Question 23 (3 marks)

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

$CH_3CH_2CH_2CH_2OH + \frac{4}{5}O_2 \longrightarrow 4CO_2 + 5H_2O$

$CH_3CH_2CH_2CH_2OH + 6O_2 \longrightarrow 4CO_2 + 5H_2O$

$CH_3CH_2CH_2CH_2OH + 6O_{2(l)} \rightarrow 4CO_{2(g)} + 5H_2O_{(l)}$
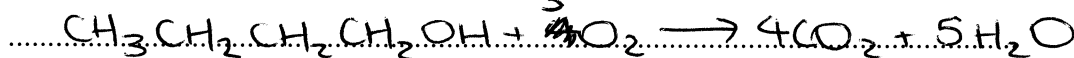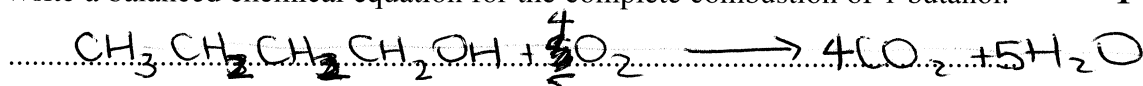
(b) A student measured the heat of combustion of three different fuels. The results   **2**
are shown in the table.

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.

$MW = (12.01 \times 4 + 1.008 \times 10 + 16)$

$= 74.12$

$moles = \frac{m}{MW}$ $-mC\Delta T$

∴ it is most likely to be B

as $-2676 \div 74.12$

∴ -38