Charles’s Law

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

For a fixed amount of gas at constant pressure, $V_1/T_1 = V_2/T_2$. Use Kelvin temperatures, with T(K) = T(°C) + 273.15.

1 A fixed sample occupies 0.600 L at 300 K. What volume will it occupy at 450 K if pressure stays constant?

(1) 0.400 L

(2) 0.600 L

(3) 0.900 L

(4) 1.35 L

2 A fixed gas sample is 1.50 L at 26.85 °C. Find its volume at 126.85 °C at constant pressure. Show the Kelvin conversions. [1]

Answer and work

_____

_____

3 Which graph shape represents volume versus Kelvin temperature in the ideal model at constant pressure and amount?

(1) A straight line through the origin with positive slope

(2) A horizontal line above zero

(3) A straight line through the origin with negative slope

(4) A curve whose volume decreases as temperature rises

4 A student predicts the volume will double when a gas is heated from 25 °C to 50 °C at constant pressure. Explain why that conclusion is incorrect. [1]

Answer and work

_____

_____

A Freely Moving Piston

Use the information below to answer the questions.

A fixed amount of gas in a freely moving piston reaches a new equilibrium in each trial. The gas pressure is the same in each row.

Trial	Temperature (K)	Volume (mL)
A	240	120
B	300	150
C	360	180

5 Calculate V/T for trials A and C with units. State what the results show. [1]

Answer and work

6 Which volume is consistent with the model at 400 K under the same pressure?

(1) 125 mL

(2) 160 mL

(3) 200 mL

(4) 240 mL

7 Describe how the particle motion and volume change from trial A to trial C. [1]

Answer and work

8 If the piston is locked and the same sample is warmed, which condition for using the given equation may no longer hold?

(1) The amount of gas is fixed.

(2) The gas has a measurable temperature.

(3) The pressure stays constant.

(4) The volume can be measured.