Standard Enthalpy of Formation/ Hess short way 17-4

The change in enthalpy that accompanies the formation of one mole of a compound is calculated from its
elements in its standard state.

ΔH^{o}_{f} — change in enthalpy of formation.

-See chart

-Elements in their standard state have a H_f = 0.0 kJ/mol

Hess's Law Continued

A chemical Equation can be express as a sum of formation reactions.

$$\Delta H^{o}_{reaction} = \sum n H^{O}_{f}(\text{Products}) - \sum n H^{O}_{f}(\text{reactants})$$

(# moles) (# moles)

Steps:
1. Write the balanced equation for the reaction
2. Obtain the molar heats of formation for all reactants and products
3. Multiply the molar heat of formation by the molar coefficient for each reactant and product.
4. Calculate the change in enthaply by subtracting sum of the reactants from products. $\Delta H = ?$
5. Calculate molar enthaply if need be...

Example HESS/SHORT....

$2\,CO_{(g)} + O_{2\,(g)} \longrightarrow 2CO_{2\,(g)}$ $\Delta H=?$

$\Delta H = \sum$ products $- \sum$ reactants

$\Delta H = (2\,mol \cdot -393.5\,KJ/mol) - (2\,mol \cdot -110.5\,KJ/mol + 0)$

$\Delta H = (-787.0\,KJ) + (+221.0\,KJ)$

$\Delta H = -566.0\,KJ$

$C_2H_5OH_{(l)} \rightarrow C_2H_{4\ (g)} + H_2O_{(l)}$ $\Delta H=?$

ethanol ethene

$\Delta H = \Sigma prod - \Sigma reactants$

$\Delta H = (1mol \cdot 52.5\frac{KJ}{mol} + 1mol \cdot -285.8\frac{KJ}{mol}) - (1mol \cdot -235.2\frac{KJ}{mol})$

$\Delta H = (52.5KJ + -285.8KJ) - (-235.2KJ)$

$\Delta H = (-233.3KJ) + (+235.2KJ)$

$\Delta H = 1.9KJ$

— Complete both sides of Hess Long Practice.

— Hess short Pg. 531 32 & 33

— Test Review

Hess Long

1. -851.5KJ
2. 131.3KJ
3. -524.8KJ
5. 464.8KJ
6. -9124.2KJ