

Часть 1

Олимпиада: **Химия 11 класс (1 часть)**

Шифр: **21300558**

ID профиля: **329966**

Вариант 2

чистовик

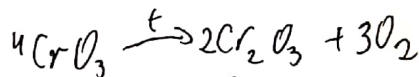
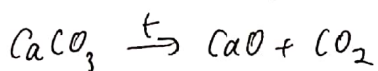
чистовик

~1

Пусть m вещества $A = 100(г)$, тогда $m(O) = 48(г)$ $n(O) = \frac{48}{16} = 3(моль)$

$m(остаточной) = 52(г)$ $52 \frac{г}{моль} - M(Cr)$ или $M(Ca) + M(C)$, тогда предполага-

емые A и B $CaCO_3$ и CrO_3



$$n(CaCO_3) = \frac{100}{100 \frac{г}{моль}} = 1,0(моль)$$

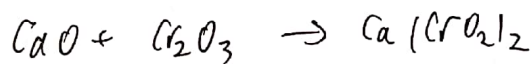
$$n(CrO_3) = \frac{40}{100 \frac{г}{моль}} = 0,4(моль)$$

$$n(CO_2) = n(CaCO_3) = 1,0(моль)$$

$$n(O_2) : n(CrO_3) = 3 : 4 \Rightarrow n(O_2) = 0,3(моль)$$

$$V(CO_2) = 1,0(моль) \cdot 22,4 \frac{л}{моль} = 22,4(л)$$

$$V(O_2) = 0,3(моль) \cdot 22,4 \frac{л}{моль} = 6,72(л)$$



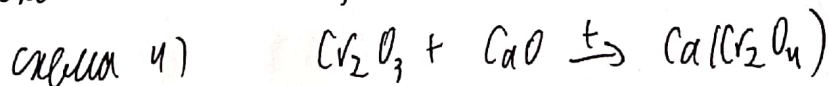
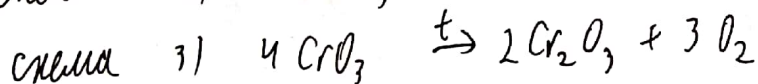
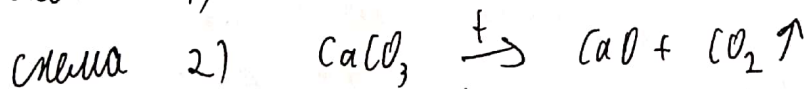
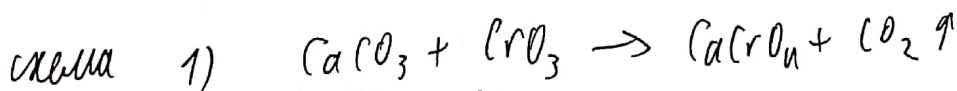
$$n(CaO) = 1,0(моль) \quad m(CaO) = 56 \cdot 1,0 = 56(г)$$

$$n(Cr_2O_3) = \frac{0,4}{2} = 0,2(моль)$$

$$m(Cr_2O_3) = 0,2 \cdot 152 = 30,4(г)$$

$$m(Ca(CrO_2)_2) = 22,4 + 30,4 = 52,8(г)$$

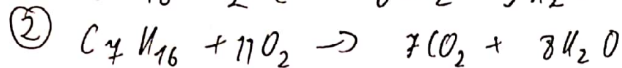
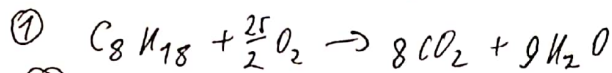
Ответ: $A - CaCO_3$ $B - CrO_3$ $B - CaCrO_4$ $Г - CO_2$
 карбонат кальция оксид хрома(VI) хромат кальция углекислый газ
 $\Delta - CaO$ $E - Cr_2O_3$ $Ж - Ca(CrO_2)_2$
 оксид кальция оксид хрома(III) хромит кальция



①

исходные

№ 3



$$\Delta H_{p-umm}^0 ① = 8 \cdot \Delta H^0(CO_2) + 9 \cdot \Delta H^0(H_2O) - \Delta H^0(C_8H_{18}) = 8 \cdot 393,5 + 9 \cdot 285,8 - 208 =$$

$$= 3148 + 2572,2 - 208 = 5512,2 \frac{kJ}{моль}$$

$$\Delta H_{p-umm}^0 ② = 7 \cdot \Delta H^0(CO_2) + 8 \cdot \Delta H^0(H_2O) - \Delta H^0(C_7H_{16}) = 7 \cdot 393,5 + 8 \cdot 285,8 - 224 =$$

$$= 2754,5 + 2286,4 - 224 = 4816,9 \frac{kJ}{моль}$$

Пусть $V(C_8H_{18}) = x(мл)$, тогда $V(C_7H_{16}) = 100 - x(мл)$

$$m(C_8H_{18}) = 0,69 \frac{г}{мл} \cdot x(мл) = 0,69x(г)$$

$$m(C_7H_{16}) = (100 - x) \cdot 0,684 \frac{г}{мл} = (100 - x) \cdot 0,684(г)$$

$$\rho(C_8H_{18}) = \frac{0,69x(г)}{114 \frac{г}{моль}} = \frac{0,69x}{114} (моль) \quad \rho(C_7H_{16}) = \frac{0,684 \cdot (100 - x) \frac{г}{мл}}{100 \frac{г}{моль}} = \frac{0,684 \cdot (100 - x)}{100} (моль)$$

$$\rho(C_8H_{18}) \cdot \Delta H_{p-umm}^0 ① + \rho(C_7H_{16}) \cdot \Delta H_{p-umm}^0 ② = 3333,8$$

$$\frac{0,69x \cdot 5512,2}{114} + \frac{0,684 \cdot (100 - x) \cdot 4816,9}{100} = 3333,8$$

