Tracking Salt Through Repeated Water Replacement

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

A classroom aquarium model starts with 4.0 L of uniformly mixed water containing 20 g of dissolved salt. Each time the class drains water, the water taken out has the same concentration as what remains. Pure water can be added to restore the starting volume.

Plan	First operation	Second operation
J	Drain 1.0 L and restore volume	Mix, then drain 1.0 L and restore volume
K	Drain 2.0 L and restore volume	None

1 How much salt does the first operation of plan J remove?

(1) 1.0 g

(2) 4.0 g

(3) 5.0 g

(4) 10 g

2 Calculate how much salt remains at the end of plan J. Show how the second liter differs from the first. [1]

Answer and work

3 Which plan leaves less dissolved salt? Explain how the timing of the refill accounts for the difference. [1]

Answer and work

In a repeat of plan J, a student restores the volume with water containing 1.0 g of salt per liter instead of pure water.

4 Predict whether the final salt mass will be higher or lower than in the original plan J. Explain why some of the salt in the first refill still affects the result. [1]

Answer and work