LAB MakeUp Data

Lab: ΔH_{rxn} for the Combustion of Magnesium **Name:**_____

p.____

Lab Ticket:

1. Write the chemical equation/reaction for the combustion of Magnesium. Balance with whole number coefficients, and include phase subscripts. Your goal in this lab is to find ΔH for this reaction.

$2Mg_{(s)} + O_{2(g)} \rightarrow 2MgO_{(s)}$

2. Look up heats of formation to determine ΔH_{rxn} for the following reaction:

$H_{2\,(g)} + 1/2\ O_{2\,(g)} \text{ ----------> } H_2O_{\,(l)}$ $\Delta H_{rxn} =$ -285.8 kJ

Reactions:

x 1. $MgO_{(s)} + 2\ HCl_{(aq)} \text{ ------> } MgCl_{2(aq)} + H_2O_{(l)}$ $\Delta H_{rxn} =$_____ (from lab data)

x 2. $Mg_{(s)} + 2\ HCl_{(aq)} \text{ ------> } MgCl_{2(aq)} + H_{2(g)}$ $\Delta H_{rxn} =$_____ (from lab data)

} prerounded numbers!

x 3. $H_{2\,(g)} + 1/2\ O_{2\,(g)} \text{ ----------> } H_2O_{\,(l)}$ $\Delta H_{rxn} =$ -285.8 (Look up in prelab)

Hess's Law: Rearrange reactions 1, 2, and 3 in order to calculate ΔH reaction for the combustion of magnesium.

_____ → _____ $\Delta H_{rxn} =$_____

_____ → _____ $\Delta H_{rxn} =$_____

_____ → _____ $\Delta H_{rxn} =$_____

Total:

_____ → _____ $\Delta H_{rxn} =$_____

Percent Error Calcuation:

For the combustion reaction for magnesium (when balanced with lowest possible whole number coefficients), the **book value** for ΔHrxn is -1203.6 kJ/mole.

Calculate your percent error.

Procedure:

Reaction #1: $MgO_{(s)} + 2\ HCl_{(aq)} \text{ ------> } MgCl_{2(aq)} + H_2O_{(l)}$

1. Obtain a calorimeter (two styrofoam cups resting in a beaker).
2. Obtain 100 mL 1.0 molar HCl. Record volume, and add the acid to your calorimeter.
3. Weigh out about 1 gram of magnesium oxide. Record mass.
4. Measure temperature of HCl solution in calorimeter. Record.
5. Add the magnesium oxide to the solution. Monitor temperature, and record highest temperature reached.
6. Discard solution in the sink and rinse out calorimeter.

Reaction #2: $Mg_{(s)} + 2\ HCl_{(aq)} \text{ ------> } MgCl_{2(aq)} + H_{2(g)}$

Follow same procedure as reaction 1, except use about 0.5 grams of Mg ribbon, instead of MgO.

Quantitative Data:

Reaction #1: $MgO_{(s)} + 2\ HCl_{(aq)} \text{------>} MgCl_{2(aq)} + H_2O_{(l)}$

Volume of 1 Molar HCl: 100. mL

Mass of Magnesium oxide: 1.00 g

Initial Temperature of solution: 20.0°

Final Temperature of Solution: 24.5°

Reaction #2: $Mg_{(s)} + 2\ HCl_{(aq)} \text{------>} MgCl_{2(aq)} + H_{2(g)}$

Volume of 1 Molar HCl: 100. mL

Mass of Magnesium: 0.50 g

Initial Temperature of solution: 20.0°

Final Temperature of Solution: 40.0°

Calcuations:

Reaction #1: $MgO_{(s)} + 2\ HCl_{(aq)} \text{------>} MgCl_{2(aq)} + H_2O_{(l)}$ $\Delta H_{rxn} =$_____

1. Calculate the heat gained by the HCl solution, in calories. Assume that 100. mL of HCl can be treated as if it is 100. mL of pure H_2O, since 1 Molar $HCl_{(aq)}$ is mostly water.

Q=

2. Convert the above value from calories into kilojoules.

3. Determine the moles of magnesium oxide that reacted.

4. Determine the heat given off in kilojoules per mole of MgO.

5. What is the value of ΔH_{rxn} (including the sign) ?_____

6. Fill in the value for ΔH_{rxn} next to the reaction, **above**, and **on the front** next to reaction #1.

Reaction #2: $Mg_{(s)} + 2\ HCl_{(aq)} \text{------>} MgCl_{2(aq)} + H_{2(g)}$ $\Delta H_{rxn} =$_____

1. Calculate the heat gained by the HCl solution, in calories. Assume that 100. mL of HCl can be treated as if it is 100. mL of pure H_2O, since 1 Molar $HCl_{(aq)}$ is mostly water.

Q=

2. Convert the above value from calories into kilojoules.

3. Determine the moles of magnesium that reacted.

4. Determine the heat given off in kilojoules per mole of Mg.

5. What is the value of ΔH_{rxn} (including the sign) ?_____

6. Fill in the value for ΔH_{rxn} next to the reaction **above**, and **on the front** next to reaction #2.

Now you are ready to do the Hess's Law calculations on the front of the lab!