

1	2	3	4	5	6	7	8	9	10
0	10	8	2	6	5	12	11	1	10

**ЧИСТОВИК**  
Лист № 1

**ВСОШ ХИМИЯ**

Задача №3,1

655  
УФУ

$h = 20 \text{ см}$   
 $d = 10 \text{ см}$   
 $l = 0,1 \text{ см}$   
 $V_{\text{H}_2\text{O}} = 0,6 \cdot V_{\text{H}_2}$   
 $V_{\text{NH}_3} = 15,5 \cdot V_{\text{H}_2\text{O}}$   
 $pK_b(\text{NH}_3) = 4,76$   
рН - ?

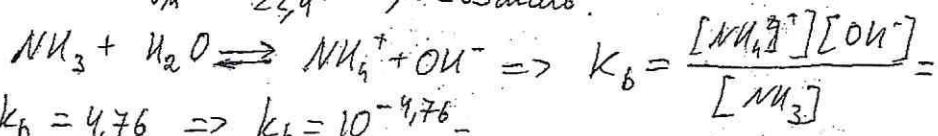
$$V_{\text{H}_2} = h \cdot S = 20 \text{ см} \cdot 75,43 \text{ см}^2 = 1508,6 \text{ см}^3 = 1,5086 \text{ л}$$

$$S = \pi R^2 = \pi \left(\frac{d}{2} - l\right)^2 = 3,14 \cdot \left(\frac{10 \text{ см}}{2} - 0,1 \text{ см}\right)^2 = 75,43 \text{ см}^2$$

$$V_{\text{H}_2\text{O}} = 0,6 \cdot V_{\text{H}_2} = 0,6 \cdot 1,5086 \text{ л} = 0,9052 \text{ л}$$

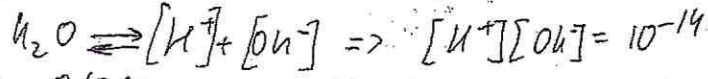
$$V_{\text{NH}_3} = 15,5 \cdot V_{\text{H}_2\text{O}} = 15,5 \cdot 0,9052 \text{ л} = 14,03 \text{ л}$$

$$\nu_{\text{NH}_3} = \frac{V_{\text{NH}_3}}{V_m} = \frac{14,03}{22,4} = 0,6263 \text{ моль}$$



$$pK_b = -\log_{10} K_b = 4,76 \Rightarrow K_b = 10^{-4,76} =$$

Пусть  $[\text{OH}^-] = x =$



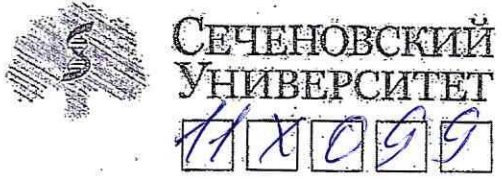
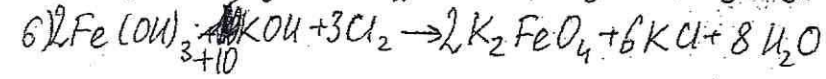
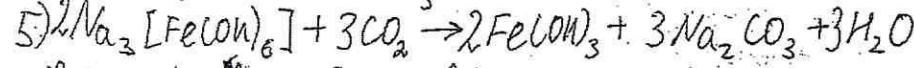
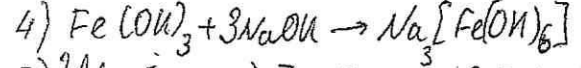
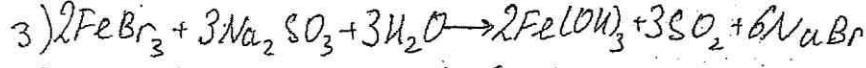
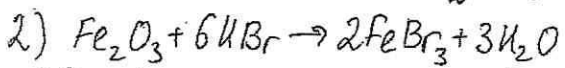
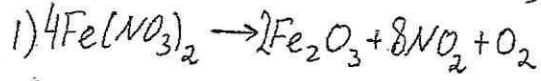
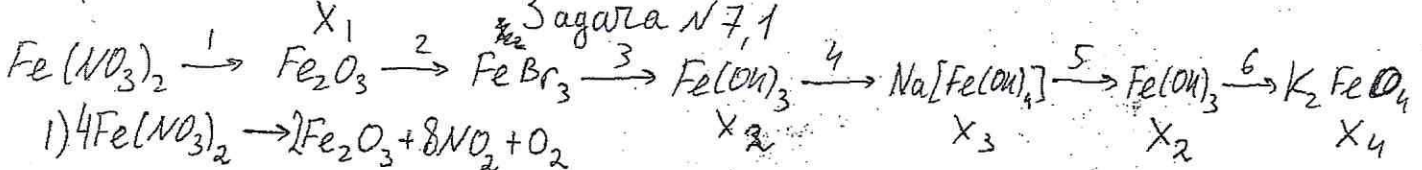
$$\Rightarrow C_{\text{NH}_3} = \frac{\nu_{\text{NH}_3}}{V_{\text{H}_2\text{O}}} = \frac{0,6263}{0,9052} = 0,692 \text{ М} \Rightarrow C_{\text{NH}_3} = [\text{NH}_3] + [\text{NH}_4^+]$$

