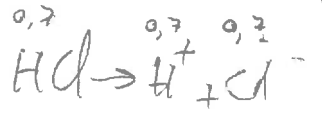


Числовий Мрочин Ярослав

(1)

N_2



$w_{HCl} = 2,55\%$

$w_{K-мат} = 1\%$

$K_a = 6,71 \cdot 10^{-3}$

$$C_{HCl} = \frac{w_{HCl} \cdot 10}{V_1} = 0,7 \text{ моль/л}$$

$$C_{HCl} = \frac{10}{168} = 0,06 \text{ моль/л}$$

$$pH_2 = -\lg 0,7 = 0,155$$

$$6,71 \cdot 10^{-3} = \frac{x^2}{0,06 - x}$$

$$pH = pH_1 + pH_2 = 0,155 + 1,77 = 1,926$$

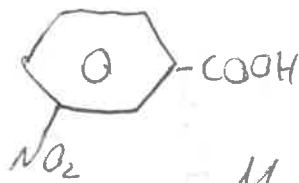
$$0,00671 = \frac{x^2}{0,06 - x}$$

$$x^2 - 0,00090 + 0,00671x = 0$$

$$D = 0,001845$$

$$x = \frac{-0,00671 + \sqrt{0,001845}}{2} = 0,017$$

$$pH_1 = -\lg 0,017 = 1,77$$



$$M = 7 \cdot 12 + 6 \cdot 1 + 9 \cdot 16 + 14 = 168$$

$\sqrt{}$

$P_1 = 1,37 \text{ атм}$

$V_2 = 0,5 \text{ л}$

$w_2 = 0,15$

$P_2 = 1,085 \text{ атм}$

$w_1 = 0,8$

$$V_1 = \frac{n}{C_1}$$

$$V = \frac{n}{C} = \frac{1,535}{15,51} = 0,099 \text{ л}$$

$$C_1 = \frac{60 \cdot 1,37 \cdot 10}{53} = 15,51 \text{ М}$$

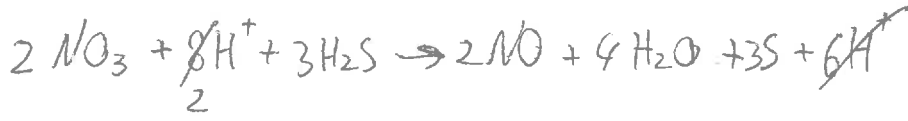
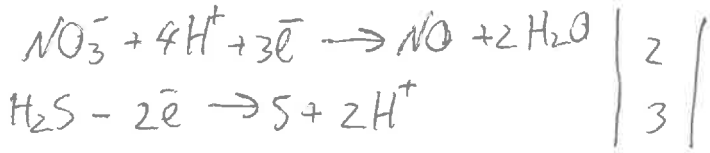
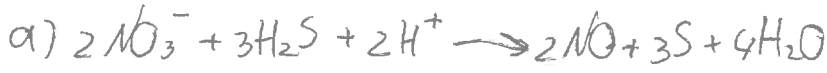
$$C_2 = \frac{15 \cdot 1,085 \cdot 10}{53} = 3,07 \text{ М}$$

$$n = CV = 3,07 \cdot 0,5 = 1,535 \text{ моль}$$

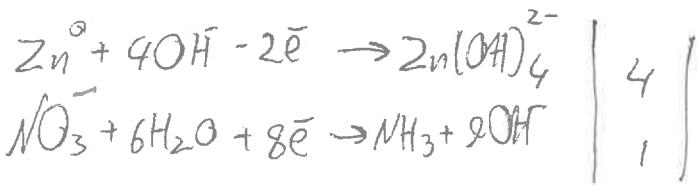
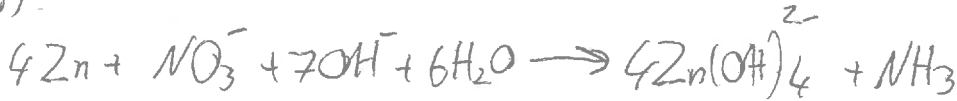
$V_1 = ?$

