Ideal Gases Lab

Chemistry Name

**Lab 1: Boyle’s Law**

1. Grease a plastic stopper with some petroleum jelly and place onto the needle end of a syringe. Push the plunger and allow it to settle onto a value.
2. Place the syringe in an air-tight bottle. Grease the cap of the bottle and tightly close.
3. Attach an air pump and begin pumping. The instant you can read a value, begin taking data. Mark the pressure **(with correct units)**, and the volume reading **(with correct units)**.
4. Continue to pump and take data points (seven in total).
5. Graph your results.

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| --- | --- |
| **P ( )** | **V ( )** |
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**Lab 2 Charles’s Law**

1. Obtain three 400mL beakers of water. Designate one beaker as the COLD beaker, and place ice in this beaker. The next beaker should remain at ROOM TEMPERATURE (no ice). The final beaker should be the HOT beaker; this should be on a hot plate, but not boiling.
2. Grease a plastic stopper with some petroleum jelly and place onto the needle end of a syringe. Push the plunger and allow it to settle onto a value.
3. Place the syringe in a beaker. Allow the temperature and volume to settle. Record the data once settled.
4. Repeat so that all three beakers data are taken.
5. Convert the Celsius readings to Kelvin
6. Graph your results.

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| --- | --- | --- | --- |
| **Beaker** | **T ( )** | **T ( )** | **V ( )** |
| **Cold** |  |  |  |
| **Room** |  |  |  |
| **Hot** |  |  |  |

**Lab 3 Boyle’s Law 2**

1. Read the barometer to determine atmospheric pressure in pounds per square inch (psi, or lb/in2).
2. Obtain a syringe. Remove the plunger. Record the diameter of the opening in inches (use as many figures as possible). Use this to solve the radius, then the area of the opening.
3. Place the plunger into the syringe. Grease a plastic stopper with some petroleum jelly and place onto the needle end of the syringe. Push the plunger and allow it to settle onto a value. Record this value for a gauge pressure of zero.
4. For each trial, place weights onto the syringe. Record the weight in the data table, and volume. *Note that these are on opposite sides of the data table.*
5. To fill in the data table, you must solve for two quantities:
   1. Pressure is defined as force divided by area. The force we are using is the weight. The area is the size of the opening, as calculated earlier. This number is the **gauge pressure**.  
      
   2. Total pressure, which is the actual number we will use for the graph, is the sum of gauge pressure and atmospheric pressure:  
      
6. Graph the total pressure versus volume.

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| --- | --- | --- | --- |
| *Patm =* | *d =* | *r =* | *A =* |



|  |  |  |  |
| --- | --- | --- | --- |
| Weight  (lb) | Gauge Pressure (psi) | Total Pressure (psi) | Volume  (mL) |
| 0 | 0 |  |  |
|  |  |  |  |
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**Post-Lab Question**

1. What is the general trend of the pressure-volume curves that you have drawn? Are they linear? Do they look similar? Briefly discuss how the curve changes with the given variables.
2. What is the general trend of the temperature-volume curves that you have drawn? Are they linear? Do they look similar? Briefly discuss how the curve changes with the given variables.
3. Is it possible for the gas in a syringe to reach zero milliliters of volume? If so, how? If not, why?