$$\Rightarrow \text{Если } [\text{H}^+] = x, \text{ то } [\text{NH}_4^+] = \frac{10^{-14}}{x} - x \Rightarrow [\text{NH}_3] = C_{\text{NH}_3} - [\text{NH}_4^+] = C_{\text{NH}_3} - \frac{10^{-14}}{x} + x$$

$$\Rightarrow K_b = \frac{\left(\frac{10^{-14}}{x} - x\right) \left(\frac{10^{-14}}{x}\right)}{\left(0,692 - \frac{10^{-14}}{x} + x\right)} = 10^{-4,76} \Rightarrow x = 2,89 \times 10^{-12} \Rightarrow \text{рН} = -\log[\text{H}^+] = -\log 2,89 \times 10^{-12} = 11,54$$

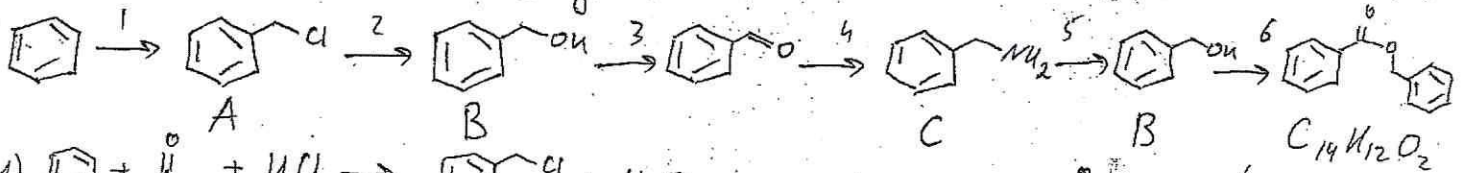
Ответ: рН = 11,54

Задача №7,1

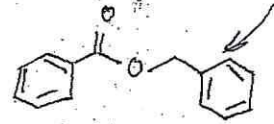


См. След. стр

Задача №8,1

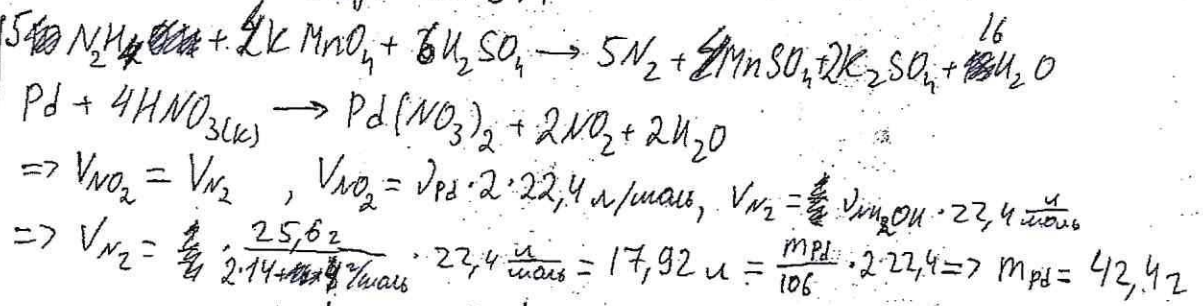


- 1) c1ccccc1 + ClCCl + HCl -> c1ccccc1CCl + HCl
- 2) c1ccccc1CCl + NaOH -> NaCl + c1ccccc1CO
- 3) c1ccccc1CO + CrO3 / PJ -> c1ccccc1C=O *± пропустить?*
- 4) c1ccccc1C=O + NH3 + H2 -> c1ccccc1CN + H2O
- 5) c1ccccc1CN + HNO2 + HCl -> NaCl + H2O + N2 + c1ccccc1CO
- 6) c1ccccc1CO + c1ccccc1C(=O)OH -> H2O + c1ccccc1C(=O)OCc2ccccc2



