

Answer on Question #76660 – Chemistry – General Chemistry

1. For many years chloroform (CHCl_3) was used as an inhalation anesthetic in spite of the fact that it is also a toxic substance that may cause liver, kidney, and heart damage. Calculate the percent composition by mass of this compound.
2. Peroxyacetyl nitrate (PAN) is one of the compounds of smog. It is a compound of C, H, N, and O. Determine the % composition of oxygen and the empirical formula for the following percent composition by mass 19.8% C, 2.50% H, and 11.6% N. What is its molecular formula given that its molar mass is about 120 g.

Solution:

1. $\text{CHCl}_3 = 119.5 \text{ g/mol}$

$\text{C} = 12 \text{ g/mol}$

$w(\text{C}) = (12 / 119.5) \times 100\% = 10.04\%$

$\text{H} = 1 \text{ g/mol}$

$w(\text{H}) = (1 / 119.5) \times 100\% = 0.84\%$

$\text{Cl}_3 = 106.3596 \text{ g/mol}$

$w(\text{Cl}) = (106.5 / 119.5) \times 100\% = 89.12\%$

2. $w(\text{O}) = 100\% - (19.8\% + 2.50\% + 11.6\%) = 66.1\%$

$$\text{C} : \text{H} : \text{N} : \text{O} = \frac{w(\text{C})}{Ar(\text{C})} : \frac{w(\text{H})}{Ar(\text{H})} : \frac{w(\text{N})}{Ar(\text{N})} : \frac{w(\text{O})}{Ar(\text{O})} = \frac{19.8}{12} : \frac{2.50}{1} : \frac{11.6}{14} : \frac{66.1}{16} = 1.65 : 2.50 : 0.82857 :$$

$4.13125 = 2 : 3 : 1 : 5$

Empirical formula $\text{C}_2\text{H}_3\text{NO}_5$

$\text{Mr}(\text{C}_2\text{H}_3\text{NO}_5) = 121 \text{ g/mol}$

Molecular formula $\text{C}_2\text{H}_3\text{NO}_5$

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