

Answer on Question #56886 – Chemistry – General Chemistry

Question:

A sample of an ideal gas has a volume of 2.28 L at 279 K and 1.07 atm. Calculate the pressure when the volume is 1.03 L and the temperature is 307 K.

Answer:

The combined gas law is a gas law that combines Charles's law, Boyle's law, and Gay-Lussac's law. The ratio between the pressure-volume product and the temperature of a system remains constant.

This can be stated mathematically as:

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

where:

P_1 , P_2 are the pressures at conditions 1 and 2, respectively;

V_1 , V_2 are the volumes at conditions 1 and 2, respectively;

T_1 , T_2 are the temperature measured in kelvin at conditions 1 and 2, respectively.

$$P_2 = \frac{P_1 V_1 T_2}{T_1 V_2} = \frac{2.28 * 1.07 * 307}{279 * 1.03} = 2.61 \text{ atm}$$

Answer: 2.61atm