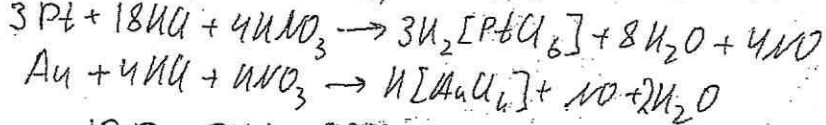
Задача №5.1

$\rho = 12,8 \text{ г/см}^3$   
 $R = 1,2 \text{ см}$   
 $h = 3 \text{ см}$   
 $V_k = 8,34 \cdot V_0$   
 $V_k = V_{\text{мелк}}$   
 $m_{\text{н}} = 25,6 \text{ г}$



$w_{\text{Pd}} \quad w_{\text{Au}} \quad w_{\text{Pt}}$

$m_{\text{стала}} = \rho V = \rho \cdot \frac{1}{3} Sh = 12,8 \cdot \frac{1}{3} \cdot 3 \cdot 1,2^2 = 57,92$   
 $\Rightarrow m_{\text{Au}} + m_{\text{Pt}} = m_{\text{стала}} - m_{\text{Pd}} = 57,9 - 42,4 = 15,5 \text{ г}$   
 Пусть  $m_{\text{Au}} = x \Rightarrow m_{\text{Pt}} = 15,5 - x \Rightarrow 17,92 = 22,4 \cdot \left( \frac{x}{197 \frac{\text{г}}{\text{моль}}} + \frac{15,5 - x}{185} \cdot \frac{1}{3} \right) \Rightarrow x = 5,71$



$\Rightarrow m_{\text{Pt}} = 15,5 - 5,71 = 9,79 \text{ г}$   
 $\Rightarrow w_{\text{Pd}} = \frac{42,4}{57,9} = 73,23\% \quad w_{\text{Au}} = \frac{5,71}{57,9} = 9,86\% \quad w_{\text{Pt}} = \frac{9,79}{57,9} = 16,91\%$

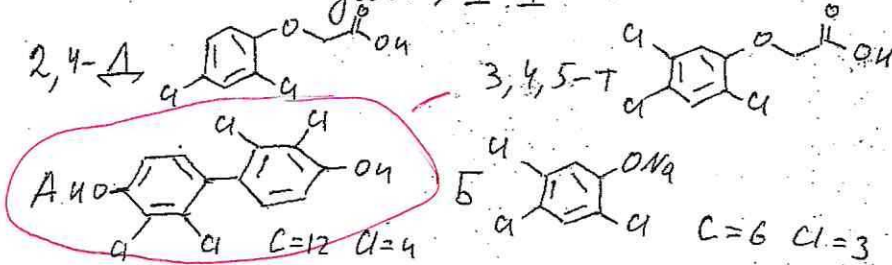
Ответ:  $w_{\text{Pd}} = 73,23\% \quad w_{\text{Au}} = 9,86\%$   
 $w_{\text{Pt}} = 16,91\%$

см след. стр.

$$\frac{N_C}{N_{Cl}} = 2,7273$$

$$W_A - ? \quad W_B - ?$$

Задача №1



пусть А - x моль, а Б - y моль  $M_A = 324 \text{ г/моль}$ ;  $M_B = 219,5 \text{ г/моль}$ .

$$\Rightarrow N_C = N_A \cdot (12x + 6y) \quad N_{Cl} = N_A (4x + 3y) \Rightarrow \frac{2x + y}{4x + 3y} = \frac{2,7273}{6}$$

$$\Rightarrow 12x + 6y = 10,9092x + 8,1819y \Rightarrow x = \frac{2,1819y}{1,0908} = 2y \Rightarrow m_{\text{др}} = 324x + 219,5y =$$

$$= 324x + 219,5 \cdot 2x = 763x \Rightarrow W_A = \frac{324x}{763x} = 42,46\% \Rightarrow W_B = \frac{219,5 \cdot 2x}{763x} = 57,54\%$$

