Name: ______________________________ Section: ____________________

Data and Calculations

Part 1

Diameter: ________ cm Radius: ________ cm Height (cylinder part): ________ cm

Volume (cylinder part): _________ cm^3
SHOW CALCULATION:

Volume (half-sphere part): _________ cm^3
SHOW CALCULATION:

Total Volume (sum): _________ cm^3

Volume (graduated cylinder): _________ mL

Average Volume: _________ mL
SHOW CALCULATION:

Percent Difference: _________ %
SHOW CALCULATION:

Part 2

Mass of Metal Cylinder ________________

Diameter ___________ Length ________________ $\text{Volume}_{\text{calipers}}$ ________________

$\text{Volume}_{\text{water}}$ __________ $\text{Volume}_{\text{metal + water}}$ ________ $\text{Volume}_{\text{water displacement}}$ __________

Density of the Cylinder: calipers: ___________ water displacement: ___________

Handbook Density ______________

Identity of Metal ________________

% Error: calipers: ___________ water displacement: ___________

SHOW CALCULATIONS:

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Part 3 Unknown Number ______________

Mass of Flask with stopper ______________ Initial Buret reading ______________

Sample	Mass Flask+Stopper+Liquid (g)	Mass Liquid Only (g)	Final Buret Reading (mL)	Net Volume (mL)	Density (x_m) (g / mL) 4 sig. figs.	d ($x_m - \bar{x}$)	d^2
1							
2							
3							
4							
5							
6							
				sum of x_m:		sum of d^2:	

Show your calculation of the standard deviation, s, from d^2 below:

Mean value ($\bar{x}$): ________________ Standard Deviation (s): ________________

Range: ______________________ % NaCl from Table: __________________

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Post-lab Questions

1. Calculate the density of a pure gold sphere with a diameter of 2.120 cm and a mass of 94.19 g.

2. The density of aluminum is 2.70 g/cm^3. Calculate the thickness of a rectangular sheet of aluminum foil with a width of 11.5 cm, a length of 14.0 cm, and a mass of 2.04 g.

3. Examine your results from your data table in Part 3. Do you have any values for the density of the salt solution that lie OUTSIDE the range ($\bar{x} \pm 2s$)? If so, list them here:

   Recalculate $\bar{x}$ by omitting values that lie OUTSIDE the range. This is the density value you should use to determine your experimental % NaCl.

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Pre-lab Questions

Upon reading the procedure in preparation for this experiment, you should also answer the following questions:

1. Consider Example One in the laboratory discussion. Since measurement 8 lies outside the range, it may be omitted in the calculation of the reported value. Omit measurement 8 and recalculate the mean ($\bar{x}$). Fill in the d and d^2 columns in the table, then calculate the standard deviation (s) and the range.

   Recalculated mean ($\bar{x}$), without measurement 8: ____________

Balance Number	**Mass (g) = x_m**	**$d = x_m - \bar{x}$**	**d^2**
1	24.29		
2	24.26		
3	24.17		
4	24.31		
5	24.28		
6	24.19		
7	24.33		
8 – OMITTED	~~24.50~~		
9	24.30		
10	24.23		
sum of x_m:		sum of d^2:	

   Recalculated standard deviatiation (s): __________ and range: _____________

   SHOW CALCULATIONS:

2. Now consider Example Two in the laboratory discussion. The student doing the titration repeated the experiment twice more. The following five values were obtained: 0.555 M, 0.565 M, 0.564 M, 0.567 M, and 0.563 M.

   A. Use the *Q Test* to demonstrate that the first value should be rejected.

   B. Recalculate the values for $\bar{x}$, omitting the value 0.555 M. Compare with the original value of $\bar{x}$.