Hess's Law

In addition to calculating $\triangle H$ directly from experiment, because enthalpy is a state function any change from reactants to products will always have the the same change in enthalpy regardless of the reaction pathway.

This means that we can calculate the enthalpy change by adding together the enthalpy of different reactions.

By adding the two equations together we have the same net reaction that we wanted to find. By adding the $\triangle H$ values we can get the $\triangle H$ for the overall reaction. We can verify this experimentally.

$Mg_{(s)} + 2\ H_2O_{(l)} \text{ --> } Mg(OH)_{2(s)} + H_{2(g)}$

$2Mg_{(s)} + 1/2\ O_{2(g)} \text{ --> } 2\ MgO_{(s)}$ $\Delta H = -1204$ kJ/mol

$MgO_{(s)} + H_2O_{(l)} \text{ --> } Mg(OH)_{2(s)}$ $\Delta H = -37$ kJ/mol

$H_2O_{(l)} \text{ --> } H_2O_{(g)}$ $\Delta H = 44$ kJ/mol

$H_{2(g)} + 1/2O_{2(g)} \text{ --> } H_2O_{(g)}$ $\Delta H = -242$ kJ/mol

Ex: