S-10

Name: **Period:** **Seat#:**

1 – EXOTHERMIC AND ENDOTHERMIC

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

______	surroundings get hot	______	ΔH is negative
______	PE diagram is uphill	______	PE diagram is downhill
______	energy is a product	______	surroundings get cold
______	ΔH is positive	______	products have more energy
______	reactants 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?

Struggled? Got some wrong? Do some self-study!

3 – HOT AND COLD OBJECTS

A 100. gram sample of aluminum (specific heat = 0.900 $J \cdot g^{-1} \cdot °C^{-1}$) 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 $J \cdot g^{-1} \cdot °C^{-1}$.

4 – HEATS OF FUSION & VAPORIZATION

Knowing that the ΔH_{fus} for water is 6.02 $kJ \cdot mol^{-1}$, 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?

Struggled? Got some wrong? Do some self-study!

5 – ΔH FROM DATA

When 10.0 grams of C_5H_{12} is burned, 453 kJ of energy is released.

What is the $\Delta H_{combustion}$ for C_5H_{12}?

When 10.0 grams of aluminum melts, 3.929 kJ of energy is required. What is the ΔH_{fus} of Al?

– HESS'S LAW—LONG VERSION

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

$$FeO(s) + CO(g) \rightarrow Fe(s) + CO_2(g)$$

Calculate the standard enthalpy change for this reaction from these reactions of iron oxides with CO:

(1) $3Fe_2O_3(s) + CO(g) \rightarrow 2Fe_3O_4(s) + CO_2(g) \quad \Delta H° = -47\ kJ$

(2) $Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g) \quad \Delta H° = -25\ kJ$

(3) $Fe_3O_4(s) + CO(g) \rightarrow 3FeO(s) + CO_2(g) \quad \Delta H° = 19\ kJ$

Struggled? Got some wrong? Do some self-study!

7 – HESS'S LAW – SHORTCUT

chemical	$CO_2(g)$	$H_2O(l)$	$C_5H_{12}(l)$	$C_2H_5OH(l)$
ΔH_f	-393.5 kJ·mol^{-1}	-285.8 kJ·mol^{-1}	-173.1 kJ·mol^{-1}	-277.6 kJ·mol^{-1}

Given the above $\Delta H_f°$'s, calculate the $\Delta H_{combustion}$ of pentane, C_5H_{12}.

Calculate the $\Delta H_{combustion}$ of ethyl alcohol, $C_2H_5OH(l)$

8 – MORE HESS'S LAW

chemical	$CO_2(g)$	$H_2O(l)$	$C_8H_{18}(l)$
ΔH_f	-393.5 kJ·mol^{-1}	-285.8 kJ·mol^{-1}	??? kJ·mol^{-1}

Knowing that the $\Delta H_{combusion}$ of octane, C_8H_{18}, is -5508.9 kJ·mol^{-1} calculate the ΔH_f of octane.