

Separating Mixtures: The Science of Solutions

Learning objective: To understand how to recover a substance from a solution and identify appropriate techniques for separating mixtures of solids, liquids, and gases.

Read each question carefully and apply your knowledge of scientific properties. Show your working for any calculations or logical explanations.

Nova the owl is experimenting with different mixtures in her laboratory. She has a beaker of saltwater, a bowl of mixed sand and gravel, and a cup of muddy water. Help Nova determine the best way to separate these materials using your knowledge of physical properties.

Word bank: solution · dissolve · evaporation · filtration · solute · solvent · residue · filtrate

1. Nova has a mixture of sand and water. Explain why filtration is an effective method to separate these two substances, and identify which part will remain in the filter paper. (2 marks)

2. A salt solution is clear, and the salt cannot be seen. Justify why filtration would fail to separate the salt from the water in this scenario. (2 marks)

3. Describe the process of evaporation. How would Nova use this method to recover solid salt from a saltwater solution? (2 marks)

4. Compare and contrast a 'mixture' and a 'solution'. Provide one example of each from everyday life. (2 marks)

5. Max the monkey has a mixture containing iron filings, sand, and sugar. He wants to separate them into three separate piles. Propose a step-by-step scientific method Max could use to achieve this. (4 marks)

6. What might happen if Nova attempted to evaporate a mixture containing both salt and sugar? Explain your reasoning. (3 marks)

Draw: Draw a scientific diagram of a filtration setup. Label the funnel, the filter paper, the beaker, the residue, and the filtrate clearly.



Extension challenge: Design an investigation to determine if the temperature of the water affects the speed at which sugar dissolves. Write a prediction, identify the variables you will control, and explain how you will ensure your results are reliable.