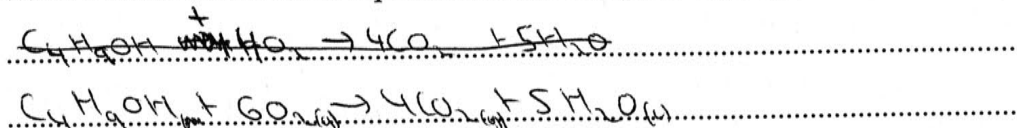


Question 23 (3 marks)

- (a) Write a balanced chemical equation for the complete combustion of 1-butanol. 1



- (b) A student measured the heat of combustion of three different fuels. The results are shown in the table. 2

Fuel	Heat of combustion (kJ g ⁻¹)
A	-48
B	-38
C	-28

The published value for the heat of combustion of 1-butanol is 2676 kJ mol⁻¹.

Which fuel from the table is likely to be 1-butanol? Justify your answer.

$n = \frac{m}{M}$
 $= \frac{1}{74.12}$
 $= 0.0135 \text{ mols}$

$\therefore B \Rightarrow 0.0135 \text{ mols} \rightarrow 38 \text{ kJ}$
 $1 \text{ mol} \rightarrow x$
 $x = 2814.8 \text{ kJ/mol}$

$\therefore A \Rightarrow 0.0135 \text{ mols} \rightarrow 48 \text{ kJ}$
 $1 \text{ mol} \rightarrow x$
 $x = 3555.5 \text{ kJ/mol}$

$\therefore C \Rightarrow 0.0135 \text{ mols} \rightarrow 28 \text{ kJ}$
 $1 \text{ mol} \rightarrow x$
 $x = 2074.1 \text{ kJ/mol}$

\therefore Fuel B is most likely 1-butanol as its ΔH is closest to 2676 kJ mol⁻¹