EVS
ASSIGNMENT - I

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18CS30021)

Q1. We have,

consumption of coal (per day) = 10,000 tons
= 10^{10} grams

Now, oxidation of sulphur takes place as follows:

$$S + O_2 \rightarrow SO_2 \quad \text{——— (1)}$$

As coal contains 2% sulphur,
so, amount of sulphur burnt per day
= 2% of 10^{10} g
= 2×10^8 g

Now from above reaction:
for 1 mole (32 g) of S, 1 mole (64 g) of SO_2 is produced,

∴ Total amount of SO_2 produced per day = $2 \times (2 \times 10^8)$ g
= 4×10^8 g

$$\therefore \text{Concentration} = \frac{\text{amount of } SO_2}{\text{volume of } SO_2}$$

$$= \frac{4 \times 10^8 \text{ g}}{10^{11} \text{ m}^3}$$

$$= \underline{\underline{4000 \, \mu g \, m^{-3}}}$$

Now, NAAQS standard is $365 \mu g \, m^{-3}$.

Let sulphur content in coal be $x\%$.

So, concentration $= \frac{\left(\frac{x}{100} \times 10^{10}\right) \times 2}{10^{11}}$

$$= 2x \times 10^{-3} \, \mu g \, m^{-3}$$

According to requirement,

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

$$\Rightarrow x \leq 0.1825$$

Hence, sulphur content must be $\leq 0.1825\%$

in the coal.

Q2. We have,

total number of gasoline cars = 1 billion

$= 10^9$

Volume of gasoline consumed by a car (per year),

$= 16000\,km \times \frac{7.8\,L}{100\,km}$

$= 16 \times 78\,L$

$= 1248\,L$

Given that combustion of 1L of gasoline produces approx. 2.3kg of CO_2,

∴ Amount of CO_2 produced by each car (per year) $= 1248\,L \times \frac{2.3\,kg}{1\,L}$

$= 2870.4\,kg$

Also, overhead is 25%, so,

Total amount of CO_2 produced by each car (per year)

$= \left(2870.4 + \frac{25}{100} \times 2870.4\right) kg$

$= 3588\,kg$

∴ Total CO_2 production from all automobiles

$= (3588\ kg) \times 10^9$

$= (3.588\ ton) \times 10^9$

$= \underline{3.588\ G\,Ton}$