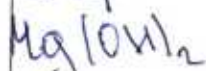


Есеп 1

Бер:



$T(Mg(OH)_2) = 298 K$

$r = 3,4 \cdot 10^{-5} \text{ моль л}^{-1} \text{ с}^{-1}$

1) $\gamma = 2,4$

$T(Mg(OH)_2) = 320 K$

$T(K): \gamma(Mg(OH)_2) - ?$

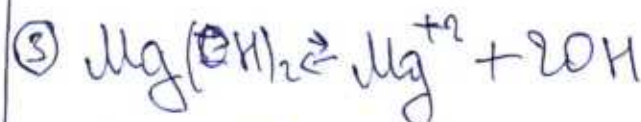
3) $K_{sp} = [Mg^{2+}] \cdot [OH^-]^2$

$K_{sp} = 5,61 \cdot 10^{-12}$

ерігіштік - ?

5) $T = 298 K$

Шешуі:



$5,61 \cdot 10^{-12} = [Mg^{2+}] \cdot [OH^-]^2$

4) Тұнба ерігіштігіне $MgCl_2$ ерітіндісік қосса - көбейеді.

5) $\Delta G^\circ = -RT \ln K$

Есеп 2

Бер:

1) $w(C) = 57,85\%$

$w(H) = 3,62\%$

$w(O) = 38,55\%$

$m(A) = 24,92$

$m(NaOH) = 80$

$w(NaOH) = 15\%$

Шешуі

$m(NaOH) = \frac{80 \cdot 15}{100} = 12$

Есеп 3

Бер:

$$D_{\text{н}}(\text{Ar мен O}_2) = 17,33$$

$$\rho = 19,47 \text{ арто}$$

$$\text{Т/к: } \omega(\text{O}_2) = ?$$

Шешуі:

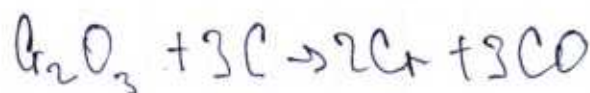
$$D = \frac{M_1}{M_2}$$

Есеп 4

Бер:

$$T = 1000 \text{ К}$$

$$G = ?$$



Есеп 5.

2.1 Көк ертіңді — $\text{Cu}(\text{OH})_2$
натрий силикаты — Na_2SiO_3
сфералит
жатынсаз қоспа

2.2. Бер:

$$m(\text{сфералит}) = 1,2125 \text{ т}$$

$$\omega(\text{сфералит}) = 10\%$$

$$m(\text{Cu}(\text{OH})_2) = 1 \text{ т}$$

$$\omega(\text{Cu}(\text{OH})_2) = 20\%$$

Шешуі:

$$m_{\text{сфералит}} = \frac{1,2125 \cdot 10}{100} = 0,12125 \text{ т}$$

$$m(\text{Cu}(\text{OH})_2) = \frac{1 \cdot 20}{100} = 0,2 \text{ т}$$

Есеп 6.

$$m(\text{MgCl}_2, \text{CaCl}_2, \text{BaCl}_2) = 4,3372$$

$$V(\text{H}_2\text{O}) = 64,00 \text{ мл}$$

$$V(\text{Na}_2\text{SO}_4) = 36,00 \text{ мл}$$

$$\omega(\text{Na}_2\text{SO}_4) = 12,63\%$$

$$m(\text{г} \text{Na}_2\text{SO}_4) = 3,6582$$

$$V(\text{Na}_2\text{CO}_3) = 100 \text{ мл}$$

$$\omega(\text{Na}_2\text{CO}_3) = 25\%$$

$$m(\text{г} \text{Na}_2\text{CO}_3) = 4,4882$$

$$T/K: \omega_1(\text{MgCl}_2) = ?$$

$$\omega_1(\text{CaCl}_2) = ?$$

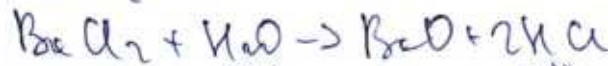
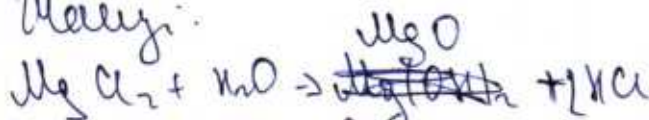
$$\omega_1(\text{BaCl}_2) = ?$$

$$C_1(\text{MgCl}_2) = ?$$

$$C_1(\text{CaCl}_2) = ?$$

$$C_1(\text{BaCl}_2) = ?$$

Малы:



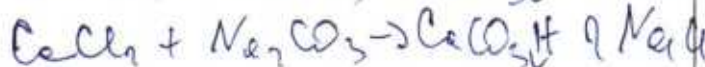
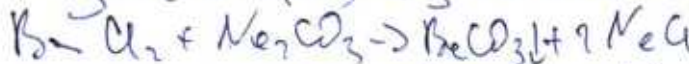
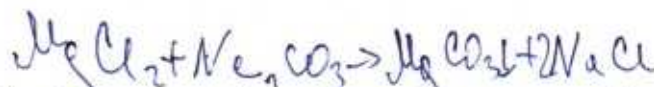
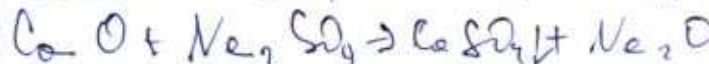
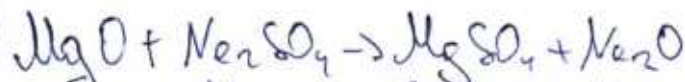
$$n(\text{Na}_2\text{SO}_4) = \frac{0,036}{17,41/\text{моль}} = 0,001 \text{ моль}$$

$$m(\text{Na}_2\text{SO}_4) = \frac{36,00 \text{ мл} \cdot 12,63\%}{100\%} = 4,5468$$

$$m(\text{Na}_2\text{SO}_4) = 0,001 \text{ моль} \cdot 144 = 0,144$$

$$M_r(\text{Na}_2\text{SO}_4) = 24 \cdot 2 + 32 + 16 \cdot 4 = 144$$

$$M(\text{Na}_2\text{SO}_4) = \frac{0,144 \cdot 12,63\%}{100\%} = 0,018$$



$$n(\text{Na}_2\text{CO}_3) = \frac{0,12}{29,41/\text{моль}} = 2,24 \text{ моль}$$

$$M_r(\text{Na}_2\text{CO}_3) = 24 \cdot 2 + 12 + 16 \cdot 3 = 106$$

$$m(\text{Na}_2\text{CO}_3) = 2,24 \text{ моль} \cdot 106/\text{моль} = 241,822$$

$$m(\text{Na}_2\text{CO}_3) = \frac{241,822 \cdot 25\%}{100\%} = 60,452$$

Тунбақы еруі:

Есеп: 1

$$1. \frac{\Gamma_2}{\Gamma_1} = \gamma^{\frac{T_2 - T_1}{T_0}}$$

$$\Gamma_1 = 3,4 \cdot 10^{-5}$$

$$T_1 = 298 \text{ K}$$

$$T_2 = 320 \text{ K}$$

$$\gamma = 2,4$$

$$\Gamma_2 = \Gamma_1 \cdot \gamma^{\frac{T_2 - T_1}{T_0}} = 3,4 \cdot 10^{-5} \cdot 2,4^{\frac{22}{10}} = 2,5 \cdot 10^{-5}$$

$$2. \frac{\Gamma_2}{\Gamma_1} = \frac{-\epsilon_a}{RT} \left(\frac{1}{T_2} - \frac{1}{T_1} \right)$$

$$\epsilon_a = 69,4 \text{ Дж.}$$

$$3. K = 5,61 \cdot 10^{-12}$$



$$[\text{Mg}^{2+}][\text{OH}^-]^2 = 45^3 5 = \sqrt[3]{\frac{K_p}{4}} = 1$$

4. $[\text{Mg}]$ шын көбейіп, тепе - теңдік солға $\leftarrow$ жылғады, өрісін -
тік азаяды

$$\Delta G = -RT \ln K = -8,314 \cdot 298 \cdot \ln 5,61$$

Есеп: 2 (орн. бақылау)

1 - А - диэтилен C_2H_4

2 - А - малон қышқылы $(\text{HOOC}-\text{CH}_2-\text{COOH})$

3 - белзоя сағ жүздерінде $\rightarrow$ су қызыл қышқылы (H_2SO_4) , күрт қышқы. түзіледі.

Есеп 3 (Газдар)

$$M_1 = 17,33 \cdot 2 = 34,66$$

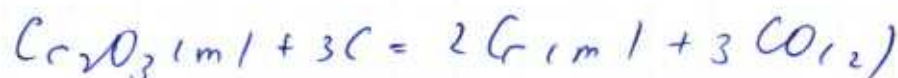
$$M_2 = 19,47 \cdot 2 = 38,94$$

баст. қоспа: $Ar(40) + O_2(32)$

$$W(O_2) = \frac{M_{Ar}(M_2 \cdot M_{O_2})}{M_2 (M_{Ar} \cdot M_{O_2})} = 0,44$$

$$0,44 \cdot 100\% = 44\%$$

Есеп 4



	Cr_2O_3	C	Cr	CO
ΔH_f	-11,41	0	0	-110,6
ΔS	81,2	5,7	136	192,7

$$\Delta H = \sum \Delta H_f(\text{өнім}) - \sum \Delta H_f(\text{реакт})$$

$$\Delta H = 2 \cdot 0 + 3 \cdot (-110,6) - [-1141] + 3 \cdot 0$$

$$\Delta H = [-331,8] - [-1141] = 809,2$$

$$-331,8 + 1141 = 809,2$$

$$\Delta S = [\sum S_{\text{өнім}} - \sum S_{\text{реакт}}]$$

$$\Delta S = [2 \cdot 136 + 3 \cdot 192,7] - [81,2 + 3 \cdot 5,7]$$

$$\Delta S = [47,2 + 593,1] - [81,2 + 12,1]$$

$$\Delta S = 542 \text{ Дж/К}$$

$$3) \Delta G = \Delta H - T\Delta S$$

$$\Delta H = 809,2 \text{ кДж} = 809200$$

$$\Delta G = 809200 - 1000 \cdot 542 = 809200 - 542000 =$$

$$\underline{267200}$$

5-есеп :



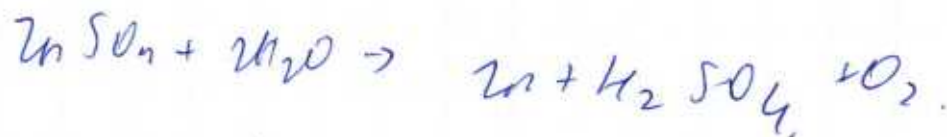
көк ерітінді → $CuSO_4$

активатор - Cu

патолизатор қоспа - Fe .

глюк - Na_2SiO_3

ром : $C_5H_5KOS_2$



$$2.1 \quad m(Zn) = 21,25 \text{ г}$$

$$2.2. \quad Me(m) = \underline{44,69} \text{ г} \quad Me \text{ оқиды}$$

6-сезім Түсінік

$$x + y + z = 4,937$$

$$m(\text{CaSO}_4) = \frac{y}{111} \cdot 136 = 1,225y$$

$$m(\text{BaSO}_4) = \frac{z}{208} \cdot 233 = 1,12z$$

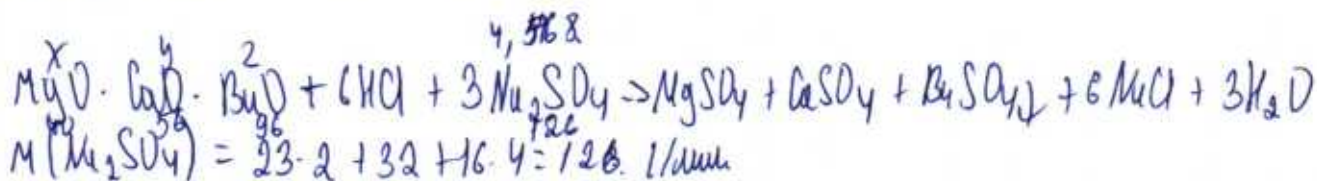
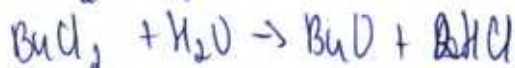
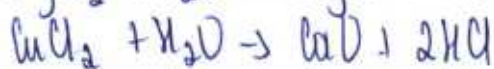
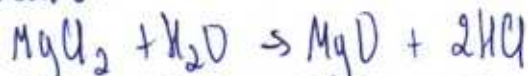
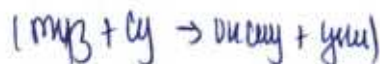
$$1,225y + 1,12z = 3,652$$

$$0,884x + 0,901y + 0,947z = 4,688$$

$$\underline{x = 1,92} \quad y = 1,11 \quad z = 1,917$$

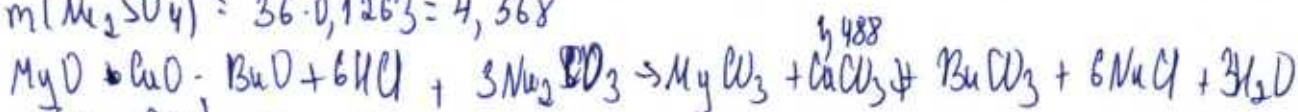
$$9,7\% \quad 8,1\% \quad 25,2\%$$

Есеп 6:



$$M(\text{MgSO}_4) = 24 + 32 + 16 \cdot 4 = 120 \text{ г/моль}$$

$$m(\text{MgSO}_4) = 36 \cdot 0,1263 = 4,568$$



$$m(\text{MgCO}_3) = 100 \cdot 0,25 = 25$$

$$M(\text{MgCO}_3) = 24 + 12 + 16 \cdot 3 = 84 \text{ г/моль}$$

$$x = \frac{40 \cdot 4,568}{120} = 1,522$$

$$y = \frac{56 \cdot 4,568}{120} = 2,082$$

$$z = \frac{96 \cdot 4,568}{120} = 3,652$$

$$M(\text{HCl}) = 36,5 \text{ г/моль}$$

$$m(\text{MgO} \cdot \text{CaO} \cdot \text{BaO} + 6\text{HCl}) = 40 + 56 + 137 + 219 = 452 \text{ г/моль}$$

