**Name: Period: Seat#:**

**S-10**

1 – EXOTHERMIC AND ENDOTHERMIC

***Classify each statement as talking about an [EXO]thermic or [ENDO]thermic reaction:***

|  |  |
| --- | --- |
| \_\_\_\_\_ surroundings get hot  \_\_\_\_\_ PE diagram is uphill  \_\_\_\_\_ energy is a product  \_\_\_\_\_ ΔH is positive  \_\_\_\_\_ reactants have more energy | \_\_\_\_\_ ΔH is negative  \_\_\_\_\_ PE diagram is downhill  \_\_\_\_\_ surroundings get cold  \_\_\_\_\_ products have more energy  \_\_\_\_\_ energy is a reactant |

2 – HEAT CALCULATIONS

A 45.0 mL sample of water is heated from 15.0°C to 35.0°C. How many joules of energy have been absorbed by the water? (Show work)

If 5430 J of energy is used to heat 1.25 L of room temperature water (23.0°C), what is the final temperature of the water?

3 – HOT AND COLD OBJECTS

A 100. gram sample of aluminum (specific heat = 0.900 J·g-1·°C-1) in boiling water is added to an insulated cup containing 50.0 grams of water at 5.00°C. What will the final temperature of the mixture be? The specific heat of water is 4.184 J·g-1·°C-1.

4 – HEATS OF FUSION & VAPORIZATION

Knowing that the ΔHfus for water is 6.02 kJ·mol-1, calculate the following:

How much energy (in kJ) is absorbed by 45.0 g of ice as it melts?

What mass of ice can be melted with 75.0 kJ of energy?

5 – ΔH FROM DATA

When 10.0 grams of C5H12 is burned, 453 kJ of energy is released.

What is the ΔHcombustion for C5H12?

When 10.0 grams of aluminum melts, 3.929 kJ of energy is required. What is the ΔHfus of Al?

– HESS’S LAW—LONG VERSION

Iron ore can be converted to iron metal with CO gas.



7 – HESS’S LAW – SHORTCUT

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **chemical** | CO2(g) | H2O(l) | C5H12(*l*) | C2H5OH(*l*) |
| **ΔHf** | -393.5 kJ·mol-1 | -285.8 kJ·mol-1 | -173.1 kJ·mol-1 | -277.6 kJ·mol-1 |

Given the above ΔHf°’s, calculate the ΔHcombustion of pentane, C5H12.

Calculate the ΔHcombustion of ethyl alcohol, C2H5OH(*l*)

8 – MORE HESS’S LAW

|  |  |  |  |
| --- | --- | --- | --- |
| **chemical** | CO2(g) | H2O(l) | C8H18(*l*) |
| **ΔHf** | -393.5 kJ·mol-1 | -285.8 kJ·mol-1 | ??? kJ·mol-1 |

Knowing that the ΔHcombusion of octane, C8H18, is -5508.9 kJ·mol-1 calculate the ΔHf of octane.