CLASS IX – SCIENCE PRACTICE PAPER (2026-27)

Step-by-Step Solutions and Marking Scheme

Chapter 5: Exploring Mixtures and their Separation | Max. Marks: 40

SECTION A – Objective Questions (1 mark each)

Q1 **[1 mark]**

Vinegar (acetic acid in water) and an aerated drink (carbon dioxide in water) are solutions, i.e. homogeneous. Brass is homogeneous but muddy water is heterogeneous; milk and smoke are heterogeneous.

Answer: (B)

Q2 **[1 mark]**

X: beam not visible, particles tiny, no settling ⇒ solution. Y: beam visible and particles settle ⇒ suspension. Z: beam visible but no settling ⇒ colloid.

Answer: (B)

Q3 **[1 mark]**

Mass of solution = 20 + 80 = 100 g. Mass % = (20 ÷ 100) × 100 = 20%.

Answer: (B)

Q4 **[1 mark]**

% v/v = (volume of solute ÷ volume of solution) × 100. Volume of acetic acid = (5 ÷ 100) × 250 = 12.5 mL.

Answer: (B)

Q5 **[1 mark]**

Camphor sublimes on heating while sand does not, so the mixture is separated by sublimation.

Answer: (C)

Q6 **[1 mark]**

From Fig. 2, the solubility of P is 110 g per 100 g of water at 60 °C and 30 g at 20 °C.

Mass crystallizing = 110 – 30 = **80 g**.

Answer: (C)

Q7 **[1 mark]**

Starch in water is a colloid, which scatters light. Copper sulphate, common salt and acetone form true solutions, which do not show the Tyndall effect.

Answer: (B)

Q8 **[1 mark]**

Alum acts as a coagulant: it makes the fine suspended particles clump together into larger masses that settle under gravity.

Answer: (B)

Q9 **[1 mark]**

Both A and R are true. On cooling, the solubility falls, so the extra solute separates out as crystals. R explains A.

Answer: (A)

Q10 **[1 mark]**

Assertion: true, since colloidal particles stay evenly distributed and do not settle.

Reason: false. Colloid particles are between 1 and 1000 nm; particles larger than 1000 nm are in suspensions.

Answer: (C)

SECTION B – Very Short Answer Questions (2 marks each)

Q11 **[2 marks]**

Any two points (1 mark each):

• Particle size: in a solution the particles are very small (less than 1 nm); in a suspension they are large (more than 1000 nm).

• Visibility: solute particles cannot be seen in a solution; particles of a suspension are visible to the naked eye.

• Settling: a solution does not settle; a suspension settles on standing.

• Filtration: solute cannot be separated by filtration; suspended particles can be.

• Tyndall effect: not shown by a solution but shown by a suspension.

Q12 **[2 marks]**

(a) (1 mark) R = water condenser, S = conical flask (receiver).

(b) (1 mark) Acetone collects in S. It has the lower boiling point (56 °C), so it vaporizes first, is cooled and condensed in R and is collected as the distillate; water (100 °C) stays in the flask.

Q13 **[2 marks]**

(1 mark) It is volume by volume percentage (% v/v): 70 mL of ethanol is present in every 100 mL of the solution.

(1 mark) Volume of ethanol = (70 ÷ 100) × 200 mL = **140 mL**.

Q14 **[2 marks]**

Option A (any two points, 1 mark each):

• Evaporation removes the solvent completely and leaves the solid behind, while crystallization forms crystals from a hot saturated solution on cooling.

• Evaporation to dryness may leave impurities in the solid, whereas crystallization gives pure, well-shaped crystals.

• Evaporation can be done at any stage, but crystallization needs a saturated solution and slow cooling.

Option B:

(1 mark) **Fractional distillation**.

(1 mark) It is used in petroleum refineries to separate crude oil into petrol, kerosene, diesel, LPG etc.

SECTION C – Short Answer Questions (3 marks each)

Q15 **[3 marks]**

(i) (1 mark) Mass of solution = 15 + 135 = 150 g. % m/m = (15 ÷ 150) × 100 = **10%**.

