Gas Laws-Virtual STEM Lab

Background

In this investigation you will examine three gas laws including Boyle's Law, Charles' Law and Gay-Lussac's Law. You will explore how manipulating the variables of volume (L), pressure (atm) and temperature (K) can affect a sample of gas. The formula for each of the gas laws are:

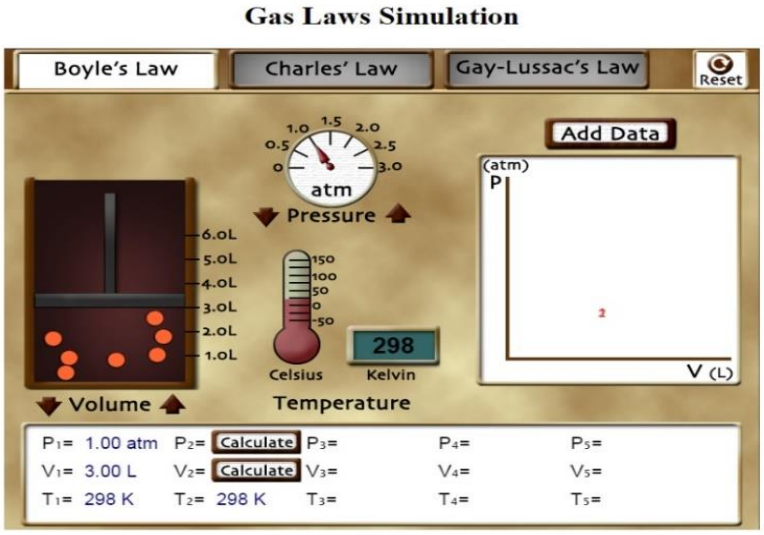
Boyle's Law:	Charles' Law:	Gay-Lussac's Law:
$P_1V_1 = P_2V_2$	$\frac{V_1}{T_1} = \frac{V_2}{T_2}$	$\frac{P_1}{T_1} = \frac{P_2}{T_2}$

Procedure

Visit http://www.teachchemistry.org/gaslaws.

I. Boyle's Law

Make sure that you select the "Boyle's Law" tab to begin; it will be shown in white. You should see the picture below on your screen.



1. Which one of the three variables: Pressure, Volume or Temperature cannot be changed in Boyle's Law? This variable is considered a constant.

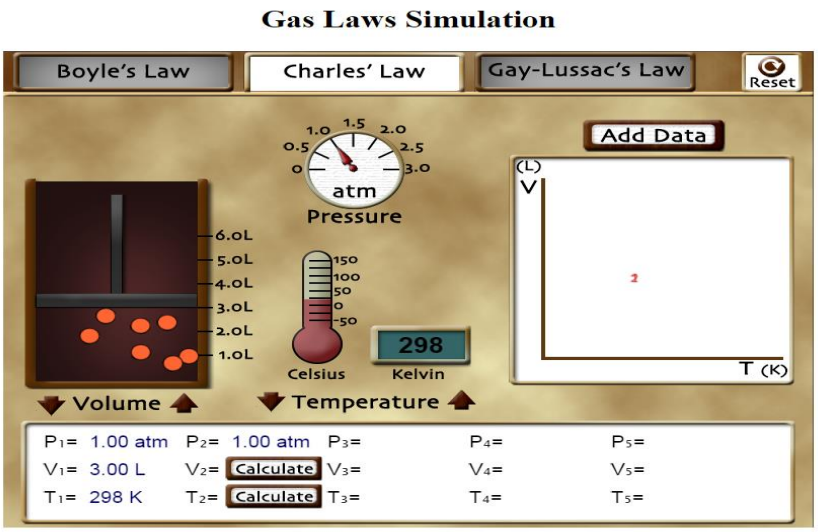
2. Using the volume control arrows, reduce the volume of the gas to **1.70L**.
    a. In the space below record your observations regarding the behavior of the particles in the gas sample as the volume is reduced. Make certain to discuss *collisions* in your comments.

    b. Calculate the new pressure P_2 for the gas, **showing all of your work** in the table below.
    Check your final answer for part b by clicking the *calculate* button next to P_2.

a. Observations when Volume is *reduced*:	b. Calculation
	$P_1V_1 = P_2V_2$

II. Charles' Law

Change the simulation to "Charles' Law" by clicking the tab at the top of the screen it will be shown in white. You should see the picture below on your screen.



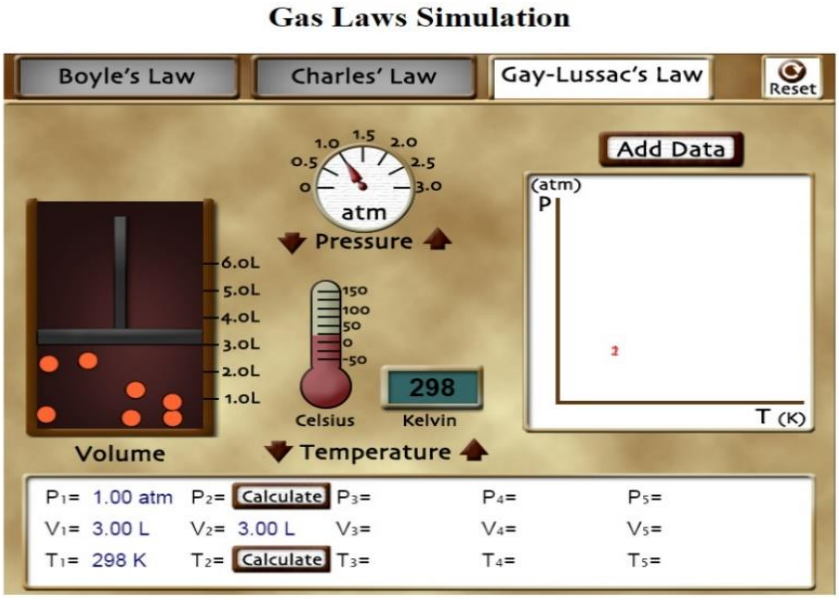
1. a. Using the Temperature controls increase the temperature of the gas. What changes do you observe in the behavior of the particles of the gas while the temperature is increased?

   b. Continue to increase the temperature value until **T_2 = 408K**. Using the equation for Charles' law, calculate the volume of the gas at this increased temperature. Check your final answer for part b by clicking the *calculate* button next to V_2:

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

III. Gay-Lussac's Law

Change the simulation to "Gay-Lussac's Law" by clicking the tab at the top of the screen it will be shown in white. You should see the picture below on your screen.



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

1. Which one of the three variables: Pressure, Volume or Temperature is considered constant in Gay Lussac's law?

2. a. Using the pressure control arrows, increase the pressure value to **1.40atm**, and fill in the corresponding T_2 value in the data table below.

P_1 = 1.00atm	P_2 = 1.40atm
T_1 =	T_2 =

Check your final answer for part b by clicking the *calculate* button next to T.