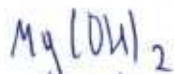
$$w(\text{Mg}) = \frac{1,522}{452} \cdot 100\% = 0,337\% = 33,7\%$$

$$w(\text{Ca}) = \frac{2,082}{452} \cdot 100\% = 0,461\% = 46,1\%$$

$$w(\text{Ba}) = \frac{3,652}{452} \cdot 100\% = 0,808\% = 80,8\%$$

әсеп:

$$\frac{\Gamma_2}{\Gamma_1} = \gamma \frac{\Gamma_2 - \Gamma_1}{10}$$



$$29 \text{ нн} = 3,4 \cdot 10^{-5} \text{ мм}^{-1}$$

$$1) \gamma = 3,4$$

$$\nu = 320 \text{ н}$$

$$n = L \cdot C \frac{E_n}{\Delta T}$$

$$M(\text{Mg(OH)}_2) = 24 + 2(16 + 1) = 58 \text{ г/мм}$$

$$k = 1000 \cdot 58 \frac{320}{24}$$

$$n = 58000 \frac{320}{24} = 58000^{1333} = 4,35$$

$$2) \frac{\Gamma_2}{\Gamma_1} = \frac{24}{4,35}$$



$$K_{sp} [\text{Mg}^{+2}] \times [\text{OH}]^{-2}$$

$$5,61 \cdot 10^{-12} = 3,4 \cdot 10^{-5} \cdot 68 \cdot 10^{-10}$$

$$5,61 \cdot 10^{-12} = 23,12 \cdot 10^{-15}$$

$$5,61 \cdot 10^{-12} \cdot 23,12 \cdot 10^{-15} = 12,97 \cdot 10^{-27}$$

4) шығу

$$5) \Delta G^\circ = -RT \ln k$$

$$\Delta G^\circ = \frac{-24 \cdot 298 \cdot 320 \cdot 12,97 \cdot 10^{-27}}{320 \cdot 12,97 \cdot 10^{-27}} = \frac{4132}{5603 \cdot 10^3} = 0,74 \cdot 10^{-3}$$

Есеп 2:

C - 57,83%

H - 3,62%

O - 38,55%

Безмассалық санын тап

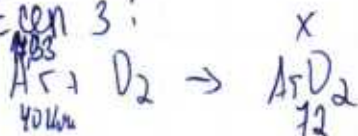
$$m(C) = \frac{100\%}{57,83\%} = 1,72$$

$$m(H) = \frac{100\%}{3,62\%} = 27,62$$

$$m(O) = \frac{100\%}{38,55\%} = 2,592$$

$$m_{\text{жам}} = 1,7 + 27,6 + 2,59 = 31,89 \approx 32$$

Есеп 3:



$$x = \frac{40 \cdot 72}{72,33} = 166,182$$

$$M(\text{As} D_2) = 40 + 16 \cdot 2 = 72$$

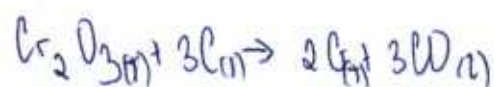
$$\omega(\text{As} D_2) = \frac{16,7}{72} \cdot 100\% = 16,25\%$$

$$166,18 - 100\%$$

$$19,47 - 4\%$$

$$y = 11,7\%$$

Есеп 4:



$$Cr_2O_3: \Delta H_{298} = -1141$$

$$\Delta S_{298} = 81,2$$

$$C: \Delta H_{298} = 0$$

$$\Delta S_{298} = 5,7$$

$$CO: \Delta H_{298} = 0$$

$$\Delta S_{298} = 23,6$$

$$CO_2: \Delta H_{298} = -110,6$$

$$\Delta S_{298} = 194,4$$

$$\Delta H = \frac{-1141}{81,2} = -14,05 \quad \Delta S = \frac{-14,05}{81,2} = -0,17$$

$$\Delta H = \frac{0}{5,7} = 0 \quad \Delta S = \frac{0}{5,7} = 0$$

$$\Delta H = \frac{0}{23,6} = 0 \quad \Delta S = \frac{0}{23,6} = 0$$

$$\Delta H = \frac{-110,6}{194,4} = -0,5 \quad \Delta S = \frac{-0,5}{194,4} = -0,002$$

Есеп 5:

Есеп 1

$$\frac{\nu_2}{\nu_1} = 4 \frac{T_2 - T_1}{10}$$

$$\frac{\nu_2}{3,4 \cdot 10^{-5} \text{ мкм} \cdot \text{н}^\circ \text{с}^{-1}} = 2,4 \frac{320 - 293}{10}$$

$$\frac{\nu_2}{3,4 \cdot 10^{-5}} = 2,4^{2,2}$$

$$\frac{\nu_2}{3,4 \cdot 10^{-5}} = 6,8$$

$$\nu_2 = 23,3 \cdot 10^{-5} \text{ мкм} \cdot \text{н}^\circ \text{с}^{-1}$$

$$\frac{\nu_1}{\nu_2} = 4 \frac{T_2 - T_1}{10}$$

$$\frac{3,4 \cdot 10^{-5}}{\nu_2} = 2,4 \frac{320 - 293}{10}$$

$$\frac{3,4 \cdot 10^{-5}}{\nu_2} = 2,4^{2,2}$$

$$\frac{3,4 \cdot 10^{-5}}{\nu_2} = 6,8$$

$$\nu_2 = \frac{6,8}{3,4 \cdot 10^{-5}} = \frac{3,4 \cdot 10^{-5}}{6,8}$$

$$\nu_2 = 0,5 \cdot 10^{-5} \text{ мкм} \cdot \text{н}^\circ \text{с}^{-1}$$

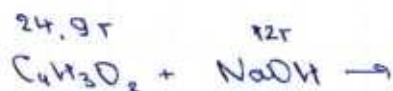
4. түрба қышқилігі ауада.

Есеп-2.

$$\frac{57,83}{12} : \frac{3,62}{1} : \frac{33,55}{16} = 4,8 : 3,62 : 2,4 = 2 : 1,5 : 1 = 4 : 3 : 2$$

молекулярлығ ф. - $\text{C}_4\text{H}_3\text{O}_2$.

2. А қосылыстың құрамында ОН гидроксил тобы бар, неке бағуон сәуірлесе бар.



$$m(\text{NaOH}) = 80 \text{ г} \cdot 0,15 = 12 \text{ г}.$$

4. пероксидең, гидроксидең
 $\downarrow$ $\downarrow$
 1,2 дигидроксидең, 1,3 дигидроксидең.

Есеп-3.

$$D = \frac{M(X)}{M(H_2)}$$

$$M(X) = 17,33 \cdot 2 = 34,66 \text{ шмоль.} \quad \begin{cases} Ar \\ O_2 \end{cases}$$

$$D = \frac{M(Y)}{M(H_2)}$$

$$M(Y) = 19,47 \cdot 2 = 38,94 \text{ шмоль.}$$

$$\omega(O_2) = \frac{m(O_2)}{m(H_2O_{cond})} \cdot 100\%$$

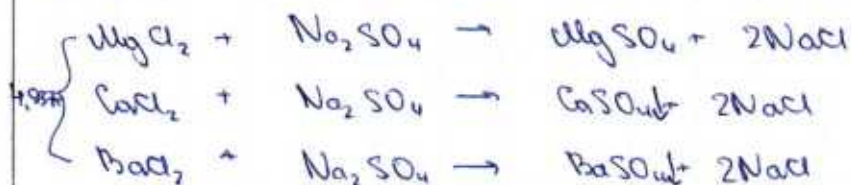
Есеп-5.

$$m(\text{сәтәуір}) = 1,2725 \text{ м} - 100\% \\ x - 10\%$$

$$x = \frac{1,2725 \cdot 10\%}{100\%} = 0,12725 \text{ м} = 127,25 \text{ см.}$$

$$m(\text{көк қымыз}) = 1 \cdot 0,2 = 0,2 \text{ м} \cdot 1000 = 200 \text{ см.}$$

Есеп-6.



$$m(Na_2SO_4) = 36 \cdot \frac{12,63\%}{100\%} = 4,54 \text{ г.}$$



$$m(Na_2CO_3) = 100 \cdot 0,25 = 25 \text{ г.}$$

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

Есеп-4

$$\Delta G = -RT \ln K$$

Есеп 1. $\frac{r_2}{r_1} = \gamma \frac{T_2 - T_1}{10}$

Берілгені:



$T_1 = 298 K$

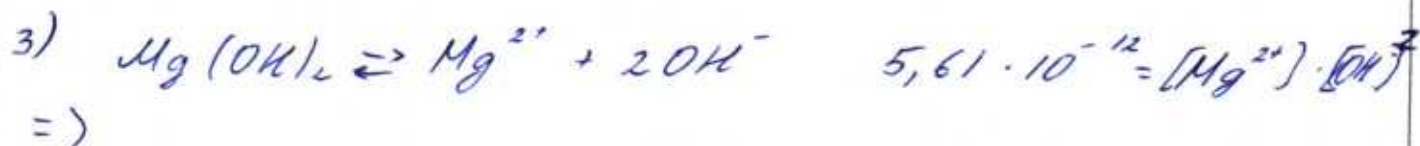
$\gamma = 3,4 \cdot 10^{-5} \text{ моль}^{-1}$

1) $\gamma = 2,4$ болса $\Rightarrow$

$T_2 = 320 K$ да,

т.к. $\gamma = ?$ кешіге тең

2/



5) $\Delta G = -RT \ln K$ $298 K - 397 = -99$
 $\Delta G = -(-99) = 99$
 $\Delta G = -298$

Есеп 2.

Берілгені
Азота:
 $w(C) = 57,83\%$
 $w(H) = 3,62\%$
 $w(O) = 38,55\%$

құрамында бензол
сақинасы бар!

$m(A) = 24,92$
 $+ m(NaOH) = 802$
 $w(NaOH) = 15\%$

$A + H_2SO_4 (конц) \rightarrow$ екі сақиналы В заты

Шешуі

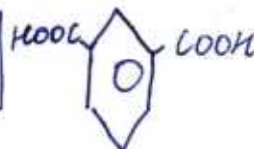
$$C_xH_yO_z = \frac{57,83}{12} : \frac{3,62}{1} : \frac{38,55}{16} =$$

$$= 4,81 : 3,62 : 2,40 = \frac{4,81}{2,40} : \frac{3,62}{2,40} : \frac{2,40}{2,40} =$$

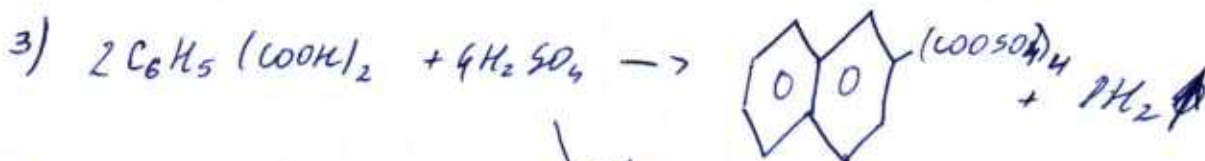
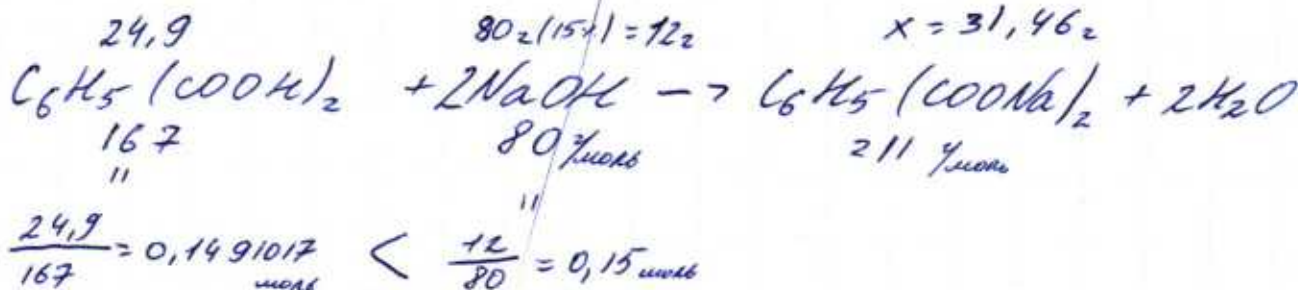
$$= 2 : 1,5 : 1 \quad (\text{бір бензол сақинасы бар!})$$

$$\times \quad \quad \quad 4$$

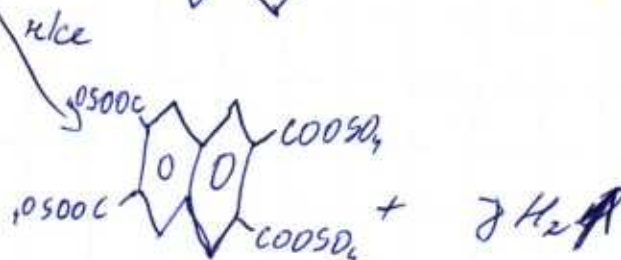
$$8 : 6 : 4$$



2) бар функ. топ $C(=O)OH$ (карбоксил топ), ароматта бай, қыш. қасиет көрсетеді!