Ответ:  $W_A = 42,46\%$

$W_B = 57,54\%$

Задача №2.1

$$n_x = 7,42$$

$$V_{CO_2} = 8,96 \text{ л}$$

$$n_{H_2O} = 92$$

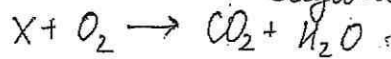
$$n_p = 152$$

$$V_{\text{мол}} = 91 \text{ л}$$

$$W_{NaOH} = 27,71\%$$

$$W_{Na} = 45\%$$

$$W_x - ?$$



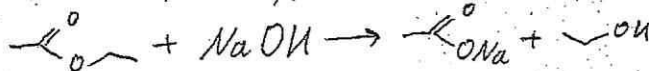
$$V_{CO_2} = \frac{V_{CO_2}}{V_m} = \frac{8,96}{22,4} = 0,4 \text{ моль} \Rightarrow V_{CO_2} = 0,4 \text{ моль}$$

$$V_{H_2O} = \frac{m_{H_2O}}{M_{H_2O}} = \frac{9}{18} = 0,5 \text{ моль} \Rightarrow V_{H_2O} = 0,5 \text{ моль}$$

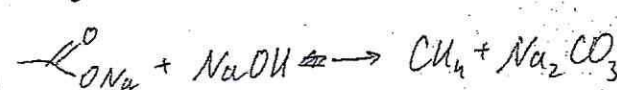
$$\Rightarrow m_O = m_x - m_C - m_H = 7,4 - 0,4 \cdot 12 - 1 \cdot 1$$

$$\Rightarrow m_O = 1,62 \Rightarrow V_O = \frac{1,62}{16} = 0,1 \text{ моль}$$

$$\Rightarrow X = C_{0,4} H_{1,0} O_{0,1} = C_4 H_{10} O \Rightarrow X = \text{—O—}$$



$$W_{Na(OH)} = \frac{23}{23+17} = 0,575$$



$$W_{Na(K)} = \frac{46}{46+48+12} = 0,434$$

$$\Rightarrow W_{Na} = \frac{m_{Na} \cdot W_{Na(OH)} + m_K \cdot W_{Na(K)}}{m_{Na} + m_K} = 0,45$$

Пусть  $\text{—O—} = x$  моль, тогда  $m_K = x \cdot M_K = 106 \text{ г/моль} \cdot x$

$$\Rightarrow m_{Na} = (V_{Na} - 2x) \cdot M_{Na} = (CV - 2x) \cdot M_{Na} = (0,091 \cdot 2,75 - 2x) \cdot 40 = (0,25 - 2x) \cdot 40$$

$$\Rightarrow \frac{106 \cdot x + 40 \cdot 0,434 + 40 \cdot 0,575(0,25 - 2x)}{106 \cdot x + 40(0,25 - 2x)} = 0,45 \Rightarrow x = 0,107 \text{ моль}$$

$$\Rightarrow W_x = 1 - W_{\text{др}} = 1 - \frac{0,107 \cdot 88}{44,15} = 0,3723 = 37,23\%$$

