**C1151 Data Sheet Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Gas Laws Date of Exp. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

 **Lab Section \_\_\_\_\_\_\_\_**

**Data table: Boyle’s Law**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Trial #** | **Pressure (torr)** | **Pressure (atm)** | **Vsyringe (mL)** | **Vtube (mL)** | **Vtotal(mL)** | **P × Vtotal = K (atm\*mL)** | **Δ%** |
| **1**  |  |  |  |  |  |  |  |
| **2** |  |  |  |  |  |  |  |
| **3** |  |  |  |  |  |  |  |
| **4** |  |  |  |  |  |  |  |
| **5** |  |  |  |  |  |  |  |
| **6** |  |  |  |  |  |  |  |
| **7** |  |  |  |  |  |  |  |
| **8** |  |  |  |  |  |  |  |
|  |  |  |  |  | **Kaverage =** |  |  |

 Kaverage is determined by averaging all of the K values from trials 1 -8

**Boyle’s Law:**

1. Using only trial 1 & 8 data, calculate the volume of the tube using the equation below. Since the tube volume is the same for each trial, you can write it into all Vtube cells in the table above. Vtube is typically several mL.

 **Vtube = (P1 × Vsyringe 1 - P8 × Vsyringe 8) (7)**

**P8 - P1**

 Show your Vtube calculations below:

2. Calculate the product of pressure (atm) and Vtotal for each trial. This value (K) should be reported in the table above with 4 significant figures. Show one calculation below:

 3. Calculate the average “K” value and report it in the data table above. Show your calclulation below:



 4. Delta percent (∆%) is a mathematical comparison of a single trial to the
 average expressed on a percent scale.

 Calculate ∆% for each trial and record each result in the data table above with 2 decimal point accuracy.

 Show one of your 10 calculations below.

 5. Use your Average “K” value to determine the gas pressure you would expect to measure when the syringe is
 at the 3.0 mL position in this experiment. Show your calculations below.

**Data table: Amonton's Law (30 data points minimum)**

**Type in the Pressure/Temperature data from your lab notebook.**

|  |  |  |
| --- | --- | --- |
| **DataPoint** | **Temp.****oC** | **Pressure (torr)** |
| **1** |  |  |
| **2** |  |  |
| **3** |  |  |
| **4** |  |  |
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| **6** |  |  |
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| **34** |  |  |
| **35** |  |  |

**Amonton’s Law: Create a Pressure (atm) vs. Temperature (°C) graph using M.S. Excel**

* + The x-axis should range from -300°C to +100°C.
	+ The y-axis should range from 0 to 1.2 atm.
	+ Perform a trendline analysis of the data and display the equation on the graph with 8 decimal place accuracy**.**
	+ Extend (forecast) the trendline backwards far enough for it to cross the temperature axis.
	+ The “Y” axis should be relocated to the far left hand side of the graph.

Insert your graph below:



1. Use your trendline equation to mathematically determine a value for absolute zero. Remember, P = 0 when T
 equals absolute zero. Show your calculation below:

2. Use your trendline equation to determine the gas pressure at 200 K and 400 K. (notice the temperature units)
 How many times greater is the pressure at 400 K in comparison to 200 K?
 Is this what you’d expect? **Why?**

3. In this experiment you have ***extrapolated*** a value for absolute zero. Why is it impossible to perform an experiment where you would ***interpolate*** a value for absolute zero?