N₃

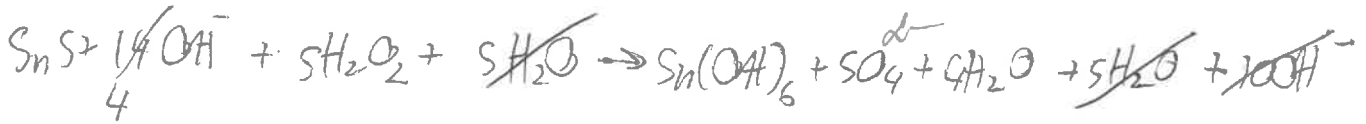
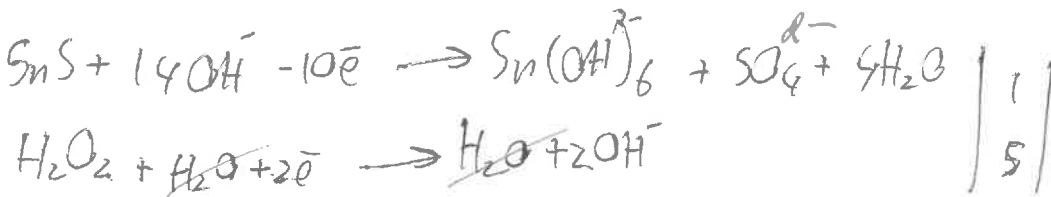
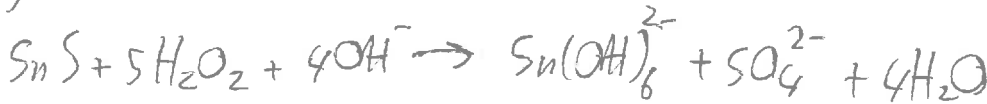
(2)



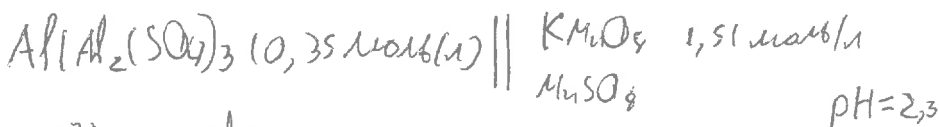
δ)



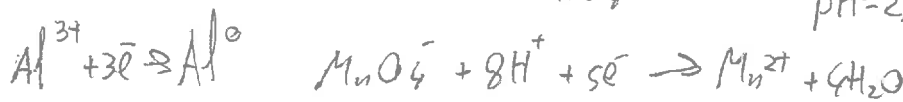
b)



N₄



$$C_{Mn^{2+}} = \frac{79}{39+55+4 \cdot 16} = 0,56 \text{ mol/l}$$



$$[H^+] = 10^{-2,3}$$

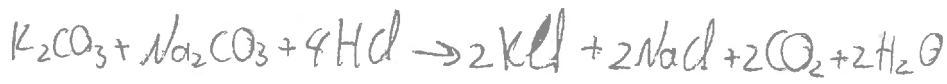
$$E_{red} = -1,66 + \frac{0,059}{3} \lg 0,7 = -1,663 \text{ B}$$

$$E_{ox} = 1,51 + \frac{0,059}{5} \lg \frac{0,5 \cdot 10^{-18,9}}{1,51} = 1,288 \text{ B}$$

$$\Delta E = E_{ox} - E_{red} = 1,288 + 1,663 = 2,95 \text{ B}$$

№5

(3)



