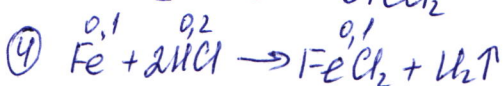
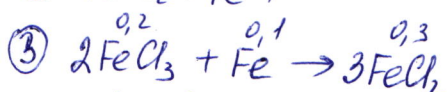
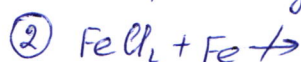
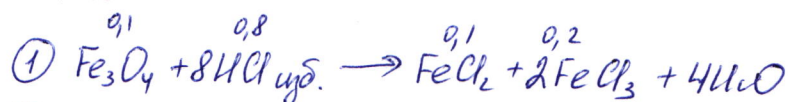


ПИСЬМЕННАЯ РАБОТА

ШИФР

(заполняется секретарём)

N2



$$\nu(\text{Fe}_3\text{O}_4) = \frac{m}{M} = \frac{23,14}{232} = 0,1 \text{ моль}$$

$$\nu(\text{HCl}) = cV = 1 \cdot 1 = 1 \text{ моль} - \text{избыток}$$

$$\frac{0,1}{1} < \frac{1}{8}$$

$$0,1 < 0,125$$

$$\nu_{\text{обр.}}(\text{FeCl}_2) = 0,1 \text{ моль}$$

$$\nu_{\text{обр.}}(\text{FeCl}_3) = 0,3 \text{ моль}$$

$$\nu_{\text{ост.}}(\text{HCl}) = \nu_{\text{исх.}}(\text{HCl}) - \nu_{\text{реак.}}(\text{HCl}) = 1 - 0,8 = 0,2 \text{ моль}$$

Fe - избыток, по условию задачи

$$\nu_{\text{обр.}}(\text{FeCl}_2) = 0,1 \text{ моль}$$

$$\nu_{\text{общ.}}(\text{FeCl}_2) = \nu_{\text{обр.}}(\text{FeCl}_2) + \nu_{\text{обр.}}(\text{FeCl}_3) + \nu_{\text{обр.}}(\text{FeCl}_2) = 0,1 + 0,3 + 0,1 = 0,5 \text{ моль}$$

$$m_{\text{кис.р}} = m(\text{Fe}_3\text{O}_4) + m_{\text{р}}(\text{HCl}) + m_{\text{исх}}(\text{Fe}) - m_{\text{ост}}(\text{Fe}) = 23,14 + 1,04 \cdot 100 + 15 - 3,8 = 1074,34$$

$$\omega(\text{FeCl}_2) = \frac{m(\text{FeCl}_2)}{m_{\text{кис.р}}} = \frac{63,5}{1074,34} = 0,0591 \text{ или } 5,91\%$$

$$m(\text{FeCl}_2) = \nu_{\text{общ.}} \cdot M(\text{FeCl}_2) = 0,5 \cdot 127 = 63,5$$

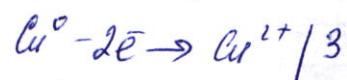
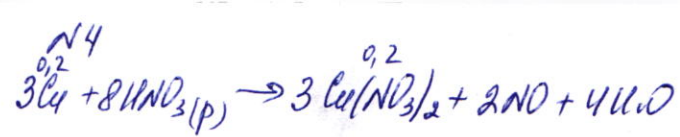
$$m_{\text{ост}}(\text{Fe}) = m_{\text{исх}}(\text{Fe}) - m_{\text{реак}}(\text{Fe}) = 15 - 11,2 = 3,8$$

$$\nu_{\text{реак.}}(\text{Fe}) = 0,1 \text{ моль}$$

$$\nu_{\text{реак.}}(\text{Fe}) = 0,1 \text{ моль} \Rightarrow \nu_{\text{общ.}} = 0,2 \text{ моль}$$

$$m_{\text{реак}}(\text{Fe}) = 0,2 \cdot 56 = 11,2$$

$$\text{Ответ: } m_{\text{ост}}(\text{Fe}) = 3,8; \omega(\text{FeCl}_2) = 5,91\%$$



$$\nu(\text{Cu}) = \frac{m}{M} = \frac{12,7}{64} = 0,2 \text{ моль}$$

$$M(\text{D}) = 2 \cdot 15 = 30 \text{ г/моль}$$

$$M(\text{NO}) = 30 \text{ г/моль}$$



$$m(\text{CuO}) = 0,2 \cdot 80 = 16 \text{ г}$$

$$m(\text{H}) = 15,9 \text{ г} \Rightarrow \text{H} = \text{CuO}$$



Ответ: A = Cu ; B = HNO₃ p ; C = Cu(NO₃)₂, D = NO, E = NO₂, G = O₂, H = CuO.

