When a Model Syringe Reaches Its Stop

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

A classroom simulation adds gas to a syringe at fixed temperature. A movable piston keeps the pressure at 100 kPa until it reaches a stop at 60 mL. After that the volume stays fixed. Gas does not escape.

Stage	Gas amount (model units)	Volume (mL)	Pressure (kPa)
Start	2.0	40	100
At the stop	3.0	60	100

1 Which quantity increased while the piston moved to the stop?

(1) Pressure only

(2) Gas amount and volume

(3) Temperature and pressure

(4) Neither volume nor gas amount

The model adds one more unit of gas after the piston has reached the stop. At fixed volume and temperature, gas pressure is proportional to gas amount.

2 Calculate the new gas pressure. Use the gas amount just before and just after the final addition. [1]

Answer and work

3 A student uses the first two rows to predict that the final volume will be 80 mL. Explain why that prediction does not fit the last stage. [1]

Answer and work

4 Suppose the stop is removed and the original pressure control still works. Predict how the volume would change as pressure returns to 100 kPa. [1]

Answer and work