Tracking Air Space as Liquid Level Rises

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

A rigid classroom gas model has an inside volume of 3.0 L. The model raises the liquid level by pumping in liquid, which displaces part of the gas space. The temperature stays fixed. The liquid neither supplies gas to nor absorbs gas from the headspace. Gas can leave through a small outlet. When no gas leaves, the product of absolute pressure and gas volume stays constant.

State	**Liquid volume (L)**	**Gas pressure (kPa)**
Before raising liquid level	1.0	100
After raising liquid level	1.5	120

1 What is the gas volume after the liquid level rises?

(1) 0.5 L

(2) 1.0 L

(3) 1.5 L

(4) 3.0 L

2 Calculate the pressure that would result after raising the level if all the original gas remained. [1]

Answer and work

3 Use the actual 120 kPa reading to evaluate whether compression alone accounts for the record. [1]

Answer and work

The model now holds the remaining gas without further loss. It returns the liquid to 1.0 L at the same temperature.

4 Predict the new gas pressure. Use the last measured pressure and the restored gas volume. [1]

Answer and work