

What Calculations can I do?

① Energy content.

The energy released during combustion can be explained by the making + breaking of bonds.



breaking	values	making	
4 x C-H	413	2 x C=O	799
2 x O=O	498.	4 x H-O	464

$$\begin{aligned}\Delta H &= \text{en req'd to break bonds} - \text{en released when forming bonds} \\ &= (4 \times 413 + 2 \times 498) - (2 \times 799 + 4 \times 464) \\ &= \underline{-890 \text{ kJ/mol}}\end{aligned}$$

EXOTHERMIC if ΔH is neg.

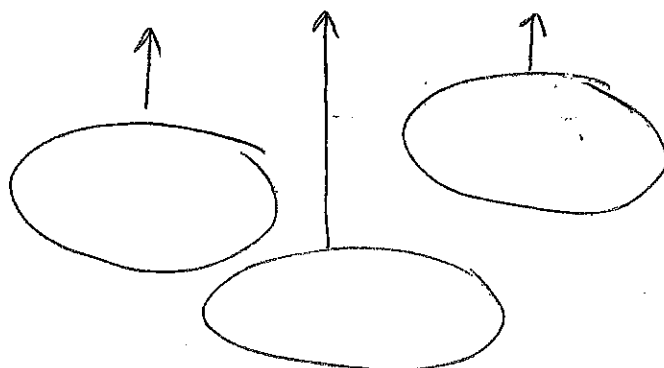
Compare to published values.

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② Energy density

- We are more interested in how much energy / L as that's how we pay for it.
- may need a few steps to get to it

eg $\frac{\text{kJ}}{\text{mol}} \times \frac{\text{mol}}{\text{g}} \times \frac{\text{g}}{\text{mL}} \times \frac{\text{mL}}{\text{L}} \Rightarrow \text{kJ/L}$



Yay!

③ Stoichiometric calculations

If I use this much of 'A'

how much of 'B' is produced?

- need balanced chemical equation.

* \Rightarrow see worksheet (STOICH)

eg. How much CO_2 is produced when I burn
1 L of ethanol compared to 1 L of petrol?

You can do these for - combustion

- transesterification reaction YIELD

- maybe production reactions?

④ % composition - especially ethanol oxygen content.

⑤ How many L required to travel 100 km?

(need data from a car manufacturer website)

fuel efficiency comparisons.

⑥ Energy density per dollar.