15) $C_xH_yN_zO_w + O_2 \rightarrow CO_2 + H_2O$

0.157g → 0.213g, 0.0310g

$$0.213\text{g } CO_2 \times \frac{1\text{mole } CO_2}{44.01\text{g } CO_2} \times \frac{1\text{mole C}}{1\text{mole } CO_2} = 0.00484\text{ mole C}$$

$$0.0310\text{g } H_2O \times \frac{1\text{mole } H_2O}{18.02\text{g } H_2O} \times \frac{2\text{mole H}}{1\text{mole } H_2O} = 0.00344\text{ mole H}$$

$C_xH_yN_zO \rightarrow NH_3$

0.103g → 0.0230g

$$0.0230\text{g } NH_3 \times \frac{1\text{mole } NH_3}{17.04\text{g } NH_3} \times \frac{1\text{mole N}}{1\text{mole } NH_3} = 0.00135\text{ mole N}$$

$$0.00484\text{ mole C} \times \frac{12.01\text{g C}}{1\text{mole C}} = 0.0581\text{ g C}$$

$$\%\text{ C in compound} = \frac{0.0581}{0.157} \times 100 = 37.0\%\text{ C}$$

$$0.00344\text{ mole H} \times \frac{1.01\text{ g H}}{1\text{mole H}} = 0.00347\text{ g H}$$

$$\%\text{ H in compound} = \frac{0.00347}{0.157} \times 100 = 2.21\%\text{ H}$$

$0.00135 \text{ mole } N \times \frac{14.01 \text{ g } N}{1 \text{ mole } N} = 0.0189 \text{ g } N$

$$\% \text{ N in compound} = \frac{0.0185}{0.103} \times 100 = 18.3\%$$

$$\% O = 100 - 37.0 - 2.21 - 18.3 = 42.49\%$$

assume 100 g of compound

$$37.0 \text{ g } C \times \frac{1 \text{ mole } C}{12.01 \text{ g } C} = 3.08/1.31 = 2.35 \times 3 = 7$$

$$2.21 \text{ g } H \times \frac{1 \text{ mole } H}{1.01 \text{ g } H} = 2.19/1.31 = 1.67 \times 3 = 5$$

$$18.3 \text{ g } N \times \frac{1 \text{ mole } N}{14.01 \text{ g } N} = 1.31/1.31 = 1 \times 3 = 3$$

$$42.49 \text{ g } O \times \frac{1 \text{ mole } O}{16.00 \text{ g } O} = 2.66/1.31 = 2 \times 3 = 6$$

$$C_7 H_5 N_3 O_6$$

15) $Zn + 2HCl \longrightarrow ZnCl_2 + H_2$

$Mg + 2HCl \longrightarrow MgCl_2 + H_2$

x = mass Mg $\qquad 10.00 - x$ = mass Zn

mole H_2 = mole Zn + mole Mg

mol H_2 = 0.5171 g H_2 $\frac{1 \text{ mol } H_2}{2.025 H_2}$ = 0.2565 mol H_2

$$0.2565 \text{ mol } H_2 = \frac{x}{24.31} + \frac{10.00 - x}{65.38}$$

x = 4.01 g = mass Mg

$$\frac{4.01}{10.00} \times 100 = 40.08\% \text{ Mg}$$