№1.

$$\nu(A) = x \quad M(A) = A$$

$$\nu(B) = y \quad M(B) = B$$

$$\nu(C) = z \quad M(C) = C$$

$$M_{\text{см}} = \nu(A) \cdot M(A) + \nu(B) \cdot M(B) + \nu(C) \cdot M(C) \Rightarrow 28 = \frac{x \cdot A}{x+y+z} + \frac{y \cdot B}{x+y+z} + \frac{z \cdot C}{x+y+z}$$

$$\left. \begin{aligned} M_{\text{см}} &= 2 \cdot 14 = 28 \text{ г/моль} \\ M_{\text{см}} &= 4 \cdot 7 = 28 \text{ г/моль} \end{aligned} \right\} \Rightarrow 28 = \frac{x \cdot A}{x+z} + \frac{z \cdot C}{x+z}$$

$$\begin{cases} 28x + 28y + 28z = xA + yB + zC \\ 28x + 28y = xA + zC \end{cases}$$

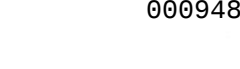
$$28y + xA + zC = xA + yB + zC$$

$$28y = yB$$

$$B = 28$$

Т.к. газ B реагирует с раствором Br₂ ⇒ это этен (C₂H₄) M(C₂H₄) = 28 г/моль.
Предположим, что 2 других газа тоже имеют M = 28 г/моль.
Т.к. оставшиеся газы не реагируют с Br₂ p, значит это газы:

~~неверно~~ CO и N₂.



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ПИСЬМЕННАЯ РАБОТА

ШИФР

(заполняется секретарём)



$$\rho = \frac{M}{V_M} \Rightarrow M = \rho V_M = 1,5 \cdot 2,4 = 3,6 \text{ моль}$$



$$\Delta m = m_{\text{реа}}(\text{LiO})$$

$$\gamma(\text{LiO}) = \frac{m}{M} = \frac{16}{80} = 0,2 \text{ моль}$$

$$\gamma(\text{CO}) = 0,2 \text{ моль} \Rightarrow \gamma(\text{N}_2) = 0,2 \text{ моль}$$

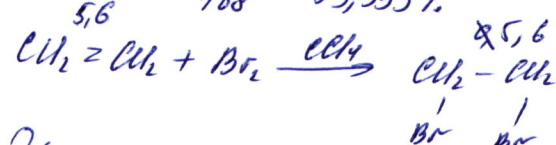
$$m(\text{CO}) = 0,2 \cdot 28 = 5,6$$

$$m(\text{N}_2) = 0,2 \cdot 28 = 5,6$$

$$m(\text{C}_2\text{H}_4) = 164 - 11,2 = 152,8$$

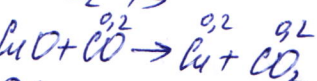
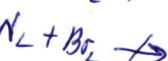
$$\omega(\text{CO}) = \omega(\text{N}_2) = \frac{5,6}{168} = 0,0333 = 3,33\%$$

$$\omega(\text{C}_2\text{H}_4) = \frac{152,8}{168} = 93,333\%$$



$$\gamma(\text{C}_2\text{H}_4) = \frac{152,8}{28} = 5,46 \text{ моль}$$

$$\rho_{\text{обр}}(\text{C}_2\text{H}_4, \text{Br}_2) = 5,46 \text{ моль} \Rightarrow m(\text{C}_2\text{H}_4\text{Br}_2) = 5,46 \cdot 198 = 1081,08$$

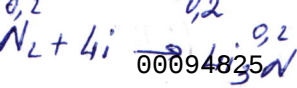


$$\gamma(\text{Li}) = 0,2 \Rightarrow m(\text{Li}) = 0,2 \cdot 64 = 12,8$$

$$\rho_{\text{обр}}(\text{CO}_2) = 0,2 \Rightarrow m(\text{CO}_2) = 0,2 \cdot 44 = 8,8$$



$$\rho_{\text{обр}}(\text{BaCO}_3) = 0,2 \Rightarrow m(\text{BaCO}_3) = 0,2 \cdot 197 = 39,4$$



$$m(\text{Li}_3\text{N}) = 0,2 \cdot 35 = 7$$

Ответ:

$$\begin{aligned} \omega(\text{CO}) &= 3,33\% \\ \omega(\text{N}_2) &= 3,33\% \\ \omega(\text{C}_2\text{H}_4) &= 93,333\% \\ m(\text{C}_2\text{H}_4\text{Br}_2) &= 1081,08 \\ m(\text{Li}) &= 12,8 \\ m(\text{CO}_2) &= 8,8 \\ m(\text{BaCO}_3) &= 39,4 \\ m(\text{Li}_3\text{N}) &= 7 \end{aligned}$$

☐ черновик

☒ чистовик

Страница № 3

(Поставьте галочку в нужном поле)

(Нумеровать только чистовики)

