When a Seed Crystal Grows or Shrinks

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

A display holds two sodium acetate solutions at 20 °C. Each has 100 g of water. The model tracks dry sodium acetate, and no water enters the crystal. At 20 °C the equilibrium capacity is 46 g sodium acetate per 100 g water. A technician adds an 8 g sodium acetate crystal to each clear solution. No sodium acetate or water leaves either tube.

Tube	Solid added (g)	Solid remaining at equilibrium (g)	Dissolved at equilibrium (g)
P	8	4	46
Q	8	14	46

1 In which tube does sodium acetate move from the solid into solution on balance?

(1) P only

(2) Q only

(3) Both tubes

(4) Neither tube

2 Calculate the mass of dissolved sodium acetate in each tube before the crystals were added. Show how the solid measurements enter the calculation. [1]

Answer and work

3 A student uses the matching final dissolved masses to argue that the starting solutions had the same concentration. Evaluate the claim with the solid readings and the water mass. [1]

Answer and work

A repeat uses a fresh tube prepared with the same starting solution as P. The technician adds only 2 g of solid sodium acetate and allows the tube to reach equilibrium at 20 °C. The water mass remains 100 g.

4 Predict the dissolved mass and the solid mass in the repeat. Explain whether the final dissolved mass reaches 46 g. [1]

Answer and work