Name: _____

Chemistry 30

Unit 1: Energy Changes in Chemical Reactions

Assignment 2: Sections 2-1 to 2-3

1. What are STP and SATP? Give definitions and appropriate values.

2. Identify each of the following reactions as ***endothermic*** or ***exothermic***. Also, write each one in an equivalent way.

> For example: $S(g) + 2\ Cl(g) \rightarrow SCl_2(g) \Delta H^\circ = -510$ kJ
>
> **Answer: Exothermic (ΔH° is negative). The reaction may also be written as:**
>
> $S(g) + 2\ Cl(g) \rightarrow SCl_2(g) + 510$ kJ
>
> Notice the sign in front of 510 kJ – when the energy term is included in the equation, it always has a + sign in front.

a. $2\ Hg(l) + I_2(s) \rightarrow Hg_2I_2(s) \qquad \Delta H^\circ = -28.9$ kcal

b. $N_2(g) + 3\ F_2(g) \rightarrow 2\ NF_3(g) + 27.2$ kcal

c. $NH_4NO_3(s) + 6.1$ kcal $\rightarrow NH_4^+(aq) + NO_3^-(aq)$

d. $Na(s) \rightarrow Na(g) \qquad \Delta H^\circ = 25.98$ kcal

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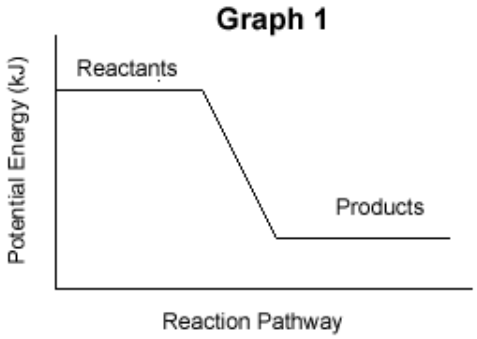
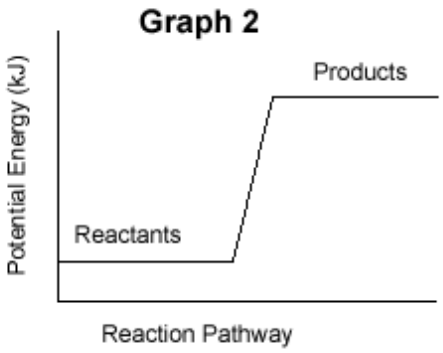
3. Consider the following two potential energy graphs:

   A. Identify the following graphs as representing **endothermic** or **exothermic** reactions:





   B. Which graph above will have a value for ΔH that is ***negative***?

4. Using a table of thermochemical data, write heats of formation reactions for the following compounds. Include the energy term as part of the equation.

Example:	Write the heat of formation reaction for KOH, including the energy term as part of the equation.
Answer:	**$K + \frac{1}{2} O_2 + \frac{1}{2} H_2 \rightarrow KOH + 428.8$ kJ**
IMPORTANT:	**Be sure to memorize the seven diatomic molecules: H_2, N_2, O_2, F_2, Cl_2, Br_2, I_2**

   a. $SO_2(g)$

   b. C_3H_8 (g)

c. N_2O (g)

d. Na_2CO_3 (s)

5. On the basis on energy changes, select the three reactions from the list below that are most likely to occur spontaneously:

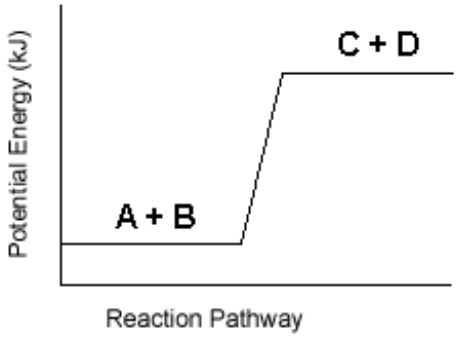
A. $H_2(g) + O_2(g) \rightarrow H_2O(g) + 220.1$ kJ

B. $3\ CO_2(g) + 4\ H_2O(l) + 2220$ kJ $\rightarrow C_3H_8(g) + 5\ O_2(g)$

C. $2\ HCl(g) \rightarrow H_2(g) + Cl_2(g)$ $\Delta H° = +185$ kJ

D. $CH_4(s) + 2\ O_2(g) \rightarrow CO_2(g) + 2\ H_2O(l)$ $\Delta H° = -890$ kJ

E.



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