Name _____ Date _____ Period _____

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Hess's Law

Chemistry

Reverse an equation: change the sign of ΔH. Multiply an equation: multiply ΔH by the same number. Add the equations, cancel what matches (same phase), and add the ΔH values. Find it, fix it, add it.

1. Given A + B → C, ΔH = −120.0 kJ. Find ΔH for each equation.

(a) C → A + B

(b) 2A + 2B → 2C

(c) 2C → 2A + 2B

(d) ½A + ½B → ½C

2. Find ΔH for $N_2(g) + 2O_2(g) \rightarrow 2NO_2(g)$ using:

$N_2(g) + O_2(g) \rightarrow 2NO(g)$ ΔH = +180.6 kJ

$2NO(g) + O_2(g) \rightarrow 2NO_2(g)$ ΔH = −114.2 kJ

3. Find ΔH for $2S(s) + 3O_2(g) \rightarrow 2SO_3(g)$ using:

$S(s) + O_2(g) \rightarrow SO_2(g)$ ΔH = −296.8 kJ

$2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$ ΔH = −197.8 kJ

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4. Find ΔH for $C_2H_4(g) + H_2(g) \rightarrow C_2H_6(g)$ using:

(1) $C_2H_4(g) + 3O_2(g) \rightarrow 2CO_2(g) + 2H_2O(l)$ $\Delta H = -1411.0$ kJ

(2) $C_2H_6(g) + {}^{7}\!/_{2}O_2(g) \rightarrow 2CO_2(g) + 3H_2O(l)$ $\Delta H = -1559.8$ kJ

(3) $H_2(g) + {}^{1}\!/_{2}O_2(g) \rightarrow H_2O(l)$ $\Delta H = -285.8$ kJ

5. Find ΔH for $2C(\text{graphite}) + 3H_2(g) \rightarrow C_2H_6(g)$ using:

$C(\text{graphite}) + O_2(g) \rightarrow CO_2(g)$ $\Delta H = -393.5$ kJ

$H_2(g) + {}^{1}\!/_{2}O_2(g) \rightarrow H_2O(l)$ $\Delta H = -285.8$ kJ

$C_2H_6(g) + {}^{7}\!/_{2}O_2(g) \rightarrow 2CO_2(g) + 3H_2O(l)$ $\Delta H = -1559.8$ kJ

6. A student cancels $2H_2O(l)$ on one side with $2H_2O(g)$ on the other. Why is this wrong?

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