

Worksheet #C51 The Combined Gas Law

When the pressure, volume, and temperature of a gas are changed, the combined gas law is used. If any of these three variables is unchanged, they cancel out.

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

Note: this only works when temperature is in degrees Kelvin. $K = ^\circ C + 273]$
 Pressure: 1.00 atm = 760. torr
 = 760. mmHg
 = 101.305 kPa
 = 14.7 psi

1. Complete the following chart:

	P₁	V₁	T₁	P₂	V₂	T₂
1.	1.59 atm	3.76 L	24°C	2.52 atm		33°C
2.	769 torr	256 mL	29°C		.247 L	51°C
3.	603 mmHg	2.87 L	22°C	1.45 atm	1.62 L	_____ °C
4.		.732 L	0°C	2.08 atm	501 mL	25°C
5.	15.9 psi	125 mL	_____ °C	730. torr	115 mL	198°C
6.	3.88 atm		100. °C	101 kPa	707 mL	20.°C

2. When temperature goes up, volume goes _____ (if the pressure stays the same).

3. If the volume goes down, pressure goes _____ (if the temperature stays the same).

4. An aerosol can contains 400. mL of compressed gas at 5.20 atm of pressure. When all of the gas is sprayed into a large plastic bag, the bag inflates to a volume of 3.52 L. What is the pressure of the gas inside the bag? (Assume constant temperature).

5. A 2.55 L balloon is at 1.15 atm of pressure at 25°C. You take it down in a submarine, where the pressure is increased to 952 torr and the temperature is reduced to a chilly -15°C. What will the volume of the balloon be down there?

6. The same lucky balloon from problem 5 is then taken up in an airplane, where the pressure is reduced to 10.6 psi and the temperature goes down even farther to -25.° C. What will its volume be now?

7. Let's say you have a 6.89 mL sample of nitrous oxide at 15°C and 730. mm Hg in another balloon. You take it to another room where the pressure is 119. kPa and notice that the volume of the balloon has changed to 7.50 mL. What must the temperature be in this new room? (answer in °C)