Answer on Question #48772, Chemistry, Other

Task:

When 3.62 g of a compound containing carbon, hydrogen, and oxygen were burned completely in air, 5.19 g of CO_2 and 2.83 g of H_2O were produced. What is the empirical formula of the compound?

Answer:

$C_xH_yO_z+(x+y/4-z/2)O_2=xCO_2+y/2H_2O$

$$\nu = \frac{m}{M}$$

$$M(CO_2) = 44 g/mol$$

$$\nu(CO_2) = \frac{5.19}{44} = 0.118 mol$$

$$\nu(C) = 0.118 mol$$

$$m(C) = \nu M = 0.118 \cdot 12 = 1.41 g$$

$$M(H_2O) = 18 g/mol$$

$$\nu(H_2O) = \frac{2.83}{18} = 0.16 moles$$

$$\nu(H) = 0.16 \cdot 2 = 0.32 moles$$

$$m(H) = \nu M = 0.32 \cdot 1 = 0.32 g$$

$$m(O) = 3.62 - 1.41 - 0.32 = 3.2 g$$

$$\nu(H) = \frac{3.2}{16} = 0.118 moles$$

C:H:O=0.118:0.32:0.118

C:H:O=1:2.66:1

After multiplying by 3 we will receive: C:H:O=3:8:3

The final formula is: $C_3H_8O_3$