

EXPERIMENT 3: CALORIMETRY**LAB REPORT WORKSHEET****Notebook Pages**

Attach copies of those notebook pages that contain your raw data for the experiment.

Calculations

1. Indicate the mass of the aluminum ingot used in your experiment and fill in the following table, including the average and standard deviation in the heat capacity for the flask. Below the table, show the series of calculations that you used for trial #1.

Mass Al ingot = _____

Trial #	mass H ₂ O (g)	$\Delta T_{\text{aluminum}}$ (°C)	q _{Aluminum} (J)	q _{calorimeter} (J)	$\Delta T_{\text{calorimeter}}$ (°C)	q _{flask} (J)	C _{flask} (J/°C)
1							
2							
3							
average =							
std. dev. =							

2. Calculate ΔH_{rxn} for the reaction of Mg with HCl (ΔH_A) for each of the three trials; compute the average of these ΔH_{rxn} values. Again, show a full set of calculations for trial #1 below the table.

Trial #	mass Mg (g)	mass HCl (g)	$\Delta T_{\text{calorimeter}}$ ($^{\circ}\text{C}$)	$q_{\text{calorimeter}}$ (J)	q_{reaction} (J)	ΔH_{rxn} (kJ/mol)
					average =	
					std. dev. =	

3. Calculate ΔH_{rxn} for the reaction of MgO with HCl (ΔH_{B}) for each of the three trials; compute the average of these ΔH_{rxn} values. Again, show a full set of calculations for trial #1 below the table.

Trial #	mass MgO (g)	mass HCl (g)	$\Delta T_{\text{calorimeter}}$ ($^{\circ}\text{C}$)	$q_{\text{calorimeter}}$ (J)	q_{reaction} (J)	ΔH_{rxn} (kJ/mol)
					average =	
					std. dev. =	

4. Apply Hess' Law to calculate the heat of formation of MgO, $\Delta H_{f(\text{MgO})}$, using the average results of (2) and (3) above and the $\Delta H_{f(\text{H}_2\text{O})}$.

5. Calculate the absolute difference of your value from the literature value for $\Delta H_{f(\text{MgO})}$. What is the *relative error* (the percent difference) between your experimental value and the literature value (divide the difference by the literature value and multiply by 100%).

6. Does your experimentally derived value of $\Delta H_{f(\text{MgO})}$ differ *significantly* from the accepted value? Compare the relative error in your experimental results (obtained using the standard deviation and the average values). Is the relative error you calculated in "5", above, within the relative error you observed in each of your individual results?

7. Cite, briefly, what you believe to be the greatest source of random error in this experiment. If you observed systematic error, what do you believe to be its single most likely source.