

## Answer on Question#65104 – Chemistry – Organic chemistry

**Question:** the process of producing gasoline from coal includes a gasification step to make hydrogen or synthesis gas. if 50kg test run of gas gives the average of 10%  $H_2$ , 40%  $CH_4$ , 30%  $CO$ , and 20%  $CO_2$ . What is the average molecular weight of the gas?

**Solution:**

$$1) m_i = w_i \times m_{gas}$$

A hydrogen is a missed component.

$$m_{H_2} = 0.1 \times 50kg = 5kg = 5 \times 10^3g$$

$$m_{CH_4} = 0.4 \times 50kg = 20kg = 2 \times 10^4g$$

$$m_{CO} = 0.3 \times 50kg = 15kg = 1.5 \times 10^4g$$

$$m_{CO_2} = 0.2 \times 50kg = 10kg = 1 \times 10^4g$$

$$2) n_i = \frac{m_i}{M_i}$$

$$n_{H_2} = \frac{5 \times 10^3g}{2 \frac{g}{mol}} = 2.5 \times 10^3mol = 2500 mol$$

$$n_{CH_4} = \frac{2 \times 10^4g}{16 \frac{g}{mol}} = 1.25 \times 10^3mol = 1250 mol$$

$$n_{CO} = \frac{1.5 \times 10^4g}{28 \frac{g}{mol}} = 536 mol$$

$$n_{CO_2} = \frac{1 \times 10^4g}{44 \frac{g}{mol}} = 227 mol$$

$$\sum n = 2500mol + 1250mol + 536 mol + 227mol = 4513 mol$$

$$\bar{M} = \frac{m_{gas}}{\sum n} = \frac{5000g}{4513 mol} = 11 \frac{g}{mol}$$

**Answer:**

$$11 \frac{g}{mol}$$