4) нафталиндегі күштірек қышқанд.



Есеп 3. Берілгені:

$$D_{H_2}(X_1) = 17,33$$

$$X_1 = 34,66\%$$

$$m(Ar + O_2) = 34,66$$

$$D_{H_2}(X_2) = 19,47$$

$$X_2 = 38,94$$

$$T/K : w(O_2) = ?$$

$$38,94 = 40\%_{\text{масс}}(Ar) + 32\%_{\text{масс}}(O_2) \Rightarrow$$

$$\Rightarrow \frac{\text{общая}}{38,94} = 0,54 \Rightarrow$$

$$\Rightarrow 0,54 \cdot 32 = 17,32$$

$$0,54 \cdot 40 = 21,642$$

$$w(O_2) = \frac{17,3}{38,94} \cdot 100\% = 44,42732\% \approx 44,43\%$$

Есеп 4

Берілгені:

$$1000 K = 603^\circ C$$

Түбс жүйе: ?



$$\Delta G = -RT \ln K$$

Бұл зат тек газ түреді, яғни, $CO \Rightarrow$

$$\Rightarrow \Delta G = -RT \ln K \Rightarrow \Delta G = -R \cdot 603 \cdot (-110,6) = 66691,8$$

$$\Rightarrow \Delta G = -R \cdot 1000 \cdot 308,3 = -308300$$

Есеп 5

2.1

1 реакция - $2H_2(Ar + O_2)$

2 реакция - $CB + Na_2SiO_3$

3 реакция - C_4H_9K

4 реакция - $K_2O + H_2SO_4 \rightarrow H_2O + K_2SO_4$

5 реакция - $K_2SO_4 \xrightarrow{2H_2O} 2K^+ + SO_4^{2-}$

катод (+): K^+

Есеп 6

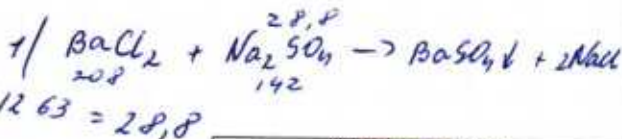
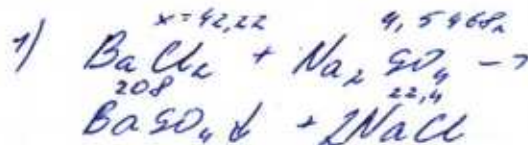
Берілгені:

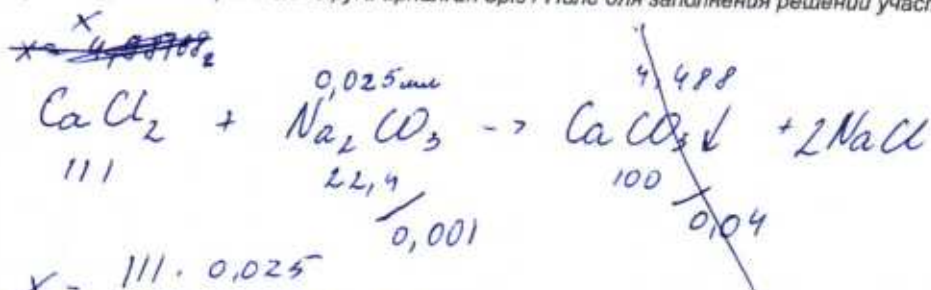
$$m_1(Mg, CaCl_2, BaCl_2) = 4,9322$$

$$+ V(H_2O) = 64 \text{ мл}$$

$$+ V(Na_2SO_4) = 36 \text{ мл} (12,63\%)$$

$$m_2(\text{тұнба}) = 3,6582$$

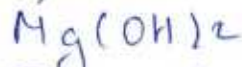




$$x = \frac{111 \cdot 0,025}{22,4} = 0,1112$$

$$1) \quad \frac{P_2}{P_1} = \delta^{\frac{T_2 - T_1}{10}}$$

Берілгені



$$T = 298 \text{ K}$$

$$V = 3,4 \cdot 10^{-5}$$

$$\delta = ?$$

Ш е ш і м

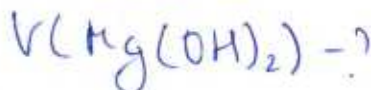
$$3,4 \cdot 10^{-5} = \delta^{\frac{298}{10}}$$

$$3,4 \cdot 10^{-5} = \delta^{29,8}$$

$$\delta =$$

$$\underline{2} \quad \delta = 2,4$$

$$T = 320 \text{ K}$$



$$V = 2,4 \cdot \frac{320}{10}$$

$$\underline{3} \quad E(\text{Mg(OH)}_2) = ?$$

$$\underline{4} \quad K_{sp} = 5,61 \cdot 10^{-12}$$



$$K_{sp} = [\text{Mg}^{2+}] \cdot [\text{OH}^-]^2$$

5 *Өзгеріссіз бамада.*

$$\underline{2} \quad T = 298 \text{ K}$$

$$\Delta G^\circ = -RT \ln K$$

2) Берілгені



$$\omega(\text{C}) = 57,83\%$$

$$\omega(\text{H}) = 3,62\%$$

$$\omega(\text{O}) = 38,55\%$$

Ш е ш і м

$$\underline{1} \quad \frac{57,83\%}{12} : \frac{3,62}{1} : \frac{38,55}{16} =$$

$$= 4,8 : 3,62 : 2,4 =$$

$$= \frac{4,68}{2,4} : \frac{3,62}{2,4} : \frac{2,4}{2,4} = 2 : 1,5 : 1 = (C_2H_2O)_?$$



2 Карбоксил.

3
4

3) Бәрімені есепте (A₁+D₂) Шешуі

$$\frac{P_{(A_1+D_2)}}{P_{H_2}} = \frac{17,33}{2} = 8,665.$$

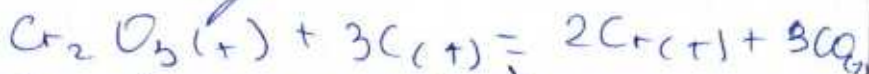
$$8,665 + 19,47 = 28,135.$$

4) Бәрімені

$$T = 1000 \text{ K}.$$

$$\Delta G = ?$$

Шешуі



$$\Delta G = (3 \cdot (-110,6)) - \Delta$$

$$\Delta H = -1141.$$

$$\Delta S = 3 \cdot 197,7 = 593,1.$$

$$\Delta G = -1141 - 593,1 = -2875,1$$

5) Бәрімені

$$\omega(\text{срашария}) = 10\%.$$

$$m(\text{срашария}) = 1,2125 \text{ т}.$$

$$\omega(\text{бел. зат}) = 20\%.$$

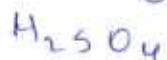
$$m(\text{белісүзет}) = 40 \text{ т}$$

2.1

2.2

6) Бөрісін

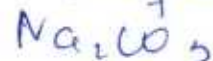
$$m(\text{MgCl}_2 + \text{CaCl}_2 + \text{BaCl}_2) = 4,9372.$$



$$\omega = 12,63\%.$$

$$V = 36 \text{ мл.}$$

$$m(\text{түндә}) = 3,6582$$



$$\omega = 25\%.$$

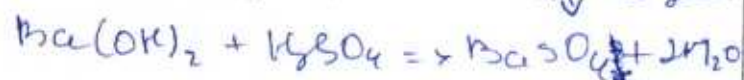
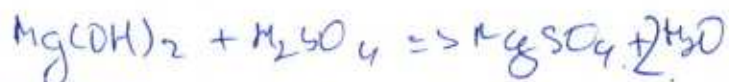
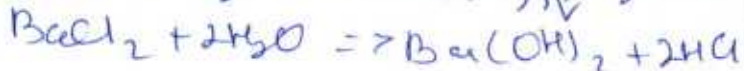
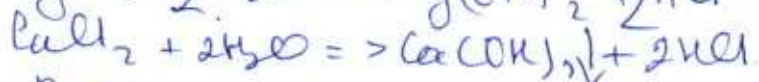
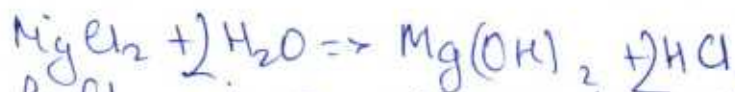
$$V = 100 \text{ мл.}$$

$$m(\text{түндә}) = 4,4882.$$

$$K_{\text{т.р.}} = 9,449 \cdot 10^{-5}.$$

$$C = 7,57 \cdot 10^{-11}.$$

$$V(\text{түндә}) = 100 \text{ мл.}$$



Есеп 1. Тұщы балық еруі

① $T_1 = 298 K$; $\gamma = 2.4$

$T_2 = 320 K$; $\Gamma_1 = 3.4 \times 10^{-5} \text{ моль д}^{-1} \text{ с}^{-1}$

$\Gamma_2 = ?$

$$\frac{\Gamma_2}{\Gamma_1} = \gamma \frac{T_2 - T_1}{10} = \frac{x}{3.4 \times 10^{-5}} = \frac{2.4 \cdot 320 - 298}{10}$$

③ $5.61 \cdot 10^{-12} \cdot (1.7 \times 10^{-5})^2 = \frac{x}{3.4 \times 10^{-5}} = 5.28$

$5.61 \cdot 10^{-12} = 1$

$x = 5.28 \cdot 3.4 \cdot 10^{-5} = 17.9 \cdot 10^{-5}$

④ Озырақ

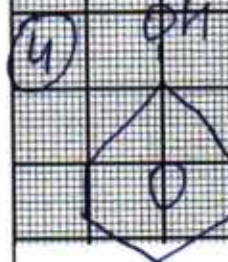
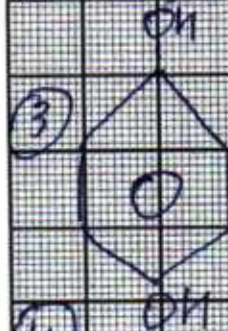
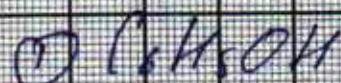
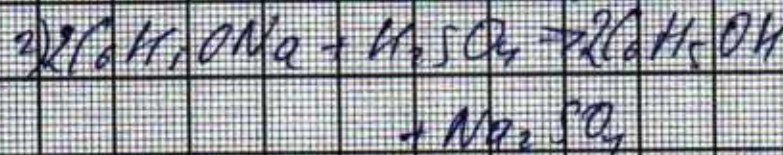
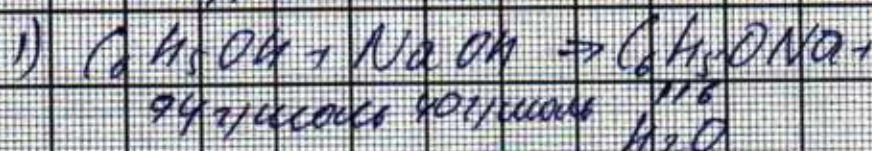
Есеп 2. Органикалық қосылыс



29.92

122

$x = 30.72$



мета А1



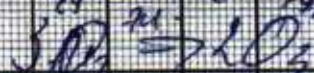
орто А1

изомер: функционал топтар орналасуы бойынша

А1 - мета

А2 - орто

Есеп 3 Таздал

 $Ar + O_2 = 17,33 \text{ г} \rightarrow$ ұнтақ бойынша $1012,79707$ 

67,2 44,8 г/моль

қапағаттан оттектің
шасысон қосын - 84,26%

$$x = 29,205$$

$$17,33 \cdot 2 = 34,66$$

$$34,66 \text{ — } 100\%$$

$$29,205 \text{ — } 84,26\%$$

Есеп 5.

сұйықтан - 12,12 тонна

активатор - с

көк сұйықты - $Si(OH)_2$ - 5 тонна

1 Есеп: тұнбалық еру

Реакцияның жылындық және температураға тәуелділігін Вант-Гоффер ережесі арқылы сызба тартыңыз. Яғни, $\frac{d \ln K}{dT} = \frac{\Delta H^\circ}{RT^2}$.
 Сізден сұралса Mg(OH)_2 - 298 К температурада еру жылындығы $\Delta H^\circ = 3,4 \cdot 10^3 \text{ Дж} \cdot \text{моль}^{-1} \cdot \text{с}^{-1}$ те.

1) $\gamma = 2,4$ болса 320 К температурада Mg(OH)_2 еру жылындығы -?

2) Mg(OH)_2 еру реакциясының стандарттық жергілікті есептеуі.
 Ой $\frac{r_2}{r_1} = \frac{K_2}{K_1}$ пропорционалдық ережесі арқылы сызба тартыңыз.

Ой үшін 1-сұрақтарға жауап дайындамаңыз.

Әрине

3) $K_{sp} = 5,61 \cdot 10^{-12}$ болатындай, тұнбалық ерігіштігін табыңыз.

4) тұнбалық ерігіштігіне MgCl_2 ерітіндісін қосыңыз.

5) реакцияларда ауыспай отырап 298 К температурада стандартты ΔG° жергілікті есептеуі. Ой шыға жергілікті ережесі арқылы сызба тартыңыз. $\Delta G^\circ = -RT \ln K$.