N6



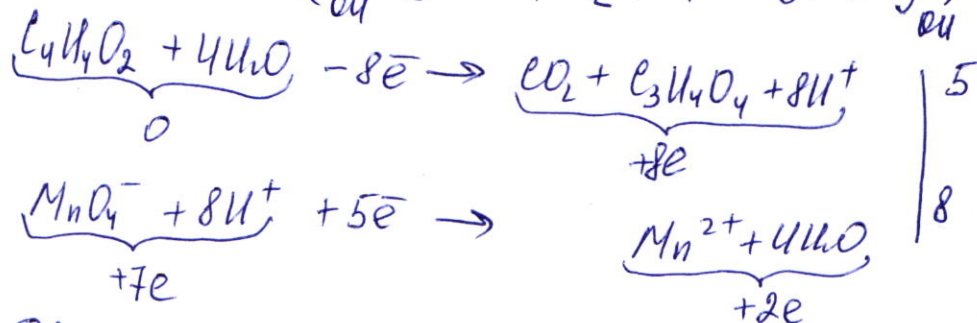
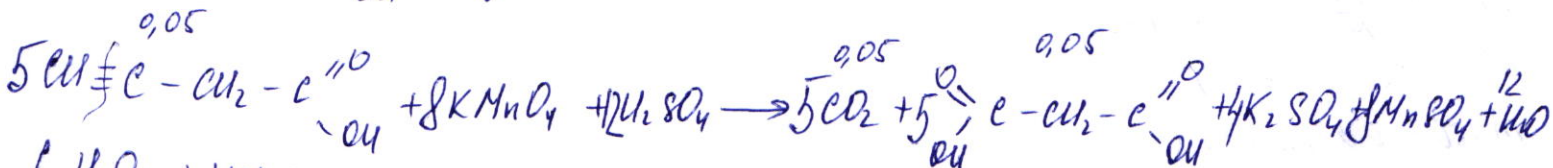
$$V(NaOH) = 1,001 = 0,01 \text{ моль}$$

П.т.к. это реакция нейтрализации, значит в реакцию вступила щелочь и кислота.

$$V(NaOH) = V(C_xH_yO_z) = 0,01 \text{ моль}$$

$$M(C_xH_yO_z) = \frac{0,84}{0,01} = 84 \text{ г/моль}$$

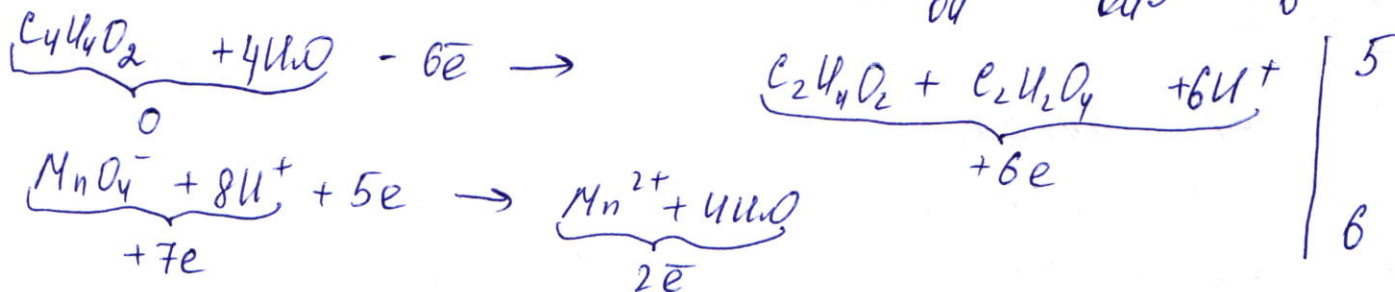
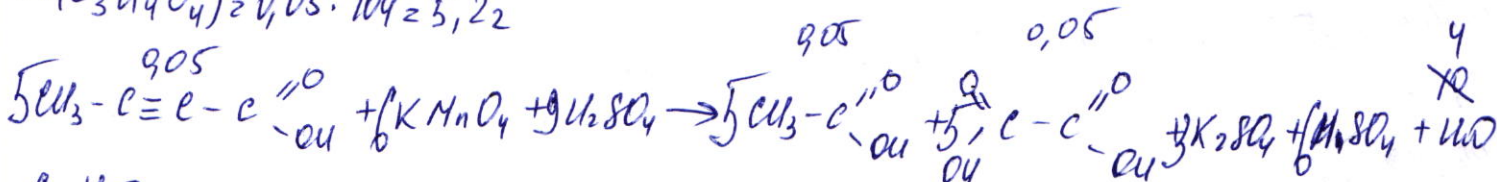
$$x:y:z = \frac{0,5714}{12} \cdot 84 : \frac{0,0476}{1} \cdot 84 : \frac{0,381}{16} \cdot 84 = 4:4:2$$



$$V(C_4H_4O_2) = \frac{4,2}{82} = 0,05 \text{ моль}$$

$$V(CO_2) = 0,05 \cdot 22,4 = 1,12 \text{ л}$$

$$m(C_3H_4O_4) = 0,05 \cdot 104 = 5,22$$



$$m(C_2H_4O_2) = 0,05 \cdot 60 = 3,2$$

$$m(C_2H_2O_4) = 0,05 \cdot 90 = 4,52$$

$$m(C_2H_4O_4) = 4,62$$

Ответ: $V(CO_2) = 1,12 \text{ л}$, $m(C_3H_4O_4) = 5,22$; $m(C_2H_4O_2) = 3,2$

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☐ черновик ☒ чистовик

(Поставьте галочку в нужном поле)

