**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Partners: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Determining the ∆H for the Formation of MgO**

**Purpose:**

* to experimentally determine the molar heat of formation of MgO

**Observation of Ms. Purcell’s demonstrations:**

**i) hair burning** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

ii) **Mg burning** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Determining ΔHf for MgO(s) is difficult because the above combustion of Mg metal results in a large evolution of heat and toxic fumes..

Write the **"bench top"** BCE for the formation of MgO.

**BCE:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **∆H = \_\_\_?\_\_\_**

**Google the Accepted Value of ∆Hf for MgO \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

However, Hess’ Law states that ΔH°f can be calculated by the summation of the molar enthalpy changes for different reactions that add up to the “bench top” equation.

We will use reactions of Mg and MgO with dilute acid solutions and the enthalpy of formation of liquid water from the Heats of Formation table.

**3 Steps to use with Hess’ Law to calculate the ∆Hf for MgO:**

**Step 1:**

* Measure 100.0 mL of 1.0 M HCl into a coffee cup calorimeter
* Record temperature \_\_\_\_\_\_\_\_\_\_\_
* Mass 1.00 g of MgO
* Add MgO to HCl
* Stir and record the highest temperature reached \_\_\_\_\_\_\_\_\_\_\_

**BCE** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Calculation of ∆Hreaction per 1 mole of MgO**

**Step 2:**

* Measure 100.0 mL of 1.0 M HCl into a coffee cup calorimeter
* Record temperature \_\_\_\_\_\_\_\_\_\_\_
* Mass a piece of Mg in the prep room balance (approx. 0.5000 g)
* Add to HCl and push below surface
* Swirl and record the highest temperature reached \_\_\_\_\_\_\_\_\_\_­

**BCE** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Calculation of ∆Hreaction per 1 mole of Mg**

**Step 3: From Heats of Formation Table**

**H2(g) + ½ O2(g) 🡪 H2O(l) ΔHf = – 286 kJ/mol**

**Write the 3 Equations for Steps 1, 2 and 3:**

|  |  |
| --- | --- |
| **Equation** | **∆H** |
| **1** |  |
| **2** |  |
| **3** |  |
|  |  |
| **Adds up to Bench Top Equation:** |  |

**Percent Error:**

**Conclusion:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_