Name _____ Date _____ Period _____

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6.8 Enthalpy of Formation

AP Chemistry

Show work with units. $\Delta H°_{rxn} = \Sigma\, n\Delta H°_f(\text{products}) - \Sigma\, n\Delta H°_f(\text{reactants})$. Elements in their standard states have $\Delta H°_f = 0$.

$\Delta H°_f$ (kJ/mol)	$NH_3(g)$ −45.9	$NO(g)$ +90.3	$H_2O(g)$ −241.8	$H_2O(l)$ −285.8	$CO_2(g)$ −393.5
	$C_3H_8(g)$ −103.8	$SO_2(g)$ −296.8	$Fe_2O_3(s)$ −824.2	$Al_2O_3(s)$ −1675.7	

1. Write the balanced formation equation, with states, for each substance. (Use C(s, graphite) for carbon.)

(a) $NH_3(g)$
(b) $C_2H_5OH(l)$
(c) $CO_2(g)$

2. Calculate $\Delta H°$ for $4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$.

3. Calculate $\Delta H°$ for the combustion of propane: $C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(l)$.

4. Calculate $\Delta H°$ for the thermite reaction: $Fe_2O_3(s) + 2Al(s) \rightarrow Al_2O_3(s) + 2Fe(s)$.

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5. For $2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$, $\Delta H° = -197.8\ kJ/mol_{rxn}$. Use the table to find $\Delta H°_f$ of $SO_3(g)$.

6. Is $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$ a formation reaction for water? Explain. Use $\Delta H°_f[H_2O(l)]$ to find $\Delta H°$ for this reaction.

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