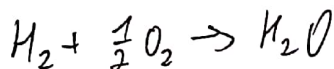
$$69x \cdot 5512,2 + 77,976 \cdot (100 - x) \cdot 4816,9 = 38005320$$

$$380347,8x + 37560259,44 - 375602,5944x = 38005320$$

$$4739,2056x = 445060,56$$

$$x = 93,91 \approx 94(мл), \text{ значит}$$

октановое число = 94



Пусть теперь $x(моль)$ водорода нужно, чтобы замесить $40(г)$ бензина, а $y(кДж)$ выделяется с $40(г)$ бензина, тогда

$$0,1x - 3333,8 \text{ кДж}$$

$$40x - 17 \text{ кДж}$$

$$1 \text{ моль} - 285,8 \text{ кДж}$$

$$x \text{ моль} - 1333520 \text{ кДж}$$

$$y = \frac{3333,8 \cdot 10}{0,1} = 1333520 \text{ кДж}$$

$$x = \frac{1333520 \cdot 1}{285,8} = 4665,92(моль) \approx 4666(моль)$$

$$V(H_2) = 4666(моль) \cdot 22,4 \left(\frac{л}{моль}\right) = 104518,4(л)$$

②

чистый ~3 процент

$$pV = \nu RT$$

$$\nu(H_2) = \frac{pV}{RT} = \frac{10,6 \cdot 10^6 \cdot 40 \cdot 10^{-3}}{8,314 \frac{Дж}{моль \cdot K} \cdot 298 K} = 376,4 \text{ (моль)}$$

$$Q = 376,4 \text{ (моль)} \cdot 285,8 \left(\frac{кДж}{моль} \right) = 10738,2 \text{ кДж.}$$

с по(1) берем можно получить 133320 кДж.

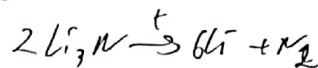
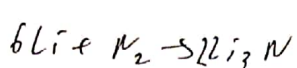
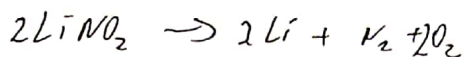
Таким образом, с точки зрения тепловой энергии это нецелесообразно.

Ответ: 1) октановое число = 94

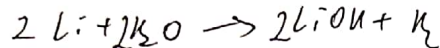
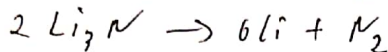
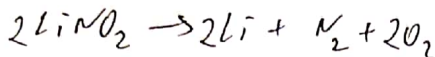
$$2) V(H_2) = 1045,18,4(1)$$

3) нецелесообразно

числовую ~2



$$\rho = \frac{m}{V} = \frac{M \cdot x}{V_m \cdot x} \Rightarrow x = \rho \cdot V_m = 1,257 \cdot 22,4 = 28 \frac{\text{г}}{\text{моль}} - \text{N}_2.$$



$$pV = \nu RT$$

$$\nu(\text{H}_2) = \frac{pV}{RT} = \frac{98858,55 \cdot 0,044848}{8,314 \cdot 293} = 1,82 (\text{моль})$$

$$\nu(\text{H}_2) : \nu(\text{Li}) = 1:2 \Rightarrow \nu(\text{Li}) = 3,64 (\text{моль})$$

Пусть $\nu(\text{Li}_3\text{N}) = x (\text{моль})$; тогда $\nu(\text{LiNO}_2) = \frac{50 - 35x}{53} (\text{моль})$

$$\nu(\text{LiNO}_2) : \nu(\text{Li}) = 1:1 \quad \nu(\text{Li}_3\text{N}) : \nu(\text{Li}) = 1:3 \Rightarrow \nu(\text{Li}) = \frac{50 - 35x}{53} + 3x.$$

$$\frac{50 - 35x}{53} + 3x = 3,64$$

$$50 - 35x + 159x = 192,92$$

$$124x = 142,92$$

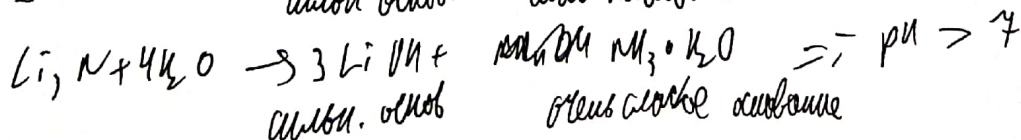
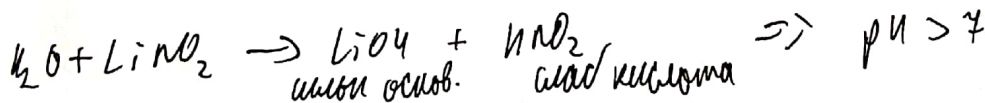
$$x = 1,15 (\text{моль}) \Rightarrow \nu(\text{Li}_3\text{N}) = 1,15 (\text{моль})$$

$$m(\text{Li}_3\text{N}) = n \cdot M = 1,15 \cdot 35 = 40,25 (\text{г})$$

$$m(\text{LiNO}_2) = 50 - 35 \cdot 1,15 = 9,66 (\text{г})$$

$$\omega(\text{Li}_3\text{N}) = \frac{40,25}{50} = 0,805 \text{ или } 80,5\%$$

$$\omega(\text{LiNO}_2) = \frac{9,66}{50} = 0,1932 \text{ или } 19,32\%$$



Ответ: 1) А - LiNO_2
щелоч. среда

$$2) \omega(\text{LiNO}_2) = 19,32\%$$

$$3) \text{А} \quad \text{pH} > 7$$

Б - Li_3N
щелоч. среда

Х - N_2 Y - Li
азот щелоч.