28 сеп. Органикалық қосынды

Берілген органикалық А заттың құрамы:

H - 3,62% O - 38,55% C - 57,83%

Әлсіз оңай ыдырайтын бұл белгілері бойынша бар. 

$m(A \text{ заты}) = 24,9$

$m(NaOH \text{ бетарып-ауымы}) = 80\% \cdot 15\% \text{ заты}$ Ол, 12г немесе 68г
Болуы үшін. Әлсіз пайдалану көрсеткішіне қарай

Немесе бұл реакциядан мағұмыр А қосындының молекулярлы H_2O немесе қыздарының қатынасында құрамында екі сақина бар В қосындысы түзіледі.

1) А қосындының молекулярлы формуласын анықтау. Егер шартында берілген қатынастарды қарай:

$$C = \frac{57,83}{12} = 4,8 \quad H = \frac{3,6}{1} = 3,6 \quad O = \frac{38,55}{16} = 2,4$$

Берілген қосындыда 1 моль немесе қосынды күйінде алынған мағұмыр оның бүтін санында бүтіндей қылып 2-ге көбейтеміз.

Немесе бұл қосынды. Немесе мағұмыр оның 2-ге көбейтеміз.

$$C = \frac{4,8}{1} = 2 \cdot 2 = 4 \quad H = \frac{3,6}{1,8} = 2 \cdot 2 = 4 \quad O = \frac{2,4}{1,2} = 2 \cdot 2 = 4$$

Қатынасында $C_4H_8O_4$ молекулярлы формуласын анықтаймыз.

2) Оңай бұл А заттың қызылдану қымы 80% 157,8% NaOH ерітіндісі.



А қосынды заттың қатынасында H_2O қыздарында, құрамында екі сақина немесе бар В қосындысы түзіледі.

А немесе В заттарында Ол әлсіз карбоксиль топтары бар.

3)  белгілері бойынша  қызылдану.

3-есеп

 $P(ArO_2)_n = 17,33$ ол жектеп разрядындағы жеріне 4шырады

 $P_2 = 19,47$
 $w(O) = ?$

Шешуі: $P_1 = 17,33$ } $2,14\%$ (за отходами)
 $P_2 = 19,47$ }

Егер $8\% ArO_2$ деп алатын болса: $\frac{P \cdot 10}{100} = \frac{12 \cdot 2,14 \cdot 10}{100} = 15,4$

ал егер ArO деп алатын болса: $\frac{36 \cdot 2,14 \cdot 10}{100} = 11,82$

Алынған газдан Отелікіз қисық тобынан болса

 $w(O) = \frac{16 \cdot 19,47 \cdot 10}{100} = 33,1$ Яғни $w(O_2) = \frac{32 \cdot 19,47 \cdot 10}{100} = 64,3$

4-есеп

Температурасы 1000K кезінде реакцияның ΔH_{298} жеріне келетіндігі

Реакция теңдеуі: $Cr_2O_3(l) + 3C(l) = 2Cr(l) + 3CO(g)$
 ΔH_{298}
 ΔH_2 -1141 0 0 -110,6

 ΔS 81,2 51,7 23,6 -194,7

Жауап: ике экстремиз температураға теңсіз

5-Есеп: Жұмбақ миталарға табу
берілген март бойынша 5 реакция жазу керек.

1 реакция:

сәулелері (АБ) $(10\% \text{ } \text{H}_2\text{O} - 12/25\text{ } \text{H}) + 1\text{ } \text{H}_2\text{O}$ көк ерітінді

2 реакция $\text{CO} + \text{Na}_2\text{O}_2$

3 реакция: калий - бұтанық сәулелер

4 реакция: $\text{XO}_2 + \text{H}_2\text{SO}_4$

5 реакция: ерітінді миталары

6-Есеп: Түздер

Есеп март бойынша:

$$m(\text{HCl} + \text{CaCl}_2 + \text{BaCl}_2) = 4,937$$

$$m(\text{Na}_2\text{SO}_4) = 36 \text{ мм}$$

$$m_2(\text{HCl} + \text{CaCl}_2 + \text{BaCl}_2) = 3,658$$

$$m_3(\text{HCl} + \text{CaCl}_2 + \text{NaCl}) = 4,888$$

Еңгі және-мекс миталары келесі
табылса

$$w(\text{HCl}) = \frac{13,476}{21} \cdot 100 = 56,15\%$$

$$w(\text{Ca}) = \frac{13,476}{40} \cdot 100 = 33,69\%$$

$$w(\text{Ba}) = \frac{13,476}{137} \cdot 100 = 9,83\%$$

Қолданылған формулалар

$$m_{\text{ерт}} = \frac{m_{\text{ерт}}}{V_{\text{ерт}}}$$

3) ерітінді миталары

$$m = \frac{V}{V_{\text{ерт}}} = \frac{54}{220} = 2,8$$

$$V = \frac{4,937}{2,8} = 1,763 \text{ л}$$

$$m_{\text{миталар}} = 4,937 + 3,658 + 4,888 = 13,476$$

$$\frac{r_2}{r_1} = v \frac{T_2 - T_1}{10}$$

Есеп 1.

1. Берілгені:

$$\gamma = 2,4$$

$$T = 320 \text{ K}$$

ТІК: $K = 1 (\text{Mg}(\text{OH})_2)$

Менші:

$$K = A \times e^{\frac{E_a}{RT}}$$

$$K = \frac{2,4}{320} = 3,2 \cdot 10^{-3}$$

$$- 0,01 =$$

$$K_{sp} = 5,02 \cdot 10^{-12} \quad \text{Mg}(\text{OH})_2 \rightleftharpoons \text{Mg}^{2+} + 2\text{OH}^- \quad K_{sp} = [\text{Mg}^{2+}][\text{OH}^-]^2$$

$$T = 298 \text{ K} \quad \Delta G^\circ = -RT \ln K = \Delta G^\circ = -298 \cdot 8,314 \cdot 2536$$

Органиколық қосынды - А ?

$$\begin{matrix} A - 57,83\% (C) \\ 3,62\% (H) \\ 38,55\% (O) \end{matrix} \left. \vphantom{\begin{matrix} A - 57,83\% (C) \\ 3,62\% (H) \\ 38,55\% (O) \end{matrix}} \right\} 100\%$$

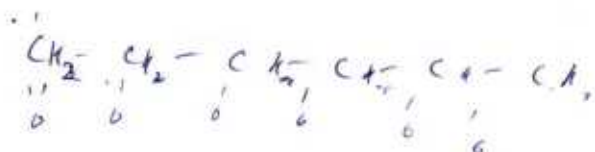
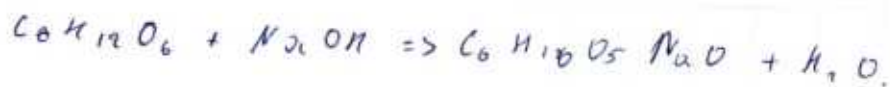
$$C = \frac{12 \cdot 57,83}{100} = 6,94 (7)$$

$$H = \frac{1 \cdot 3,62}{100} = 0,0362$$

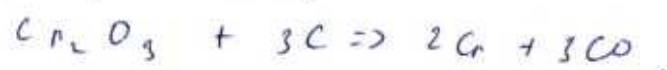
$$O = \frac{16 \cdot 38,55}{100} = 6,168$$

формуласы:

$$C_6H_{12}O_6 - C_6H_6 - 29,9\%$$



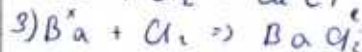
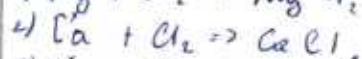
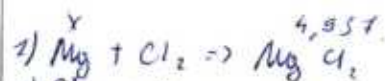
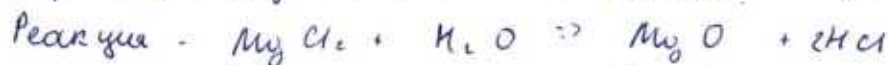
4. $T = 1000\text{K}$



$$\Delta G^0 = RT \ln k$$

6 - тапсырма.

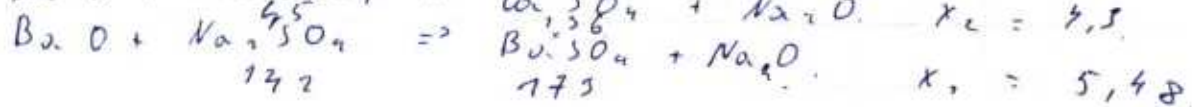
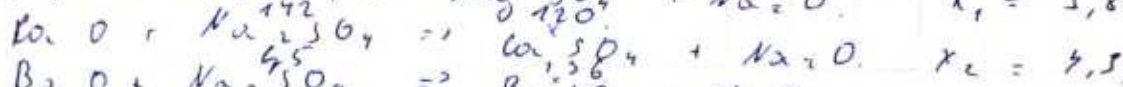
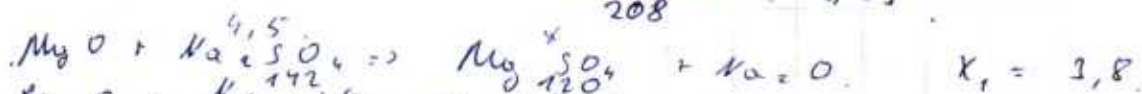
Берілгені: $MgCl_2$, $CaCl_2$, $BaCl_2$ - (4,937) г



1) $x = \frac{24 \cdot 4,937}{95} = 1,24$

2) $x = \frac{40 \cdot 4,937}{111} = 1,77$

3) $x = \frac{137 \cdot 4,937}{208} = 3,25$



:

есеп 1

1. $2.4 \cdot 10^{-5}$

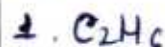
2. $1,04$

3. 408

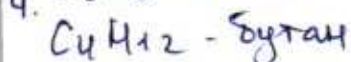
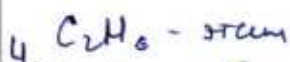
4. көбейеді.

5.

есеп 2



2.

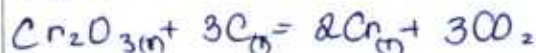


есеп 3

$M(O_2) = 32$

$32 \cdot 19,44 = 623,04$

есеп 4



$C \approx 68,4$

$C_r = -1224,2$

есеп 5

2.1

22. 4.

есеп 6

$M(Hg) = 4,86$

$M(Ca) = 8,10$

$M(Ba) = 24,44$

есеп 1.

$$\frac{r_2}{r_1} = 4 \frac{72-71}{10}$$

$$\text{deg}(\text{OH})_2 = ?$$

$$1) \quad r = 2,4 \frac{320}{10}$$

$$r = 2,4 \cdot 32$$

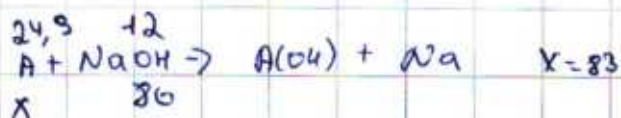
2) көбейтінді

есеп 2.

$$C = 57,83\%$$

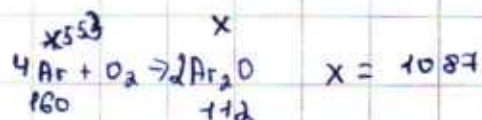
$$H_2 = 3,62\% \quad O_2 = 38,55\%$$

$$A = 24,9$$



$$NaOH = 80 \cdot 0,15 = 12.$$

$$\frac{15\%}{100\%} = 0,15\%$$



$$1553 - 1087 = 466$$

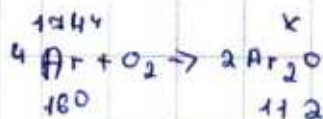
есеп 3

$$\frac{16}{466} \cdot 100\% = 3,43$$

$$p = 17,33$$

$$m = p \cdot v = 17,33 \cdot 89,6 = 1553$$

$$v = n \cdot v_m = 4 \cdot 22,4 = 89,6$$



$$X = 1220.$$

$$1244 - 1220 = 24$$

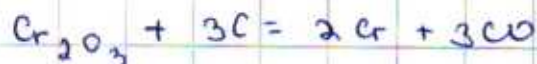
$$p = 13,47$$

$$m = 13,47 \cdot 89,6 = 1204$$

$$\frac{16}{524} \cdot 100\% = 3,05\%$$

есен 4.

$$t = 1000 \text{ K}$$



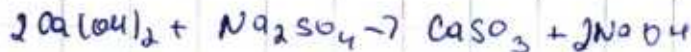
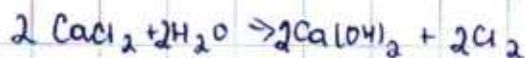
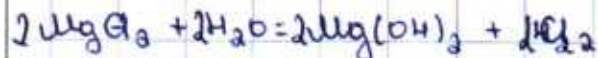
$$\Delta G^\circ = -RT \ln K$$

есен 5

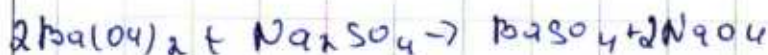
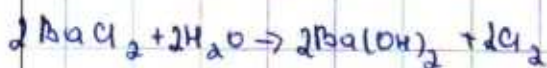
$$C = 63,63$$

$$10000 \cdot 0,2 = 2000$$

есен 6.