(ii) (1 mark) % m/v = (10 g ÷ 200 mL) × 100 = **5%**.

(iii) (1 mark) % v/v = (25 mL ÷ 250 mL) × 100 = **10%**.

Q16 **[3 marks]**

(i) (1 mark) X and Y are present: the spot of X is at the same height as P and the spot of Y is at the same height as R. Z matches no component of the ink.

(ii) (1 mark) R: it travels farthest, i.e. closest to the solvent front.

(iii) (1 mark) Pencil marks are insoluble and do not run with the solvent, whereas ink would dissolve and spread. If the solvent level is above the baseline, the spots would dissolve into the solvent instead of travelling up the paper.

Q17 **[3 marks]**

Option A:

• (1 mark) Apparatus: separating funnel. Principle: two immiscible liquids separate into layers according to their densities.

• (1 mark) Pour the mixture into the funnel and let it stand. Mustard oil, being less dense, forms the upper layer and water the lower layer.

• (1 mark) Open the stopcock to drain the lower water layer, closing it when the water is almost drained; collect the interface portion separately and discard it; then collect the oil layer in another container.

Option B:

• (1 mark) Dissolve the sample in water with a drop of dilute sulphuric acid, gently heat in a water bath, and add more copper sulphate until the solution is saturated.

• (1 mark) Filter the hot solution to remove insoluble impurities, collect the filtrate and cover it.

• (1 mark) Cool slowly without disturbing, filter the crystals, wash with cold water and dry them.

SECTION D – Case-Based Questions (4 marks each)

Q18 **[4 marks]**

(i) (1 mark) Mass of glucose = (5 ÷ 100) × 500 = **25 g**.

(ii) (1 mark) Mass of NaCl = (0.9 ÷ 100) × 200 = **1.8 g**.

(iii) (1 mark) It is easier to measure the volume of a liquid than to weigh it, so % m/v is convenient for medicines and laboratory solutions.

(iv) (1 mark) 5 g of glucose is in 100 mL, so 7.5 g is in (7.5 ÷ 5) × 100 = **150 mL**.

Q19 **[4 marks]**

(i) (1 mark) Coagulation. Alum acts as a coagulant: it makes the fine suspended particles clump together into larger masses.

(ii) (1 mark) The clumps settle at the bottom under gravity (sedimentation). The clear water is then separated by **decantation**.

(iii) (1 mark) Muddy water is a **suspension**. Very fine particles pass through the pores of the filter, so the water can remain cloudy; hence coagulation and settling are done first.

(iv) (1 mark) No Tyndall effect means no suspended or colloidal particles remain; the particles still present (dissolved substances) are smaller than 1 nm, as in a true solution.

SECTION E – Long Answer Question (5 marks)

Q20 **[5 marks]**

Option A:

(i) (1 mark) Step P is **sublimation**. The vapours turning back into a solid on cooling is **deposition**.

(ii) (1 mark) X = camphor; Y = sand; Z = common salt (crystals).

(iii) (1 mark) Filtration. Sand does not dissolve in water, while salt does, so sand stays on the filter paper.

(iv) (1 mark) Crystallization. It gives pure, well-formed crystals and removes soluble impurities, whereas heating to dryness may leave impurities with the solid.

(v) (1 mark) Gentle heating keeps the temperature below the melting point of camphor, so that it passes directly from solid to vapour (sublimes) without melting.

Option B:

(i) (1 mark) Mass % of camphor = (10 ÷ 50) × 100 = **20%**.

(ii) (1 mark) Mass of solution = 25 + 75 = 100 g. Mass % = (25 ÷ 100) × 100 = **25%**.

(iii) (1 mark) Mass of salt in 200 g = (25 ÷ 100) × 200 = **50 g**.

(iv) (1 mark) Neither sand nor salt sublimes on heating, so neither can be separated by sublimation.

(v) (1 mark) Crystallization. It gives pure, well-shaped crystals and avoids leaving impurities behind.

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