Ответ:  $W_x = 37,23\%$



СЕЧЕНОВСКИЙ  
УНИВЕРСИТЕТ

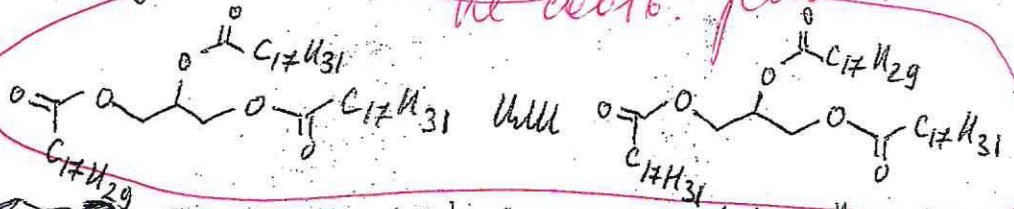


Ан. Олег ступ

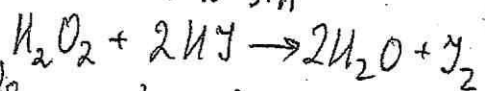
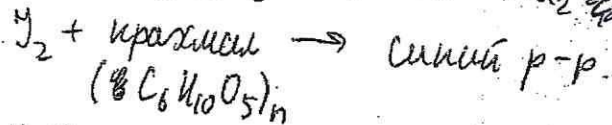
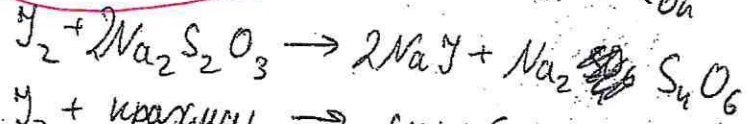
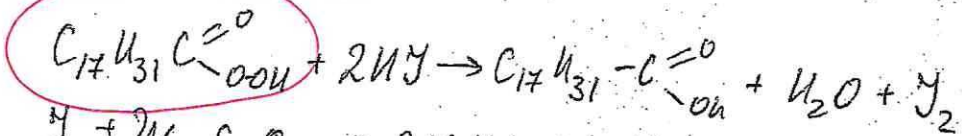
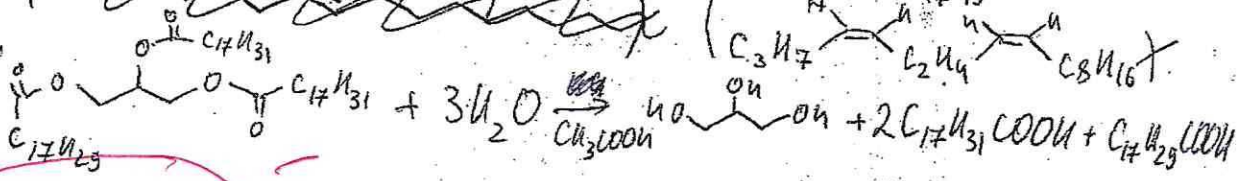
Задача № 1

не соств. условие!

1) Молекула масла:



2) реакция:



3)  $I_p = \frac{V_0}{t_m}$ ;  $V_0 = V_{пер} = V_{Cl_2} = \frac{1}{2} V_{Na_2S_2O_3} = \frac{1}{2} (V_{Na_2S_2O_3, м} - V_{Na_2S_2O_3, фок}) =$   
 $= \frac{1}{2} (2,5 \cdot 0,01 \times 10^{-3} - 0,1 \cdot 0,01 \times 10^{-3}) \text{моль} = 1,2 \times 10^{-5} \text{моль}$

$\Rightarrow I_p = \frac{1,2 \times 10^{-5} \text{моль}}{0,005 \text{м}} = 2,4 \text{ ммоль/м} ; 2,4 < 2,5 \Rightarrow \text{доброкачественное}$

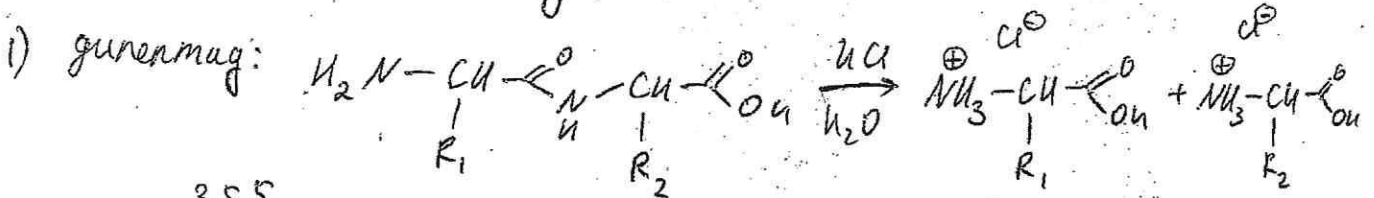
$\omega_0 = \frac{V_0 \cdot M_0}{m_{обп}} = \frac{1,2 \times 10^{-5} \text{моль} \cdot 16 \frac{\text{г}}{\text{моль}}}{52} = 3,84 \times 10^{-3} \%$

Ответ:  $I_p = 2,4 \text{ ммоль/м}$  +

$\omega_0 = 3,84 \times 10^{-3} \%$

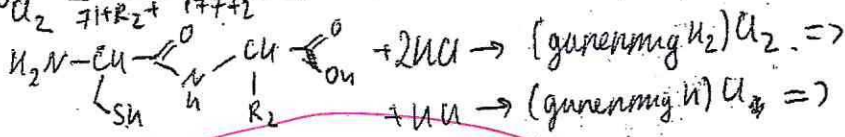
см. след стр.