38



1-Танымал

Берілгені

$$T_1 = 298 \text{ K}$$

$$\nu_1 = 3,4 \cdot 10^{-5} \text{ моль л}^{-1} \text{ с}^{-1}$$

$$\gamma = 2,4$$

$$T_2 = 320 \text{ K}$$

$$\nu_2 = ?$$

Шешуі

Вант-Гофс ережесі бойынша -
температураның 10°C -қа
көтерген сайын реакцияның
температураның коэффициенті
2-4 аралығында болады,
мына мысалдауық, сонша
ее 2-4 ое артады.

$$1) t_1 = (298 \text{ K} - 273 \text{ K})^\circ\text{C} = 25^\circ\text{C}$$

$$t_2 = (320 \text{ K} - 273 \text{ K})^\circ\text{C} = 47^\circ\text{C}$$

$$\frac{\nu_2}{\nu_1} = \gamma^{\frac{T_2 - T_1}{10}} \Rightarrow \frac{\nu_2}{\nu_1} = 2,4^{\frac{47 - 25}{10}} \Rightarrow \frac{\nu_2}{\nu_1} = 2,4^{2,4}$$

$$\frac{\nu_2}{\nu_1} = 8,175 ; \quad \frac{3,4 \cdot 10^{-5}}{\nu_1} = 8,175$$

Бұдан шегден ν_1 шығаруымызға турады:

$$(\nu_1 = 3,4)$$

$$8,175 \nu_1 = 3,4 \cdot 10^{-5}$$

$$\nu_1 = \frac{3,4 \cdot 10^{-5}}{8,175} = 0,4159 \text{ моль л}^{-1} \text{ с}^{-1}$$

Аррениус теңдеуі - $k = A \cdot e^{\frac{-E_a}{RT}}$ $\Rightarrow E_{\text{акт}} = ?$

$$2) \frac{\nu_2}{\nu_1} = \frac{k_2}{k_1} = \gamma^{\frac{T_2 - T_1}{10}} = 2,175$$

Теңдеудің (Аррениус) А шығаруы үшін,
екі температуралық коэффициенттерден бір-біріне
8,175 шығады.

$$3) k_{\text{сп}} = 5,61 \cdot 10^{-12}$$

$$k_{\text{сп}} = 1 \text{ мс}^{-1} \cdot 10 \text{ л}^2$$

4) Түндөмөң ерітіндісіне $MgCl_2$ ерітіндісін қосқанда түндө ерітіндісі өзгеріссіз қалады.



$MgCl_2 \rightarrow$ түндө болмаған соң, ерітінді кетеді, ал $Mg(OH)_2 \rightarrow$ түндө болған соң, ерітіндіде өзгеріссіз ерітінді қала береді.

5) $T = 298 K \Rightarrow \Delta G^\circ = -RT \ln K$

$$\gamma = \frac{\mu}{R} \Rightarrow R = \frac{\mu}{\gamma} = \frac{25}{8} \times$$

Мағадт: 1) $\gamma_1 (Mg(OH)_2) = 0,4159 \text{ моль/л} \cdot \text{с}^{-1}$

2) $\frac{k_2}{k_1} = 8,175$

3) $K_{sp} = 5,61 \cdot 10^{-12}$

4) өзгеріссіз қалады.

2-тапсырма (Органикалық қосымша)

Берілгені

Шешуі

A - орг. қосымша

$$C : H : O = \frac{57,83}{12} : \frac{3,62}{1} : \frac{38,55}{16}$$

$w(C) = 57,83\%$

$$= \frac{4,82}{2,4} : \frac{3,62}{2,4} : \frac{2,4}{2,4} \Rightarrow$$

$w(H) = 3,62\%$

$$= 2 : 1,5 : 1 \cdot 2 \rightarrow$$

$w(O) = 38,55\%$

$$= 4 : 3 : 2 \cdot 2 \rightarrow C_8H_6O_4$$

$m(A) = 24,9 \text{ г}$

$m(NaOH) = 80 \text{ г} \rightarrow 15\%$

A - ? A₁ - ?

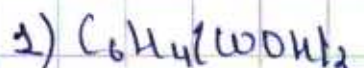
Мағадт: $C_8H_6O_4$

B - ? A₂ - ?

Алайда, құрамында C_6H_5 бензол сақиналар болған соң, таза да 2 есептейміз.



Демек, А зат - $C_6H_4(COOH)_2$



$$M(C_6H_4(COOH)_2) = 166 \text{ г/моль}$$

$$w(C) = \frac{12 \cdot 8}{166} \cdot 100\% = 57,83\%$$

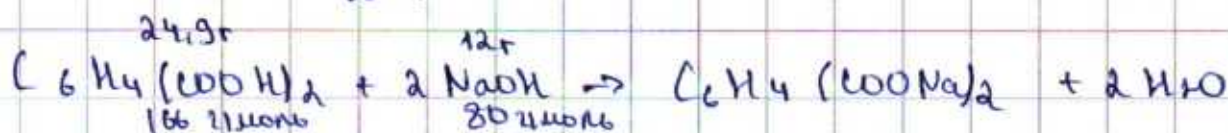
$$w(H) = \frac{6}{166} \cdot 100\% = 3,62\%$$

$$w(O) = \frac{64}{166} \cdot 100\% = 38,55\%$$

2) А қосылысқа функционалдық топ - $-COOH$, карбон қышқылдарының функ тоба.

↳ карбоксил тоба.

$$m(NaOH) = \frac{80 \cdot 15\%}{100\%} = 12 \text{ г}$$

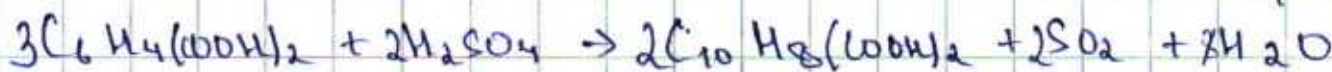


$$n_1(C_6H_4(COOH)_2) = \frac{24,9}{166} = 0,15 \text{ моль}$$

$$n_2(NaOH) = \frac{12}{80} = 0,15 \text{ моль}$$

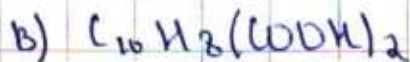
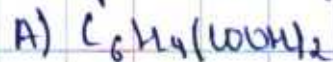
$$\left. \begin{array}{l} \\ \end{array} \right\} n_1 = n_2$$

Демек, $C_6H_4(COOH)_2$ ге, $NaOH$ та толық жұмысқан.

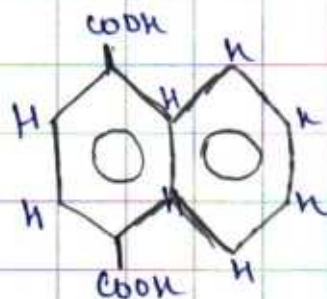
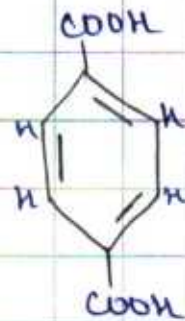


В зат - $C_{10}H_8(COOH)_2$

3) Күрделілік формулалар:



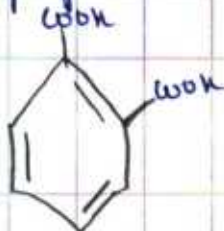
↳ 2 циклика бар B жүйесі



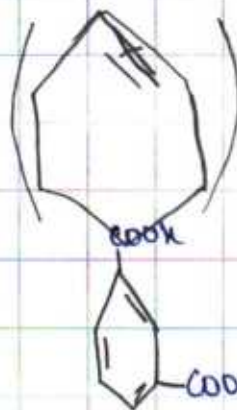
4) A жүйесі



изомерлері:



бензол қосықпалары - 1,2



бензол қосықпалары - 1,3

- орто

бензол қосықпалары - 1,4

- пара

- мета

Изомерлер: орто, мета, пара бөйімнен жіктеледі

3- тапсырма

Берілгені

$$m_{\text{кислота}} (Ar; O_2) = ?$$

$$D_1(H_2) = 17,33$$

$$D_2(H_2) = 19,47$$

$$w(O_2) = ?$$

Шешуі

$$m_1 = 17,33 \cdot 2 = 34,66 \text{ г}$$

$$m_2 = 19,47 \cdot 2 = 38,94 \text{ г}$$

$$\Delta m = 38,94 - 34,66 = 4,28 \text{ г}$$

$$\begin{cases} 40x_1 + 32y_1 = 34,66 \\ 40x_2 + 32y_2 = 38,94 \end{cases}$$

$$x = Ar; y = O_2$$

Парақтың артқы жағын толтырмаңыз / Обратную сторону листа не заполнять

$$40(x_2 - x_1) + 32(y_2 - y_1) = 4,28$$

↳ Осы теңдеу арқылы O_2 мен Ar массалары табылады.

С-тапсырма Бөрімені

$$m(MgCl_2 + CaCl_2 + BaCl_2) = 4,937r$$

$$V(H_2O) = 64ml = 0,064r$$

$$V(Na_2SO_4) = 36,00ml$$

$$w(Na_2SO_4) = 12,63\%$$

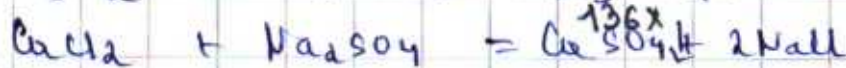
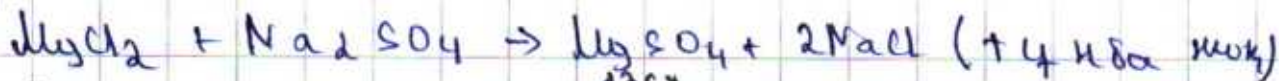
$$w(CaCl_2) = ?$$

$$w(MgCl_2) = ?$$

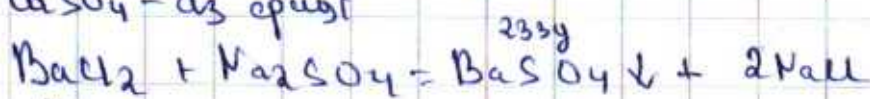
$$w(BaCl_2) = ?$$

$$m_{ep-gi} = 4,937r + 64r = 68,937r$$

Шешуі:

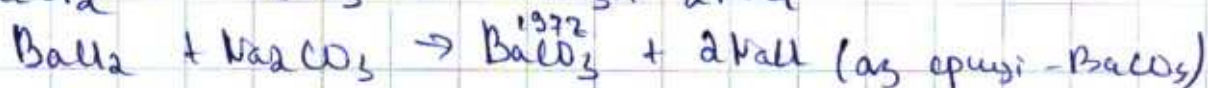
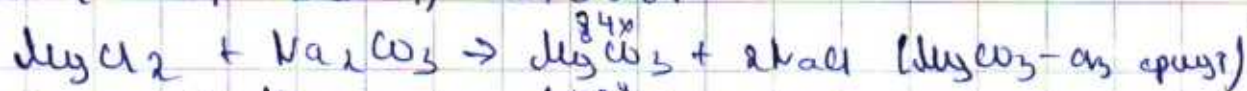


$CaSO_4$ - аз еригі

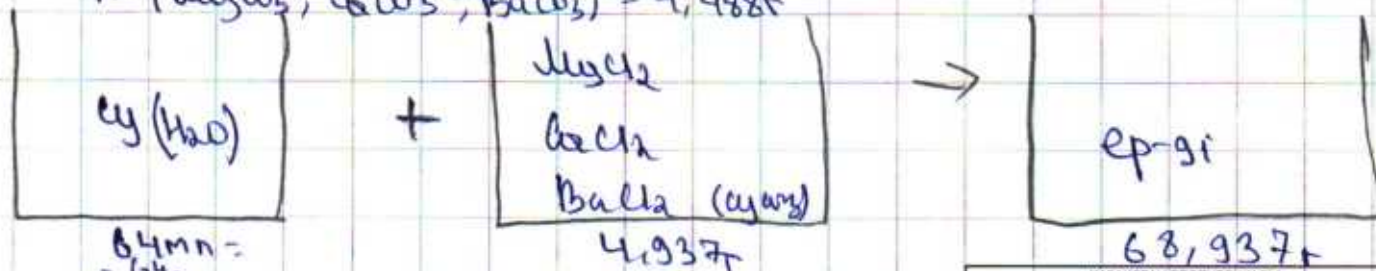


$BaSO_4$ - ақ түті тунда

$$m(CaSO_4 + BaSO_4) = 3,658r$$



$$m(MgCO_3; CaCO_3; BaCO_3) = 4,488r$$



$$\begin{cases} 136x + 233y = 3,658 \end{cases}$$

$$\begin{cases} 84x + 100y + 197z = 4,488 \end{cases}$$

Теңдеулер жүйесі.

$$m(\text{Na}_2\text{SO}_4) = \frac{36 \cdot 12,63\%}{100}$$

N 6.

