Testing Heat-Sealed Air Samples

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

A school lab tests two rigid containers holding air. Each container has the same fixed volume. At first the containers and their air samples are both at 300 K and 100 kPa absolute pressure. They warm to 330 K and are then returned to 300 K. The same pressure gauge is used throughout.

Stage	**Container R (kPa absolute)**	**Container S (kPa absolute)**
Before warming	100	100
After warming	110	99
Back at 300 K	100	90

1 Use the original pressure and temperature to predict the pressure at 330 K if the amount of gas stays fixed. Show your setup. [1]

Answer and work

2 At 330 K, container S has a lower pressure than R. A student concludes the particles in S have a lower average kinetic energy. Use the particle model to evaluate that conclusion. [1]

Answer and work

A student suggests that S might still contain its original amount of air and that the lower final pressure could be due solely to cooling back to 300 K.

3 Which two measurements best test that explanation? State what they imply about S. [1]

Answer and work

4 Under the model, what fraction of S’s initial amount of air remains when it returns to 300 K?

(1) 0.10

(2) 0.90

(3) 1.00

(4) 1.10