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Class VIII Science – Chapter 9 Worksheet

The Amazing World of Solutes, Solvents, and Solutions

~ Answer Key Copy (with questions and solutions) ~

Name: _____	Roll No.: _____	Date: _____
Class: VIII (Science)	Time: 2 Hours	Max. Marks: 60

Instructions:

- All questions are compulsory. Marks are shown in [] on the right.
- Write neat, labelled, to-the-point answers. Show formula, working and units in numericals.
- Green boxes show the model answers with the marking points.

Section A – Chalo Shuru Karte Hain! (Objective Questions)

20 × 1 = 20

1. Every sip of homemade ORS tastes the same because:

[1]

- (a) sugar and salt settle at the bottom
- (b) its components are evenly distributed throughout
- (c) salt is heavier than sugar
- (d) it is a non-uniform mixture

Ans: (b) its components are evenly distributed throughout (it is a uniform mixture, i.e. a solution).

2. 5 mL of ethanol is mixed with 95 mL of water to form a solution. Which statement is correct?

[1]

- (a) Ethanol is the solute as it is present in the smaller amount
- (b) Water is the solute as it is present in the larger amount
- (c) Both ethanol and water are solvents
- (d) Both ethanol and water are solutes

Ans: (a) When two liquids mix, the one present in the smaller amount is the solute.

3. A saturated solution of baking soda at 20 °C is heated to 50 °C. It will now behave as:

[1]

- (a) a saturated solution
- (b) an unsaturated solution
- (c) a non-uniform mixture
- (d) a pure substance

Ans: (b) an unsaturated solution. Solubility of most solids increases with temperature, so more solute can dissolve.

4. Which water sample will have the maximum amount of dissolved oxygen?

[1]

- (a) Water at 10 °C
- (b) Water at 25 °C
- (c) Water at 35 °C
- (d) Water at 45 °C

Ans: (a) Water at 10 °C. Solubility of gases decreases as temperature increases.

5. A block has a mass of 500 g and a volume of 250 cm³. Its density in g/cm³ is:

- (a) 0.5 (b) 2
(c) 2.5 (d) 20

Ans: (b) 2 g/cm³. Density = $500 \div 250 = 2$ g/cm³.

6. One litre of a liquid is equal to:

- (a) 10 cm³ (b) 100 cm³
(c) 1000 cm³ (d) 1 cm³

Ans: (c) 1000 cm³. 1 L = 1 dm³ = 1000 cm³ (and 1 mL = 1 cm³).

7. While reading the level of a coloured liquid in a measuring cylinder, the eye is kept level with:

- (a) the bottom of the meniscus (b) the top of the meniscus
(c) the base of the cylinder (d) the nearest big mark

Ans: (b) the top of the meniscus. (For water and colourless liquids, the bottom of the meniscus is used.)

8. A 1 litre pack of oil is labelled 910 g. The density of the oil is:

- (a) 0.91 g/mL (b) 1.1 g/mL
(c) 9.1 g/mL (d) 910 g/mL

Ans: (a) 0.91 g/mL. Density = $910 \text{ g} \div 1000 \text{ mL} = 0.91 \text{ g/mL}$, which is less than water, so oil floats on water.

For Q9 and Q10, an Assertion (A) and a Reason (R) are given. Choose the correct option:

- (i) Both A and R are true, and R is the correct explanation of A. (ii) Both A and R are true, but R is not the correct explanation of A.
(iii) A is true but R is false. (iv) A is false but R is true.

9. **Assertion (A):** The density of a gas increases when it is compressed.

Reason (R): On compression, gas particles move closer, so the volume decreases while the mass stays the same.

Ans: (i) Both are true and R correctly explains A.

10. **Assertion (A):** Ice floats on liquid water.

Reason (R): Ice has a higher density than liquid water.

Ans: (iii) A is true but R is false. Ice is less dense than liquid water, which is why it floats.

11. Fill in the blank: The maximum amount of solute that dissolves in a fixed quantity of solvent at a given temperature is called its _____.