Берілгені:

$$m(\text{MgCl}_2; \text{CaCl}_2; \text{BaCl}_2) = 4,934 \text{ г}$$

$$V = 64 \text{ мл} = 0,064 \text{ л (мольды)}$$

$$m(\text{H}_2\text{O}) = 3,6582$$

$$m(\text{H}_2\text{O}) = 4,4882$$

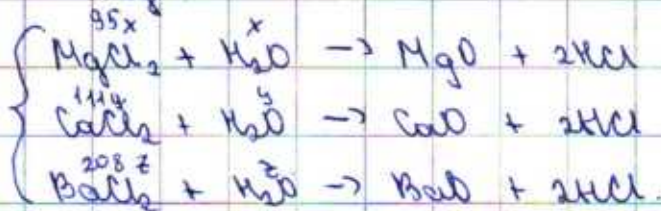
$$V(\text{мыз. мыз}) = 0,1 \text{ л}$$

$$V = 36 \text{ мл} = 0,036 \text{ л}; \rho = 12,63\%$$

$$V = 100 \text{ мл} = 0,1 \text{ л}; \eta = 25\%$$

$$m/\text{к} \quad \text{C}_{1,2,3} - ?; \quad \omega_{1,2,3} - ?$$

Менші:



$$n(\text{H}_2\text{O}) = \frac{0,064}{22,4} = 0,003 \text{ моль}$$

$$m(\text{мыз. мыз}) = 95 \cdot x + 95x$$

$$m(\text{мыз}) = 111 \cdot y = 111y$$

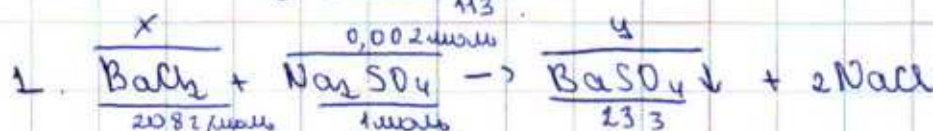
$$m(\text{мыз}) = 208 \cdot z = 208z$$

$$\begin{cases} 95x + 111y + 208z = 4,934 \\ x + y + z = 0,003 \quad / \cdot 95 \Rightarrow \end{cases}$$

$$\begin{cases} 95x + 111y + 208z = 4,934 \\ - 95x + 95y + 95z = 0,285 \end{cases}$$

$$16y + 113z = 4,652$$

$$z = \frac{4,652 - 16y}{113}$$

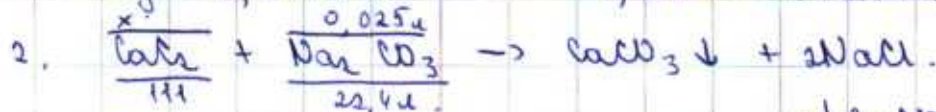


$$V = 0,036 \cdot 0,1263 = 0,005 \text{ л}$$

$$n = \frac{0,005}{22,4} = 0,0002 \text{ моль}$$

$$x = \frac{208 \text{ г/моль} \cdot 0,002 \text{ моль}}{1 \text{ моль}} = 0,416 \text{ г}$$

$$y = 0,04662 \rightarrow 3,6582 \text{ (келген)}$$



$$x = \frac{111 \cdot 0,025}{22,4} = 0,122$$

$$m(\text{CaCO}_3 \downarrow) = 4,4882$$

$$V = 0,1 \cdot 0,25 = 0,25 \text{ л}$$

$$3. \quad c(\text{BaCl}_2) = \frac{n}{V} = \frac{m}{M \cdot V} = \frac{0,416}{208 \cdot 0,1} = 0,002 \text{ M}$$

$$c(\text{CaCl}_2) = \frac{n}{V} = \frac{m}{M \cdot V} = \frac{0,466}{111 \cdot 0,1} = 0,01 \text{ M}$$

$$w(\text{CaCl}_2) = \frac{0,12}{4,934} \cdot 100\% = 2,43\%$$

$$w(\text{BaCl}_2) = \frac{0,0416}{4,934} \cdot 100\% = 0,84\%$$

$$w(\text{MgCl}_2) = 100 - (2,43 + 0,84) = 96,73\% \text{ (мүжімен соң, мүжінін!)}$$

N2

Әерімелі:

$$w(\text{C}) = 54,83\%$$

$$w(\text{H}) = 3,62\%$$

$$w(\text{O}) = 38,55\%$$

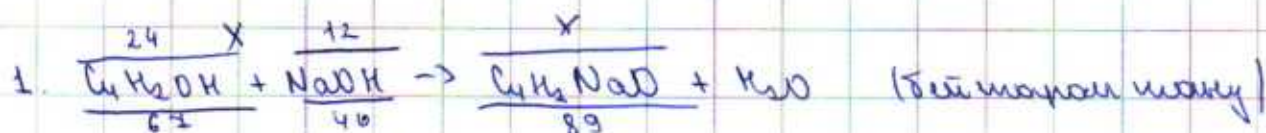
$$m(\text{A}) = 24,97$$

$$m(\text{NaOH}) = 80; \eta = 15\%$$

$$m/\kappa \text{ B} - ?$$

Мемігі:

$\frac{54,83}{12}$	$\frac{3,62}{1}$	$\frac{38,55}{16}$	
4,82	3,62	2,41	
$\frac{4,82}{2}$	$\frac{3,62}{1,5}$	$\frac{2,41}{1}$	$\cdot 2$
2	1,5	1	
$4 : 3 : 2$			



$$M(\text{C}_4\text{H}_2\text{OH}) = 49 + 2 + 17 = 68$$

$$m(\text{NaOH}) = 80 \cdot 0,15 = 12$$

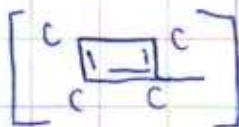
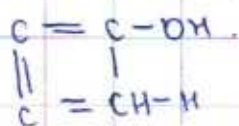
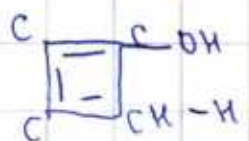
$\text{C}_4\text{H}_2\text{OH}$ - не әсерізбейміз, себебі зат мөлшері көп

$$x = \frac{12 \cdot 89}{40} = 26,7$$

$$1. \text{A} = \text{C}_4\text{H}_2\text{OH}$$

2. А затында бензол сақинасы текше; спирт молекулалары бар. Яғни $\text{C}_4\text{H}_2\text{OH}$ бензол таңбалының спирті $[\text{C}_6\text{H}_5-\text{C}_4\text{H}_2\text{OH}]$

3. А қызылмендегі формуласы:



N1

$$\frac{r_1}{r_2} = 10$$

$$V = \gamma \frac{T_2 - T_1}{10}$$

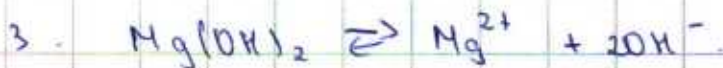
$$1. V = 2,4 \frac{320 - 10}{10} = 2,4^{32}$$

$$V = 3,2^{24}$$

$$2. K = A \times e^{-\frac{E_a}{RT}}$$

A - активності жеткізесі (соңғышы саны).

$$\frac{r_2}{r_1} = \frac{k_2}{k_1}$$



$$K_{sp} = [Mg^{2+}] \cdot [OH^-]^2$$

4. Мұндағы маңғыл қорықын қоса ($MgCl_2$), өзгерілігі себепі мұз мұндағыа керіне алмайды, керінегі үшін мұнда мұндағы керіне, себепі масса артады.

N3

Берілгені:

$$\frac{D - p(Ar + O_2)}{m/k} = 17,33$$

Менші:

$D \rightarrow$ армен бойынша

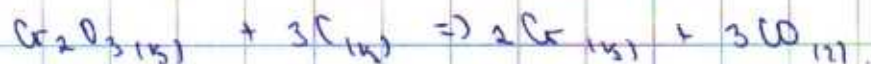
$$p(Ar + O_2) = D \cdot Ar(H) = 17,33 \cdot 1 = 17,33$$

$$17,33 \xrightarrow{\text{және}} 19,44$$

$$w(Ar + O_2) = \frac{32}{42} \cdot 100 = 44,44\% \quad \text{[массаның үлесі]}$$

мыңдан масса бойынша, массаның үлесі басыа.
(мәжірібеген кейін)

N4.



$$\Delta H = -1141 \text{ (Cr}_2\text{O}_3)$$

$$\Delta S = 81,2 \text{ (Cr}_2\text{O}_3)$$

$$T = 1000 \text{ K}$$

Таббас жерінен:

$$\Delta G^0 = -RT \ln K$$

K - жабдан газ тұрақтысы.

$$\Delta H = -110,6 \text{ (CO)}$$

$$\Delta S = 197,7 \text{ (197,7)}$$

N5.

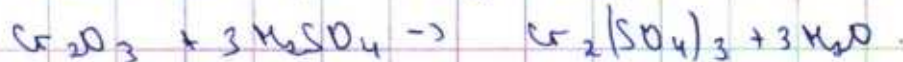
Егер Сб қосынның белімаран тандыру үшін қосынның (14) нұс қосынға, деген. а негіз болуы мүмкін.

Ал, Ас қосыннан, қосыннан бөлініп үшін қосын-
ні зонт нұсқа а мүмкін С. жемінен.

$$\omega(C) = 63,63\%$$



Sn(OH)_2 - нәтижесінде болуы мүмкін.



ж: нәтижесінде 1.

N^o 1 рет

$$\frac{r^2}{r^1} = \gamma \frac{T_2 - T_1}{10}$$

$$n(\text{Mg}(\text{OH})_2) = 3,4 \cdot 10^{-5} \text{ моль д'с'}$$

$$\gamma = 2,4$$

$$t = 320 \text{ K}$$

$\text{Mg}(\text{OH})_2$ - еру шындығы.

Аррениус теңдеуі:

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

N^o 2 рет.

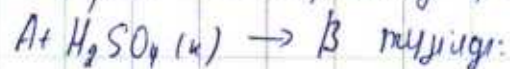
$$C = 54,83 \%$$

$$H = 3,62 \%$$

$$O = 38,55 \%$$

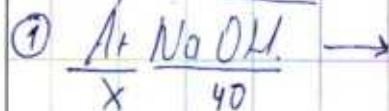
1 молекула бензол бар.

A = 249 г. Әзімтәрікәтәу үшүн $\text{NaOH} = 80,15 \%$

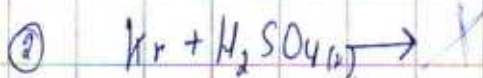


$$m(\text{NaOH}) = 80 \cdot 0,15 = 12 \text{ г}$$

$$\frac{249 \text{ г}}{x} \quad \frac{12 \text{ г}}{40}$$



$$x = 83. (\text{Kr}) \text{ қышқыл.}$$



$N^{\circ} 3$ есеп.

$p = 14,332 \rightarrow Ar, O$

$Ar + O_2 \rightarrow ArO_4$ $p = 19,49 \rightarrow$ аргентин.

$$\omega(O_2) = \frac{16}{104} \cdot 100\% = 15,38\%$$

$N^{\circ} 4$ есеп.

$T = 1000 K$

$Cr_2O_3(1) + 3C(1) = 2Cr(1) + 3CO(2)$

	Cr_2O_3	C	Cr	CO
$\Delta H_{298, kDh/mol}$	-1141	0	0	-110,6
$\Delta S_{298, Dh(mol \cdot K)}$	81,2	5,7	23,6	197,4

$$\Delta H = -1141 + 0 + 0 + (-110,6) = -1251,6$$

$$\Delta S = 81,2 + 57,2 + 23,6 + 197,4 = 359,4$$

$N^{\circ} 5$ есеп.

$Al_2 = 10\% \quad 1; 2125 \text{ г} \quad \omega(C) = 63,63\%$

көк ерітінді: 1 т 20%

СБ-машинаға қоспа

Веймарлануға қабілеті дүррессізді натрий сымкаты қоспа

Жеңгі 50-60 % қабілеті и/е күйірісі:

Оксид сымкаты и/е күйірісі қиыны ерітінді:

Қоспа тауарлығы и/е электрқалудың:

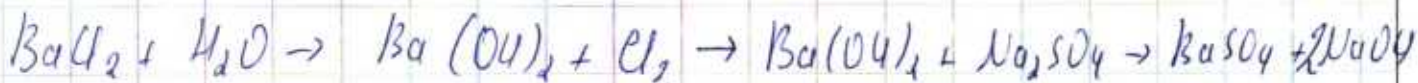
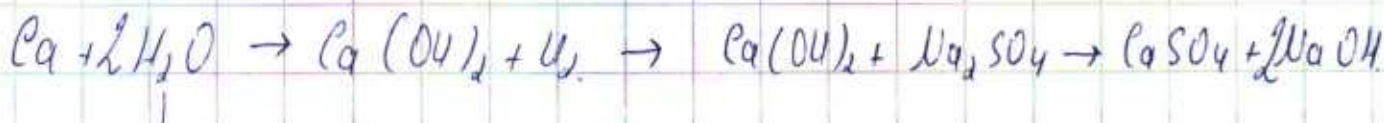
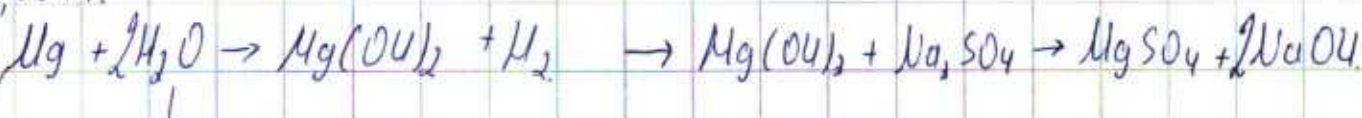
тауар алын кетуде тауар

$$m(AB) = 1,2125 \cdot 0,1\% = 0,12125$$

$$\text{көп ермелігі} = 1 \cdot 0,2 = 0,2$$

$\lambda^0 = 6 - \text{сип.}$

$$m = 4,9342$$



$$\text{H}_2\text{O} = 64,00 \text{ ш. су мөлш.}$$

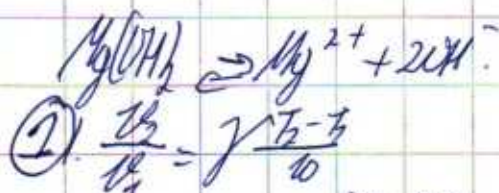
$$m(\text{Na}_2\text{SO}_4) = 36 \cdot 0,1263 = 4,5468$$

