

Nova's Laboratory: The Mystery of Mixtures

Learning objective: To understand that some materials can be separated after being mixed, while others form solutions.

Read the passage carefully and answer the questions below. Think deeply about the scientific processes described.

Nova the barn owl is a keen scientist who loves exploring how substances interact. One afternoon, she conducted an experiment in her forest laboratory. She combined a cup of water with a spoonful of sugar, stirring until the sugar vanished into a clear solution. However, when she mixed sand into a second beaker of water, the grains remained visible, settling at the bottom. Nova explained that while sugar dissolves to form a solution, sand is insoluble. To retrieve the sand, she used a piece of filter paper to separate the solid from the liquid. Later, she wanted to recover the sugar from the first beaker. She placed the solution in a warm spot, allowing the water to undergo evaporation. Eventually, the water turned into vapour, leaving behind sparkling sugar crystals. Nova marvelled at how these mixtures could be manipulated. By understanding the properties of materials, such as solubility and particle size, she could always revert a mixture back to its original components. Whether using a sieve, filter, or heat, Nova proved that science is the art of unravelling the world's hidden patterns.

Word bank: mixture · solution · dissolve · solute · solvent · evaporation · residue · separate

1. Identify two specific methods Nova used to separate the materials from the water. (2 marks) (2 marks)

2. Based on the text, what is the key difference between the sugar-water mixture and the sand-water mixture? (2 marks) (2 marks)

3. Explain why Nova needed to use a heat source to recover the sugar, but not to recover the sand. (3 marks) (3 marks)

4. What might happen if Nova tried to use a simple filter paper to separate the dissolved sugar from the water? Justify your answer. (3 marks) (3 marks)

5. Do you think it is more useful for a scientist to create a solution or a simple physical mixture? Justify your opinion. (3 marks) (3 marks)

Draw: Draw a scientific diagram showing Nova's laboratory bench. Include two beakers: one containing a clear solution and one showing a mixture with sediment at the bottom. Label the components correctly.



Extension challenge: Research a real-world scenario where separating mixtures is essential for human survival or industry, such as desalination plants or recycling centres. Write a short paragraph explaining the process involved.