Checking Solution Volume With an Air Gap

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

A class fills a transparent measuring barrel to prepare a salt solution. In this barrel the scale reports the total volume occupied by liquid and any trapped air. The solute is fully dissolved in the liquid. The amount of solute is 0.012 mol in both preparations.

Preparation	Scale reading (mL)	Trapped air volume (mL)
P	100	0
Q	100	20

1 What is the actual liquid volume in Q?

(1) 20 mL

(2) 80 mL

(3) 100 mL

(4) 120 mL

2 Calculate and compare the molar concentrations of the two solutions. [1]

Answer and work

The class removes the air from Q without losing liquid. It can then add pure water without losing any solute. Assume the liquid volumes add in this model.

3 Find the amount of water to add so Q has the same concentration as P. Explain how the measurement should be made. [1]

Answer and work

4 A student says removing the air itself reduced Q’s concentration before any water was added. Evaluate the claim. [1]

Answer and work