N1) $Mg(OH)_2$
 $T_1 = 298K$
 $v_1 = 3,4 \cdot 10^{-5} \text{ моль/л}$
 $\gamma = 2,4$
 $T_2 = 320K$
 $v_2 = ?$

$$\frac{v_2}{v_1} = \gamma^{\frac{T_2 - T_1}{10}}$$

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

$$\frac{v_2}{v_1} = \frac{K_2}{K_1}$$

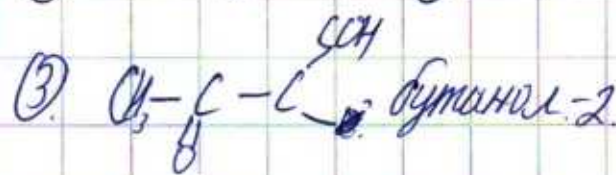
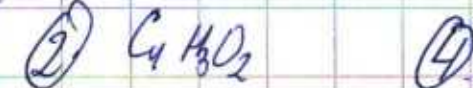
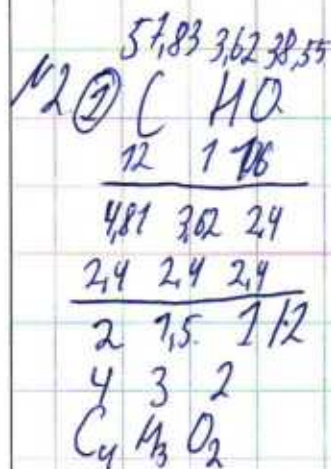


$$\frac{v_2}{3,4 \cdot 10^{-5}} = 2,4^{\frac{320 - 298}{10}} = 2,4^{2,2}$$

$$v_2 = 5,16 \cdot 3,4 \cdot 10^{-5}$$

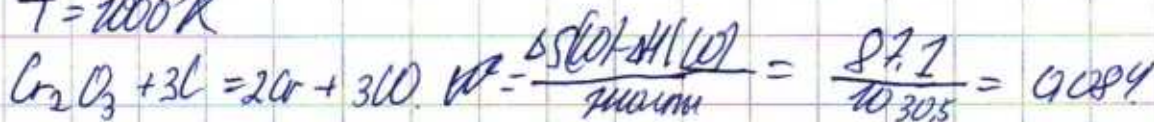
$$v_2 = 19,584 \cdot 10^{-5}$$

② $\frac{19,584}{3,4} = 5,76 \cdot 10^{-5}$ ③ $K_{sp} = 5,67 \cdot 10^{-12}$ ④ көбейеді.



N3 $D_{H_2O} = 1733 \cdot 2 = 3466$ $W = \frac{O_2}{\text{масса}} = \frac{19,47}{34,66} \cdot 100 = 56,17\%$

N4 $T = 1000K$



N5 ① $1,2125 \cdot 10^6 = 1,2125 \cdot 10^6$

$1T \cdot 200 = 200K$

$$84 \text{ мм} = 842$$

$$N6. \quad m(\text{MgCl}_2; \text{CaCl}_2; \text{BaCl}_2) = 4.9372$$

$$m = 36 \cdot 0.1263 = 4.5468$$

$$\frac{\text{MgCl}_2}{4.937} + \frac{\text{H}_2\text{O}}{100} \Rightarrow \frac{\text{MgCl}_2}{4.937 - 0.42} = 40.937 + 4.5468 = 45.4838 / 100 \cdot 258 = 252$$

$$\textcircled{1} \quad w_1(\text{MgCl}_2) = \frac{77.725}{29.488} = 0.6 \quad \textcircled{2} \quad w_2(\text{CaCl}_2) = \frac{4.19}{29.488} = 0.14 \quad w_3(\text{BaCl}_2) = 25 + 4.48 = 29.48$$

$$\textcircled{3} \quad w_3(\text{BaCl}_2) = \frac{7.57}{29.488} = 0.258$$

$$29.488 - 4.49 - 7.57 = 77.728$$

N1.

$$\frac{r_2}{r_1} = \gamma \frac{T_2 - T_0}{T_0}$$

$$J(Mg(OH)_2) = 3,4 \cdot 10^{-5} \text{ моль/л} \cdot \text{с}^{-1}$$

$$1) \gamma = 2,4 \quad \frac{r_2}{r_1} = 2,4 \frac{320 - 298}{10} = 2,4^{2,2} \approx 7. \quad 7 \cdot 3,4 \cdot 10^{-5} = 2,38 \cdot 10^{-6}$$

$$2) \gamma = \frac{k_2}{k_1}$$

$$\gamma = \frac{e^{-\frac{E_{a2}}{RT}}}{e^{-\frac{E_{a1}}{RT}}}$$

$$\gamma = e^{-\frac{E_{a2}}{RT}} - (-\frac{E_{a1}}{RT})$$

$$\gamma = e^{-\frac{E_{a1} + E_{a2}}{RT}}$$

4) Тұйылану ерігіштігіне мәтінді хлориді ерітіндісіне қоса алғанда ол азаяды.

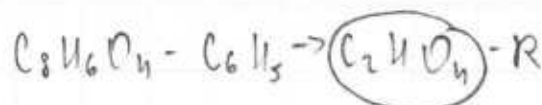
N2.

$$1) C:H:O = \frac{57,83}{12} : \frac{3,62}{1} : \frac{3,55}{16}$$

$$C:H:O = 4,8 : 3,62 : 2,4 = \frac{4,8}{2,4} : \frac{3,62}{2,4} : \frac{2,4}{2,4}$$

$$C:H:O = 2 : 1,5 : 1 = 4 : 3 : 2 \quad C:H:O > C_6H_6$$

$$C:H:O = 8 : 6 : 4$$



N3.

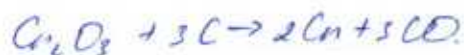
$$W: P_{H_2} = 17,33 \cdot 2 = 34,6 \quad (An \cdot O)$$

$$P_{H_2} = 19,47 \cdot 2 = 38,9$$

$$\omega(O) = \frac{16}{38,9} \cdot 100\% = 41,1\%$$

N4.

$$W: \Delta G^\circ = -RT \ln K$$



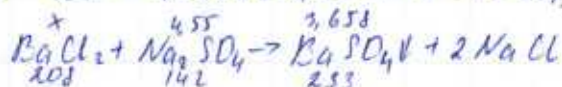
N5.



N6.

$$W: m(MgCl_2) + m(CaCl_2) + m(BaCl_2) = 4,9572.$$

$$1) 36 \cdot \frac{12,63}{100} = 4,5468 \approx 4,55 \text{ m}(Na_2SO_4)$$

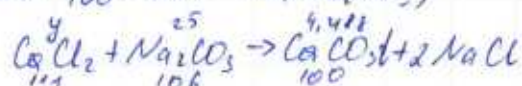


$$n(Na_2SO_4) = 0,032 \text{ моль}$$

$$n(BaSO_4) = 0,015 \text{ моль.}$$

$$x = 208 - 0,15 \text{ моль} = 3,122 \text{ m}(BaCl_2)$$

$$100 \cdot \frac{25}{100} = 25 \text{ m}(Na_2CO_3)$$



$$n(CaCO_3) = 0,045 \text{ моль}$$

$$n(Na_2CO_3) = 0,25 \text{ моль.}$$

$$m(CaCl_2) = 0,045 \cdot 111 = 4,995 \approx 52.$$

$$3,12 : 2 = 1,562.$$

$$5 : 2 = 2,52.$$

$$2,5 + 1,56 = 4,062.$$

$$m(MgCl_2) = 4,957 - 4,06 = 0,8772.$$

$$2) \left(\cancel{C = \frac{3,12}{208 - 100} = 0,015 \text{ моль}} \right)$$

$$C = \frac{0,15}{0,1} = 1,5 \text{ моль/л.}$$

$$C = \frac{0,032}{0,1} = 0,32 \text{ моль/л.}$$

$$w(Mg) = \frac{24}{95} \cdot 100\% = 25,3\%$$

$$w(Ca) = \frac{40}{111} \cdot 100\% = 36\%$$

$$w(Ba) = \frac{137}{208} \cdot 100\% = 65,86\%$$

$$0,877 \cdot \frac{25,3}{100} = 0,22 = 22,2\%$$

$$\left(\cancel{0,015 \cdot 100\% = 1,5\%} \right)$$

$$\left(\cancel{0,032 \cdot 100\% = 3,2\%} \right)$$

$$\left(\cancel{0,015 \cdot 100\% = 1,5\%} \right)$$

$$2,5 \cdot \frac{36}{100} = 0,9 = 90\%$$

$$1,56 \cdot \frac{65,9}{100} = 1,02 = 102\%$$

Задача N3. Таян.

Дано:

 $m(\text{Ar} + \text{O}_2)$ смеси $D(\text{H}_2)(1) = 17,33$ (нужн. как (1) первая смесь) $D(\text{H}_2)(\text{смеси, после } \frac{1}{2} \text{ заряд}) = 19,47$ (2) смесь.Найти $\omega_2(\text{O}_2)$ после испарения. - ? ~~$m(\text{O}_2) = m(\text{Ar})$~~ $m(\text{O}_2) = m_{\text{смеси}(1)} - m(\text{Ar})$.

$$m(\text{O}_2) = 32 \cdot x = 32x.$$

$$32x + 40x = (17,33 \cdot 2)$$

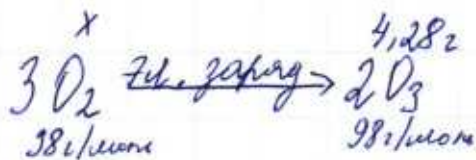
$$72x = 34,662.$$

$$x = 0,48 \text{ моль, отсюда } m(\text{Ar}) = 0,48 \cdot 40 = 19,252.$$

$$m(\text{O}_2) = 0,48 \cdot 32 = 15,362$$

Электрический заряд возможен для кислорода, в его превращ.
в озон. $3\text{O}_2 \xrightarrow{\frac{1}{2} \text{ заряд}} 2\text{O}_3$, раз небольшой $\frac{1}{2}$ заряд, то не весь кислород превратился. Если во внимание изменение в плотности можно увидеть массу (если перевести) плотность).

$$T. \Rightarrow 38,942 - 34,662 = 4,282.$$



$$M_{\text{г}}(2\text{O}_3) = 2 \cdot (16 + 16 + 16) = 98 \text{ г/моль}$$

$$M_{\text{г}}(3\text{O}_2) = 3 \cdot (16 + 16) = 98 \text{ г/моль}$$

$$x = \frac{4,282 \cdot 98 \text{ г/моль}}{98 \text{ г/моль}} = 4,282.$$

$$\omega_2(\text{O}_2) = \frac{m(\text{O}_2)}{m(\text{смеси}(2))} = \frac{4,282}{38,942} =$$

$$= 10,99\% \quad 0,284 \cdot 100 = 28,4\%.$$

Ответ: $\omega_2(\text{O}_2) = 28,4\%$.

Задача №2.

Дано:

$$C\% = 57,83\% (w)$$

$$O_2 = 38,55\% (w)$$

$$w(H_2) = 3,62\%$$

ароматич. соед.

Әлг. нейтр. 24,92 г. А қуаны: 80,15% NaOH

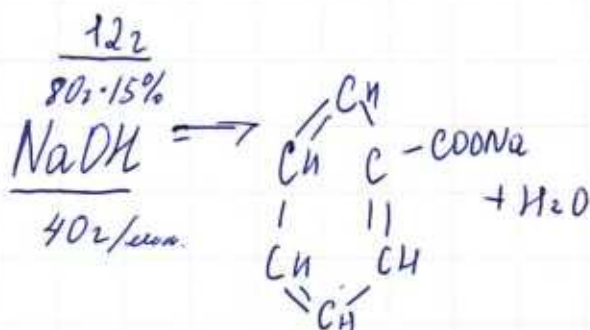
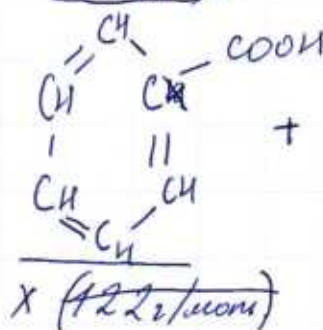
$$A = C + O + H \approx 100\%$$

1) Найми молек. формула.

прост. формула ($C_{12}H_{15}O_2$), $M_r(C_{12}H_{15}O_2) = 211,5$ г/мол.Ароматическая кислота должна быть, если реакция
нейтрализации. Проверим для бензойной кислоты.~~X~~ 24,92

$$\frac{24,92 \cdot 40 \text{ г/мол}}{122} = x$$

$$x = 8,3 \text{ г/мол.}$$



Задача N4.