Ans: solubility

12. Fill in the blank: Relative density is a number without any _____.

Ans: units

13. Fill in the blank: The SI unit of volume is _____.

Ans: cubic metre (m³)

14. Fill in the blank: The curved surface of water in a measuring cylinder is called the _____.

Ans: meniscus

15. True or False? Correct the statement if it is false: The mass of 1 mL of water is approximately 1 g at room temperature. [1]

Ans: True.

16. True or False? Correct the statement if it is false: The solubility of gases in liquids generally increases with an increase in temperature. [1]

Ans: False. It generally decreases with an increase in temperature.

17. True or False? Correct the statement if it is false: A wooden stick and an iron rod of the same size have the same density. [1]

Ans: False. Iron has a much higher density than wood, which is why the iron rod feels heavier.

18. Match the following (1 mark each): write the correct letter against each number. [3]

Column A	Column B
(1) Unsaturated solution	(a) Density of a substance ÷ density of water
(2) Relative density	(b) Used to find the volume of an irregular solid
(3) Water displacement	(c) More solute can still dissolve at that temperature

Ans: (1) - (c), (2) - (a), (3) - (b)

Section B – Thoda Dimaag Lagao (Short Answer)

5 × 2 = 10

19. Define solubility. How does temperature affect the solubility of most solids in a liquid? [2]

Ans: Solubility is the maximum amount of solute that dissolves in a fixed quantity of solvent at a particular temperature (1). For most solids, solubility increases as the temperature increases (1).

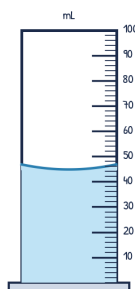
20. A notebook is 25 cm long, 18 cm wide and 2 cm high. Its mass is 450 g. Find its volume and its density. [2]

Ans: Volume = $l \times w \times h = 25 \times 18 \times 2 = 900 \text{ cm}^3$ (1). Density = mass ÷ volume = $450 \text{ g} \div 900 \text{ cm}^3 = 0.5 \text{ g/cm}^3$ (1).

21. Explain, using the idea of density, why a hot air balloon rises up in the air. [2]

Ans: The air inside the balloon is heated; it expands, so its volume increases while the mass stays the same, and its density decreases (1). This hot air is less dense than the cool air outside, so the balloon rises (1).

22. A measuring cylinder has big marks every 10 mL, with 5 equal small divisions between two big marks. [2]
The figure shows water in the cylinder. (i) Find the smallest volume it can read. (ii) Read the volume of water.



Ans: (i) Smallest volume = $10 \text{ mL} \div 5 \text{ divisions} = 2 \text{ mL}$ (1). (ii) The bottom of the meniscus is 3 small divisions above 40 mL, so the volume = $40 + 6 = 46 \text{ mL}$ (1).

23. A bottle has a capacity of 1.5 litres and already contains 650 mL of water. How much more water can it hold? Give your answer in mL and in cm^3 . [2]

Ans: $1.5 \text{ L} = 1500 \text{ mL}$ (the capacity). More water = $1500 - 650 = 850 \text{ mL}$ (1). Since $1 \text{ mL} = 1 \text{ cm}^3$, this is 850 cm^3 (1).

Section C – Kuch Mazedaar Questions (Application Based)

5 × 3 = 15

24. Raj adds baking soda to 50 mL of water at 20°C till some solid remains undissolved. He heats it to 50°C and all of it dissolves. He adds more soda until some remains again, and then heats it to 70°C , when the solid dissolves again. [3]

(i) What do you infer about the solubility of baking soda as the temperature rises?

Ans: Solubility of baking soda increases with temperature; water at 70°C dissolves more than at 50°C (1).

(ii) How does a saturated solution at one temperature behave when it is heated?

Ans: It behaves as an unsaturated solution, because more solute can now dissolve (1).

(iii) Arrange 20°C , 50°C and 70°C in increasing order of the amount of baking soda 50 mL of water can dissolve.

Ans: 20°C , then 50°C , then 70°C (least to most) (1).

25. A raw egg sinks in a glass of tap water but floats when a lot of salt is dissolved in the water. Explain why. [3]

Ans: The egg is denser than tap water, so it sinks (1). Dissolving salt makes the water denser (the solution is denser than plain water) (1). When the salt solution becomes denser than the egg, the egg floats (1).

