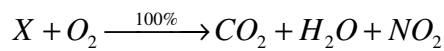


Oppgave 1

$$n_{CO_2} = \frac{m_{CO_2}}{M_{m_{CO_2}}} = \frac{35,2}{12,02 + 2 \cdot 16,00} = 0,80$$

$$n_{H_2O} = \frac{m_{H_2O}}{M_{m_{H_2O}}} = \frac{25,2}{2 \cdot 1,01 + 16,00} = 1,40$$

$$n_{O_2} = \frac{m_{O_2}}{M_{m_{O_2}}} = \frac{60,7}{2 \cdot 16,00} = 1,90$$

$$2n_{O_2} = 2n_{CO_2} + n_{H_2O} + 2n_{NO_2}$$

$$n_{NO_2} = \frac{2n_{O_2} - 2n_{CO_2} - n_{H_2O}}{2} = \frac{2 \cdot 1,90 - 2 \cdot 0,80 - 1,40}{2} = 0,40$$

$$m_{NO_2} = n_{NO_2} \cdot M_{m_{NO_2}} = 0,40 \cdot (14,01 + 2 \cdot 16,00) = 18,40$$

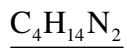
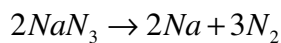
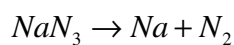
$$m_X + m_{O_2} = m_{CO_2} + m_{H_2O} + m_{NO_2}$$

$$m_X = m_{CO_2} + m_{H_2O} + m_{NO_2} - m_{O_2} = 35,2 + 25,2 + 18,4 - 60,7 = \underline{\underline{18,1}} \text{ g}$$

$$n_C \cdot n_X = n_{CO_2} \Rightarrow n_C = \frac{n_{CO_2}}{n_X} = \frac{0,8}{0,2} = 4$$

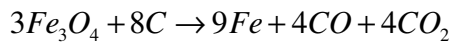
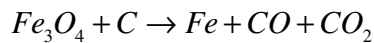
$$n_H \cdot n_X = 2n_{H_2O} \Rightarrow n_H = \frac{2n_{H_2O}}{n_X} = \frac{2 \cdot 1,4}{0,2} = 14$$

$$n_N \cdot n_X = n_{NO_2} \Rightarrow n_N = \frac{n_{NO_2}}{n_X} = \frac{0,4}{0,2} = 2$$

**Oppgave 2**

$$m_{NaN_3} = n_{NaN_3} \cdot M_{m_{NaN_3}} = \frac{2}{3} n_{N_2} \cdot M_{m_{NaN_3}} = \frac{2}{3} \cdot \frac{VP_{N_2}}{RT} \cdot M_{m_{NaN_3}}$$

$$= \frac{2}{3} \cdot \frac{56,00 \cdot 1,00}{0,0821 \cdot 298,15} \cdot 65,01 = \underline{\underline{99,25}} \text{ g}$$

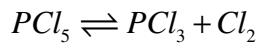
Oppgave 3

$$m_C = n_C \cdot M_{m_C} = \frac{8}{3} n_{Fe_3O_4} \cdot M_{m_C} = \frac{8}{3} \frac{m_{Fe_3O_4}}{M_{m_{Fe_3O_4}}} \cdot M_{m_C}$$

$$= \frac{8}{3} \frac{1000 \cdot 1000}{3 \cdot 55,85 + 4 \cdot 16,00} \cdot 12,01 = 138314 \text{)}: g = \underline{\underline{138,31 \text{ kg}}}$$

$$n_C = \frac{8}{3} n_{Fe_3O_4} = \frac{8}{3} \frac{1000 \cdot 1000}{3 \cdot 55,85 + 4 \cdot 16,00} = 11516,60$$

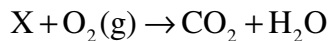
$$V = \frac{n_C RT}{p} = \frac{11516,60 \cdot 0,08203 \cdot 293,15}{1} = 276941 \text{)}: L = \underline{\underline{277 \text{ m}^3}}$$

