Answer on Question #50437, Chemistry, Other

Task:

1) If an electric discharge produces 800 cm^3 of ozone (O_3), how many cm^3 of oxygen (O_2) are required?

$3O_2(g) \dashrightarrow 2O_3(g)$

2. When 75.0 dm^3 of O_2 react with an excess of glucose ($C_6H_{12}O_2$), according to the reaction below, what volume of carbon dioxide will be produced?

$6O_2(g) + C_6H_{12}O_6(s) \dashrightarrow 6H_2O(g) + 6CO_2(g)$

3. If an excess of nitrogen gas reacts with 250 L of hydrogen gas, according to the reaction below, how many L of ammonia will be produced?

$N_2(g) + 3H_2(g) \dashrightarrow 2NH_3(g)$

4. How many cm^3 of oxygen would be required to react completely with 432 cm^3 of hydrogen gas according to the reaction below?

$2H_2(g) + O_2(g) \dashrightarrow 2H_2O(g)$

Answer:

$$\nu = \frac{V}{22.4}$$

1)

$$\nu(O_3) = \frac{0.8}{22.4} = 0.036\,mol$$

$$\nu(O_2) = \frac{3}{2}\nu(O_3) = \frac{3}{2}\cdot 0.036 = 0.054\,mol$$

$$V(O_2) = 22.4\cdot\nu = 22.4\cdot 0.054 = 1.21l = 1210\,cm^3$$

$$\nu = \frac{V}{22.4}$$

2)

$$\nu(O_2) = \frac{75}{22.4} = 3.35\,mol$$

$$\nu(O_2) = \nu(CO_2) = 3.35\,mol$$

$$V(CO_2) = 22.4\cdot\nu = 22.4\cdot 3.35 = 75l = 75\,dm^3$$

$$\nu = \frac{V}{22.4}$$

3)

$$\nu(H_2) = \frac{250}{22.4} = 11.16\,mol$$

$$\nu(NH_3) = \frac{2}{3}\nu(H_2) = \frac{2}{3}\cdot 11.16 = 7.44\,mol$$

$$V(NH_3) = 22.4\cdot\nu = 22.4\cdot 7.44 = 166.7l$$

$$\nu = \frac{V}{22.4}$$

4)

$$\nu(H_2) = \frac{0.432}{22.4} = 0.02\,mol$$

$$\nu(O_2) = \frac{1}{2}\nu(H_2) = \frac{1}{2}\cdot 0.02 = 0.01mol$$

$$V(O_2) = 22.4\cdot\nu = 22.4\cdot 0.01 = 0.224l = 224\,cm^3$$