Joining Two Chambers in a Gas Model

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

A model has two rigid chambers connected by a closed gate. Each contains the same gas at 300 K. At this fixed temperature the amount of gas in a chamber is proportional to its absolute pressure multiplied by its volume. The gate can open without letting any gas leave the combined chambers.

Chamber	Volume (L)	Absolute pressure before opening (kPa)
Left	1.0	160
Right	2.0	100

1 Calculate pressure times volume for each chamber. Which starts with more gas? [1]

Answer and work

2 Which result should stay fixed when the gate opens and the gas reaches a common pressure at 300 K?

(1) The left chamber’s original pressure

(2) The right chamber’s original gas amount

(3) The total amount of gas in the combined chambers

(4) The pressure difference between chambers

After opening the gate, the gas occupies the combined volume at one pressure. The model still holds the temperature at 300 K.

3 Calculate the common absolute pressure. Show how the gas in both original chambers enters your setup. [1]

Answer and work

4 A student averages the two starting pressures equally. Explain why that approach gives a different result here. [1]

Answer and work

5 Which chamber gains gas after the gate opens? Use its starting and final pressures at fixed volume to explain. [1]

Answer and work