

**GAS TEMPERATURE LAB**

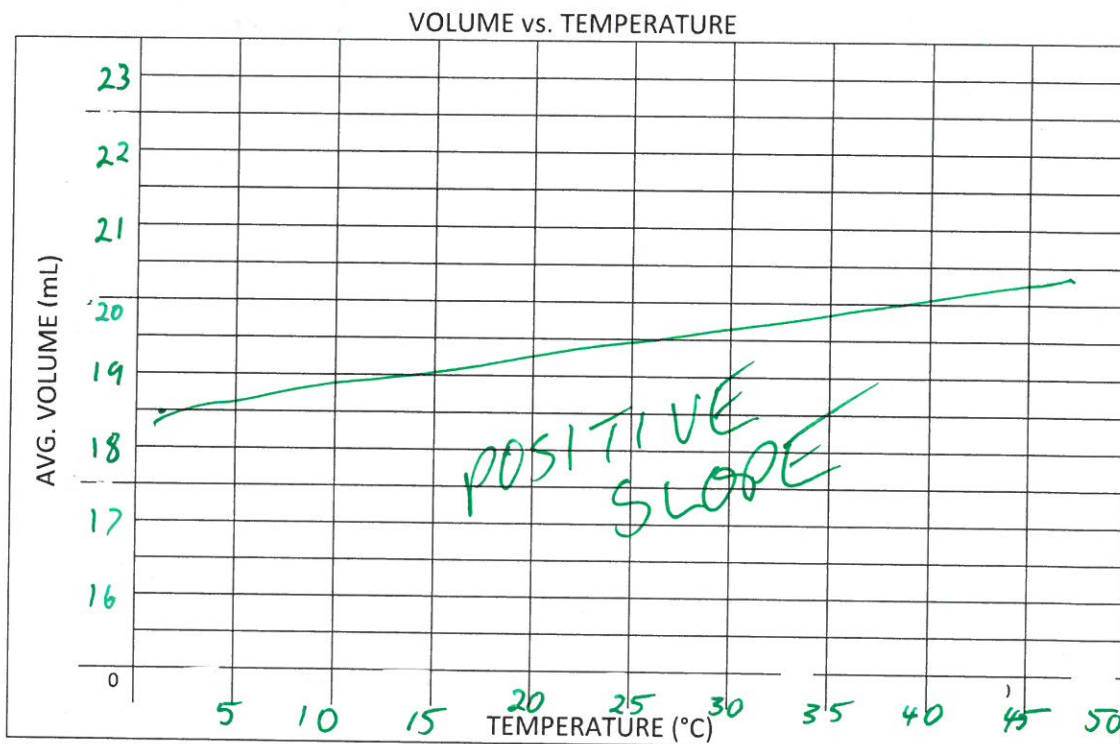
Before beginning, answer the following questions:

- 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:

- A. Locate your three containers filled with water. One container has hot water, one has cold water, and another has room temperature water.
- B. 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.
- C. Place a thermometer into one of the containers of water to record the temperature.
- D. 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.
- E. 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.
- F. 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.
- G. Follow steps B-F until you've tested each of your three containers of water (hot, cold, and room temperature).
- H. 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				HIGHER
COLD WATER				LOWER
ROOM TEMP. WATER				MIDDLE



- 4) Describe the relationship between temperature and volume based on your graph.

TEMPERATURE AND VOLUME HAVE A DIRECT RELATIONSHIP. INCREASING ONE INCREASES THE OTHER + VICE VERSA

- 5) Did the amount of gas inside the syringe change during your investigation?

NO, THE SAME NUMBER OF PARTICLES REMAINED INSIDE THE SYRINGE.

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

- 6) According to Charles' Law, what must happen to the volume of a gas if the temperature goes up?

IF THE TEMPERATURE INCREASES, SO WILL THE VOLUME OF AN IDEAL GAS

- 7) According to Charles' Law, what must happen to the volume of a gas if the temperature goes down?

IF THE TEMPERATURE DECREASES, SO WILL THE VOLUME OF AN IDEAL GAS

- 8) How does Charles' Law relate to the concept of density?

INCREASING THE TEMPERATURE CAUSES THE VOLUME TO INCREASE. THIS LOWERS THE DENSITY SINCE THE SAME NUMBER OF MOLECULES OCCUPY A GREATER AMT. OF SPACE.