VALENCIA COLLEGE

Experiment 1: Mass, Volume, and Density Data Tables

Version 2

Name: _____ Date: _____

Lab Partner: _____ Section: _____

Remember to include units of measure with each entry, and to read and record each measurement to the full precision allowed by the instrument used. Make sure that your work is neat and legible so that you may communicate your results to others such as your instructor.

Data Table 1. Reading Common Glassware.

Known Readings	10 mL grad. cylinder	50 mL grad. cylinder	buret
Unknown Readings Unk. #_____ (if given)	10 mL grad. cylinder	50 mL grad. cylinder	buret

Data Table 2. Measuring Volume with a Volumetric Pipet.

Mass of flask 1						
Mass of flask 1 + H_2O						
Mass of H_2O	0.000 g					
Total Volume of H_2O	0.00 mL	10.00 mL	20.00 mL	30.00 mL	40.00 mL	50.00 mL
Density of H_2O						
Mean of Density						
Standard Deviation						

(Note: the clear cells should contain your data; the shaded cells will contain calculated values.)

Name: _____

Data Table 3. Measuring Volume with a Graduated Cylinder.

Mass of flask 2						
Mass of flask 2+H_2O						
Mass of H_2O	0.000 g					
Total Volume H_2O (check the sig figs of your graduated cylinder)	0.0 mL	10.0 mL	20.0 mL	30.0 mL	40.0 mL	50.0 mL
Density of H_2O						
Mean of Density						
Standard Deviation						

Show your work for one example of each type of calculation in Data Tables 2/3:

Name: _____

Data Table 4. Temperature and Pressure Measurements.

Barometric Pressure	
Water Temperature	
Density from Appendix 1	

- Using the mass and volume data obtained for each flask (from Data Table 2 and Data Table 3), use Excel to plot two mass (y-axis) versus volume (x-axis) scatter plots (see Appendix 7 Using Excel).
    - Add a trend line for each plot; the slope of each line will be the density. Make sure to include the line equation and the coefficient of determination (R-squared value).
    - You can place both lines on the same plot. Make sure to use a legend to label each line.
    - Add a title to the plot.
    - Print the Excel plot, and include it in your lab report.
- Use the slope of each line to fill in the density in Data Table 5. Use the accepted value for density from Appendix 1 (Data Table 4) to calculate the relative percent error.

Data Table 5. Relative Percent Error for the Density of Water.

	Density from Excel Plot	Rel. % Error
Flask 1 (using pipet)		
Flask 2 (using graduated cylinder)		

Show your work for one example of each calculation:

Name: _____

Data Table 6. Density and Identity of Unknown Plastics in Set Number _____.

Unknowns	Observations	Mass	Volume	Density	Identity
example object	clear, colorless flake	0.2790 g	too small to measure by ruler or displacement	• floats on water • sinks in sol'n 3 • density must be between 0.945 and 1.00 g/mL	HDPE
Object 1					
Object 2					
Object 3					
Object 4					
Object 5					

Show your work for one example of each type of calculation:

Name: _____

Post-lab

1. Instruments that were used to measure volume included a graduated cylinder, a volumetric pipet, and a buret, whereas a beaker does not provide volume with any reasonable certainty. Provide one explanation as to why this is true.
2. Among the two instruments that you used to measure density of water in Data Table 2 and Data Table 3, which one was most accurate? Most precise? What in the data supports your argument?
3. Which method, average or graph, was more accurate in determining the density of water?
4. Which has a greater effect on density of water: temperature or pressure? How do you know?
5. Briefly explain a process for how you would scale up your density technique to sort a whole batch of mixed plastics for recycling.
6. Conclusions: Once you have completed your experiment, you will need to prepare a report (see Appendix 6 How to Write a Lab Notebook). Your report should be less than 5 pages, be clear and readable to the instructor and anyone that would need your data, and include:

   Title and lab partner names

   Purpose

   Any diagrams, figures, or tables with your lab data (units and significant figures are important, remember your Excel graph too)

   Calculations (include one example calculation for each type)

   Post-lab questions

   Conclusions (see Appendix 9 How to Write a Scientific Conclusion: What concept were you investigating and how does it relate to the experimental procedure? How did you go about your work and why? This is **not** the details of your procedure repeated again, but discussion of the processes. For example, describe the methods for finding volume of the unknown objects. What is your conclusion for each part? Use the values you obtain as evidence in your reasoning. Statements like, "see data table for values" are not acceptable! Discuss the validity and reliability of your data in answering the question. Clearly state the identity of each unknown plastic.)