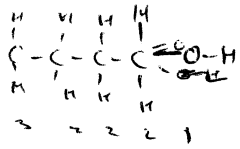
Question 23 (3 marks)

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

$C_4H_9OH_{(g)} + 6O_{2(g)} \rightarrow 4CO_{2(g)} + 5H_2O_{(l)}$



(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 → $\frac{2676}{74}$ → = 36.16 kJ/g exothermic

hence B (−38) kJ/g is the closest