Oppgave 4a

$$pV = nRT$$

$$n = \frac{pV}{RT} = \frac{V}{0,08203 \cdot 293,15} = 0,0416V$$

$$p = \frac{nRT}{V} = \frac{0,0416V \cdot 0,08203 \cdot 523,15}{V} = \underline{\underline{1,78 \text{)}: atm}}$$

Oppgave 5

$$n_{CO_2} = \frac{m_{CO_2}}{M_{m_{CO_2}}} = \frac{1,43}{12,01 + 2 \cdot 16,00} = 0,0325$$

$$n_{H_2O} = \frac{m_{H_2O}}{M_{m_{H_2O}}} = \frac{1,18}{2 \cdot 1,01 + 16,00} = 0,0655$$

$$n_O = 2n_{CO_2} + n_{H_2O} = 2 \cdot 0,0325 + 0,0655 = 0,1305$$

$$n_{O_2} = \frac{n_O}{2} = \frac{0,1305}{2} = 0,0653$$

$$m_{O_2} = n_{O_2} \cdot M_{m_{O_2}} = 0,0653 \cdot 2 \cdot 16 = 2,088$$

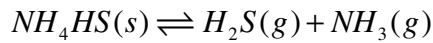
$$m_X = m_{CO_2} + m_{H_2O} - m_{O_2} = 1,43 + 1,18 - 2,088 = \underline{\underline{0,522 \text{)}: g}}$$

$$n_X = \frac{p_X V}{RT} = \frac{1 \cdot 1}{0,08203 \cdot 373,15} = \underline{\underline{0,0327}}$$

$$n_C = \frac{n_{CO_2}}{n_X} = \frac{0,0325}{0,0327} = \underline{\underline{1}}$$

$$n_H = \frac{2n_{H_2O}}{n_X} = \frac{0,131}{0,0327} = \underline{\underline{4}}$$

Molekylformelen til den ukjente gassen er CH_4 .

Oppgave 6a

$$K = \frac{[\text{H}_2\text{S}][\text{NH}_3]}{[\text{NH}_4\text{HS}]} = [\text{H}_2\text{S}][\text{NH}_3]$$

$$K_p = \frac{p_{\text{H}_2\text{S}} \cdot p_{\text{NH}_3}}{p_{\text{NH}_4\text{HS}}} = p_{\text{H}_2\text{S}} \cdot p_{\text{NH}_3} = \left(\frac{p_t}{2}\right)^2 = \frac{p_t^2}{4} = \frac{0,750^2}{4} = \underline{\underline{0,141}}$$

Oppgave 6b

$$(I) K_p = p_{\text{H}_2\text{S}} \cdot p_{\text{NH}_3}$$

$$(II) p_{\text{H}_2\text{S}} = p_t - p_{\text{NH}_3}$$

$$K_p = (p_t - p_{\text{NH}_3}) \cdot p_{\text{NH}_3}$$

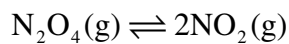
$$K_p = p_t p_{\text{NH}_3} - p_{\text{NH}_3}^2$$

$$p_{\text{NH}_3}^2 - p_t p_{\text{NH}_3} + K_p = 0$$

$$p_{\text{NH}_3}^2 - 0,960 p_{\text{NH}_3} + 0,141 = 0$$

$$p_{\text{NH}_3} = \cancel{0,779} \wedge \underline{\underline{0,181}} \text{ : atm}$$

p_{NH_3} synker som følge av at vi introduserer mer NH_3 ifølge Le Châteliers prinsipp.

Oppgave 7a

$$p_{\text{N}_2\text{O}_4} = 0,050 \text{ atm}$$

$$\frac{(p_{\text{NO}_2})^2}{p_{\text{N}_2\text{O}_4}} = K_p = 0,143$$

$$\frac{(2x)^2}{0,05 - x} = 0,143$$

$$4x^2 = 0,143(0,05 - x)$$

$$4x^2 + 0,143x - 0,00715 = 0$$

$$x_1 = 0,028 \quad x_2 = \cancel{0,064}$$

$$p_{\text{N}_2\text{O}_4} = 2x = \underline{\underline{0,056}} \text{ : atm}$$

$$p_{\text{NO}_2} = 0,05 - x = \underline{\underline{0,022}} \text{ : atm}$$