Cambridge Lower Secondary Science
Chapter 2: Properties of Materials (Solutions & Dissolving)

Student Practice Worksheet

Section 1: Multiple Choice Questions

Select the single best answer for each question by circling the correct letter.

1. What do we call the solid substance that dissolves into a liquid?

A. Solvent
B. Solution
C. Solute
D. Mixture

2. Which of the following liquids is opaque and therefore NOT a true solution?

A. Copper sulfate in water
B. Milk
C. Saltwater
D. Sugar dissolved in black tea

3. A student dissolves 15 g of salt into 50 g of water. What is the total mass of the resulting solution?

A. 50 g
B. 15 g
C. 65 g
D. Mass cannot be determined

4. What term describes a solution in which absolutely no more of the solid will dissolve?

A. Dilute
B. Soluble
C. Saturated
D. Concentrated

5. Which process requires two substances (a solute and a solvent) to occur?

A. Melting
B. Freezing
C. Boiling
D. Dissolving

6. In a scientific investigation, what do we call the variable that you intentionally choose to change?

A. Dependent variable

B. Independent variable
C. Control variable
D. Anomalous variable

7. When drawing a graph of your experimental results, where should the independent variable be placed?

A. On the vertical axis (y-axis)
B. On the horizontal axis (x-axis)
C. It does not matter
D. In the title

8. How does temperature generally affect the solubility of most solid solutes in water?

A. Solubility decreases as temperature increases
B. Temperature has no effect on solubility
C. Solubility increases as temperature increases
D. The solute becomes insoluble

9. Which of the following statements about a dilute solution is true?

A. It contains more solute particles than a concentrated solution.
B. It contains fewer solute particles than a concentrated solution.
C. No more solute can dissolve in it.
D. It is always completely colourless.

10. What is paper chromatography used for?

A. To melt solid substances
B. To conserve the mass of a solution
C. To separate and identify substances in a sample
D. To measure the temperature of a solvent

Section 2: Fill in the Blanks

Complete the following sentences with the correct scientific terms.

11. When sugar dissolves in water, the sugar particles spread out among the water particles, forming a uniform mixture called a _____.

12. All true solutions are _____, which means you can see light clearly through them.

13. During the process of dissolving, no mass is lost; scientists say the mass has been _____.

14. A solid, such as iron filings, that will not dissolve in water is described as _____.

15. If a solution has a very high number of solute particles dissolved in the solvent, it is described as a _____solution.

16. The variable that you measure in an experiment (such as the mass of salt dissolved) is called the _____variable.

17. To ensure a fair test, you must keep certain conditions exactly the same; these are called _____variables.

18. When planning a solubility investigation using temperature, the gap you choose between your temperatures (e.g., 10°C, 20°C, 30°C) is known as the _____.

19. Candle wax turning to liquid as a candle burns is an example of _____, not dissolving.

20. In an experiment, if you measure temperatures from 10°C up to 80°C, this spread of temperatures is known as your _____.

Section 3: True or False

State whether each statement is True or False. If False, briefly explain why on the lines provided.

21. When a sugar cube is dissolved in water, the sugar particles disappear and no longer exist. _____

22. A transparent solution can still have a colour, like blue copper sulfate. _____

23. Melting butter in a hot frying pan is a chemical example of dissolving. _____

24. If 9 g of salt is dissolved in 50 g of water, the final mass of the solution will be exactly 59 g. _____

25. A saturated solution can dissolve plenty of additional solute if you stir it without heating it. _____

26. Scientists often measure the solubility of a solute by finding out how many grams will dissolve in exactly 100 g of water. _____

27. When plotting a graph of your results, the dependent variable is always placed on the vertical axis. _____

28. Sodium chloride and sugar are both examples of insoluble substances. _____

29. To compare the solubility of two different salts fairly, you must use the same volume and type of solvent. _____

30. As water particles vibrate and slide past one another, they bump into solid sugar particles, which helps separate them during dissolving. _____

Section 4: Matching

Match the items in Column A with their correct descriptions in Column B by writing the correct letter on the line.

31. The Dissolving Process

1. Solute	_____	A. The mixture formed
2. Solvent	_____	B. The solid that is dissolving
3. Solution	_____	C. The liquid doing the dissolving

32. Visual Properties of Liquids

1. Transparent	_____	A. Cannot see through it (like milk)
2. Opaque	_____	B. Looks like pure water with no hue
3. Colourless	_____	C. Can see through it (even if it has a hue)

33. Solution Types

1. Concentrated	_____	A. Contains very few solute particles
2. Dilute	_____	B. Cannot dissolve any more solute
3. Saturated	_____	C. Contains a large number of solute particles

34. Identifying Variables

1. Independent	_____	A. The condition you measure
2. Dependent	_____	B. The condition kept the same
3. Control	_____	C. The condition you intentionally change

35. Scientific Processes

1. Melting	_____	A. Requires two substances to mix
2. Dissolving	_____	B. Separates and identifies substances in a sample
3. Paper Chromatography	_____	C. Requires only one substance and heat

Section 5: Short Answer Questions

Provide a brief, accurate answer for each question on the lines provided.

36. Explain the difference between the terms “transparent” and “opaque” when describing liquids.

37. Use particle theory to explain what happens to the tightly packed particles of a sugar crystal when it is placed in water.

38. Why is it scientifically incorrect to say that salt “disappears” when it is mixed into water?

39. Write the simple word equation that proves mass is conserved during dissolving.

40. Define the term “solubility” as it is commonly measured in a science laboratory.

41. State the difference between an “insoluble” solid and a “soluble” solid, giving one example of an insoluble solid.

42. Why does stirring a mixture help a solute dissolve faster?

43. If a student is investigating how the volume of water affects how much salt can dissolve, name two control variables they must keep the same.

44. Explain why the solubility of most solid solutes increases when the solvent is heated.

45. In paper chromatography, why do different substances in a mixture separate into distinct spots as the solvent moves up the paper?

Section 6: Application & Data Interpretation

Apply your scientific knowledge to solve these specific scenarios. Show your working where appropriate.

46. Data Calculation: The solubility of sodium chloride is 36 g in 100 g of water at 20°C. Exactly how much sodium chloride would dissolve in just 50 g of water at 20°C? Show your working.

47. Data Calculation: If 204 g of sugar can dissolve in 100 g of water at 20°C, how much sugar will dissolve in 200 g of water at 20°C? Show your working.

48. Graph Analysis: A student plots a line graph showing the temperature of water on the x-axis and the mass of dissolved copper sulfate on the y-axis. One of the plotted points sits far away from the smooth trend of the line. What is the scientific term for a result that does not fit the pattern?

49. Experimental Design Flaw: Marcus wants to compare the solubility of Salt A and Salt B. He dissolves Salt A in 50 cm^3 of hot water, and Salt B in 100 cm^3 of cold water. Explain why his results will be invalid.

50. Application: A food scientist places a spot of black ink from a child's candy packaging onto chromatography paper and places it in a solvent. After 10 minutes, there are three distinct spots on the paper (red, yellow, and blue). What does this prove about the black ink?