Question 23 (3 marks)

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

$$C_4H_9OH_{(l)} + 6O_{2(g)} \rightarrow 4CO_{2(g)} + 5H_2O_{(l)}$$
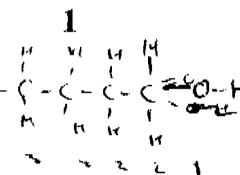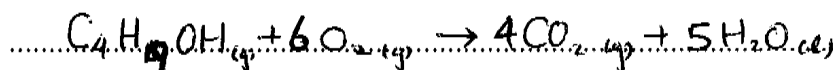
(b) A student measured the heat of combustion of three different fuels. The results are shown in the table. **2**

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.

butanol C_4H_9OH, molar mass $= 74$

1 mol $= 74$ g

hence 2676 kJ/mol $\rightarrow \dfrac{2676}{74} \rightarrow = 36.16$ kJ/g exothermic

hence $\underline{B}$ (−38) kJ/g is the closest