**Combined Gas Laws Lab Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***Station: Inverted Beaker with Candle***

1. Insert 1 candle into the clay in the center of the pie pan.
2. Light the candle, and place the beaker over the candle. Then, try 2 candles together; then 3, then 4.
3. Record Observations:
   1. 1 Candle
   2. 2 Candles
   3. 3 Candles
   4. 4 Candles
4. Explain what you observed using the relationships of PV=nRT and Kinetic Molecular Theory.

***Station: Calculations*** (You need to complete a MINIMUM of two calculations!)

* + - 1. 2. 3. 4.

***Station:  Syringe Apparatus***

1. Remove the red cap from the syringe.
2. Place a marshmallow into the syringe, press the plunger down to remove most of the air, and then replace the cap on the end of the syringe.

Record the starting position of the plunger: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Pull back on the plunger, ***without*** removing it from the syringe.

Final position of plunger\_\_\_\_\_\_\_\_\_\_\_

Record your observations:

1. Let go of the plunger, and record your observations:
2. What happens to the pressure inside the syringe as you pull back on it?  How do you know?  Explain what occurs when you let go of the syringe, based on pressure inside and outside of the syringe.
3. Explain what you observed using the relationships of PV=nRT and Kinetic Molecular Theory.

***Station: Calculations*** (You need to complete a MINIMUM of two calculations!)

* + - 1. 2. 3. 4.

***Station:  Inflate & Deflate a Balloon With Heat & Ice***

1. Bring the water to a boil on the hot plate.
2. Record observations:
3. After the water has boiled for a minute or two, use the crucible tongs to hold the bottom of the Erlenmeyer Flask into the ice water bath.  Swirl the flask in the ice bath.
4. Record observations:
5. Explain what you observed using the relationships of PV=nRT and Kinetic Molecular Theory.

***Station: Calculations*** (You need to complete a MINIMUM of two calculations!)

1. 2. 3. 4.

***Station:  Can Crush***

1. Place about a pinky finger’s width of water in the bottom of a soda can (just enough to fill the very bottom of the can), and place it on the hotplate.
2. Turn hotplate on HIGH, and allow the water to boil so that a steady stream of steam is coming out of the can opening.
3. Using beaker tongs along the bottom of the can, QUICKLY invert the can into an ice water bath.
4. Record observations:
5. Explain what you observed using the relationships of PV=nRT and Kinetic Molecular Theory.

**STATION: CALCULATIONS**

1. A tank has an internal volume of 12,000 L. What will be the volume of the gas in the tank be when the pressure goes from 1.0 atm to 1.4 atm?

2. Calcium carbonate decomposes at 1200° C to form carbon dioxide and calcium oxide. If 25 liters of carbon dioxide are collected at 1200° C, what will the volume of this gas be after it cools to 25° C?

3. 10.0 L of a gas is found to exert 97.0 kPa at 25.0°C. What would be the required temperature (in Celsius) to change the pressure to standard pressure (101.325 kPa)?

4. A weather balloon has a volume of 35 L at sea level (1.0 atm). After the balloon is released it rises to where the air pressure is 0.75 atm. What will the new volume of the weather balloon be?

**STATION: CALCULATIONS**

1. A toy balloon has an internal pressure of 1.05 atm and a volume of 5.0 L. If the temperature where the balloon is released is 20° C, what will happen to the volume when the balloon rises to an altitude where the pressure is 0.65 atm and the temperature is –15° C?

2. A small research submarine with a volume of 1.2 x 105 L has an internal pressure of 1.0 atm and an internal temperature of 15° C. If the submarine descends to a depth where the pressure is 150 atm and the temperature is 3° C, what will the volume of the gas inside be if the hull of the submarine breaks?

3. If divers rise too quickly from a deep dive, they get a condition called “the bends” which is caused by the expansion of very small nitrogen bubbles in the blood due to decreased pressure. If the volume of the bubbles in a diver’s blood is 15 mL and the water pressure is 12.75 atm with a temperature of 20° C, what is the volume of the bubbles when the diver has surfaced to standard temperature and pressure?

4. A bag of potato chips is packaged at sea level (1.00 atm and 25° C) and has a volume of 315 mL. If this bag of chips is transported to Denver (0.775 atm and 20° C), what will the new volume of the bag be?

**STATION: CALCULATIONS**

1. Calculate the volume 3.00 moles of a gas will occupy at 24.0 °C and 762.4 mm Hg.

2. How many moles of gas would be present in a gas trapped within a 100.0 mL vessel at 25.0 °C at a pressure of 2.50 atmospheres?

3. What volume will 1.27 moles of helium gas occupy at STP?

4. 1.09 **grams** of H2 is contained in a 2.00 L container at 20.0 °C. What is the pressure in this container in **mmHg**?