Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Pd: \_\_\_ Ast: \_\_\_\_\_

**GAS TEMPERATURE LAB**

***Before beginning, answer the following questions:***

1. When thermal energy is added to a substance, how do the molecules react?
2. When thermal energy is removed from a substance, how do the molecules react?
3. What does temperature measure?

***Follow these directions to set up your equipment and perform the investigation:***

1. Locate your three containers filled with water. One container has hot water, one has cold water, and another has room temperature water.
2. Draw air into the syringe so that 20 mL of air is contained within the syringe and place the rubber cap over the tip to seal it.
3. Place a thermometer into one of the containers of water to record the temperature.
4. Place the syringe into the container of water so that the 20 mL of air is submerged (you’ll probably have to hold it under). Let it sit for a minute while the air temperature inside the syringe comes to an equilibrium with the water surrounding it. Observe the volume of air in the syringe.
5. While it is still submerged in the water, GENTLY pull back on the plunger of the syringe and release it. Read and record the volume of air inside the syringe.
6. Again, while it is still submerged in the water, GENTLY push and release the syringe plunger. Read and record the volume of air inside the syringe.
7. Follow steps B-F until you’ve tested each of your three containers of water (hot, cold, and room temperature).
8. Calculate the average volume for each temperature and record it in your table. Plot the average volume vs. temperature on your graph (line graph).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONTAINER** | **TEMPERATURE (°C)** | **VOLUME (mL)*****pull back & release*** | **VOLUME (mL)*****push & release*** | **AVG. VOLUME** **(mL)** |
| HOT WATER |  |  |  |  |
| COLD WATER |  |  |  |  |
| ROOM TEMP. WATER |  |  |  |  |

VOLUME vs. TEMPERATURE

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AVG. VOLUME (mL) |  |  |  |  |  |  |  |  |  |  |  |
| 23 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| 22 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| 21 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| 20 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| 19 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| 18 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| 17 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| 16 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
|  | TEMPERATURE (°C) |

1. Describe the relationship between temperature and volume based on your graph.
2. Did the amount of gas inside the syringe change during your investigation?

***Charles’ Law states that when pressure is constant, the volume of a gas will be directly proportional to its temperature.***

1. According to Charles’ Law, what must happen to the volume of a gas if the temperature goes up?
2. According to Charles’ Law, what must happen to the volume of a gas if the temperature goes down?
3. How does Charles’ Law relate to the concept of density?