble in ether.

Q13. How does nature of attractive forces of solute-solute and solvent-solvent affect the solubility?

Ans. Solubility is greater if the attractive forces between solvent-solvent are stronger similarly if the attractive forces become weaker in solute-solute then solubility will be greater.

Q14. How you can explain the solute-solvent interaction to prepare NaCl solution?

Ans. When NaCl is added in water it dissolves readily because the attractive interaction between ions of NaCl and polar molecules of water are strong enough to overcome attractive forces between Na⁺ and Cl⁻ in solid NaCl. In this way NaCl dissolve in water.

Q15. Justify with example that solubility increases with increase in temperature.

Ans. When salt like KNO₃ is dissolved in water, heat is absorbed. It means heat is required to break the attractive forces between ions of solute. Therefore solubility of such salt increases with increases of temperature

Q16. What do you mean by volume/volume % ?

Ans. It is the volume in cm³ of a solute per 100cm³ of the solution.

$$\% \text{ by volume} = \frac{\text{Volume of solute}}{\text{Volume of solution}}$$

Q17. What is aqueous solution?

Ans. The solution which is formed by dissolving a substance in water is called an aqueous solution.

Q18. What is difference between solute and solvent?

The component of solution which is present in smaller quantity is called solute.

The component of a solution which is present in larger quantity in solution is called solvent.

Q19. Define saturated solution.

Ans. A solution containing maximum amount of solute at a given temperature is called saturated solution.

Q20. Define unsaturated solution.

Ans. A solution which contains lesser amount of solute than that which is required to saturate it at a given temperature is called unsaturated solution.

Q21. Define supersaturated solution.
Ans. The solution that is more concentrated than a saturated solution is known as supersaturated solution.

Q22. What is difference between dilute and concentrated solution?

Ans. Dilute solution

Dilute solutions are those which contain relatively small amount of dissolved solute in the solution.

Concentrated solution

Concentrated solutions are those which contain relatively large amount of dissolved solute in the solution are called concentrated solutions.

Q23. What is concentration?

Ans. Ratio of amount of solute to the amount of solution or amount of solute to the amount of solvent.

(224. Define percentage mass/mass (% m/m).

Ans. It is the number of grams of solute in 100 grams of solution.

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

Q25. What is percentage-mass/volume (% m/v)?

Ans. It is the number of grams of solute dissolved in 100cm³ of solution

$$\% \text{ m / v} = \frac{\text{Mass of solute}}{\text{Volume of solution}} \times 100$$

Q26. What is percentage volume by mass (% v/m)?

Ans. It is the volume in cm³ of a solute dissolved in 100g of the solution

$$\% \text{ v / m} = \frac{\text{Volume of solute}}{\text{Mass of solution}} \times 100$$

Q27. Define Molarity. Write its formula.

Ans. Number of moles of solute dissolved in 1 dm³ of solution is called molarity. It is represented by *M*.

$$\text{Molarity} = \frac{\text{Mass of solute (g)}}{\text{Molar mass of solute (g mol}^{-1}) \times \text{volume of solution (dm}^3)} = \frac{\text{No. of moles of solute}}{\text{Volume of solution (dm}^3)}$$

Q28. Define solubility.

Define solubility.

Ans. Solubility is defined as the number of grams of the solute dissolved in 100g of solvent to prepare a saturated solution at a particular temperature.

Q29. Define colloid.

Ans. Colloids are solutions in which the solute particles are larger than those present in the true solution but not large enough to be seen by naked eye. e.g. blood.

Q30. Define suspension.

Ans. Suspension is a heterogeneous mixture of undissolved particles in a given medium e.g.

Chalk in water.

Q31. Why solubility of Li_2SO_4 and $\text{Ce}_2(\text{SO}_4)_3$ decreases with the increase of temperature?

Ans. Li_2SO_4 and $\text{Ce}_2(\text{SO}_4)_3$ dissolve in water with the evolution of heat, therefore solubility

of such salts decrease with the increases of temperature. Q32.

Why solution is considered mixture?

Ans Because components of solution can be separated by physical means.

Q33. Distinguish between the following pairs as compound or solution.

- Water and salt solution
- Vinegar and benzene
- Carbonated water and acetone

Ans. Water and salt solution, water is compound and salt solution is solution

(a) Vinegar is solution and benzene is compound

(b) Carbonated water is solution and acetone is compound

Q34. What is the major difference between a solution and a mixture?

Ans. A solution is always homogeneous but mixture may be homogeneous or heterogeneous.