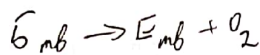
$$\omega(\text{Li}_3\text{N}) = 80,68\%$$

$$\text{Б} \quad \text{pH} > 7$$

(4)

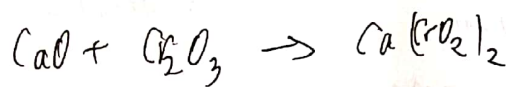
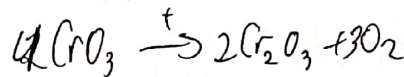
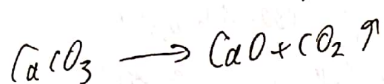
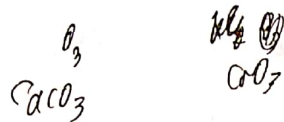
Тыс.мб $m = 700(2)$, масса $m(O) = 48(2)$

$\nu(O) = \frac{48}{76} = 3/10(6)$ $m(O_{21}) = 52(7)$

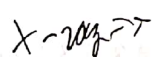
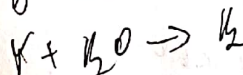
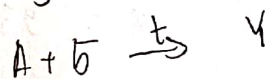
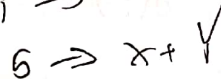
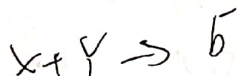
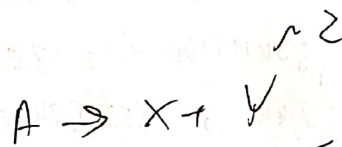
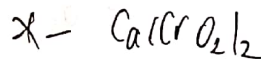
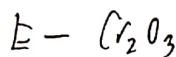
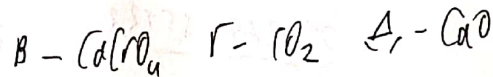
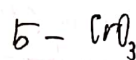
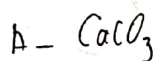


$\nu(O_2) = \frac{6,72}{22,4} = 0,3(1)$

$\nu(Cr) = 9,4$

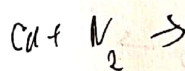
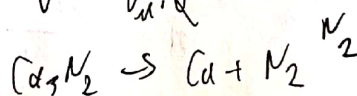


$\frac{22,4}{22,4} + 10,4$



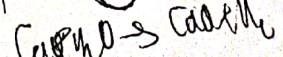
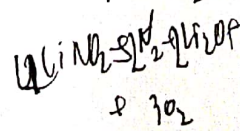
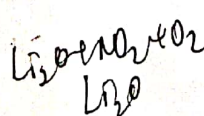
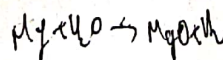
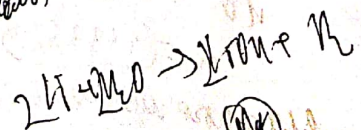
$\rho = \frac{m}{V} = \frac{m \cdot Q}{V_{\text{н.к.}} \cdot Q}$

$m = 1,251 \cdot 22,4 = 28 \frac{1}{2} \text{ моля}$



$\nu(H_2) =$

$pV = \nu RT$
 $\nu = \frac{pV}{RT} = \frac{98658,55 \cdot 0,011848}{8,314 \cdot 293} = 1,82 \text{ (моля)}$



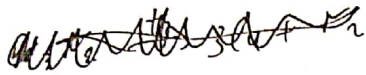
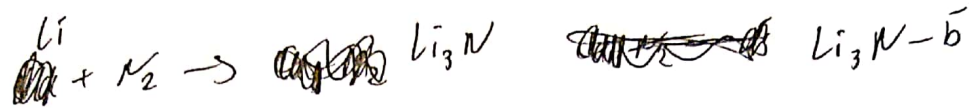
черновик. ~~исходник~~ 3 (продолжение)

~~115000~~ $n(H_2) = \frac{76500 (г)}{2 \left(\frac{г}{моль} \right)} = 38250 (моль)$

$$Q = 38250 (моль) \cdot 285,8 \left(\frac{кДж}{моль} \right) = 10931850 \text{ кДж.}$$

N₂

$$\rho = \frac{m}{V} = \frac{M \cdot x}{V_M \cdot x} \Rightarrow M = \rho \cdot V_M = 1,257 \left(\frac{\text{г}}{\text{л}} \right) \cdot 22,4 \left(\frac{\text{л}}{\text{моль}} \right) = 28 \left(\frac{\text{г}}{\text{моль}} \right) - \text{N}_2.$$



Часть 2

Олимпиада: **Химия 11 класс (2 часть)**

Шифр: **21300558**

ID профиля: **329966**

Вариант 2

условия - 4

$$V(CO_2) = \frac{11,2 \text{ л}}{22,4 \frac{\text{л}}{\text{моль}}} = 0,5 (\text{моль}) \quad V(H_2O) = \frac{9 \text{ мл} \cdot \frac{10}{18}}{18 \frac{\text{г}}{\text{моль}}} = 0,5 (\text{моль})$$

$$V(C) = 0,5 (\text{моль})$$

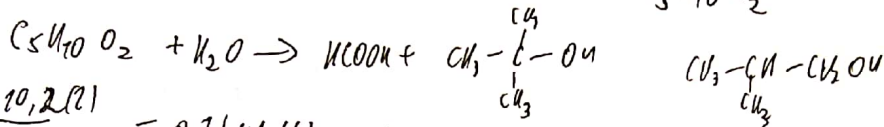
$$V(H_2O) : V(H_2) = 1:2 \Rightarrow V(H) = 1 \text{ моль}$$

