Report Sheet: Thermochemistry CHEM 111 / 154

CAPILANO UNIVERSITY

Department of Chemistry

LAST NAME: _____ SEC # _____ LOCKER # _____

FIRST NAME: _____ DATE: _____

Name of Partner: _____

RAW DATA

- **record all data in blue or black ink only and in the proper format.**
- **report all temperatures in both tables to 2 decimal places.**

	Part 1	Part 2	Part 3
initial temperature of calorimeter + contents **T_{init}**:	°C	°C	°C
concentration of standardized HCl:	**1.799 M**	NA	NA
mass of empty vessel plus…→	NA	Mg: g	MgO: g
mass of vessel after transfer:		g	g

RESULTS	Part 1	Part 2	Part 3
mass of solid Mg or MgO delivered to calorimeter:	NA	g	g

Use the plotted thermograms to graphically determine T_{inst}. Then calculate ΔT for each Part.

extrapolated temperature of calorimeter + contents **T_{inst}**:	°C	°C	°C
temperature change **ΔT**:	K	K	K

Part 1 – Calorimeter Calibration

Calculate number of moles of limiting reagent:

(Report your answer to 4 significant figures.)

_____ mol

Calculate and report the calorimeter constant:

(Report your answer to at least 4 significant figures and carry this through to the calculations in Parts 2 & 3.)

CALORIMETER CONSTANT = _____ kJ/K

Part 2 – Reaction of Magnesium with Acid

Calculate number of moles of Mg: *use the correct number of significant figures for all answer below*

_____ mol

Calculate and report the value of ΔH for this reaction:

$Mg(s) + 2H^+(aq) \rightarrow Mg^{2+}(aq) + H_2(g)$

ΔH_1 = _____ kJ/mol

Part 3 – Reaction of Magnesium Oxide with Acid

Calculate number of moles of MgO:

_____ mol

Calculate and report the value of ΔH for this reaction:

$MgO(s) + 2H^+(aq) \rightarrow Mg^{2+}(aq) + H_2O(l)$

ΔH_2 = _____ kJ/mol

Hess's Law: Calculation of ΔH_f (MgO)

$Mg_{(s)} + 2H^+_{(aq)} \rightarrow Mg^{2+}_{(aq)} + H_{2(g)}$ ΔH_1 *(exp)* _____ kJ/mol

$MgO_{(s)} + 2H^+_{(aq)} \rightarrow Mg^{2+}_{(aq)} + H_2O_{(l)}$ ΔH_2 *(exp)* _____ kJ/mol

$H_{2(g)} + \frac{1}{2}O_{2(g)} \rightarrow H_2O_{(l)}$ ΔH_3 *(lit)* _____ kJ/mol

Use Hess's Law with the above ΔH values to calculate an <u>experimental value</u> for the enthalpy of formation of magnesium oxide:

experimental $\Delta H_{f(MgO)}$ _____ kJ/mol

Report the **literature value** for ΔH_f(MgO) and calculate the **% difference**:

literature $\Delta H_{f(MgO)}$ _____ kJ/mol

percent difference _____ %