

## 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.

$\Delta H^{\circ}_f$  — 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.

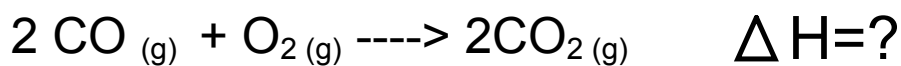
$$\Delta H^{\circ}_{\text{reaction}} = \sum n H^{\circ}_f(\text{Products}) - \sum n H^{\circ}_f(\text{reactants})$$

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### 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 enthalpy by subtracting sum of the reactants from products.  $\Delta H = ?$
5. Calculate molar enthalpy if need be...

Example HESS / SHORT....

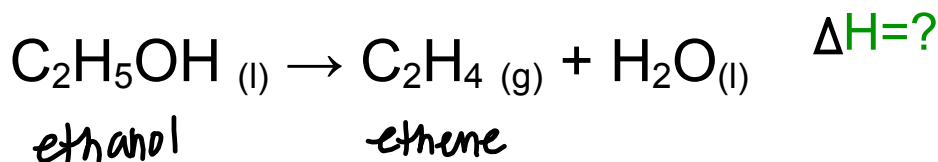


$$\Delta H = \sum \text{products} - \sum \text{reactants}$$

$$\Delta H = (2 \text{ mol} \cdot -393.5 \frac{\text{KJ}}{\text{mol}}) - (2 \text{ mol} \cdot -110.5 \frac{\text{KJ}}{\text{mol}} + 0)$$

$$\Delta H = (-787.0 \text{ KJ}) + (+221.0 \text{ KJ})$$

$$\Delta H = -566.0 \text{ KJ}$$



$$\Delta H = \sum \text{prod} - \sum \text{reactants}$$

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

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

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

$$\Delta H = 1.9 \text{ KJ}$$

— Complete both sides of Hess Long Practice.

— Hess short Pg. 531  
32 & 33

— Test Review

Hess Long

1. - 851.5 KJ

2. 131.3 KJ

3. - 524.8 KJ

5. 464.8 KJ

6. - 9124.2 KJ