

Gas Laws

- 1) As temperature increases, volume increases
- 2) At constant temperature, as volume decreases pressure increases.
- 3) $485 \text{ K} = \underline{212} \text{ }^\circ\text{C}$
- 4) $-50^\circ\text{C} = \underline{223} \text{ K}$
- 5) What is STP? What values? standard temp + pressure (0°C , 1 atm)
- 6) What will be the new volume of 1.75 L of gas that is cooled from 25°C to 0°C at constant pressure?

$$\frac{1.75}{298} = \frac{V_2}{273} \quad V_2 = 1.60 \text{ L}$$
- 7) The volume of a gas is 4.85 L at 35°C . What is its volume at 55°C ?

$$\frac{4.85}{308} = \frac{V_2}{328} \quad V_2 = 5.16 \text{ L}$$
- 8) A 10.0 L sample of gas at 300°C is to be cooled at constant pressure until it reaches half its original volume. At what temperature will this sample reach half its volume?

$$\frac{10.0}{573} = \frac{5.0}{T_2} \quad T_2 = 286 \text{ K}$$
- 9) A sample of gas occupies 125 ml at standard pressure. What is its pressure when its volume is compressed to 75.0 ml ?

$$125(1) = 75(P_2) \quad P_2 = 1.67 \text{ atm}$$
- 10) A sample of gas occupies 2.50 L at 1.15 atm of pressure. What is its volume at standard pressure?

$$(2.50)(1.15) = V_2(1) \quad V_2 = 2.88 \text{ atm}$$
- 11) A sample of gas occupies a volume of 20.0 L at a pressure of 1.15 atm and a temperature of 0°C . What will be its volume at a pressure of $.974 \text{ atm}$ and a temperature of 50°C ?

$$\frac{20.0(1.15)}{273} = \frac{V_2(.974)}{323} \quad V_2 = \overset{28.0}{\cancel{30.4}} \text{ L}$$
- 12) A sample of gas occupies a volume of 20.0 L at a pressure of 1.15 atm and a temp of 0°C . What will be the pressure if the volume changes to 15.0 L and the temp to 50°C ?

$$\frac{(20)(1.15)}{273} = \frac{15.0(P_2)}{323} \quad P_2 = 1.81 \text{ atm}$$
- 13) A sample of gas occupies $.575 \text{ L}$ at 1.50 atm and 125°C . At what pressure will its volume be $.300 \text{ L}$ at 20°C ?

$$\frac{(575)(1.50)}{398} = \frac{(300)(P_2)}{293} \quad P_2 = 2.12 \text{ atm}$$
- 14) A sample of gas occupies 2.30 L at 825 mmHg and 70°C . What is its volume at STP?

$$(2.30)(825) = \frac{(V_2)(760)}{273} \quad V_2 = 1.99 \text{ L}$$
- 15) A flask containing 155 ml of hydrogen gas is collected under 2.3 atm of pressure. What pressure would be required to collect 90 ml ?

$$(155)(2.3) = (90)P_2 \quad P_2 = 3.96 \text{ atm}$$
- 16) A balloon filled with helium gas has a volume of 500 ml at 1 atm . After the balloon is released it reaches an altitude where the pressure is only $.5 \text{ atm}$. What is the volume of the balloon now?

$$(500)(1) = V_2(.5) \quad V_2 = 1000 \text{ mL}$$
- 17) At standard temperature a gas has a volume of 275 ml . If the temperature is increased to 130°C , what is the new volume?

$$\frac{275}{273} = \frac{V_2}{403} \quad V_2 = 406 \text{ mL}$$

18) A helium balloon has a volume of 2.75L at 20 C. The volume decreases to 2.46L on a cold day. What is the temperature that causes the balloon to occupy 2.46L?

$$\frac{2.75}{293} = \frac{2.46}{T_2} \quad T_2 = 262 \text{ K}$$

19) The volume of a gas is 27.5ml at 22 C and 740 mm Hg. What will its volume be at 15 C and 755 mmHg?

$$\frac{(27.5)(740)}{295} = \frac{V_2(755)}{288} \quad V_2 = 26.3 \text{ L}$$

20) A 700 ml gas sample at STP is compressed to 200 ml and the temperature is increased to 30 C. What is the new pressure of the gas?

$$\frac{700(1)}{273} = \frac{200 P_2}{303} \quad P_2 = 3.88 \text{ atm}$$

21) Before a trip from New York to Boston, the pressure in an auto tire is 1.8 atm at 20 C. At the end of the trip the gauge reads 1.9 atm, what is the temperature of the air in the tire now?

$$\frac{1.8}{293} = \frac{1.9}{T_2} \quad T_2 = 309 \text{ K}$$

* STOP *

Gay-Lussac's Law

Using the online animation, collect data on how the pressure changes as the temperature changes. Graph the data when you are finished.

Temp (K)	Pressure