Страница № 4

(Нумеровать только чистовики)

ПИСЬМЕННАЯ РАБОТА

ШИФР

(заполняется секретарём)

$V_{\text{реал}} = \frac{1}{2} V_{\text{кисл.}}$
 $M_{\text{ам}} = 28 \text{ г/моль}$

$\gamma(A) = x \quad M(A) = A$
 $\gamma(B) = y \quad M(B) = B$
 $\gamma(C) = z \quad M(C) = C$

$M_{\text{ам}} = \gamma(A) \cdot M(A) + \gamma(B) \cdot M(B) + \gamma(C) \cdot M(C)$

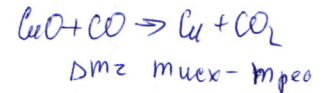
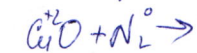
$M_{\text{ам}} = \gamma(A) \cdot M(A) + \gamma(B) \cdot M(B) + \gamma(C) \cdot M(C)$ $M_{\text{ам}} = 28 \text{ г/моль}$

$28 = \frac{x \cdot A}{x+y+z} + \frac{y \cdot B}{x+y+z} + \frac{z \cdot C}{x+y+z}$

$28(x+y+z) = xA + yB + zC$

$M_{\text{ам}} = 28$

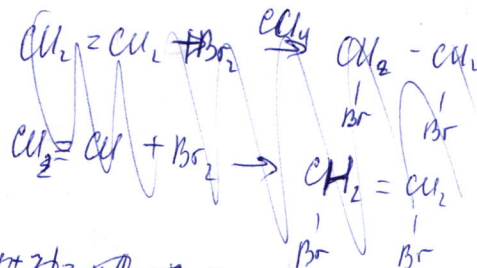
$M_{\text{ам}} = M_{\text{ам}}$



$28y + 28z + 28x = 14x + 14z + By$
 $28y + 14z + 14x = By$
 $14(2y + z + x) = By$

$V_1 = V_2 + V_3$

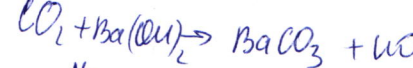
$y = \frac{x}{x+y}$



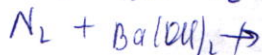
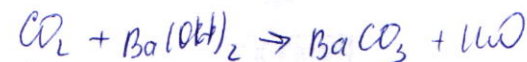
$28(x+y+z) = xA + yB + zC$

$28 = \frac{x \cdot A}{x+y+z} + \frac{y \cdot B}{x+y+z} + \frac{z \cdot C}{x+y+z}$

$\frac{28x}{x+y+z} + \frac{yB}{x+y+z} + \frac{zC}{x+y+z} = \frac{x \cdot A}{x+y+z} + \frac{zC}{x+y+z}$



$p = \frac{m}{V}$
 $n(\text{газа}) = 28$



$$\rho = \frac{M}{V_m}; M = \rho V_m = 1,25 \cdot 22,4 = 28 \text{ г/моль}$$



$$\omega(N_2) = \frac{m(N_2)}{m_{\text{см}}}$$



~~$$28 = \frac{28x}{28x + 28(1-x)}$$~~

~~$$28 = 28x + 28 - 28x$$~~

$$\Delta m = m(CuO) - m(Cu)$$

$$\Delta m = m_{\text{реакт}}(CuO)$$

$$\rho(CuO) = \frac{m}{M} = \frac{16}{80} = 0,2 \text{ моль}$$

$$\rho(CO) = 0,2 \text{ моль} \Rightarrow \rho(N_2) = 0,2 \text{ моль}$$

~~$$\rho(CO) = 0,2 \cdot 22,4 = 4,48$$~~

~~$$m_{\text{реакт}}(CO) = 5,6$$~~

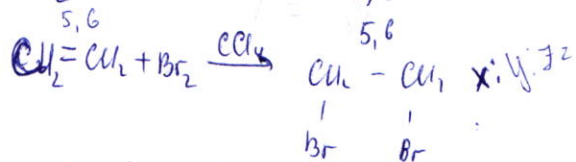
$$m(CO) = 0,2 \cdot 28 = 5,6$$

$$m(N_2) = 0,2 \cdot 28 = 5,6$$

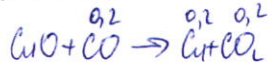
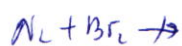
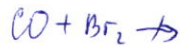
$$m(C_2H_4) = 168 - 11,2 = 156,8$$