Q35. Why alloys are considered solutions?

Ans. Because alloys are also homogeneous mixture.

Q36. Dead sea is so rich with salt that it forms crystals when temperature lowers in winter.

Can you comment why is it named as dead sea?

Ans. Because it does not support life.

Q37. Does the percentage calculation require the chemical formula of the solute?

Ans. No. chemical formula is not required.

Q38. You are asked to prepare 15 percent (w/w) solution of common salt. How much amount of water will be required to prepare this solution.

Ans. 85g of water is required to prepare this solution.

Q39. How much water should be mixed with 18cm^3 of alcohol so as to obtain 18% (v/v) alcohol solution?

Ans. 18cm^3 of alcohol is dissolved in sufficient amount of water so that the total volume of the solution become 100cm^3 .

Q40. Calculate the concentration % (w/w) of a solution which contains 2.5g of salt dissolved in 50g of water Ans. Solution

Mass of salt = 2.5g

Mass of water = 50g

Mass of solute

$$\text{Concentration (w / w)} = \frac{\text{Mass of solute}}{\text{Mass of solute} + \text{mass of solvent}} \times 100$$

$$= \frac{2.5}{2.5+50} \times 100$$

$$= \frac{2.5}{52.5} \times 100$$

(241. Which one of the following is more concentrated one molar or three molar?

Ans. Three molar

Q42. What will happen if the solute-solute forces are stronger than those of solute-solvent forces?

Ans. Solute will not dissolve in the solvent

Q43. When solute-solute forces are weaker than those of solute-solvent forces? Will solution form?

Ans. Solute will dissolve and solution will form.

Q44. Why is iodine soluble in CCl_4 and not in water?

Ans. Because iodine is non-polar in nature and CCl_4 is also non-polar but water is polar.

Q45. Why test tube become cold when KN_3 is dissolved in water?

Ans. Because when KN_3 is dissolved in water heat is absorbed from the surrounding.

Q46. What is difference between colloid and suspension?

Ans. Colloid

In colloid particles are larger than those present in the true solution.

Suspension

Suspension is a heterogeneous mixture of undissolved particles in given medium.

Q47. Can colloids be separated by filtration, if not why?

Ans. Not, because particles are not so big.

Q48. Why are the colloids quite stable?

—Ans. Because particles do not settle down for a long time.

Q49. Why does the colloid show tyndall effect?

Ans. Because their particles scatter the path of light rays.

Q50. What is tyndall effect and on for what factor it depends?

Ans. The scattering of beam of light by particles of colloids is called tyndall effect.

It depends up the size of particles.

Q51. Identify as colloids or suspension from the following:

Paints, milk, milk of magnesia, soap solution

Ans. Suspension

Paints, milk of magnesia

Colloids

Soap solution, milk

Q52. How can you justify that milk is colloid?

Ans. Milk is colloid because it shows tyndall effect.

Multiple Choice Questions

- Butter is example of solution
(a) Gas-gas
(c) solid-solid
- Sea water is a source of naturally occurring elements
(a) 18 (b) 92
(c) 118 (d) 95
- Brass is a solid solution of Zn and
(b) Sn
(d) cu
- Brass and Bronze are considered
(a) Compounds (b) mixtures
(c) Elements
- In soft drink CO₂ is
(a) Solvent
(c) Solution
- Which salt supersaturated solution
(a) Na₂SO₄ (b) NaCl
(c) Na₂SO₄ (d) NaHSO₄
- Air is a example of solution
(a) gas in liquid
(c) gas in gas
- Hydrogen absorbed in palladium is example of solution
(a) solid in gas (b)
(c) gas in gas (d)
- Example of liquid-gas solution is
(a) Mist (b) fog
(c) air pollutants (d) All of
- Example of liquid in solid
(a) Butter (b) Cheese
(c) both a and b (d) none of these
- Smoke in air is example of solution
(a) gas in gas (b) solid in liquid
(c) solid in gas (d) All of these
- Example of solid in solid solution is
(a) Brass (b) Bronze
(c) Opals (d) All of these
Alcohol in water is example of solution
(a) Liquid-gas (b) Liquid-liquid
(c) gas-liquid (d) None of these
- 10% m/v sugar solution contains 10g of sugar in solution
(a) 90g (b) 100g
m³ (d) 90cm³
- 10% v/m alcohol solution contains 10cm³ of sugar in solution
(a) 100cm (b) 100g
(c) 90cm (d) 90g
- One molar solution contains one mole of solute in 1000 cm³ volume. (a) 100cm³ (b) 1cm