Pressure and Temperature of Gases

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

For a fixed amount of gas in a rigid container, $P_1/T_1 = P_2/T_2$ in the ideal gas model. Use Kelvin temperatures and absolute pressures.

1 A gas in a sealed rigid tank has a pressure of 80.0 kPa at 250. K. What is its pressure at 375 K in this model?

(1) 53.3 kPa

(2) 80.0 kPa

(3) 120. kPa

(4) 200. kPa

2 A gas is at 90.0 kPa and 26.85 °C in a sealed rigid tank. Find its pressure at 66.85 °C. Show the Kelvin conversion. [1]

Answer and work

_____

_____

3 Explain how heating a gas in a sealed rigid tank increases pressure using particle motion. [1]

Answer and work

_____

_____

4 Which two quantities must be fixed for the given pressure–temperature equation to apply?

(1) Pressure and temperature

(2) Volume and amount of gas

(3) Temperature and amount of gas

(4) Volume and pressure

Pressure Sensor Test

Use the information below to answer the questions.

A pressure sensor monitors a sealed, rigid gas cell at three Kelvin temperatures. The table shows idealized readings after the temperature settles.

Trial	Temperature (K)	Pressure (kPa)
A	280	84
B	320	96
C	360	108

5 Calculate P/T for trials A and C with units. What relationship do these readings support? [1]

Answer and work

6 What pressure is consistent with the model at 400 K?

(1) 96 kPa

(2) 108 kPa

(3) 120 kPa

(4) 144 kPa

7 The sensor is moved to a sealed cell whose walls expand when heated. Explain why the original relationship may no longer fit the readings. [1]

Answer and work

8 Which property is greater in trial C than in trial A?

(1) The number of gas particles

(2) The volume of the cell

(3) The average kinetic energy of the gas particles

(4) The mass of one gas particle