$$V(C) : V(H) = 1:2 \Rightarrow C_n H_{2n}$$

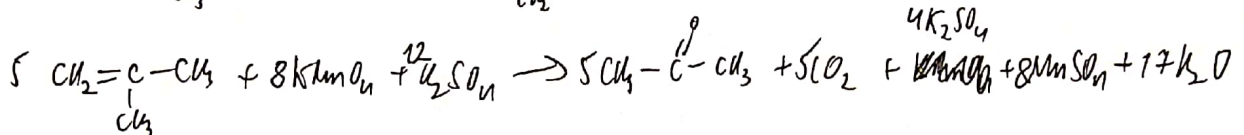
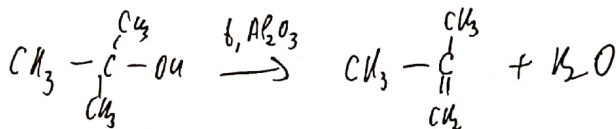
$$m(C) + m(H) = 0,5 \cdot 12 + 1 \cdot 1 = 7 (\text{г}), \text{ и } m(A) = 10,2 (\text{г}) \Rightarrow$$

$$m(O) = 10,2 - 7 = 3,2 (\text{г}) \quad V(O) = \frac{3,2}{16} = 0,2 (\text{моль})$$

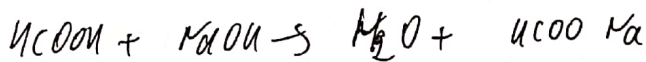
$$V(C) : V(H) : V(O) = 5:10:2 \Rightarrow C_5 H_{10} O_2$$



$$V(C_5 H_{10} O_2) = \frac{10,2 (\text{г})}{102 \frac{\text{г}}{\text{моль}}} = 0,1 (\text{моль}) \quad V(HCOOH) = 0,1 (\text{моль}) \quad m(HCOOH) = 0,1 \cdot 46 = 4,6 (\text{г})$$



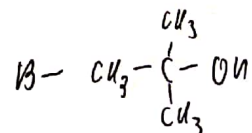
$$m(CO) = \frac{76}{58} = 0,2759 \text{ моль } 27,59 (\%)$$



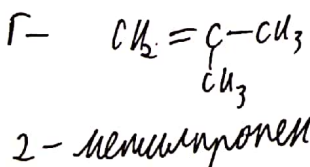
$$V(NaOH) = 0,05 (\text{л}) \cdot 2 \left(\frac{\text{моль}}{\text{л}} \right) = 0,1 (\text{моль}) \quad V(NaOH) = V(HCOOH)$$

Ответ: А - $HC \overset{\overset{O}{||}}{\underset{\underset{CH_3}{|}}{O}} - \overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}} - CH_3$
третичный спирт

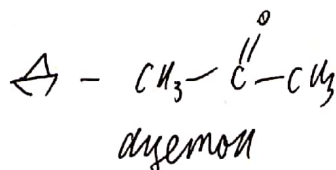
Б - $HCOOH$
нравильная кислота



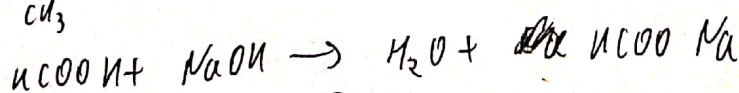
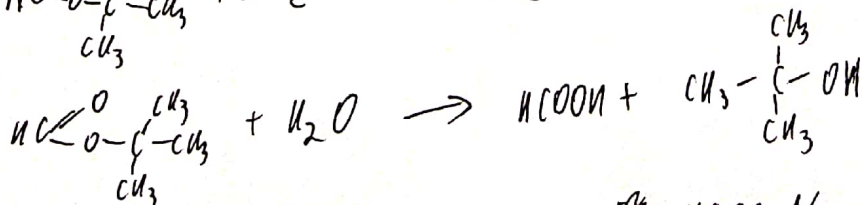
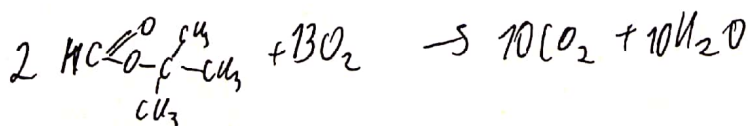
2-метилпропанол-2



2-метилпропен



ацетон

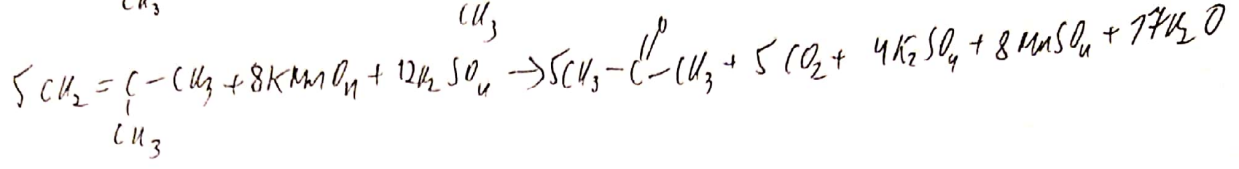
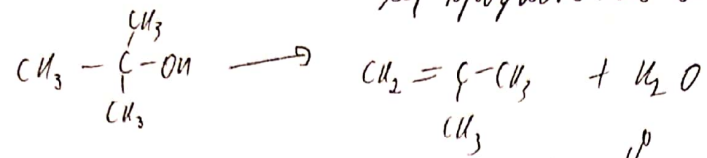


(1)

