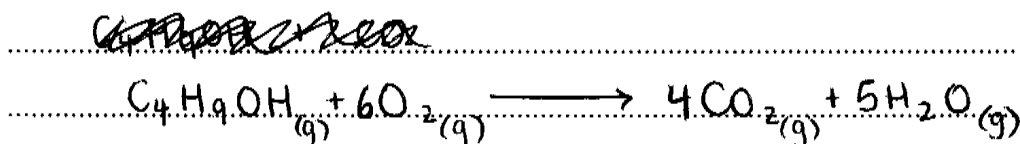


**Question 23** (3 marks)

- (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 <sup>-1</sup> )
A	-48
B	-38
C	-28

The published value for the heat of combustion of 1-butanol is 2676 kJ mol<sup>-1</sup>.

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

$$M_r = 4(12.01) + 10(1.008) + 16 = \text{per mol} = 74.12 \text{ g}$$

$$\Delta H = 2676$$

$$= m \times C \times \Delta T$$

$$\frac{\text{kJ/mol}}{\text{kJ/g}} = \frac{m}{M} = \frac{1}{74.12}$$

The fuel is most likely to be B. This is because the molar mass of 1-butanol is 74.12 (known above). When the heat of combustion is divided by this value, you obtain  $\frac{-2676}{74.12} = -36.1036$ . ... B (-38) is the most correct choice.