Gas Law Claims and Experimental Controls

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

For a fixed amount of gas, use $P_1V_1/T_1 = P_2V_2/T_2$ with absolute pressure and Kelvin temperature.

1 To isolate the effect of temperature on gas volume for a fixed sample, which condition should remain fixed?

(1) Temperature

(2) Pressure

(3) Volume

(4) Both temperature and volume

2 Explain why a larger final volume alone cannot prove that the gas temperature increased. [1]

Answer and work

_____

_____

3 Two ideal-gas readings have the same pressure and amount. Which temperature ratio predicts a doubling of volume?

(1) $T_2/T_1 = 1/2$ in Kelvin

(2) $T_2/T_1 = 1$ in Kelvin

(3) $T_2/T_1 = 2$ in Kelvin

(4) $T_2/T_1 = 2$ using any temperature scale

4 Explain why a leaking container can make the combined gas law fail to predict a change in its gas volume. [1]

Answer and work

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Comparing Piston Trials

Use the information below to answer the questions.

A sealed piston contains the same amount of gas in all trials. The gas reaches equilibrium at each stated temperature and pressure.

Trial	Temperature (K)	Pressure (kPa)	Volume (L)
A	300	100	1.20
B	350	100	1.40
C	300	120	1.00
D	350	120	1.17

5 Which pair isolates a pressure change while holding the temperature at 300 K?

(1) A and B

(2) A and C

(3) B and C

(4) C and D

6 Calculate the volume ratio V(B)/V(A) and temperature ratio T(B)/T(A). Round both to two decimal places. [1]

Answer and work

7 A student says the volume change from A to D measures only the effect of warming. Use the trial data to evaluate the claim. [1]

Answer and work

8 If the pressure stays at 120 kPa, what volume does the ideal model predict at 360 K starting from C?

(1) 0.83 L

(2) 1.00 L

(3) 1.20 L

(4) 1.44 L