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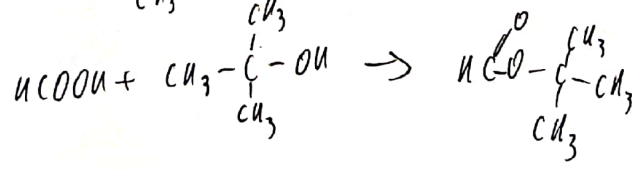
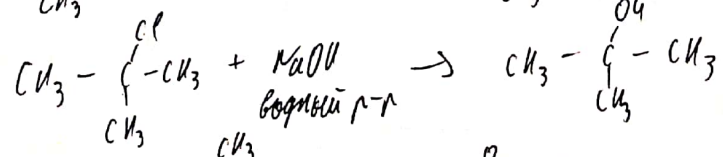
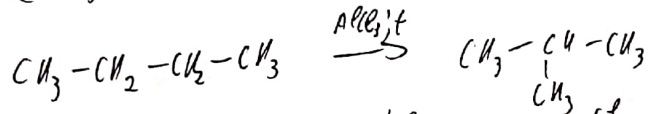
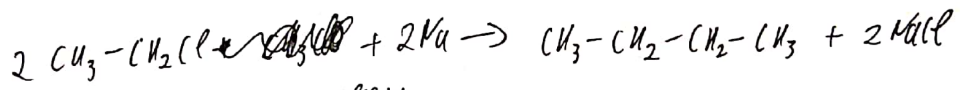
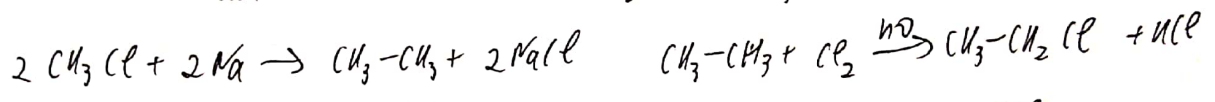
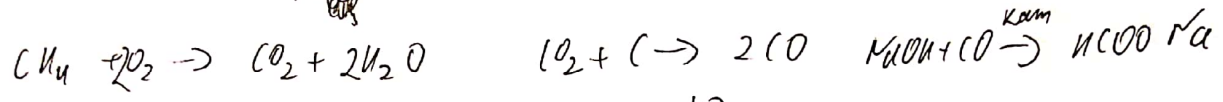
чистовик

и продолжение ответа:



~~амальгам~~

~~16, 16~~



(2)

числовы. ✓

$$\nu(\text{CuSO}_4) = \frac{64}{160} = 0,4 (\text{моль}) \quad m(\text{Cu}) = 0,4 \cdot 64 = 25,6 (г)$$

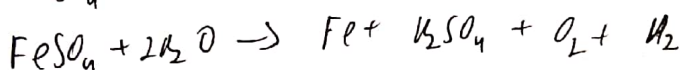
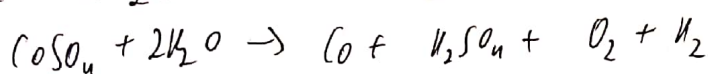
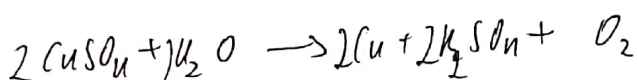
$$t = 78580 (с) \quad m(\text{Cu}) = \frac{M \cdot I \cdot t}{n \cdot F}$$

$$t = \frac{m \cdot n \cdot F}{n \cdot I} = \frac{25,6 (г) \cdot 2 \cdot 96500}{64 \cdot 3} = 25733,3 (с)$$

$$t_{\text{общ}} = 12846,7 (с)$$

$$\nu(\text{Fe}) = \frac{69,8}{152} = 0,4 (\text{моль})$$

$$m(\text{Fe}) = 22,4 (г)$$



$$t = \frac{n \cdot n \cdot F}{M \cdot I}$$

$$t = 25733,3 (с)$$

$$\text{или } 428,9 (\text{минут})$$

$$m(\text{Co}) = \frac{M \cdot I \cdot t}{n \cdot F} = \frac{59 \cdot 3 \cdot 12846,7}{2 \cdot 96500} = 7,854 (г)$$

$$\nu(\text{CoSO}_4) = \frac{62}{155} = 0,4 (\text{моль}) \quad m(\text{Co}) = 0,4 \cdot 59 = 23,6 (г)$$

$$m(\text{Co}) = \frac{M \cdot I \cdot t}{n \cdot F} \quad t = \frac{23,6 \cdot 2 \cdot 96500}{59 \cdot 3} = 18533,3 (с)$$

$$t_{\text{предельная}} = 18533,3 - 12846,7 = 5686,6 (с) \text{ или } 94,8 (\text{минут})$$

$$m(\text{Cu}) = 25,6 (г) \quad m(\text{O}_2) = 6,4 (г) \quad \nu(\text{Co}) = \frac{7,854}{59} = 0,133 (\text{моль}) \Rightarrow m(\text{H}_2) = 0,266 (г)$$

$$m(\text{O}_2) = 4,26 (г)$$

$$m(\text{р-ра})_{\text{конец}} = 1250,6 - m(\text{Cu}) - m(\text{O}_2) - m(\text{Co}) - m(\text{H}_2) - m(\text{O}_2) = 1250,6 - 25,6 - 6,4 - 7,854 -$$

$$- 0,266 - 4,26 = 1206,22 (г)$$

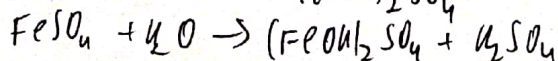
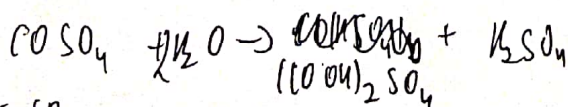
$$m(\text{CoSO}_4)_{\text{общ}} = (0,4 - 0,133) \cdot 155 = 41,33 (г) \quad m(\text{H}_2\text{SO}_4) = 0,4 \cdot 98 + 0,133 \cdot 98 = 52,27 (г)$$

$$w(\text{CoSO}_4) = \frac{41,33}{1206,22} = 0,034 \text{ или } 3,4 \% \quad w(\text{H}_2\text{SO}_4) = \frac{52,27}{1206,22} = 0,043 \text{ или } 4,3 \%$$

