

Bond Enthalpy and Energy Calculations

BOND ENTHALPY

- This is the average energy required to break the bond in 1 mole of gaseous compounds
- Bond breaking is endothermic, ΔH is +ve
- Bond making is exothermic, ΔH is -ve

WORKED EXAMPLE



Bonds Broken

$$\begin{aligned} 1 \times \text{C-C} (347) &= 347 \\ 6 \times \text{C-H} (413) &= 2478 \\ 3.5 \times \text{O=O} (498) &= 1743 \end{aligned}$$

$$\text{Total} = +4568$$

+ is the sign for bond breaking

Bonds Made

$$\begin{aligned} 4 \times \text{C=O} (805) &= 3220 \\ 6 \times \text{O-H} (464) &= 2784 \end{aligned}$$

$$\text{Total} = -6004$$

- is the sign for bond making

$$\Delta H_c(\text{C}_2\text{H}_6) = (+4568) + (-6004) = -1346 \text{ kJ/mol}$$

This symbol refers to enthalpy change when a substance burns completely in oxygen

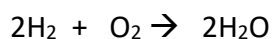
$$\Delta H = -1346 \text{ kJ/mol}$$

Energy has been released so to show ΔH we put a -ve

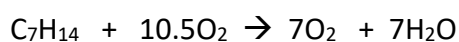
-ve energy change, this is an exothermic reaction

Questions

1. Calculate the enthalpy of combustion of hydrogen



2. Calculate the enthalpy of combustion of hept-1-ene



Bond	Bond Enthalpy kJ/mol
C-C	347
C-H	413
O=O	498
O-H	464
C=O	805
C-O	358
H-H	436
C=C	612