Question 1 – (10 Marks) A $4.502\ g$ sample of an organic compound containing C, H, and O on combustion produced $4.401\ g\ of\ CO_2$ and $0.901\ g\ of\ H_2O$. The molar mass of the compound is $90.04\ g/mol$.Determine the empirical and molecular formula of the organic compound.

$$C_x H_y O_z + excess\ O_2 \Rightarrow x CO_2 + \frac{y}{2} H_2O$$

(1) $n_C = x = \dfrac{4.401\ g}{12.01 + 2 \times 16.00\ g/mol} = 0.1000\ mol$

$\dfrac{y}{2} = \dfrac{0.910\ g}{16.000 + 2 \times 1.008\ g/mol} = 0.0502\ mol$

(1) $n_H = y = 2 \times 0.0502\ mol = 0.100\ mol$

(1) $m_C = 0.1000\ mol \times 12.01\ g/mol = 1.201\ g$