

Grade 7 Natural Science Worksheet

Assessment Task: Physical Sciences: liquids

The effect of temperature on the solubility of liquids

1. What do the following terms mean? Explain the terms and give examples.

1. Solute
2. Solvent
3. Solution

[12 marks]

When we talk about solubility, we are referring to how easy it is to dissolve a solute in a solvent to make a solution.

The solubility of liquids is affected by the temperature of the solvent.

2. Design and carry out an experiment using coffee powder and water to show how the solubility of water is affected by heat. Write up your procedure as a scientific investigation.

[40 marks]

Rubric to assess scientific investigation

Criteria	Level 4	Level 3	Level 2	Level 1
Research question	Well articulated, based on careful observation, excellent scope for investigation. [5 marks]	Well stated, based on observation, good scope for investigation. [4 marks]	Fairly well stated, observations made, will permit investigation. [3 marks]	Vaguely stated, not really based on observation, limited scope for investigation. [2 marks]
Hypothesis	Well stated prediction, testable. [3 marks]	Prediction is stated, testable. [2 marks]	Vague statement, not really testable. [1 mark]	None. [0 marks]
Method:	Fully listed.	Incomplete.	Incomplete.	None.
Materials	[2 marks]	[1 mark]	[0 marks]	[0 marks]
Method:	Logical detailed	Detailed	Basic description	Vague description

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Steps taken	description of methods, can be clearly followed, innovative, valid hypothesis testing. [10 marks]	description of methods, easy to follow, some evidence of innovation, largely valid hypothesis testing. [8 marks]	of methods, generally logical, not very innovative, does address hypothesis in tenuous way. [5 marks]	of methods, flaws in logic, no innovation, no real valid hypothesis testing. [3 marks]
Method:	Excellent steps taken to ensure fair test and reliability. [6 marks]	Good steps taken to ensure fair test and reliability. [4 marks]	Some steps taken to ensure fair test and reliability. [2 marks]	Not a fair test. [0 marks]
Fair test				
Results and discussion	Results recorded in a meaningful manner and displayed in a way which communicated findings logically and clearly, results discussed intelligently showing understanding of the information. [10 marks]	Results accurately recorded, displayed appropriately, discussed in a basic way showing a good grasp of the information investigated. [7 marks]	Results adequately recorded, adequate display of results, discussion covered most of the results and showed a fair grasp of the information investigated. [5 marks]	Results not accurately or appropriately recorded or displayed, discussion inadequate with flaws in thinking and grasp of information. [3 marks]
Conclusions	Well drawn from the research, sensible inferences made relate back to hypothesis. [4 marks]	Drawn fairly well from research, makes some reference to hypothesis. [3 marks]	Faulty reasoning in conclusion, no relation to hypothesis. [2 marks]	No conclusions offered. [0 marks]

3. Design and carry out an experiment using a carbonated cold drink such as Coca Cola or Sprite to show how carbon dioxide gas dissolved in the cold drink is affected by temperature. Write up your procedure as a scientific investigation.

[40 marks]

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Suggested Solutions

Question number	Possible marks	Solution
1.1	4	Solute: the substance, usually a solid ✓, that is being dissolved ✓ in the solvent (or liquid); for example coffee powder ✓ (which is dissolved in water); sugar (which is dissolved in milk), etc. ✓
1.2	4	Solvent: the liquid ✓ in which the solute is dissolved ✓; for example, water (in which the coffee powder is dissolved) ✓, alcohol (in which sugar is dissolved), etc. ✓
1.3	4	The resulting combination of the solute and the solvent ✓; the mixture that results when the solute is dissolved in the solvent ✓; for example, the coffee that one drinks ✓, milk, ✓ etc.
2	40	The increase in temperature causes the molecules of the solvent to move faster; this brings about an increase in solubility. The learners will probably demonstrate the increased solubility by showing that it is easier or takes less time, to dissolve a spoonful of coffee powder in hot water than it does to dissolve the same amount of coffee powder in cold water. See rubric in Appendix of Assessment Tools.
3	40	However, the opposite is true of gases dissolving in liquids. With gases, the colder the solvent, the more soluble the gas is. Think of fizzy or carbonated soft drinks, such as Coke. The gas making the bubbles in these drinks is carbon dioxide. The carbon dioxide is dissolved in water along with sugar and other flavourants. The colder the cold drink, the more gas it has dissolved in it. If you leave the cold drink in a warm place, the gas escapes from the cold drink more readily than if it was left in a cold place. See rubric in Appendix of Assessment Tools.

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Appendix of Assessment Tools

Rubric to assess scientific investigation

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