Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Quick Change Lab**

**Interpreting Data – Using Our Measurements in Calculations**

**Problem:** How can a graph help to interpret data gathered in the laboratory?

|  |  |  |
| --- | --- | --- |
| Solution 1 | Small Beaker | Stopwatch |
| Solution 2 | 2 Graduated Cylinders | Stirring Rod |

**Materials**:

**Safety**: Goggles must be worn at all times. All solutions can be disposed of down the sink while running the water.

**Let’s Investigate**: Take the mass of the unmarked graduated cylinder.

Mass of Unmarked Graduated Cylinder: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Measure 5 mL of water in the unmarked graduated cylinder. Then calculate the mass and density of the water (use the correct number of significant figures!).

Mass of Unmarked Graduated Cylinder + 5 mL of water: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

SHOW WORK:

Mass of 5 mL of water: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Density of Water: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Pour the water into your small beaker. Using the same graduated cylinder, add 5 mL of solution 2 to the beaker with the 5 mL of water. Measure out 5 mL of solution 1 using the MARKED graduated cylinder. BEFORE adding this to the beaker, get the stopwatch ready!

When you are ready, add the 5 mL of solution 1 to the combination of solution 2 and water and stir. Determine the length of time it takes for a change to occur once the solutions are mixed. Record this time in the Data Table below.

After you have finished this first exercise in the experiment, continue testing the different combinations of volumes of each solution listed in the Data Table.

**REMEMBER: You must begin by mixing solution 2 and water together.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Combination** | **Solution 1 (mL)** | **Solution 2 (mL)** | **Tap Water (mL)** | **Reaction Time (s)** |
| 1 | 5 mL | 5 mL | 5 mL |  |
| 2 | 5 mL | 4 mL | 6 mL |  |
| 3 | 5 mL | 3 mL | 7 mL |  |
| 4 | 5 mL | 2 mL | 8 mL |  |

**Summing It Up**

1. What is the independent variable in this experiment?
2. What is the dependent variable in this experiment?
3. Prepare a graph comparing the volumes of solution 2 against the time required for the chemical reaction to occur. Remember to place the independent variable on the x-axis (horizontal). Attach your graph.
4. What is the title of your graph?
5. Data that is measureable is said to be quantitative. Referring now to your data, what data did you collect that would be considered quantitative?
6. Descriptive data is called qualitative. Could any part of the experiment be considered qualitative? Explain your answer.
7. At the beginning of this experiment, you calculated the density of water. Using your reference tables, write the formula for Percent Error below. The density you calculated is the *measured value*. The *accepted value* for the density of water is 1 g/cm3 which is equal to 1 g/mL. What is your percent error to the correct number of significant figures? *Show work!*
8. Using your graph, what would you predict the reaction time to be if you used 1 mL of solution 2?
9. Using your graph, what would you predict the reaction time would be if you used 3.5 mL of solution 2?