$$\omega(CO) = \omega(N_2) = \frac{5,6}{168} = 0,0333 = 3,33\%$$

$$\omega(C_2H_4) = 0,93333 = 93,33\%$$

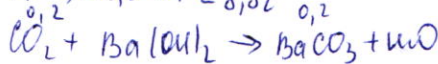


$$m(C_2H_4Br_2) = 188 \cdot 5,6 = 1052,8$$



$$\rho(Cu) = 0,2 \cdot 64 = 12,8$$

$$\rho(CO_2) = 0,2 \cdot 44 = 8,8$$



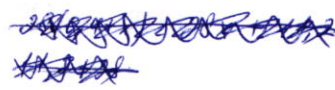
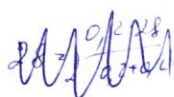
$$m(BaCO_3) = 0,2 \cdot 197 = 39,4$$

~~$$28 = \frac{0,2 \cdot 28}{0,2 + x} + \frac{x \cdot 28}{0,2 + x}$$~~

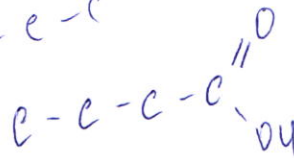
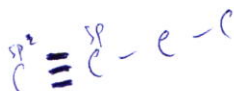
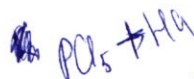
~~$$28(0,2 + x) = 5,6 + 28x$$~~

~~$$28 \cdot 0,2 + 28x = 5,6 + 28x$$~~

~~$$28 = \frac{28x}{x + 0,2} + \frac{28 \cdot 0,2}{x + 0,2} + \frac{28 \cdot 0,2}{x + 0,2}$$~~



$$\rho(C_2H_4) = \frac{156,8}{28} = 5,6 \text{ моль}$$



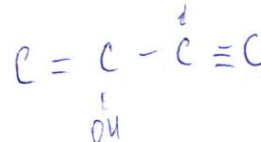
$$\rho(NaOH) = 1 \cdot 0,01 = 0,01$$

$$M(Ba) = \frac{0,84}{0,01} = 84$$



$$x:y:z = \frac{0,5714 \cdot 84}{12} : \frac{0,381}{16} : \frac{0,0476 \cdot 84}{1}$$

$$x:y:z = 4:2:4$$



ПИСЬМЕННАЯ РАБОТА

ШИФР

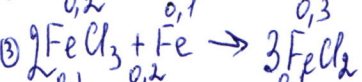
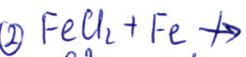
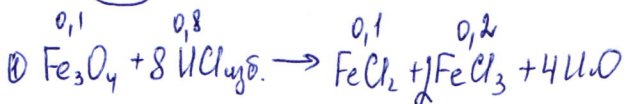
(заполняется секретарём)

$$\gamma_{\text{ост}}(\text{HCl}) = \gamma_{\text{исх}}(\text{HCl}) - \gamma_{\text{реак}}(\text{HCl}) = 1 - 0,8 = 0,2 \text{ моль.}$$



$$\gamma_{\text{обр}}(\text{FeCl}_2) = 0,3 \text{ моль.}$$

$$\gamma_{\text{кон}}(\text{FeCl}_2) = \gamma_{\text{обр}_1}(\text{FeCl}_2) + \gamma_{\text{обр}_3}(\text{FeCl}_2) + \gamma_{\text{обр}_4}(\text{FeCl}_2) = 0,1 + 0,3 +$$



$$\gamma(\text{Fe}_3\text{O}_4) = \frac{m}{M} = \frac{23,14}{232} = 0,1 \text{ моль}$$

$$\gamma(\text{HCl}) = cV = 1 \cdot 1 = 1 \text{ моль} - \text{избыток}$$

$$\frac{0,1}{1} < \frac{1}{8}$$

$$0,1 < 0,125$$

$$\gamma_{\text{обр}_1}(\text{FeCl}_2) = 0,1 \text{ моль.}$$

$$\gamma_{\text{обр}_3}(\text{FeCl}_2) = 0,3 \text{ моль}$$

$$\gamma_{\text{ост}}(\text{HCl}) = 1 - 0,8 = 0,2 \text{ моль}$$

Fe - в избытке, т.к. по условию задачи.

