The Amazing World of Solutes, Solvents, and Solutions

Standard difficulty · 20 questions · 40 marks · Time: 36 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. In salt water, the salt is the:

(a) solution **(b)** mixture of gases
(c) solvent **(d)** solute

2. An object has a mass of 57 g and a volume of 19 cm^3. What is its density?

(a) 3 g/cm^3 **(b)** 1083 g/cm^3 **(c)** 0.33 g/cm^3 **(d)** 4 g/cm^3

3. An object has a density of 0.2 g/cm^3. In water (density 1 g/cm^3) it will:

(a) dissolve at once **(b)** sink
(c) turn into a gas **(d)** float

4. Water in a measuring cylinder is at 30 mL. A stone is lowered in and the level rises to 39 mL. What is the stone's volume?

(a) 18 cm^3 **(b)** 39 cm^3 **(c)** 30 cm^3 **(d)** 9 cm^3

5. A block measures 23 cm × 12 cm × 4 cm. What is its volume?

(a) 1,104 cm^3 **(b)** 276 cm^3 **(c)** 39 cm^3 **(d)** 832 cm^3

6. A 50 mL measuring cylinder has 100 equal divisions. What is its least count?

(a) 2 mL **(b)** 0.5 mL **(c)** 50 mL **(d)** 5 mL

7. In baking soda solution, the solute is:

(a) baking soda **(b)** air **(c)** carbon dioxide **(d)** salt

8. How many millilitres are there in 5 L?

(a) 50,000 mL **(b)** 500 mL **(c)** 5,000 mL **(d)** 50 mL

Section B — Short answer — 8 × 2 = 16 marks

9. What are a solute, a solvent and a solution?

10. A brick piece has a mass of 75.6 g and a volume of 28 cm^3. Find its density. Will it float or sink in water?

11. Name the solute in (a) salt water (b) lemonade

12. Solution A has 5 spoons of sugar in 200 mL of water; solution B has 4 spoons in 50 mL. Which is more concentrated?

13. A metal piece has a mass of 535 g and a density of 8 g/cm^3. What is its volume?

14. A 5 L bottle has 3200 mL taken out. How much is left, in mL?

15. Compared with cold water, does "more" or "less" dissolve? (a) oxygen in hot water (b) salt in hot water

16. A liquid has a density of 13.6 g/mL. What is the mass of 10 L of it, in grams?

Section C — Word problems — 4 × 4 = 16 marks

17. Describe an activity to show how temperature affects how much solid dissolves.

18. A stone has a mass of 40 g. In a measuring cylinder, the water level goes from 30 mL to 41 mL when it is put in. (a) What is the stone's volume? (b) What is its density? (c) Will it float or sink in water? (d) Why read the bottom of the meniscus?

19. Block A: 296 g, 38 cm^3. Block B: 112 g, 75 cm^3. (a) Find each density. (b) Which is denser? (c) Which would float in water, if any?

20. A student dissolved as much baking soda as possible in 100 mL of water at 20 °C, 50 °C, 70 °C, getting 10 g, 12 g, 17 g. (a) What happens to solubility as temperature rises? (b) How much more dissolved at 70 °C than at 20 °C? (c) What is a saturated solution?

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Answer key

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Q	Answer	Working
1	**(d) solute**	—
2	**(a) 3 g/cm^3**	57 ÷ 19 = 3
3	**(d) float**	0.2 is less than 1
4	**(d) 9 cm^3**	39 − 30 = 9
5	**(a) 1,104 cm^3**	23 × 12 × 4 = 1104
6	**(b) 0.5 mL**	50 ÷ 100 = 0.5
7	**(a) baking soda**	—
8	**(c) 5,000 mL**	5 × 1000
9	**The solute dissolves in the solvent to make a uniform solution, like sugar (solute) in water (solvent).**	—
10	**2.7 g/cm^3; it will sink**	75.6 ÷ 28
11	**(a) salt (b) sugar**	—
12	**B: A has 2.5 spoons per 100 mL and B has 8**	compare spoons per 100 mL
13	**66.9 cm^3**	volume = mass ÷ density = 535 ÷ 8
14	**1,800 mL**	5000 − 3200
15	**(a) less (b) more**	—
16	**136,000 g**	13.6 × 10000 mL
17	**Take the same amount of water at 20 °C, 50 °C and 70 °C. Add baking soda spoon by spoon to each, stirring, until no more dissolves. More dissolves in the hotter water, so solubility of solids increases with temperature.**	—
18	**(a) 11 cm^3 (b) 3.64 g/cm^3 (c) Sink (d) For a clear liquid, the bottom of the curved surface gives the true level.**	41 − 30; 40 ÷ 11
19	**(a) A: 7.79 g/cm^3; B: 1.49 g/cm^3 (b) A (c) Neither: both are denser than water**	—
20	**(a) It increases. (b) 7 g (c) One in which no more solute can dissolve at that temperature.**	—

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