Ideal Gas Law Syringe Activity Option 1

For this lab, you will be using a syringe with an absolute pressure sensor with GLX to determine the number of moles of air molecules in the syringe. You will do this by varying the volume of the compressed air and measuring the resulting absolute pressure. These syringes can leak, especially at high pressure, so start at the max volume and do **NOT** go smaller than **10 mL**. If the data get weird, unplug the tube from the pressure sensor and reset.

**Data**:

Temperature of air in room: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| Trial | Volume (mL) | Resulting absolute pressure (kPa) |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |
| 9 |  |  |
| 10 |  |  |
| 11 |  |  |
| 12 |  |  |
| 13 |  |  |
| 14 |  |  |

If you assume that the temperature remains constant (it most nearly does), determine a way to find the number of moles contained in the syringe. Show the equation below:

If we want to find the number of moles GRAPHICALLY, what should be on our axis?

X:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ y:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The elevation of Castle Rock is 6224 ft. At this elevation, the atmospheric pressure (on a calm day with no storms or pressure systems) is **80,500 Pa**. What would be the number of moles of air in the **25 mL** syringe at the temperature you recorded? (This will be your expected value to compare your answer to)

You can choose to do a formal lab report on this activity or the Ideal Gas Law Online Activity. The formal lab report is due **Thursday Aug 26th.**

Ideal Gas Law Syringe Activity Option 2

For this lab, you will be using a syringe, some wood blocks and a force sensor with GLX to determine the number of moles of air molecules in the syringe. You will do this by varying the applied force placed on the syringe and recording the resulting volume of the compressed air. These syringes can leak, so if you find that your data is being weird, reset the number of moles by taking out the plunger.

**Data**:

Inner diameter of syringe tube: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Temperature of air in room: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| Trial | Applied Force (N) | Resulting volume of compressed air (mL) |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |
| 9 |  |  |
| 10 |  |  |
| 11 |  |  |
| 12 |  |  |
| 13 |  |  |
| 14 |  |  |
| 15 |  |  |

If you assume that the temperature remains constant (it most nearly does), determine a way to find the number of moles contained in the syringe. NOTE: The Pressure in the Ideal Gas Law is the Pressure of the GAS, not the Applied Pressure. What external pressures does the gas have to fight against? Use Excel to determine the number of moles in the syringe and once completed, print out the spreadsheet with your calculations and **staple it to this page**.

* If we want to find the number of moles GRAPHICALLY, what should be on our axis?

X:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ y:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Your value for the number of moles in the syringe: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Does this value seem reasonable to you or not?

At this elevation, the atmospheric pressure (on a calm day with no storms or pressure systems) is **80,500 Pa**. What would be the number of moles of air in the **35 mL** syringe at the temperature you recorded? (This will be your expected value to compare your answer to)

You can choose to do a formal lab report on this activity or the Ideal Gas Law Online Activity. The formal lab report is due **Thursday Aug 26th**