$$\gamma_{\text{обр}_4}(\text{FeCl}_2) = 0,1 \text{ моль}$$

$$\gamma_{\text{обр}_\Sigma}(\text{FeCl}_2) = \gamma_{\text{обр}_1}(\text{FeCl}_2) + \gamma_{\text{обр}_3}(\text{FeCl}_2) + \gamma_{\text{обр}_4}(\text{FeCl}_2) = 0,1 + 0,3 + 0,1 = 0,5 \text{ моль.}$$

$$\omega(\text{FeCl}_2) = \frac{\gamma(\text{FeCl}_2)}{\gamma_{\text{р.}}} = \frac{0,5}{1,033} = 0,484 \text{ моль.}$$

$$\gamma_{\text{р.}} = \frac{m_{\text{р.}}}{M} = \frac{1074,34}{1,04} = 1033 \text{ моль.}$$

$$m_{\text{исх. р.}} = m(\text{Fe}_3\text{O}_4) + m_{\text{р.}}(\text{HCl}) + m_{\text{реак}}(\text{Fe}) - m_{\text{ост}}(\text{Fe}) = 23,14 + 1,04 \cdot 1000 + 15 - 3,8 = 1074,34 \text{ г}$$

$$m_{\text{ост}}(\text{Fe}) = m_{\text{исх}}(\text{Fe}) - m_{\text{реак}}(\text{Fe}) = 15 - 11,2 = 3,8 \text{ г}$$

$$\gamma_{\text{реак}_3}(\text{Fe}) = 0,1 \text{ моль} \Rightarrow \gamma_{\text{обр}} = 0,2 \text{ моль}$$

$$\gamma_{\text{реак}_4}(\text{Fe}) = 0,1 \text{ моль}$$

$$m_{\text{реак}}(\text{Fe}) = 0,2 \cdot 56 = 11,2 \text{ г}$$

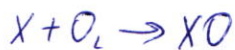
$$\omega(\text{FeCl}_2) = \frac{m(\text{FeCl}_2)}{m_{\text{р.}}}$$

$$m(\text{FeCl}_2) = 0,5 \cdot 127 = 63,5 \text{ г}$$

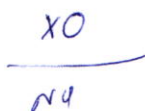
$$\omega(\text{FeCl}_2) = \frac{63,5}{1074,34} = 0,0591 \text{ или } 5,91\%$$



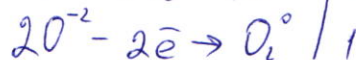
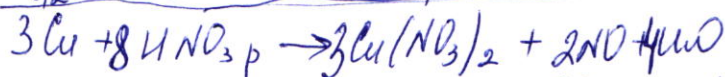
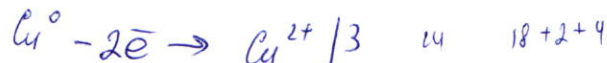
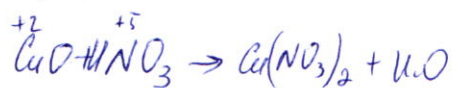
$$M(X) = M.$$



$$\gamma(X) = \frac{29,1}{M} \text{ моль.}$$



$$M(D) = 15 \cdot 2 = 30, \text{ моль.}$$



$$m(CuO) = 0,2 \cdot 80 = 16,2$$

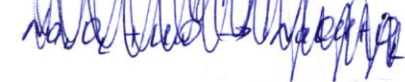
$$m(H) = 15,9 \Rightarrow H = CuO.$$

$$\gamma(Cu) = \frac{m}{M} = \frac{12,7}{64} = 0,2 \text{ моль}$$

$$M(D) = 2 \cdot 15 = 30,2 \text{ моль}$$

$$M(NO) = 30,2 \text{ моль}$$

$$\Rightarrow D = NO$$



A
B
B

A =

B =

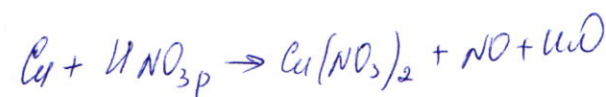
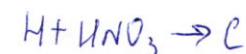
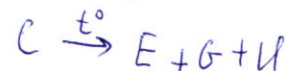
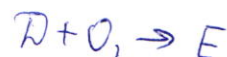
C = Cu(NO₃)₂

D = NO

E = NO₂

G = O₂

H = CuO



(N4)

A = Cu

B = HNO₃

C = Cu(NO₃)₂

D = NO

E = NO₂

G = O₂

H = CuO.

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☒ черновик

☐ чистовик

(Поставьте галочку в нужном поле)

Страница №

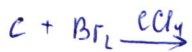
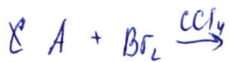
(Нумеровать только чистовики)

