# Strategies for solving enthalpy calculations

What sort of question / data do you have?

Temperature rises and volumes of water or solution, average bond energies or $\Delta H$ info ($\Delta_f H^o$, $\Delta_c H^o$, $\Delta_r H^o$, $\Delta_{fus} H^o$, $\Delta_{vap} H^o$)

| Temperature rises and volumes | Average bond energies | Do you have all the necessary $\Delta_f H^o$ data that you need? | |
|---|---|---|---|
| | | Yes | No |
| Use $q = mc\Delta T$ And<br><br>$\Delta_r H^o = q/n$ (endo)<br><br>$\Delta_r H^o = -q/n$ (exo) | Bond breaking is endo, bond making is exo<br><br>The overall difference between the bond breaking and making is the enthalpy change<br><br>Note: these Q are now more common in L2 but you could still get one | Use a form of Hess's Law<br>$\Delta_r H^o = \Sigma \Delta_f H^o$ (products) - $\Sigma \Delta_f H^o$ (reactants)<br><br>Remember some $\Delta_c H^o$ can be used e.g. $\Delta_c H^o(C(s)) = \Delta_f H^o(CO_2(g))$ both have the same value because the equations are the same for both<br><br>$C(s) + O_2(g) \rightarrow CO_2(g)$ | Need to use Hess's Law<br><br>Either construct a diagram (usually triangular shape or rectangular shape with equations and arrows) or line up below and cancelling equations method<br><br>Remember that if you reverse an equation you need to change the sign |

UNITS: Use kJ except use kJ $mol^{-1}$ when…

$\Delta_c H^o(S(s))$ **one mol** of S solid is completely burnt

$\Delta_f H^o(CH_4(g))$ **one mol** of $CH_4$ gas is formed

$\Delta_r H^o$ **one mol** of reaction (which means the quantities that are reacting in the equation