

20/07/2026 Enthalpy of Combustion

Aim: To investigate the ~~enthalpy~~ of combustion of different alcohols.

Method: As per stapled sheet.

^{AB}
Results: Raw Data:

Alcohol Used	Initial mass of Burner (g)	Final mass of Burner (g)	Mass of alcohol used (g)	Average Mass Used (g)
Methanol A	184.89	184.47	0.42	} 0.40
Methanol B	184.47	184.09	0.38	
Ethanol A	189.42	189.18	0.24	} 0.22
Ethanol B	189.18	188.98	0.20	
Propanol A	188.96	188.77	0.19	} 0.18
Propanol B	188.77	188.60	0.17	

Calculations:

For each run, 100 ml of water was heated by 10°C .

$$\text{so, } \Delta H = cm\Delta T = 4.18 \times 0.1 \times 10 = \underline{\underline{4.18 \text{ kJ}}}$$

$$\begin{aligned}\text{methanol: gfm} &= 32, \text{ so } \Delta H = \frac{4.18 \times 32}{0.40} \\ &= 334.4 \text{ kJ/mol}\end{aligned}$$

$$\begin{aligned}\text{ethanol: gfm} &= 46, \text{ so } \Delta H = \frac{4.18 \times 46}{0.22} \\ &= 847.0 \text{ kJ/mol}\end{aligned}$$

$$\begin{aligned}\text{propanol: gfm} &= 60, \text{ so } \Delta H = \frac{4.18 \times 60}{0.18} \\ &= 1393.3 \text{ kJ/mol}\end{aligned}$$

^{AB}

Conclusions:

Enthalpies of combustion found are in table below, with values from databook

	methanol	Ethanol	Propanol
Experimental Value (kJ/mol)	-334.4	-847.0	-1393.3
Data book value (kJ/mol)	-726	-1367	-2021

The trend shows that the enthalpy increases with chain length. This agrees with databook.

The actual values are all much lower than databook.

Sources of Error/Evaluation:

The values being lower than those from databook shows there was a lot of heat loss to surroundings. This could have been minimised by using a draft shield.

The thermometer had divisions of 1°C . Using a digital thermometer would have been more accurate.

Unseen warming of water was a possibility. But this was ~~avoided~~ by stirring
with a glass rod.
AA
minimised