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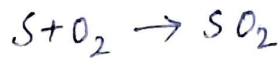
Assignment 1

Solⁿ 1:- \therefore Amount of coal consumed per day

$$= 10^4 \text{ tons} = 10^4 \times 10^3 \times 10^3$$

$$= 10^{10} \text{ gm.}$$

Now, the reaction that produces SO_2 is



\therefore for 32 gm S \rightarrow 64 gm SO_2 is produced

$$\therefore \text{mass ratio} = 64/32 = 2$$

\therefore Amount of sulphur consumed per day

$$= 2\% \text{ of } 10^{10} \text{ gm} = 2 \times 10^8 \text{ gm}$$

\therefore amount of SO_2 produced per day

$$= 2 \times 2 \times 10^8 \text{ gm} = 4 \times 10^8 \text{ gm}$$

$$\therefore \text{Concentration of } \text{SO}_2 = \frac{4 \times 10^8 \text{ gm}}{10^{11} \text{ m}^3}$$

$$= 4 \times 10^{-3} \text{ gm/m}^3$$

$$= 4000 \text{ } \mu\text{g/m}^3$$

\therefore NAAQS standard is $365 \text{ } \mu\text{g/m}^3$

let the optimal sulphur content be $x\%$.

$$\therefore \text{concentration of } \text{SO}_2 \leq 365 \text{ } \mu\text{g/m}^3$$

$$\Rightarrow 10^{10} \times \frac{x}{100} \times 2 \times 10^{-11} \leq 365 \times 10^{-6}$$

$$\Rightarrow x \leq \frac{365}{2} \times 10^{-3}$$

$$\Rightarrow x \leq 0.18\%$$

\therefore The sulphur content in coal should be less than 0.18%.

Solⁿ 2:- \because number of gasoline-powered cars = 10^9
 \therefore volume of gasoline produced from a car per year

$$= \frac{16000 \text{ Km} \times 7.8 \text{ L}}{100 \text{ Km}}$$

$$= 7.8 \times 160 \text{ Lit}$$

$$= 1248 \text{ litres}$$

Now, CO_2 produced from combustion of gasoline per year

$$= \frac{1248 \times 2.3}{1 \text{ lit}} \text{ Lit} \cdot \text{Kg} = 2870.4 \text{ Kg}.$$

Also, there is 25% overheading
 \therefore total annual CO_2 emission ~~from~~ ^{per} automobiles

$$= 2870.4 \times (1.25) \text{ Kg}$$

$$= 3588 \text{ Kg}$$

$$= 3.588 \text{ tonnes}.$$

\therefore total emitted by automobile industry

$$= 3.588 \times 10^9 \text{ tonnes}$$

$$= 3.588 \text{ Gt}.$$

{ 10^9 since no. of gasoline powered cars }.

$$\{ \because 1 \text{ ton} = 10^9 \text{ Gt} \}$$