Question 23 (3 marks)

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

$CH_3.CH_2.CH_2.CH_2OH \rightarrow$ ~~$CH_3.CH_2.CH_2$~~ $+ H_2O$

$H-\overset{H}{\underset{H}{C}}-\overset{H}{\underset{H}{C}}-\overset{H}{\underset{H}{C}}-\overset{H}{\underset{H}{C}}-OH$

(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

$n = \dfrac{m}{M}$

$x = \dfrac{48}{74.12}$

$= 0.64$

0.51

Molar mass
$= (12.01 \times 4) +$
(16)
(1.008×10)
$= 74.12$

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.

Fuel C. fuel C has a total of 0.377657555 J/mol, henceforth, having the closest number to the published value of 2676 kJ mol. Compared to the other values of ↑

A = 0.64
B = 0.51.   where both are in joules