ПИСЬМЕННАЯ РАБОТА

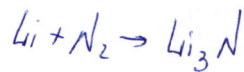
ШИФР

(заполняется секретарём)

$$M_{\text{вх}} = 14 \cdot 2 = 28 \text{ г/моль.}$$



$$\rho(X) = 1,25 \text{ г/л}$$



$$C = \frac{P}{V}$$

$$V_{\text{вх}} = \frac{1}{2} V_{\text{вх.}}$$

$$M_{\text{вх}} = \varphi(A)M(A) + \varphi(B)M(B) + \varphi(C)M(C)$$

$$\varphi(A) = x \quad M(A) = A$$

$$\varphi(B) = y \quad M(B) = B$$

$$\varphi(C) = z \quad M(C) = C$$

$$\rho = \frac{m}{V}$$

$$\frac{Ax}{y+z} + \frac{By}{x+z} + \frac{Cz}{y+x} = 28$$

$$Ax + By + Cz = 168$$

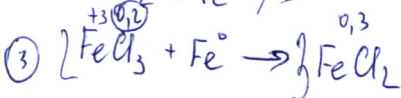
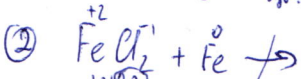
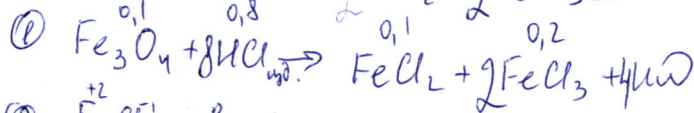
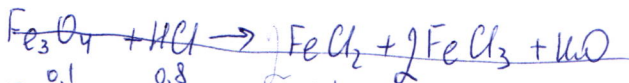
$$28 = \frac{x}{y+z} A + \frac{y}{x+z} B + \frac{z}{x+y} C$$

$$\frac{(y+z)(x+z)(y+x)}{(y+z)(x+z)(y+x)} = 28$$

$$Ax(x+z)(y+z) + By(y+z)(y+x) + Cz(y+z)(x+z) = 28(y+z)(x+z)(y+x)$$

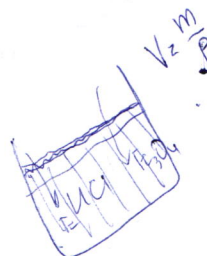
$$V_{\text{вх}} = \frac{M_{\text{вх}}}{\rho}$$

N₂



$$V(\text{Fe}_3\text{O}_4) = \frac{23,14}{232} = 0,1 \text{ моль.}$$

$$V(\text{HCl}) = CV = 1 \cdot 1 = 1 \text{ моль - избыток}$$



$$\frac{0,1}{1} < \frac{1}{8}$$

$$0,1 < 0,125$$

$$\rho = \frac{m}{V} \quad \rho = \frac{m}{V} \quad \rho = \frac{m}{V}$$

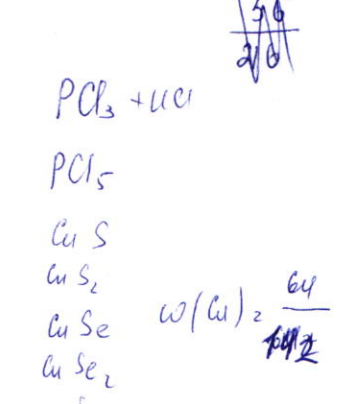
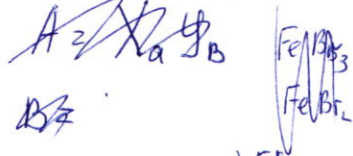
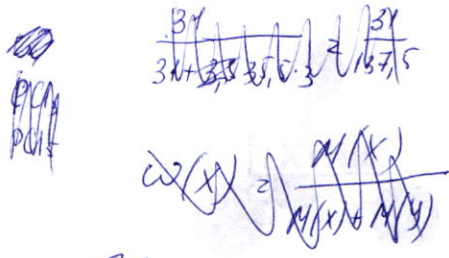
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☒ черновик ☐ чистовик

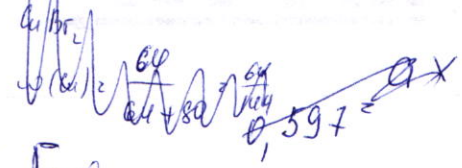
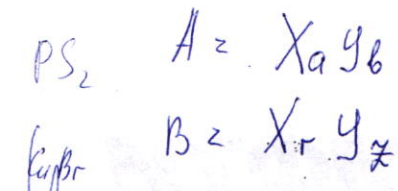
(Поставьте галочку в нужном поле)

Страница №

(Нумеровать только чистовики)



$0,597(aX + bY) = aX$
 $0,597aX + 0,597bY = aX$
 $0,597bY = aX - 0,597aX$
 $0,597bY = 0,403aX$
 $\frac{b}{a} = \frac{0,403X}{0,597Y}$



