LAB: PERCENT ERROR Name: _____

Hour: _____ Date: _____

INTRODUCTION:

When writing a formal laboratory write-up, the write up should include percent error. Percent error lets you know how good you are in the laboratory. Collecting quantitative measurements in the lab are a crucial part of the experiment. It is important to understand that NO measurement is absolutely certain. All measurements have some degree of uncertainty. This can be calculated and termed by PERCENT ERROR.

Percent Error = $\frac{\lvert \text{Actual yield} - \text{Theoretical yield} \rvert}{\text{Theoretical yield}}$
Actual yield ☒ calculated volume (AKA: Experimental Yield) Theoretical yield ☒ intended volume (AKA: Known Value or True Yield)

Absolute values are used because you technically cannot get a negative percent. You can go under (+) OR over (-) the theoretical yield value, but it is still an error.

PURPOSE: To understand percent error and how to calculate it in a lab. To understand how important significant figures are in calculating percent error.

MATERIALS:

PROCEDURE:

1. Obtain a Styrofoam cup 100 mL beaker, a 125 mL Erlenmeyer flask, a 50 mL graduated cylinder, a 50 mL buret, a 25 mL pipet and a 2nd 250 mL beaker filled with distilled water.

2. Obtain the mass of the empty, dried Styrofoam cup. Record the mass of the cup under **Mass of Cup** in the data table below.

3. Measure 50.0 mL of water with the 100 mL beaker then pour it into the cup. Measure the mass of the cup with water and record under **Mass Cup/H_2O**. Pour out the water and dry the cup with a paper towel. Repeat steps #2 and #3 again for the beaker.

4. Repeat steps #2 & #3 for each of the instruments. Measure out 50.0 mL for each except for the buret which you will measure out 25.0 mL. Be sure that you are doing 2 trials for each.

CALCULATIONS:

1. Mass of Water: subtract the Mass of the Cup from the mass of the Cup & Water. Record this mass under **Mass of Water**:

2. Calculated Volume of Water: determine the volume of the water actually delivered to the cup by using the density of water, D= 1.00 g/mL. Density is the ratio of the mass of a substance and the volume of the substance. Solve for volume by dividing the mass of water by the density of water.

3. Average Calculated Volume of water: add the calculated volumes of water from each trial and divide by 2.

4. Percent Error. Percent error is the error divided by the theoretical yield. This is calculated by the equation in the box of previous page.

Data Table

Container	Mass of Cup (g)	Mass Cup/H_2O (g)	Mass of H_2O (g)	Calculated volume of H_20 (mL)	Average calc. vol. of H_20 (mL)	Percent Error
Beaker. Trial 1						
Beaker. Trial 2						
Flask. Trial 1						
Flask. Trial 2						
Cylinder. Trial 1						
Cylinder. Trial 2						
Buret. Trial 1						
Buret. Trial 2						
Pipet. Trial 1						
Pipet. Trial 2						

CONCLUSION:

1. Rate the glassware in their accuracy for delivering 50 mL of water from the most to least accurate.
2. One instrument has an error of + 1.0 mL and another has an error or + 0.1 mL.
   a. Which instrument is more accurate? Why?
   b. Which instrument has more precision? Why

3. Explain the relevance of knowing the uncertainty of a measuring device.