Name
Date **Period**

Grade:

Lab 5

Volume and Density

PRELAB QUESTIONS:

1. What is a meniscus?
2. When recording the volume of a water solution, what part of the meniscus should be read?
3. Why is it important to remove air bubbles from the tip of a buret?
4. At what temperature is the density of water greatest?
5. All things being equal, which should give a more accurate result when determining density, a large sample or a small sample? Why should it matter?

NAME _____ PERIOD_____

DATE _____

EXPERIMENT 5
Volume and Density

DATA TABLE GRADUATED CYLINDER

Trial	Mass of dry cylinder	Mass of cylinder and water	Mass of water	Error
1				
2				
3				
Average				

DATA TABLE BURET (VOLUME)

Trial	Initial Reading	Final reading	Volume of water
1			
2			
3			
Average			

DATA TABLE BURET (MASS)

Trial	Mass of dry beaker	Mass of beaker and water	Mass of water	Error
1				
2				
3				
Average				

DATA TABLE PIPET

Trial	Mass of dry beaker	Mass of beaker and water	Mass of water	Error
1				
2				
3				
Average				

E. Room temperature

CALCULATIONS

List the uncertainty (average error) for each of the following instruments:

Graduated Cylinder +/-

Burette +/-

Pipette +/-

The average error for each instrument will give you some measure of the precision, that is how reproducible are its readings, for that instrument. Which instrument has the greatest precision? (smallest error)

(2) From your data, calculate the density of distilled water for each trial and for each instrument separately. Then, for each instrument, calculate an average. Record these data in the table. Take careful note of the correct use of significant figures

DATA TABLE DENSITY

INSTRUMENT	TRIAL 1	TRIAL 2	TRIAL 3	AVERAGE
GRADUATED CYLINDER				
BURETTE				
PIPETTE				

(3) Using the table below, record the book value for the density of water at your recorded temperature in table 4.

Temperature Celsius	Density g/mL	Temperature Celsius	Density g/mL
15	0.9991	26	0.9968
16	0.9999	27	0.9965
17	0.9968	28	0.9962
18	0.9986	29	0.9959
19	0.9984	30	0.9956
20	0.9982	31	0.9953
21	0.9980	32	0.9950
22	0.9978	33	0.9947
23	0.9975	34	0.9944
24	0.9973	35	0.9940
25	0.9970		

DATA TABLE 4

Book value for the density of water at °C is

(4) Determine a percent error of each of your average value from the "book value. Record this in Data Table 5. Examination of the percent error from the book value will give you an idea of the instrument's accuracy.

DATA TABLE 5

GRADUATED CYLINDER:

BURET:

PIPET:

(5) On the basis of the precision and accuracy determined for each instrument, decide which instrument is best for determining liquid volume in order to determine density. Write your conclusion and one or two sentences Justifying your answer in the space provided below. If your data does not allow you to come to a firm conclusion you might want to make further measurements with one or more of the instruments.

PROCEDURE CONTINUED

F. Density of an Unknown Liquid

1. Based on your conclusion above rinse the preferable instrument twice with about 10 mL of unknown each time to remove traces of water.

2. Follow the procedure list in the lab for the instrument of your choice. Run at least two trials.
3. Compare the density of your unknown with a list of densities of possible liquids printed below and identify the unknown.

Sample Density:
Ethanol 0.79 g/mL
Vegetable oil 0.92 g/mL
Ethylene glycol 1.11 g/mL
Glycerin 1.25 g/mL

4. Record the result in Data Table 6.

DATA TABLE 6

Instrument used:

	Trial 1	**Trial2**
Mass of container plus liquids		
Mass of dry container		
Mass of liquid		
Volume of liquid		
Density of Unknown Liquid		
Average		

Identity of Unknown Liquid:

Calculate the % error for the unknown.