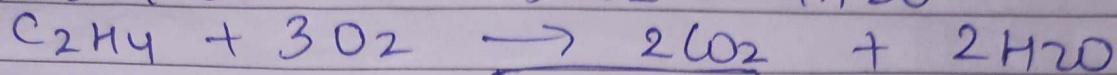
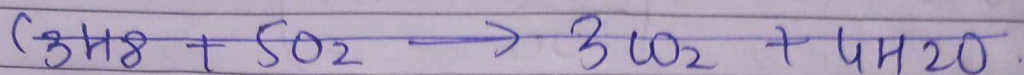


Question bank Chem numericals

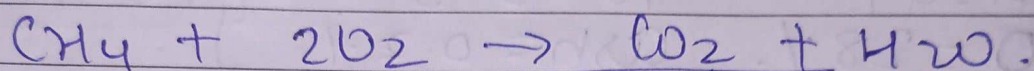
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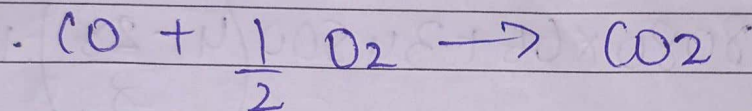
1) $H_2 = 35\% = 0.35$ $C_2H_4 = 10\% = 0.10$
 $CH_4 = 40\% = 0.40$ $CO = 5\% = 0.05$



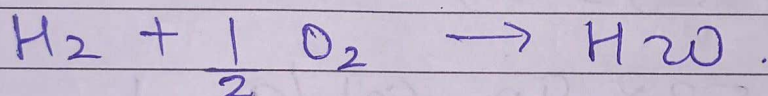
$0.10 \times 3 = \boxed{0.30 m^3}$ of O_2



$0.40 \times 2 = \boxed{0.80 m^3}$ of O_2



$0.05 \times 0.5 = \boxed{0.025 m^3}$ of O_2



$0.35 \times 0.5 = \boxed{0.175 m^3}$ of O_2

Total vol^m of $O_2 = 0.30 + 0.80 + 0.025 + 0.175$
 $= 0.025$

↪ already present

Total vol^m = $1.275 m^3$ of O_2

also for $1 m^3$ of fuel = $1.275 m^3$ of O_2 is required.

$$2) \quad GCV = \frac{1}{100} \left(8080C + 34500 \left(\frac{H-O}{8} \right) + 2240S \right)$$

$$LCV = GCV - \left(\frac{a_H}{100} \times 587 \right)$$

$$\begin{array}{lcl} C = 66\% & S = 1.5\% & \\ H = 4\% & N = 0.8\% & \text{no need.} \\ O = 28\% & Ash = 0.2\% & \end{array}$$

$$GCV = \frac{1}{100} \left(8080 \times 66 + 34500 \left(\frac{4 - 28}{8} \right) + 2240 \times 1.5 \right)$$

$\underbrace{\quad}_{0.5}$

$$= \frac{1}{100} (553890)$$

$$\boxed{GCV = 5538.90 \text{ cal/g}}$$

$$LCV = 5538.90 - \left(\frac{a \times 4}{100} \times 587 \right)$$

$$= 5538.90 - (0.36 \times 587)$$

$$\boxed{LCV = 5327.58 \text{ cal/g}}$$

$$3) \%N = \frac{\text{Vol}^m \text{ of acid consumed} \times \text{Normality of acid} \times 1.4}{\text{weight of waal sample}}$$

$$\%S = \frac{\text{Weight of BaSO}_4 \text{ ppt} \times \left(\frac{32 \times 100}{233} \right)}{\text{weight of waal sample}}$$

$$\downarrow 13.73$$

Soln:-

$$\%N = \frac{12.5 \times 0.5 \times 1.4}{2.7}$$

$$\boxed{N = 3.24 \%}$$

$$\%S = \frac{0.64 \times 13.73}{2.7}$$

$$\boxed{S = 3.25 \%}$$

4.) $w_1 = \text{weight of coal} = 2.499 \text{ g}$
 $w_2 = \text{weight after heating} = 2.368 \text{ g}$
 $w_3 = 1.75 \text{ g}$
 $w_4 = 0.95 \text{ g}$

% of moisture = $\frac{w_1 - w_2}{w_1} \times 100 = \frac{2.499 - 2.368}{2.499} \times 100$
 $= 5.2\%$

% of volatile matter = $\frac{w_2 - w_3}{w_2} \times 100 = \frac{2.368 - 1.75}{2.368} \times 100$
 $= 24.7\%$

% of ash content = $\frac{w_4}{w_1} \times 100 = \frac{0.95}{2.499} \times 100$
 $= 38.01\%$

% Carbon = $100 - 5.2 - 24.7 - 38.01$
 $= 32.09\%$

$$5) \text{ Weight of } O_2 = \left[\frac{32C + 8H + S - O}{12} \right] \text{ kg}$$

reqd

$$\text{Vol}^m \text{ of } O_2 = \frac{\text{Weight of } O_2 \times 22.4}{28.94}$$

reqd

Soln:-

$$\begin{aligned} \text{Weight of } O_2 &= \frac{32 \times 0.90 + 8(0.01) + 0.005}{12} \\ &= \boxed{2.429 \text{ kg}} \end{aligned}$$

$$\begin{aligned} \text{Vol}^m &= \frac{2.429 \times 22.4}{28.94} \\ &= \boxed{1.88 \text{ m}^3} \end{aligned}$$