Checking Equal Pressure in Warm and Cool Chambers

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

Two rigid gas chambers have the same volume. A narrow tube lets gas pass between them. A controller holds chamber P at 300 K and chamber Q at 450 K. The model treats pressure as proportional to particle count times absolute temperature when volume stays fixed.

Chamber	Temperature (K)	Particle count (model units)	Pressure (kPa)
P	300	60	100
Q	450	40	100

1 Which comparison explains how the chambers can have the same pressure in this model?

(1) They contain the same number of particles.

(2) They have the same absolute temperature.

(3) The particle count times absolute temperature is the same.

(4) The particle count divided by absolute temperature is the same.

The class closes the connecting tube and cools Q to 300 K. P stays at 300 K. Neither chamber loses any gas while the tube is closed.

2 Calculate the new pressure in Q before reopening the tube. [1]

Answer and work

3 The tube is then reopened while both chambers remain at 300 K. Predict which chamber initially loses particles. Explain. [1]

Answer and work

4 A student says equal pressures after reopening imply that the chambers again have different particle counts. Evaluate the claim and predict both final counts. [1]

Answer and work