Solutes and Solvents

Name: _____ Class: _____ Date: _____

Quick Reference

Solute: the substance that dissolves. Solvent: the substance that does the dissolving. Solution: a homogeneous mixture in which a solute is evenly distributed in a solvent.

A homogeneous mixture has uniform composition throughout. A heterogeneous mixture is not uniform. A pure substance contains only one chemical substance; a solution contains at least two substances physically mixed.

Part A: Multiple Choice (10 marks)

1. In salt water, which substance is the solute?

   A. Salt
   B. Water
   C. Glass
   D. Air

2. What is a solvent?

   A. A substance that must be solid
   B. The substance that dissolves the solute
   C. A substance that never mixes
   D. A pure element

3. Which is a homogeneous mixture?

   A. Sand and water
   B. Oil and water
   C. Filtered salt water
   D. Granite

4. Which statement about solutions is correct?

   A. All solutions are solids
   B. Solutions are pure substances
   C. Solutions always contain water
   D. Solutions are uniform mixtures

5. Which is a pure substance?

   A. Distilled water
   B. Air
   C. Lemonade
   D. Seawater

6. Which is a heterogeneous mixture?

   A. Vinegar
   B. Muddy water
   C. Air
   D. Brass

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7. In sugar dissolved in tea, what is the solute?

A. Cup
B. Water vapour
C. Sugar
D. Spoon

8. Why is salt water not a pure substance?

A. It is colourless
B. It contains atoms
C. It is a liquid
D. It contains water and dissolved salt

9. Which everyday example is generally a gaseous solution?

A. Clean, dry air
B. Sand
C. Ice
D. Pure copper

10. Which observation supports that a mixture is homogeneous?

A. It separates into layers
B. Samples from different locations have the same composition
C. Solid pieces settle to the bottom
D. Different regions have different colours

Part B: Identify the Solute and Solvent (10 marks)

For each example, identify the solute and solvent. (2 marks each)

Example	Solute	Solvent
11. Sugar dissolved in water		
12. Salt dissolved in water		
13. Carbon dioxide dissolved in water (sparkling water)		
14. Iodine dissolved in ethanol (tincture of iodine)		
15. A small amount of food colouring dissolved in water		

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Part C: Classifying Matter (10 marks)

Classify each as a pure substance, homogeneous mixture, or heterogeneous mixture. (1 mark each)

Substance	Classification
16. Pure gold	
17. Salt water (fully dissolved)	
18. Oil and water in separate layers	
19. Distilled water	
20. Clean air	
21. Sand mixed with water	
22. Vinegar	
23. Pure oxygen gas	
24. Granite	
25. Brass (uniform copper–zinc alloy)	

Part D: Explain Your Reasoning (10 marks)

26. Explain why a salt-water solution is a mixture rather than a pure substance. (2 marks)

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27. A student says, "If I cannot see the sugar, it has disappeared." Explain why this is incorrect. (2 marks)

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28. Explain how you could distinguish a homogeneous mixture from a heterogeneous mixture by examining samples taken from different parts. (2 marks)

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29. Why is it incorrect to say that every solution is a liquid? Give one example. (2 marks)

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30. A beaker contains water and undissolved sand. Explain why this is not a solution. (2 marks)

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Part E: Science in Everyday Life (10 marks)

31. A student adds 5 g of salt to 100 mL of water and stirs until no crystals remain. Identify the solute, solvent, and type of mixture formed. (3 marks)

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32. A bottle of salad dressing separates into oil and vinegar layers. Classify the mixture and explain your answer. (2 marks)

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33. A student prepares two clear drinks: one is pure distilled water and the other is sugar dissolved in water. Explain one way their compositions differ, even though both look uniform. (2 marks)

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34. Give an example of a solution used at home, identify its solute and solvent, and explain one use. (3 marks)

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Teacher Answer Key — Solutes and Solvents

Part A (10 marks): 1 A; 2 B; 3 C; 4 D; 5 A; 6 B; 7 C; 8 D; 9 A; 10 B.

Part B (10 marks): 11 sugar / water; 12 salt / water; 13 carbon dioxide / water; 14 iodine / ethanol; 15 food colouring / water. Award 1 mark per correct identification.

Part C (10 marks): 16 pure substance; 17 homogeneous mixture; 18 heterogeneous mixture; 19 pure substance; 20 homogeneous mixture; 21 heterogeneous mixture; 22 homogeneous mixture; 23 pure substance; 24 heterogeneous mixture; 25 homogeneous mixture.

Part D (10 marks): 26 It contains two substances (salt and water) (1) physically mixed, not one pure chemical substance (1). 27 Sugar particles remain present (1) but are distributed throughout the water (1). 28 Homogeneous samples have the same composition (1); heterogeneous samples can differ by location (1). 29 Solutions can be gases or solids (1); e.g., air or brass (1). 30 Sand does not dissolve evenly (1); the mixture is heterogeneous (1).

Part E (10 marks): 31 salt (1), water (1), homogeneous mixture/solution (1). 32 Heterogeneous mixture (1) because separate layers/nonuniform composition are visible (1). 33 Distilled water is a pure substance (1); sugar water contains two substances physically mixed (1). 34 Accept any scientifically correct example (e.g., salt water for cooking): solute (1), solvent (1), appropriate use (1).

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