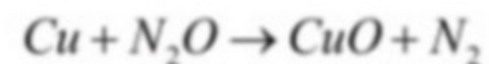
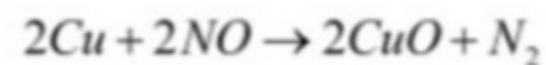
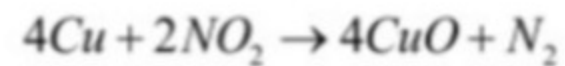
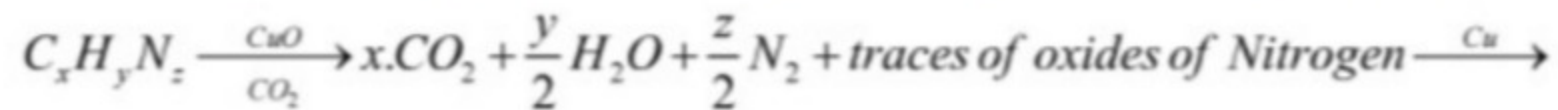


DUMA'S METHOD

This method can be applied to all nitrogenous compounds. Though tedious better than Kjeldahl's method.



The mixture of gases is passed in KOH all gases except N_2 are absorbed. Nitrogen is collected over KOH and its volume at NTP is measured.

$$\text{Percentage of Nitrogen} = \frac{28 \times \text{volume of } \text{N}_2 \text{ at NTP} \times 100}{22400 \times \text{wt. of organic compound}}$$

$$= \frac{\text{wt of nitrogen} \times 100}{\text{wt. of organic substance}}$$

KJELDAHL'S METHOD

Organic compound + Conc H_2SO_4 + (small amount of K_2SO_4 and $CuSO_4$ or Hg) $\rightarrow (NH_4)_2SO_4 \xrightarrow{2NaOH} Na_2SO_4 + 2NH_3 + 2H_2O$

Ammonia is passed into H_2SO_4 or HCl of known volume and normality. The volume of acid neutralised by NH_3 is calculated by neutralising the acid left by $NaOH$ solution.

$$\text{Percentage of Nitrogen} = \frac{1.4 \times N \times V}{\text{wt. of organic compound}}$$

N = normality of acid, V = volume of acid in ml. neutralised by ammonia

In practice K_2SO_4 is added to raise the bpt of H_2SO_4 and $CuSO_4$ or Hg is added to catalyse the reaction)

Kjeldahl's method is not reliable. The results obtained are generally low. It cannot be applied to compounds in which nitrogen is directly linked to oxygen such as nitro, nitroso, azo and nitrogen present as in pyridine. It is used for estimating nitrogen in food, fertilizers and agricultural products.

CARIUS METHOD

Organic compound + Fuming HNO_3 + $\text{AgNO}_3 \rightarrow \text{AgX}$.

It is estimated gravimetrically

$$\text{Percentage of halogen} = \frac{\text{wt. of halogen atom} \times \text{wt. of AgX} \times 100}{\text{Mol. wt. of AgX} \times \text{wt. of organic compound}}$$