

NAMUNAVIY MASALALAR

1-masala. Modda miqdori + zarrachalar soni

$9.03 \cdot 10^{23}$ ta molekuladan iborat moddaning modda miqdorini toping.

Yechim:

$$N = 9.03 \cdot 10^{23}$$

$$N_A = 6.02 \cdot 10^{23} \text{ mol}^{-1}$$

$$n = N / N_A$$

$$n = (9.03 \cdot 10^{23}) / (6.02 \cdot 10^{23}) = 1.50 \text{ mol}$$

2-masala. Massa $\rightarrow$ hajm (normal sharoit)

11 g CO₂ gazi normal sharoitda qanday hajm egallaydi?

Yechim:

$$M(\text{CO}_2) = 44 \text{ g} \cdot \text{mol}^{-1}$$

$$n = m / M = 11 / 44 = 0.25 \text{ mol}$$

NS da:

$$V = n \cdot 22.4 = 0.25 \cdot 22.4 = 5.6 \text{ L}$$

3-masala. Gazlar aralashmasi (Avogadro + Dalton)

Shart:

Bir idishda 4 mol N₂ va 6 mol O₂ mavjud. Aralashmaning umumiy bosimi 2.0 atm. N₂ ning qisman bosimini toping.

Yechim:

$$n_{\text{umumiy}} = 4 + 6 = 10 \text{ mol}$$

$$\varphi(\text{N}_2) = 4 / 10 = 0.40$$

$$p(\text{N}_2) = \varphi \cdot p_{\text{umumiy}} = 0.40 \cdot 2.0 = 0.80 \text{ atm}$$

4-masala. Gaz tenglamasi (NS emas)

Shart:

2.0 g H₂ gazi 300 K temperaturada va $2.0 \cdot 10^5$ Pa bosimda qanday hajm egallaydi?

Yechim:

$$M(\text{H}_2) = 2 \text{ g} \cdot \text{mol}^{-1}$$

$$n = 2.0 / 2 = 1.0 \text{ mol}$$

$$p \cdot V = n \cdot R \cdot T$$

$$V = (n \cdot R \cdot T) / p$$

$$V = (1.0 \cdot 8.31 \cdot 300) / (2.0 \cdot 10^5)$$

$$V = 2493 / 200000 = 0.01247 \text{ m}^3$$

$$V = 12.5 \text{ L}$$

5-masala. Gaz zichligi

0.10 MPa bosimda va 400 K temperaturada CO₂ gazining zichligini toping.

Yechim:

$$p = 0.10 \text{ MPa} = 1.0 \cdot 10^5 \text{ Pa}$$

$$M = 44 \cdot 10^{-3} \text{ kg} \cdot \text{mol}^{-1}$$

$$\rho = (p \cdot M) / (R \cdot T)$$

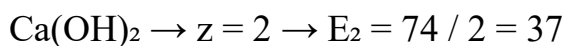
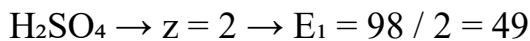
$$\rho = (1.0 \cdot 10^5 \cdot 44 \cdot 10^{-3}) / (8.31 \cdot 400)$$

$$\rho = 4400 / 3324 \approx 1.32 \text{ kg} \cdot \text{m}^{-3}$$

6-masala. Ekvivalent usuli (kislota–asos)

9.8 g H₂SO₄ ni to‘liq neytrallash uchun qancha Ca(OH)₂ kerak?

Yechim:



Ekvivalent qonuni:

$$m_1 / E_1 = m_2 / E_2$$

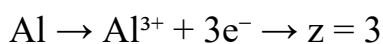
$$9.8 / 49 = m_2 / 37$$

$$m_2 = (9.8 \cdot 37) / 49 = 7.4 \text{ g}$$

7-masala. Oksidlanish–qaytarilish (ekvivalent)

5.4 g Al to‘liq oksidlanishi uchun qancha O₂ kerak?

Yechim:



$$E(\text{Al}) = 27 / 3 = 9$$



$$E(\text{O}_2) = 32 / 4 = 8$$

Ekvivalent qonuni:

$$m(\text{Al}) / 9 = m(\text{O}_2) / 8$$

$$5.4 / 9 = m / 8$$

$$m = 4.8 \text{ g}$$

8-masala. Aralash gaz — hajm ulushi

Shart:

Normal sharoitda 10 L H₂ va 30 L N₂ aralashtirildi. H₂ ning hajm ulushini toping.

Yechim:

$$V_{umumiy} = 10 + 30 = 40 \text{ L}$$

$$\varphi(\text{H}_2) = 10 / 40 = 0.25 \text{ (25\%)}$$

9-masala. Gaz tenglamasi orqali molyar massa

Shart:

0.50 g gaz 300 K da va $1.0 \cdot 10^5$ Pa bosimda 0.40 L hajm egallaydi. Gazning molyar massasini toping.

Yechim:

$$V = 0.40 \text{ L} = 4.0 \cdot 10^{-4} \text{ m}^3$$

$$M = (m \cdot R \cdot T) / (p \cdot V)$$

$$M = (0.0005 \cdot 8.31 \cdot 300) / (1.0 \cdot 10^5 \cdot 4.0 \cdot 10^{-4})$$

$$M = 1.2465 / 40 = 0.031 \text{ kg} \cdot \text{mol}^{-1} = 31 \text{ g} \cdot \text{mol}^{-1}$$

10-masala. Bir masalada 3 qonun

Normal sharoitda 22.4 L gaz 28 g massa ega. Gazning molekulalar sonini toping.

Yechim:

$$n \text{ da } 22.4 \text{ L} = 1 \text{ mol}$$

$$n = 1 \text{ mol}$$

$$N = n \cdot N_A$$

$$N = 1 \cdot 6.02 \cdot 10^{23} = 6.02 \cdot 10^{23} \text{ ta molekula}$$