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Combined Gas Law: (use for GASES ONLY when all THREE VARIABLES for a gas are CHANGING – nothing remains constant in this type of problem)

From Reference Table T:

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

P_1 = Initial Presure	V_1 = Initial Volume	T_1 = Initial Kelvin Temperature
P_2 = Final Pressure	V_2 = Final Volume	T_2 = Final Kelvin Temperature

**NOTE: You MUST use Kelvin (not °C) for the calculation to work!

Sample Problem 1: A gas has a volume of 100. mL at a temperature of 20.0 K and a pressure of 760. mmHg. What will be the new volume if the temperature is changed to 40.0 K and the pressure to 380. mmHg?

Sample Problem 2: An ideally behaving gas occupies 500. mL at STP. What volume does it occupy at 546 K and 980. KPa?

*Both Avogadro's Law and the Kinetic Molecular Theory can be used to explain the relationship between pressure, temperature, and volume of a gas.

Some Gas Law Problems to Try:

1. A gas has a volume of 75.0 mL at a temperature of 15.0 K and a pressure of 760. mm Hg. What will be the new volume when the temperature is changed to 40.0 K and the pressure is changed to 570. mm Hg?

2. The volume of a sample of a gas at 273°C is 200.0 L. If the volume is decreased to 100.0 L at constant pressure, what will be the new temperature of the gas?

3. What will be the new volume of 100. mL of gas if the Kelvin temperature and the pressure are both doubled?

4. A gas occupies a volume of 400. mL at a pressure of 330. torr and a temperature of 298 K. At what temperature will the gas occupy a volume of 200. mL and have a pressure of 660. torr?