$0,597 = \frac{aX}{aX + bY}$
 $0,1411 = \frac{rX}{rX + zY}$

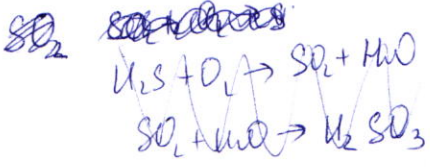
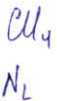
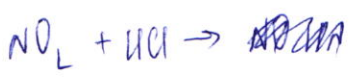
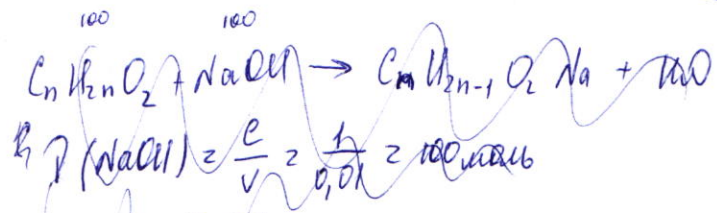
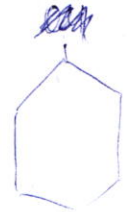
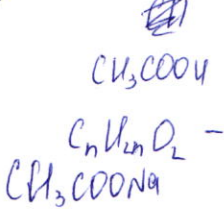
$100 - 1000$
 100



$w(C) = 57,14\%$
 $w(O) = 38,10\%$
 $w(H) = 4,76\%$



$x:y:z = 0,5714:0,381:0,0476$
 $x:y:z = 12:8:1$



ПИСЬМЕННАЯ РАБОТА

ШИФР

(заполняется секретарём)



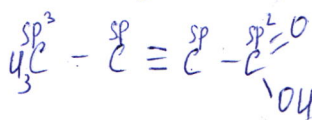
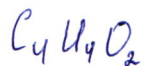
$$V(\text{NaOH}) = 1 \cdot 0,01 = 0,01 \text{ моль}$$

$$r(\text{NaOH}) = r(\text{C}_x \text{H}_y \text{O}_z) = 0.01$$

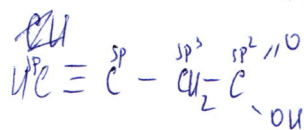
$$M(\text{C}_{10}\text{H}_8\text{O}_2) = \frac{0,84}{0,01} = 84 \text{ г/моль}$$

$$x_{14.7} = \frac{0,5714}{12} \cdot 84; \frac{0,38}{12} \cdot 84$$

$$x:y:z = \frac{0,5714}{12} \cdot 84 : \frac{0,0476}{1} \cdot 84 : \frac{0,381}{16} \cdot 84 = 4 : 4 : 2$$

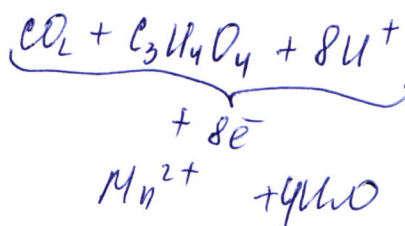
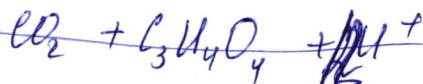
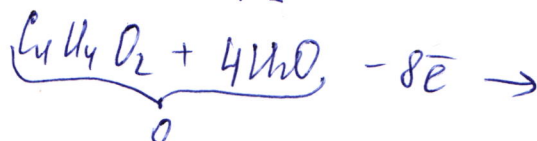
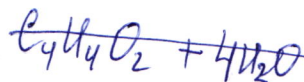
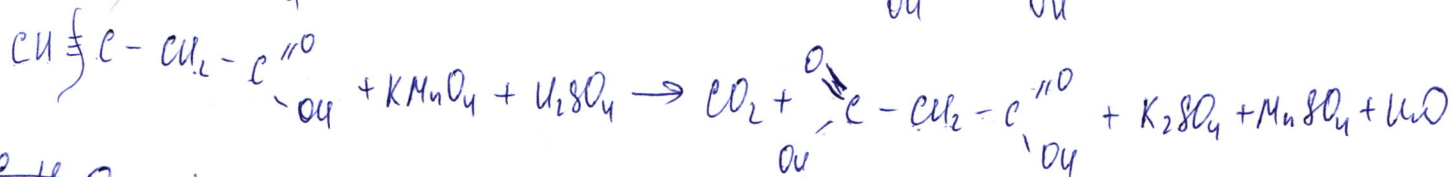
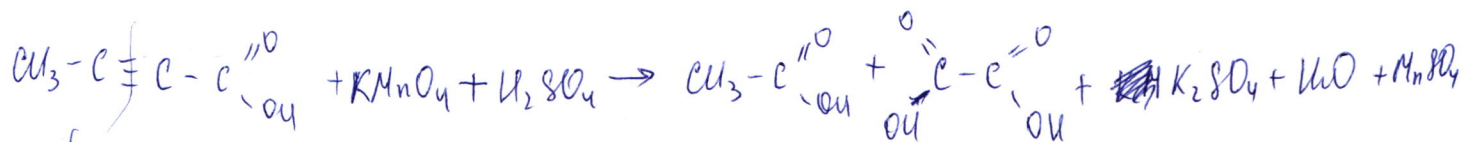


— ~~20~~ ~~20~~ будиновая клетка - 2



— Бутимовая кимота-1.

$$V = P \cdot V_M$$



48

20

30

20