$$C = \frac{n}{V} \quad n = CV$$

$$n(HCl) = 0,0736 \cdot \frac{22}{1000} = 0,0016 \text{ mol}$$

$$n_{\text{carbon}} = \frac{1}{4} n(HCl)$$

$$m(K_2CO_3) = 0,0004 \cdot (39 \cdot 2 + 12 + 48) = 0,0552 \text{ g}$$

$$m = n \cdot M$$

$$m(Na_2CO_3) = 0,0004 \cdot (23 \cdot 2 + 12 + 48) = 0,0424 \text{ g}$$

$$W = \frac{m_f}{m_p} = \frac{0,0424}{0,1} \cdot 100\% = 42,4\%$$

$$W(Na_2CO_3) = \frac{0,0424}{0,1} \cdot 100\% = \underline{42,4\%}$$

$$W(K_2CO_3) = \frac{0,0552}{0,1} \cdot 100\% = \underline{55,2\%}$$

№6



$$n(I_2) = CV = 0,0105 - 0,05 = 0,00053 \text{ mol}$$

$$n(Na_2S_2O_3) = \frac{10,5}{1000} - 0,0208 = 0,00022 \text{ mol}$$

$$n_{I_2 \text{ proz}} = \frac{1}{2} n_{Na_2S_2O_3} = 0,00011 \text{ mol}$$

$$n_{I_2 \text{ omm}} = 0,00053 - 0,00011 = 0,00042 \text{ mol}$$

$$n_{I_2 \text{ omm}} = n_{H_2S} = 0,00042 \text{ mol}$$

$$m = M \cdot n$$

$$m_{H_2S} = 0,00042 \cdot 34 = \underline{0,0143 \text{ g}}$$

N7

~~$$C = \frac{0,01020 \cdot 18,45}{0,02 \cdot 1000} = 0,011 \text{ моль/л}$$~~

~~$$n(\text{Ca/Mg}) = 0,011 \text{ моль}$$~~

$$C = \frac{0,01020 \cdot 18,45}{0,02 \cdot 1000} = 0,0094 \text{ моль/л}$$

$$n(\text{Ca/Mg}) = 0,0094 \text{ моль}$$

$$C_1 = \frac{0,01020 \cdot 8,22}{0,02 \cdot 1000} = 0,0042 \text{ моль/л}$$

$$n(\text{Ca}) = 0,00042 \text{ моль}$$

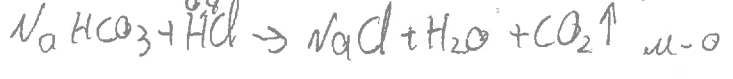
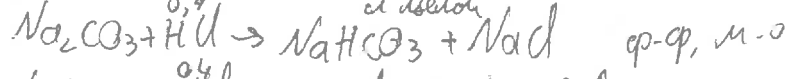
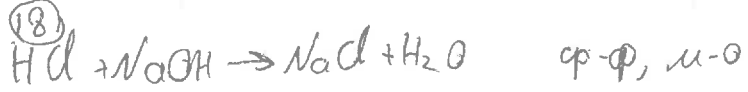
$$n(\text{Mg}) = n(\text{Ca/Mg}) - n(\text{Ca}) = 0,0052 \text{ моль}$$

$$m = n \cdot M$$

$$m(\text{Ca}) = 0,00042 \cdot 40 = 0,0168 \text{ г} - 20 \text{ мл} \Rightarrow 100 \text{ мл} - 0,084 \text{ г}$$

$$m(\text{Mg}) = 0,0052 \cdot 24 = 0,1248 \text{ г} - 20 \text{ мл} \Rightarrow 100 \text{ мл} - 0,624 \text{ г}$$

N8



18,60 мл }
18,80 мл

$$V_{\text{м-о}} - V_{\text{ср-ср}} = V(\text{HCl})_3 = V(\text{HCl})_2$$

$$V_{\text{HCl}} = V_{\text{м-о}} - (V(\text{HCl})_3 + V(\text{HCl})_2) = 18 \text{ мл}$$

$$V = 18 \text{ мл}$$

$$n(\text{HCl}) = \frac{18}{1000} \cdot 0,1 = 0,0018 \text{ моль}$$

$$n(\text{NaOH}) = 0,0018 \text{ моль}$$

$$m = M \cdot n = 0,0018 \cdot (23 + 16 + 1) = 0,072 \text{ г} - 25 \text{ мл}$$

$$\eta(\text{бисм}) = 0,072 \cdot 4 = 0,288 \text{ г}$$

$$\omega = \frac{m_b}{m_p} \cdot 100\% = \frac{0,288}{0,3251} \cdot 100\% = 88,59\%$$