CLASS 8 · SCIENCE

The Amazing World of Solutes, Solvents, and Solutions

Sample paper · 15 questions · 22 marks

10 objective questions × 1 mark. Five written-response questions: 12 marks. Write your working where needed. Suggested time: 45 minutes. Answers and marking guidance follow the questions.

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Section A · Objective questions (10 marks)

1. In a glass of salt water, the salt is the:

A. solute

B. solution

C. residue

D. solvent

2. Which of these dissolves in water to form a solution?

A. Chalk powder

B. Sugar

C. Sand

D. Mustard oil

3. A solution in which no more solute can dissolve at that temperature is called:

A. a pure solvent

B. an unsaturated solution

C. a dilute solution

D. a saturated solution

4. For most solid solutes, raising the temperature of the water generally:

A. turns the solute into a gas

B. decreases their solubility

C. has no effect on solubility

D. increases their solubility

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5. Stirring helps sugar dissolve faster in water mainly because it:

A. evaporates the water

B. changes sugar into a new substance

C. makes the sugar particles magnetic

D. brings fresh solvent into contact with the solute

6. An object has a mass of 100 g and a volume of 50 cm^3. Its density is:

A. 50 g/cm^3

B. 5000 g/cm^3

C. 0.5 g/cm^3

D. 2 g/cm^3

7. Two liquids are not mixed in this question. Equal 50 mL samples have masses 60 g and 45 g. Which sample has the greater density?

A. The 45 g sample

B. They must have equal densities

C. Density cannot be compared without their colours

D. The 60 g sample

8. A small stone sinks in a bucket of water, but a much heavier block of ice floats. What does this show?

A. water pushes only cold objects up

B. ice is less dense than water while the stone is denser

C. ice dissolves slowly in water

D. heavier things always sink

9. Which of these is NOT a true solution?

A. Copper sulfate dissolved in water

B. Salt water

C. Muddy water

D. Air

10. A fixed mass of water is heated and expands. Its density:

A. stays exactly the same

B. decreases

C. becomes zero

D. increases

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Section B · Written responses (12 marks)

Attempt all five. Use a separate sheet if you need more space. The marks for each question are shown.

11. Define solute and solvent. Identify them when a little sugar and salt dissolve completely in a glass of water. [2 marks]

12. A sugar solution is saturated at room temperature. What does saturated mean, and how could more sugar be dissolved without adding water? [2 marks]

13. Equal masses of sugar with the same grain size are put into equal volumes of water, one cold and one warm. Both are stirred equally. Where should sugar dissolve faster, and why? [2 marks]

14. A laboratory needs 80 cm3 of a liquid with density 1.25 g/cm3. An empty measuring vessel has mass 30 g. What total mass should the filled vessel have? Explain how you account for the vessel. [3 marks]

15. Two covered cups each contain 100 mL of water at the same temperature. Cup A contains 10 g dissolved sugar; cup B contains 20 g dissolved sugar. Both can still dissolve more. A student says cup B is saturated because it is sweeter. Evaluate the claim, then describe a fair way to check saturation without tasting. [3 marks]

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Answers & marking guidance

Use these after attempting the paper. Accept equivalent correct reasoning and sensible units. These are Evater model answers, not an official marking scheme.

Section A · 1 mark each

1. A — The substance that dissolves is the solute; water is the solvent.

2. B — Sugar is soluble in water; chalk, sand and oil are not.

3. D — A saturated solution holds the maximum amount of solute possible at that temperature.

4. D — Most solids dissolve more in hotter water, so solubility usually increases with temperature.

5. D — Stirring continuously brings unsaturated solvent into contact with undissolved solute, speeding up dissolving.

6. D — Density = mass ÷ volume = 100 ÷ 50 = 2 g/cm³.

7. D — For equal volumes, the sample with the larger mass has the larger density: 60/50 = 1.2 g/mL, compared with 45/50 = 0.9 g/mL.

8. B — Floating and sinking depend on density, not mass alone: ice is less dense than water and the stone is denser.

9. C — Muddy water has solid particles suspended, not dissolved, so it is not a true solution.

10. B — The same mass now occupies a larger volume, so density = mass ÷ volume decreases.

Section B · Model answers

11. A solute is a substance that dissolves; the solvent is the substance in which it dissolves. Sugar and salt are the solutes here, and water is the solvent.

Marking: 1 mark for both definitions; 1 mark for identifying sugar/salt as solutes and water as solvent.

12. At that temperature the solution contains the maximum sugar that can dissolve. Warming it usually increases the solubility of sugar, so more sugar can dissolve.

Marking: 1 mark for the temperature-qualified definition; 1 mark for warming the sugar solution.

13. Sugar should dissolve faster in the warm water. Higher temperature increases particle motion and generally increases the rate at which sugar dissolves. The water volumes, sugar mass, grain size and stirring are held the same for a fair comparison.

Marking: 1 mark for warm water; 1 mark for explaining the temperature effect on dissolving rate.

14. Liquid mass = density x volume = 1.25 x80 = 100 g. The balance includes the 30 g vessel, so the filled vessel should have mass 130 g.

Marking: 1 mark for mass = density x volume; 1 mark for 100 g of liquid; 1 mark for adding the 30 g vessel to obtain 130 g.

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15. The claim is unsupported: B is more concentrated than A, but both are stated to be unsaturated. Saturation means no more solute dissolves at that temperature, not merely that the solution is sweet. Add a small measured amount of sugar, stir and allow enough time at constant temperature. Sugar remaining undissolved after mixing indicates saturation under those conditions. Never taste laboratory samples.

Marking: 1 mark for distinguishing concentration from saturation; 1 mark for constant-temperature addition/stirring; 1 mark for interpreting persistent undissolved sugar after sufficient time.

Topic references

NCERT Class 8 Science, Curiosity, Chapter 9: The Amazing World of Solutes, Solvents, and Solutions.

https://ncert.nic.in/textbook/pdf/hecu109.pdf

Concept reference only. Questions and model answers are original Evater practice material, not an official NCERT paper.

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