$$w(\text{FeSO}_4) = \frac{60,8}{1206,22} = 0,05 \text{ или } 5 \%$$

$$\{20 (г) \quad m(\text{CoSO}_4) = 20 \cdot 0,034 = 0,68 (г) \quad m(\text{H}_2\text{SO}_4) = 0,87 (г) = 9043 \cdot 20$$

$$m(\text{FeSO}_4) = 20 \cdot 0,05 = 1 (г)$$



pH < 7

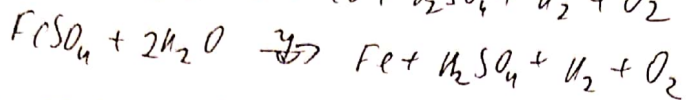
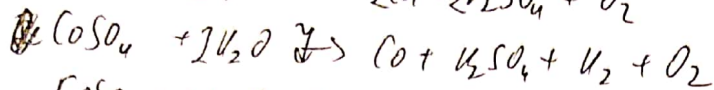
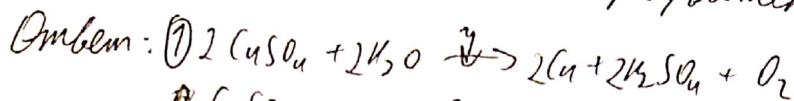
pH < 7

(3)

мисловий

мисловий

чистовик № 6 продовження



В першу чергу буде протікати електрика CuSO_4 , так як вона стоїть правіше Co і Fe в ряді активності металів і їй легше всего прийняти електрони, далі буде протікати електрика CoSO_4 , так як Co стоїть правіше Fe , а в останню чергу протікати електрика FeSO_4 .

② В залишковому розчині містяться H_2SO_4 ; FeSO_4 ; CoSO_4 .

$$\omega(\text{H}_2\text{SO}_4) = 4,3\% \quad \omega(\text{FeSO}_4) = 5\% \quad \omega(\text{CoSO}_4) = 3,4\%$$

③ Якщо збільшити час на $523,69$ (хв), то в розчині залишиться тільки H_2SO_4 .

$$t = 428,9 + 94,8 = 523,69 \text{ (хв)}$$

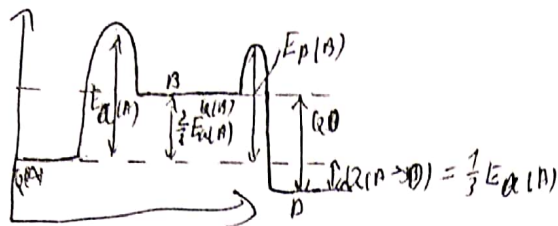
④ $\text{pH} < 7$

②

Чеснов

~ 5

$E_a(A)$ — энергия активации процесса $A \rightarrow B$



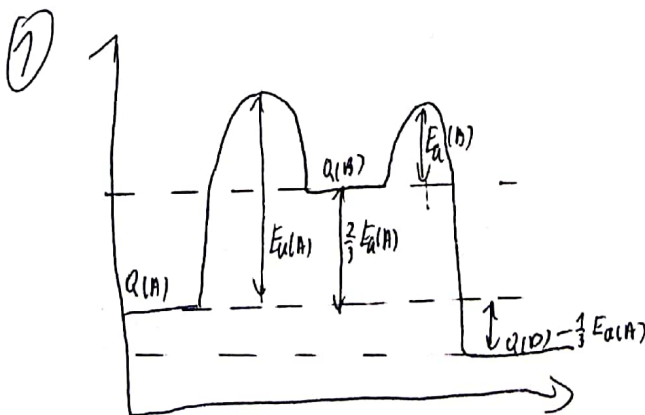
В результате реакции $A \rightarrow B$ поглощается тепла $Q = \frac{2}{3} E_a(A)$, но
в результате процесса $B \rightarrow A$ выделяется $Q = 1,5 \cdot \frac{2}{3} E_a(A) = E_a(A)$

Среднюю энергию можно рассчитать как $Q = 0 + \frac{2}{3} E_a(A) - E_a(A) = -\frac{1}{3} E_a(A)$,
но есть она ~~увеличивается~~ на $-\frac{1}{3} E_a(A)$, но есть процесс экзотермический.
 $E_a(A \rightarrow B) = 3 E_a(B \rightarrow A)$, т.к. тепло
поглощается по условию на $\frac{2}{3} E_a$.

$$\frac{E_{a(A)}}{E_{a(B)}} = \frac{E_a}{\frac{1}{3} E_a} = 3 \Rightarrow \frac{E_{a(A \rightarrow B)}}{E_{a(B \rightarrow A)}} = 3$$

$$\frac{k_1}{k_2} = \frac{A \cdot e^{-\frac{E_a}{RT}}}{A \cdot e^{-\frac{\frac{1}{3} E_a}{RT}}} = e^{\frac{\frac{1}{3} E_a}{RT} - \frac{E_a}{RT}} = e^{-\frac{\frac{2}{3} E_a}{RT}} = e^{-\frac{2 E_a}{3 RT}}$$

Ответ:



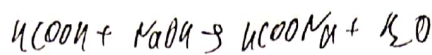
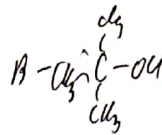
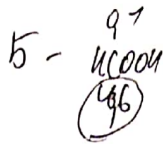
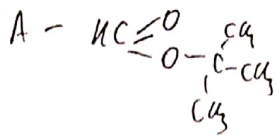
②

тепловой эффект будет экзотермическим, так как энергия уменьшается

③

$$\frac{E_{a(A \rightarrow B)}}{E_{a(B \rightarrow A)}} = 3 \quad \frac{k_1}{k_2} = e^{-\frac{2 E_a}{3 RT}}$$

