Tracking Labeled Salt in a Saturated Bath

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A model salt solution is saturated at a fixed temperature and contains undissolved crystals. Some dissolved chloride ions have a stable isotope label. The label distinguishes them in the simulation and does not change how they interact with the salt. The crystals start without the label.

Measurement	**Start**	**After 20 min**
Mass of undissolved crystals	3.0 g	3.0 g
Total dissolved salt concentration	Same fixed value	Same fixed value
Labeled chloride detected in crystals?	No	Yes

1 Which process must have occurred to account for the new label in the crystals?

(1) Labeled chloride left the solution and entered the crystals.

(2) The crystals released labeled chloride into the solution.

(3) The isotope label changed the chloride into a different element.

(4) The crystals increased in total mass.

2 Use the unchanged masses and the label result to explain how ions can keep moving between solid and solution. [1]

Answer and work

The class repeats the model and adds pure water at the same temperature. It stirs and waits until the solution is saturated again. Some undissolved salt remains.

3 Predict whether the mass of undissolved salt is greater or less after adding the water. Explain what must happen before the solution returns to saturation. [1]

Answer and work

4 After saturation returns, how does the final concentration compare with the concentration before the water was added? Explain why this does not require the same dissolved amount. [1]

Answer and work