Задача №6



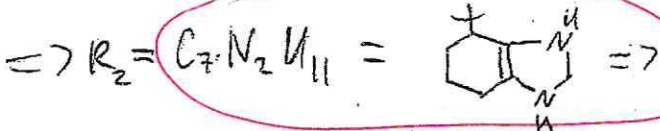
$$\Rightarrow \omega_{C_1} = \frac{35,5}{35,5 + M_{R_1} + 32 + 24 + 14 + 5} = 22,54\% \Rightarrow M_{R_1} = 47 \Rightarrow R_1 = HS-CH_2-$$

$$\Rightarrow \omega_{C_2} = \frac{35,5 \cdot 2}{71 + R_2 + 177 + 2} = 10,5498\% \Rightarrow R_2 = 423$$

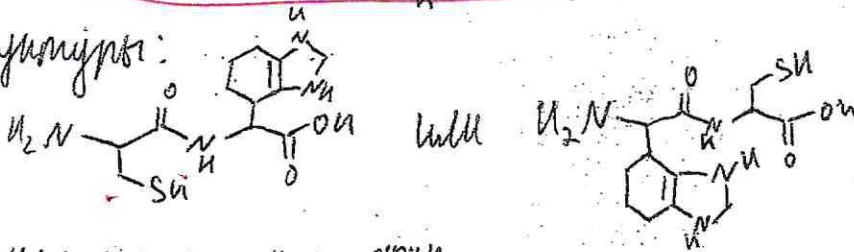


$$\frac{35,5}{R_2 + 177 + 1} = 10,5498\%$$

$$\Rightarrow R_2 = 423$$

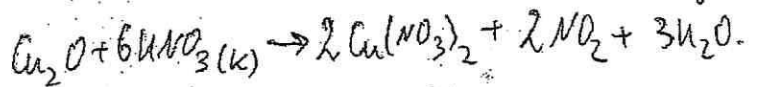
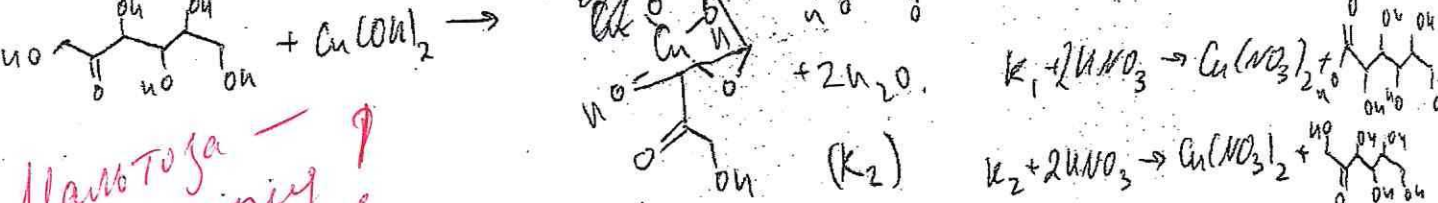
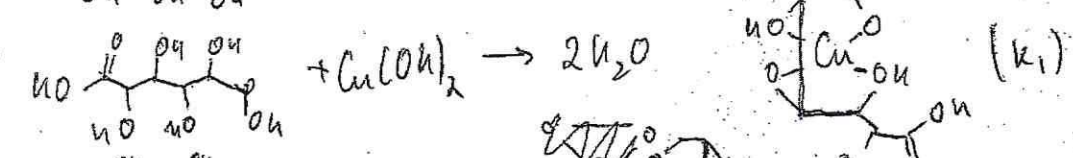
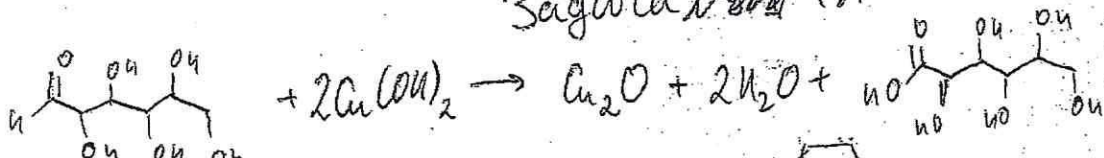


Структурні:



Цистеїн і триметарин

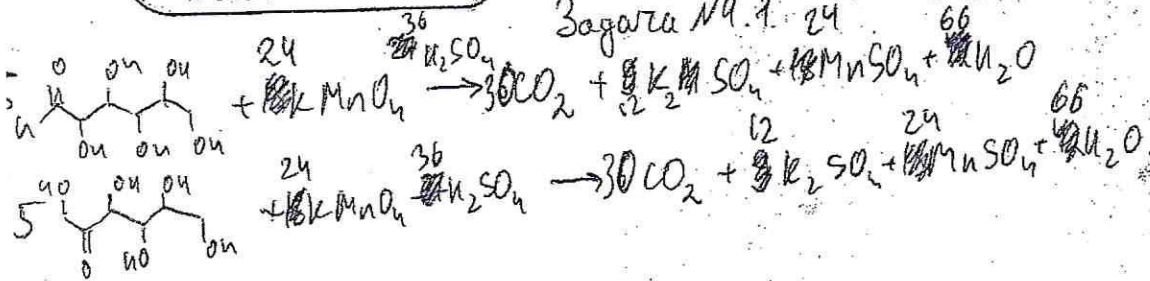
Задача №4.1



см. след стор.

Мальтоза — дисахарид!

Задача №4. 24

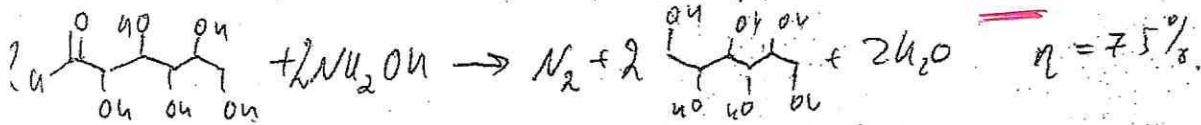


$$\Rightarrow \nu_{\text{CO}_2} = \nu_{\text{ушв}} \cdot 6 \Rightarrow \nu_{\text{ум}} = \nu_{\text{CO}_2} / 6 = 0,2 \text{ моль}$$

$$pV = \nu RT \Rightarrow \nu = \frac{pV}{RT} = \frac{101000 \cdot 29,42 \times 10^{-3}}{8,314 \cdot 298} = 1,2 \text{ моль}$$

$$\Rightarrow \text{пусть маннозы } x, \text{ тогда маннозы } y, 0,2 - x \Rightarrow$$

$$\Rightarrow m_{\text{ам}} = 0,2 \text{ моль} \cdot 180 = 36 \text{ г}$$



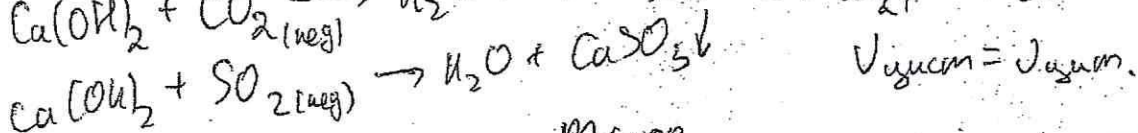
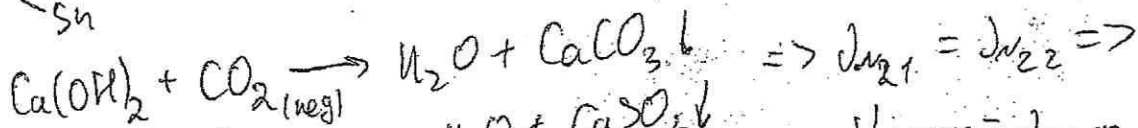
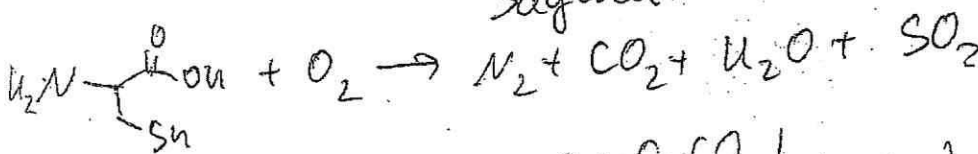
$$\Rightarrow 0,2 - 2 \cdot (15 + 48) + x \cdot 6 \cdot (15 + 48) = 0,75 \cdot 75,62 \Rightarrow x = 0,0833 \text{ моль}$$

$$\Rightarrow m_{\text{ам}} = 1,917 \text{ моль} \Rightarrow$$

$$\Rightarrow m_{\text{проу}} = 1,917 \cdot 0,75 \cdot 182 = 261,67 \text{ г}$$

Ответ:  $m_{\text{проу}} = 261,67 \text{ г}$

Задача №9.



$$\frac{m_{\text{CaCO}_3}}{m_{\text{CaSO}_3}} =$$

нет решения!



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УНИВЕРСИТЕТ

