Dumas Method

(I) $M.M. = \frac{m}{V}\frac{RT}{P}$

$m = 451.75_g - 451.00 = 0.75_g$

$T = 99.95 + 273.15 = 373.10\,K$

$V = 0.5000\,L$

$P = \frac{755.1\,mmHg}{760\,\frac{mmHg}{1\,atm}} = 0.9936\,atm$

$M.M. = \frac{0.75g}{0.5000L} \cdot \frac{0.08201 \cdot 373.1}{0.9936}$

$M.M. = 46.19\,g/mol$

(II)

$1.91_g\,CO_2 \cdot \frac{1\,mol\,CO_2}{44.01_g\,CO_2} = 4.34 \cdot 10^{-2}\,mol\,CO_2 = 4.34 \cdot 10^{-2}\,mol\,C$

$.521_g\,C$

$1.17_g\,H_2O \cdot \frac{1\,mol\,H_2O}{18.02_g} \cdot \frac{2H}{1\,H_2O} = 1.30 \cdot 10^{-1}\,mol\,H$

$1.309 \cdot 10^{-1}\,g\,H$

$g\,H + g\,C = 0.652 \neq 1.00_g$

$g\,O = 1.00 - 0.652 = 0.348_g\,O = 2.18 \cdot 10^{-2}\,mol\,O$

$\frac{4.34 \cdot 10^{-2}\,mol\,C}{2.18 \cdot 10^{-2}} \simeq 2$

$\frac{1.30 \cdot 10^{-1}\,mol\,H}{2.18 \cdot 10^{-2}} \simeq 6$

$\frac{2.58 \cdot 10^{-2}\,mol\,O}{2.18 \cdot 10^{-2}} = 1$

$C_2H_6O = 46.07\,g/mol$

C_2H_6O

$\frac{46.19}{46.07} \simeq 1$

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