Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Period\_\_\_\_\_\_Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Heat of Formation of Magnesium Oxide**

**PROCEDURE:**

1. Measure out 100.0 mL of 1.0 M HCl in a graduated cylinder.

Assume that its density and specific heat are essentially equivalent to that of water.

Pour the acid into a styrofoam cup.

2. Mass out about 0.2 g of cleaned magnesium to the nearest 0.0001 g.

3. Record the temperature of the hydrochloric acid, then add the magnesium to it.

4. Stir the mixture constantly, and record the highest temperature reached.

5. Make duplicate determinations until you obtain a set of results for ΔH that differs by no more than 3%.

Record the average of these two values.

6. Repeat the above procedure using approximately 0.5 g of MgO instead of Mg. Be sure that all the MgO goes directly into the HCl. Do not allow it to “cake” on the bottom.

## DATA TABLE A: THE REACTION OF Mg AND HCl

|  |  |  |  |
| --- | --- | --- | --- |
| Trial # | **1** | **2** | **3** |
| Mass of Mg |  |  |  |
| Mass of solution |  |  |  |
| Moles of Mg |  |  |  |
| **Ti** |  |  |  |
| **Tf** |  |  |  |
| **ΔT** |  |  |  |
| Heat released |  |  |  |
| **ΔHrxn/mole Mg** |  |  |  |

Balanced Chemical Equation:

Average ΔHrxn/mole: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Calculations:

**DATA TABLE B: THE REACTION OF MgO and HCl**

|  |  |  |  |
| --- | --- | --- | --- |
| **Trial #** | **1** | **2** | **3** |
| **Mass of MgO** |  |  |  |
| **Mass of Solution** |  |  |  |
| **Moles of MgO** |  |  |  |
| **Ti** |  |  |  |
| **Tf** |  |  |  |
| **ΔT** |  |  |  |
| **Heat released** |  |  |  |
| **ΔHrxn/mole MgO** |  |  |  |

Balanced Chemical Equation:

Average ΔHrxn/mole: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Calculations:

**Analysis:**

1. Using the thermochemical equations for the reactions that you have performed, and the ΔHfo for H2O(l) form your textbook, apply Hess’s Law to obtain a thermochemical equation for the following equation (show work):

Mg(s) + 0.5 O2(g) → MgO(s)

1. Determine the percent error between your value for the heat of formation of magnesium oxide and the published value from your text book.