26. Object A has a mass of 120 g and a volume of 150 cm³. Object B has a mass of 240 g and a volume of 80 cm³. (Density of water = 1 g/cm³) [3]

(i) Calculate the density of each object.

Ans: A: $120 \div 150 = 0.8 \text{ g/cm}^3$. B: $240 \div 80 = 3 \text{ g/cm}^3$ (1).

(ii) Which object will float and which will sink in water? Why?

Ans: A floats, since its density (0.8) is less than that of water. B sinks, since its density (3) is more than that of water (1).

(iii) Find the relative density of object B with respect to water.

Ans: Relative density = $3 \div 1 = 3$. It has no unit (1).

27. Explain with reference to particles why the density of a substance generally decreases on heating. Give one everyday example. [3]

Ans: On heating, the particles move away from each other and spread out, so the volume increases but the mass does not change (1). Since density = mass $\div$ volume, density decreases (1). Example: hot air rises above cooler air / a hot air balloon rises (1).

28. How does an increase in pressure affect the density of a gas, a liquid and a solid? [3]

Ans: Gas: particles come closer, volume decreases, so density increases (1). Liquid: nearly incompressible, so the effect is small (1). Solid: even less affected; the change in density is negligible (1).

Section D – Ab Poori Kahani Batao (Long Answer)

2 × 5 = 10

29. Describe an activity to show that a fixed amount of solvent can dissolve only a limited amount of solute. Also define unsaturated and saturated solutions. [5]

Ans: Activity (2): Take a clean glass tumbler half-filled with water. Add one spoon of salt and stir until it dissolves. Keep adding salt one spoon at a time, stirring each time, and record in a table whether it dissolves or not. **Observation (1):** At first the salt dissolves completely. After a few spoons, the added salt stops dissolving and settles at the bottom. **Conclusion (2):** Water has a limit to dissolve salt. A solution in which more solute can still be dissolved at a given temperature is an unsaturated solution. When the solute stops dissolving and settles at the bottom, it is a saturated solution at that temperature.

30. Describe how you would find the density of an irregularly shaped stone using a digital balance and a measuring cylinder. Write the formula and a short worked example. [5]

Ans: Mass (2): Switch ON the balance, check zero (press tare if needed), place a dry watch glass, press tare again, place the stone on it and note the reading (mass in g). **Volume (2):** Fill a measuring cylinder with water to a mark (say 50 mL) and note it as the initial volume. Tie the stone with a thread and lower it slowly into the water. Note the final volume. Volume of stone = final – initial (1 mL = 1 cm³). **Density (1):** Density = Mass $\div$ Volume. Example: mass = 27 g, initial 50 mL, final 60 mL, so volume = 10 cm³ and density = $27 \div 10 = 2.7 \text{ g/cm}^3$.

Section E – Dekhe Kya Seekha Tumne? (Case Based Question)**1 × 5 = 5****31.** Read the passage and answer the questions:

In Ningel village of Manipur, salt is still made by a traditional method. Salty water is drawn up from salt wells and boiled in large metal pans over firewood. As the water evaporates, salt crystals are left behind and are shaped into round "salt cakes".

(i) Name the solute and the solvent in the salty well water.

[1]

Ans: Solute: salt; solvent: water (1).

(ii) Is the salty well water a uniform or a non-uniform mixture? Give a reason.

[1]

Ans: Uniform; salt is evenly distributed in water and is not visible separately (1).

(iii) What happens to the concentration of the solution as water evaporates during boiling?

[1]

Ans: It increases; the solution becomes more concentrated because the amount of solvent decreases (1).

(iv) Why do salt crystals finally appear in the pan?

[1]

Ans: As water evaporates, the solution becomes more and more concentrated until no more salt can stay dissolved; when the water is gone, only salt is left as crystals (1).

(v) If some sand falls into the well water, what type of mixture does the sand form with water? Why?

[1]

Ans: A non-uniform mixture; sand is not evenly distributed and can be seen separately (it settles at the bottom) (1).

~ All the Best! ~