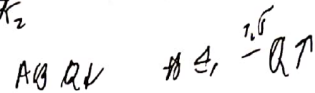
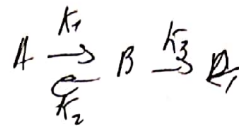
⑤



$$\alpha(\text{KOH}) = 0,05 \cdot 2 \frac{\text{моль}}{\text{л}} = 0,1 \text{ моль/л}$$

$$R = A \cdot e^{-\frac{E_a}{RT}}$$

~5

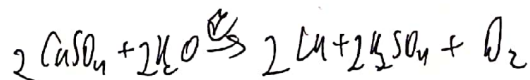
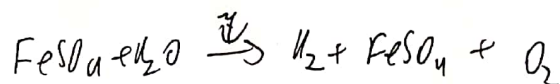
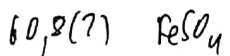


$$Q_{\text{упр}} = \frac{2}{3} E_{\text{умм}}$$



~6

$$m = \frac{M \cdot t}{n \cdot F} \quad 96500$$



$$\alpha(\text{Cu}) = \frac{64}{160} = 0,4 (\text{моль}) \quad m(\text{Cu}) = 25,6(2)$$

$$25,6 = \frac{64 \cdot 3 \cdot t}{2 \cdot 96500}$$

$$t = \frac{2 \cdot 96500 \cdot 25,6}{64 \cdot 3} = 25733,33 (\text{C})$$

$$I(\text{C}) = 38580$$

$$t_{\text{сум}} = 12846,66 (\text{C})$$

$$m(\text{CO}) = \frac{62}{115} = 0,4 (\text{моль}) \Rightarrow m(\text{CO}) = 23,6(2)$$

$$m(\text{CO}) = \frac{59 \cdot 2 \cdot 12846,66 \cdot \frac{2}{3}}{2 \cdot 96500}$$

$$m(\text{CO}) = \frac{59 \cdot 12846,66 \cdot 2}{2 \cdot 96500} = 4,854(2)$$

~7

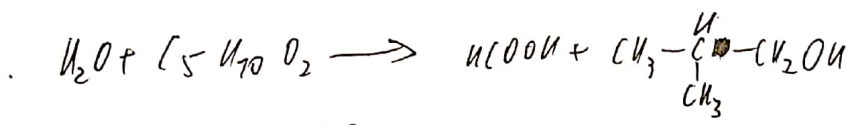
$$v(CO_2) = \frac{11,2(л)}{22,4 \left(\frac{л}{моль}\right)} = 0,5(моль) \quad v(H_2O) = \frac{9(г) \cdot 1 \left(\frac{г}{моль}\right)}{18 \cdot 2} = 0,5(моль)$$

$$v(C) = 0,5(моль) \quad v(H) : v(H_2O) = 2 : 1 \Rightarrow v(H) = 1(моль)$$

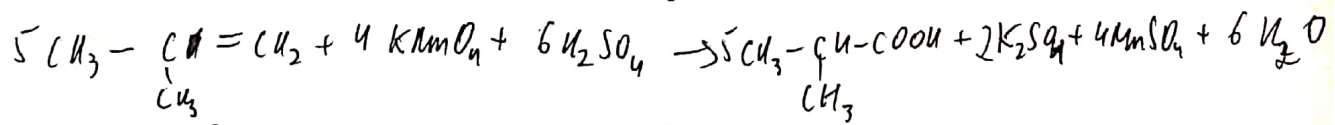
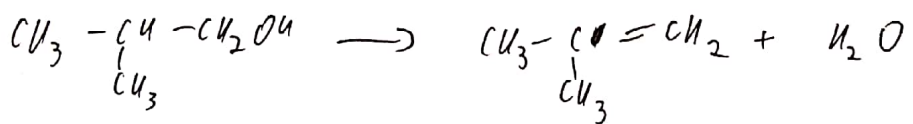
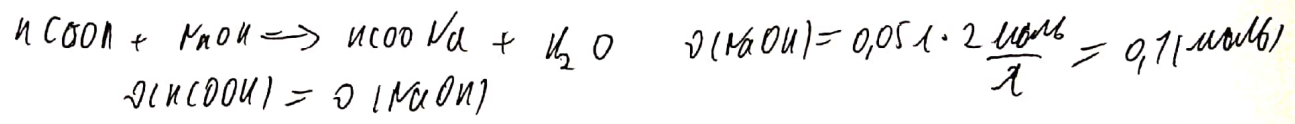
$$v(C) : v(H) = 1 : 2 \Rightarrow C_n H_{2n}$$

$$m(C) + m(H) = 0,5 \cdot 12 + 1 \cdot 1 = 7(г), \text{ но } m(A) = 10,2(г) \Rightarrow m(O) = 3,2(г)$$

$$v(O) = \frac{3,2}{16} = 0,2(моль) \quad v(C) : v(H) : v(O) = 5 : 10 : 2 \Rightarrow C_5 H_{10} O_2$$



$$v(C_5 H_{10} O_2) = \frac{10,2}{102} = 0,1(моль) \quad v(HCOOH) = 0,1(моль) \quad m(HCOOH) = 4,6(г)$$



$$w(O) = \frac{32}{88} = 0,3636 \text{ или } 36,36\%$$

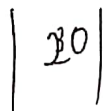
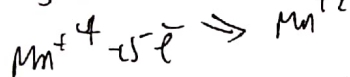
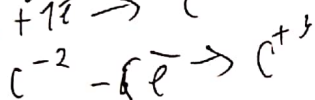
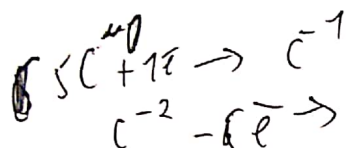
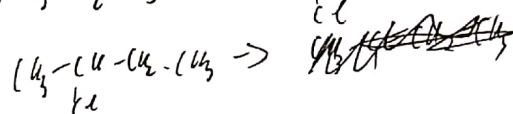
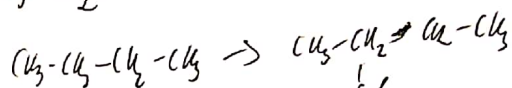
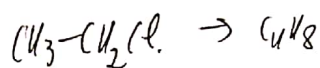
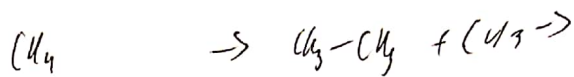
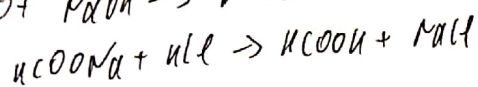
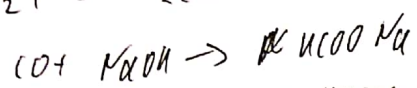
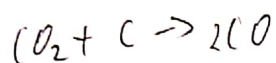
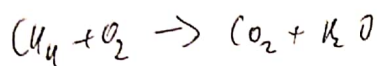
Ответ: А - $HC \equiv O - CH_2 - CH - CH_3$
изобутиропропионат

Б - $HCOOH$
муравьиная кислота

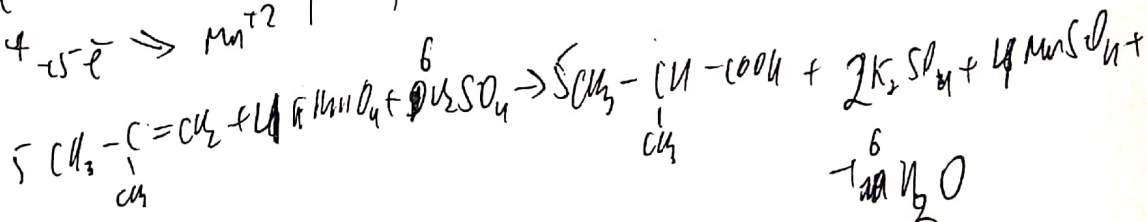
В - $CH_3 - \underset{CH_3}{CH} - CH_2OH$
2-метилпропанол-1

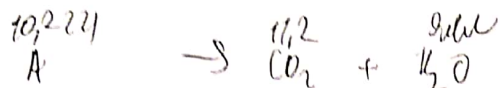
Г - $CH_3 - \underset{CH_3}{CH} = CH_2$
2-метилпропен

Д - $CH_3 - \underset{CH_3}{CH} - COOH$
2-метилпропановая кислота



4

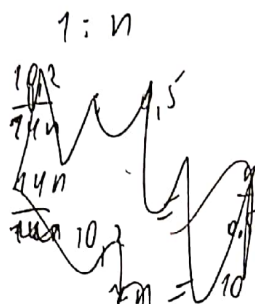
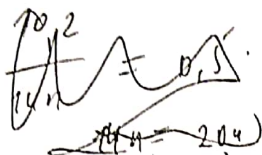
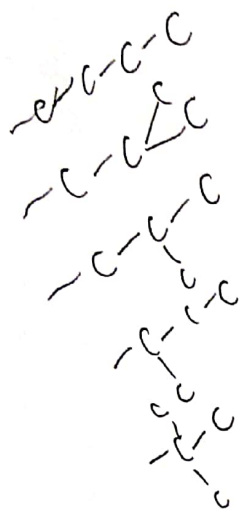




$$d(CO)_2 = \frac{11,2}{22,4} = 0,5 (\text{моль}) \quad d(H_2O) = \frac{9}{18} = 0,5 (\text{моль})$$

$$d(CO) : d(H_2O) = 1 : 2 \Rightarrow C_n H_{2n}$$

10,22

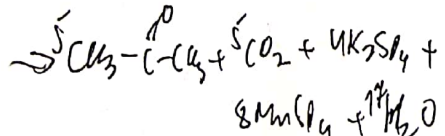
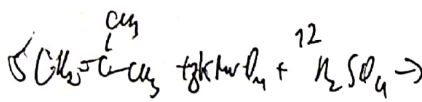
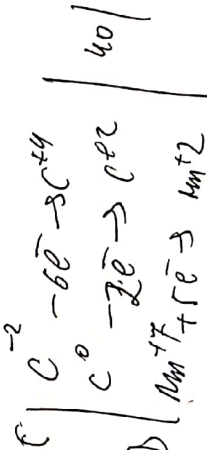
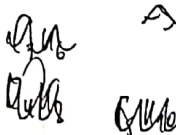


$$\frac{10,2}{14n} = 0,5n$$

$$10,2 = 7n$$

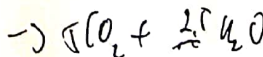
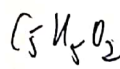
$$n = 1,45$$

$$n = 1,2$$

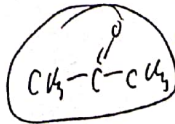
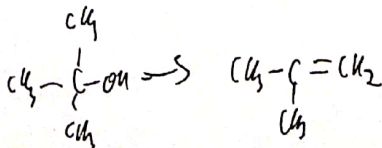
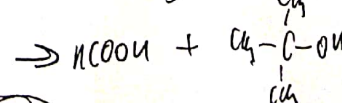
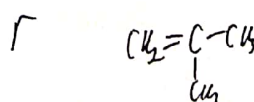
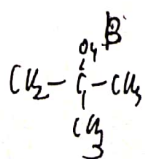
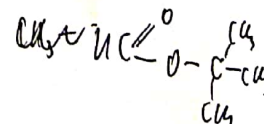
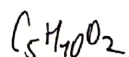


$$M(1) = 0,5 \cdot 12 + 0,5 \cdot 2 = 7(1)$$

$$0,2 \quad 0,2$$



$$60 + 10 + 32$$



$$\frac{16}{58} = 27,5\%$$