Дано:

$$t = 1000 \text{ K}.$$

$$\Delta H_{298} \text{ кДж/моль} \rightarrow \text{Cr}_2\text{O}_3 = -1141.$$

$$\rightarrow C = 0$$

$$\rightarrow \text{Cr} = 0$$

$$\rightarrow -110,6 \text{ (гид CO)}$$

$$\Delta S_{298} \text{ Дж/моль} \cdot \text{K}.$$

$$\rightarrow 81,2 = \text{Cr}_2\text{O}_3$$

$$\rightarrow C = 5,7.$$

$$\rightarrow \text{Cr} = 23,6.$$

$$\rightarrow \text{CO} = 192,7$$

$$\text{Решение: } \text{Cr}_2\text{O}_3(\text{v}) + 3\text{C}(\text{тв}) = 2\text{Cr}(\text{тв}) + 3\text{CO}(\text{г})$$

$$\begin{aligned} \Delta H_{298} &= \Delta H_{\text{продукты}} - \Delta H_{\text{реагенты}} = \\ &= (-110,6) \cdot 3 + 0 \cdot 2 - (3 \cdot 0) + (-1141) = \\ &= -331,8 + 0 - 0 + (-1141) = \\ &= (-331,8 - 1141) = -1472,8. \end{aligned}$$

$$809,2 - 298$$

$$x = 1000$$

$$x = 2715,5$$

$$\text{Данное: } 2715,5 \text{ кДж/моль}.$$

Наим: Жергенов Тибек.

Задача №6.

Дано:

$$m_{\text{смеси}} = 4,9372$$

амесь / $MgCl_2 + CaCl_2 + BaCl_2$

$$V_{\text{смеси}} = 84,00 \text{ мл}$$

$$V(Na_2SO_4) = 36 \text{ мл}$$

$$\omega(Na_2SO_4) = 12,63\%$$

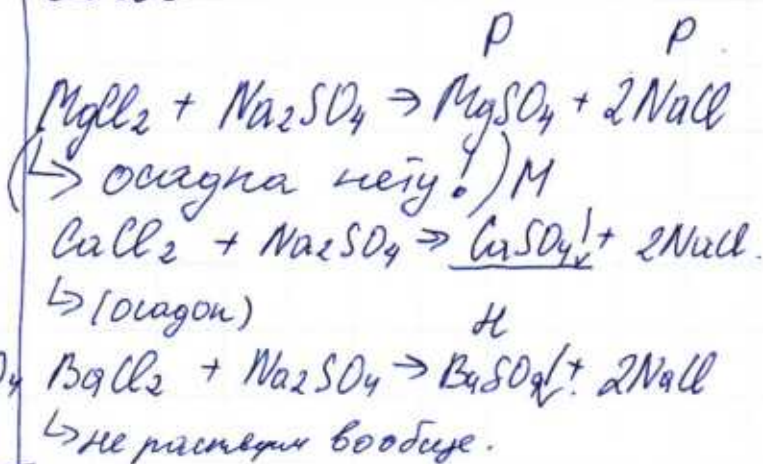
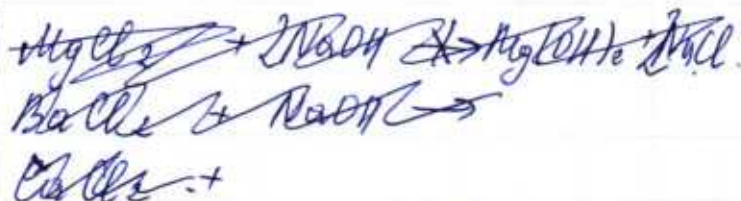
$$m(\text{осадка}) = 3,6582$$

$$V(\text{р-р } Na_2CO_3) = 100 \text{ мл}$$

$$\omega(\text{р-р } Na_2CO_3) = 25\%$$

$$\text{р-р } (9,419 \cdot 10^{-5}) \text{ } CaSO_4$$

$$\text{р-р } (4,54 \cdot 10^{-11}) \text{ } BaSO_4$$



$$\frac{m}{V} = \frac{4,9372}{84,00} = 0,058776$$

Задача N1.

$$\frac{r_2}{r_1} = \gamma \frac{T_2 - T_1}{10}, \quad V(\text{MgOH})_2 = 3,4 \cdot 10^{-5} \text{ моль} \cdot \text{л}^{-1} \cdot \text{с}^{-1} \text{ @ } 298 \text{ K}$$

$$\frac{r_2}{r_1} = 2,24 \frac{298-273}{10}, \quad \frac{r_2}{r_1} = 2,24 \frac{25}{10}, \quad \frac{r_2}{r_1} = 2,24^{2,5}.$$

$$\frac{r_2}{r_1} = \frac{k_2}{k_1} \quad \text{где} \quad k = A \cdot e^{-\frac{E_a}{RT}}.$$

$$A = \frac{k_1}{2,24^{2,5}} = 5,61 \cdot 10^{-12} \cdot 2,24^{2,5}.$$

Задача N 5.

Дано:

$$(AB) = 1.2125 + 10\%$$

1 + 20% р-р мою ие

менет.

примен (СБ) менет

оцениваются.

N3.

$$19,47 - 17,33 = 2,14$$

$$2,14 \cdot 32 = 68,48$$

$$\frac{32}{68,48} = 47\%$$

N2.

$$C = \frac{54,83}{12} = 4,819$$

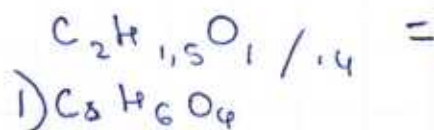
$$O = \frac{38,55}{16} = 2,409$$

$$H = \frac{3,62}{1} = 3,62$$

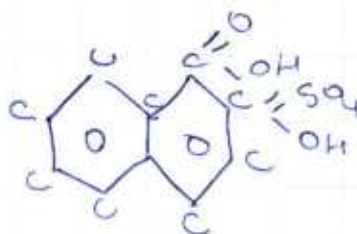
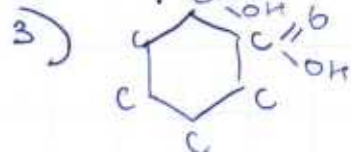
$$\frac{4,819}{2,409} = 2$$

$$= 1$$

$$= 1,5$$



2) спирт карбоксил



4 - ?

N1.

$$1) \gamma = 2,4$$

$$3,4 \cdot 10^{-5} \text{ моль м}^{-1} \text{ с}^{-1}$$

1 - мақсат

1. $K =$

2. $\frac{r_2}{r_1} = \frac{k_2}{k_1}$

3. $K_{sp} =$



5. $\Delta G^\circ = -RT \ln K$

2 - маңырына

$$w(C) = 57,83\%$$

$$w(H) = 3,62\%$$

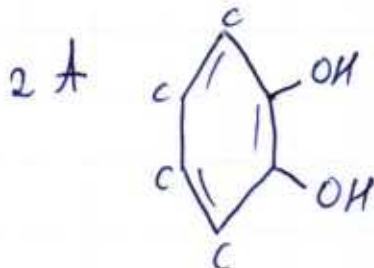
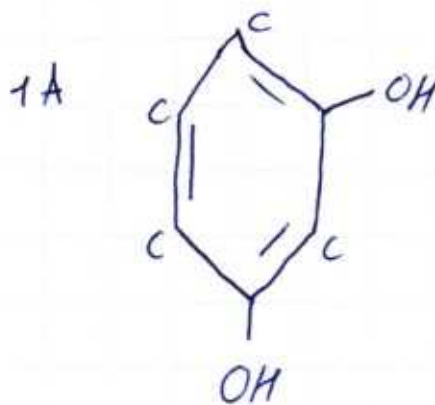
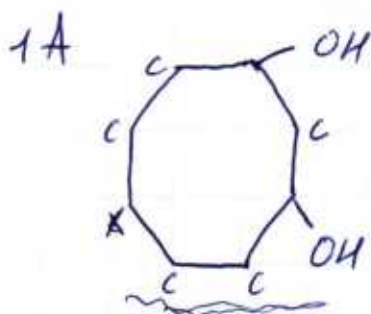
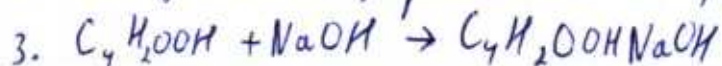
$$w(O) = 38,55\%$$

Бензол сақинасы - 6 C 2OH

$$6 - 2 = 4(C)$$

1. $A = C_4H_2O_2$

2. 2 Гидроксатом, атомарлы көмірсутек



4. 1A - 1,3 Дигидроксиол

2A - 1,2 Дигидроксиол

3 - марка

$O_2 \xrightarrow{4}$

$Ar \xrightarrow{4} 19,47$

$$M_r = 40 + 32 = 72$$

$$w(O_2) = \frac{32}{72} \cdot 100 = 44,44\%$$

маңсауы - 4



$$K = \frac{197,7 \cdot 23,6^2}{81,2 \cdot 5,7^3} = \cancel{10,08} 7,32$$

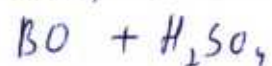
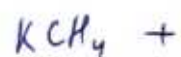
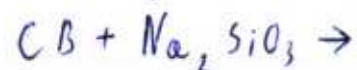
$$\Delta G^0 = -RT \ln K$$

$$\Delta G^0 = -1030,4 \cdot \overset{7,32}{\cancel{10,08}} = \overset{-7544,94}{\cancel{1055,52}}$$

Планшма - 5

$$1,2125 \cdot 0,1 = 0,12125 T$$

$$1T = 1000 K\Omega \cdot 0,2 = 200 K\Omega (0,2T)$$

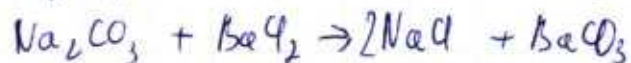
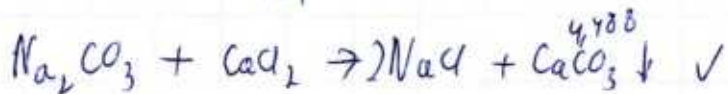
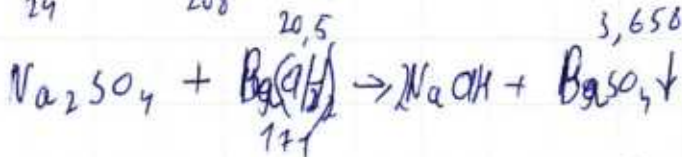
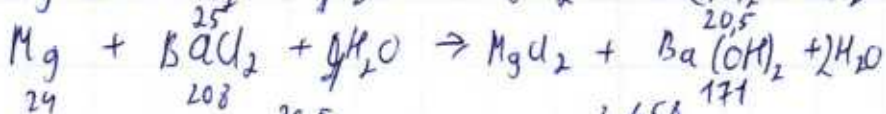
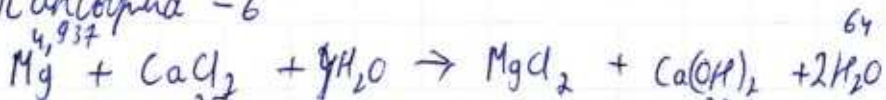


A - S

B - Fe

C - O₂

Талансырма - 6



N 1

$$\frac{v^2}{v^1} = \gamma \frac{T_2 - T_1}{10}$$

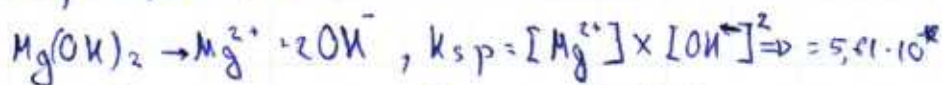
$$1) \frac{v^2}{v^1} = 2,4 \frac{320 - 298}{10} = 5,28$$

$$2) k = A \cdot e^{-\frac{E_a}{RT}}$$

$$\frac{v^2}{v^1} = \frac{k^2}{k^1} = 5,28$$

$$A = \frac{k \cdot RT}{e^{-\frac{E_a}{RT}}} = 2 \frac{5,28}{1,6} = 3,3$$

$$3) K_{sp} = 5,61 \cdot 10^{-12}$$



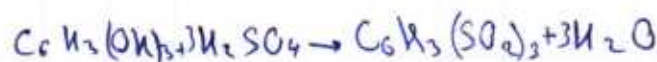
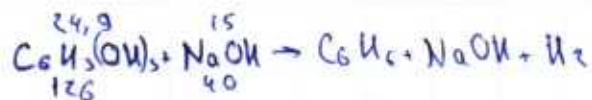
4) Түзбе әрілігінің көбейтіндісі, $Mg(OH)_2 + MgSO_4 \rightarrow$

$$5) \Delta G^\circ = -1,58 \cdot 298 \cdot 1 \cdot 5,61 \cdot 10^{-12} = -2641,4$$

N 2

Бер: C (57,83%), H (3,62)%, O (38,55)%

1) $C_6H_3(OH)_3$, 2) Спирт мабт OH



N 3

$$D(H) < D(Ar_5C_6) = 17,33$$

$$1947 - 1733 = 214$$

$$D(Ar_5C_6) + 4 = 19,47$$

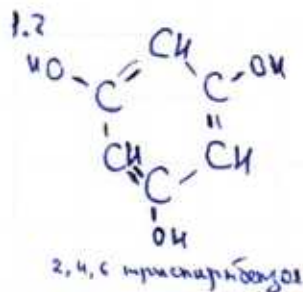
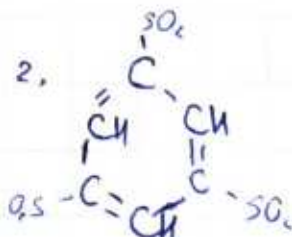
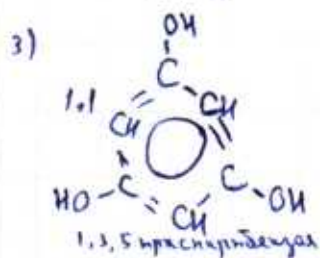
$$\frac{56}{17,33} = 3,23, \quad \frac{56}{19,47} = 2,87$$

$$\frac{333}{16} = 0,2, \quad \frac{2,87}{16} = 0,17 = 0,37$$

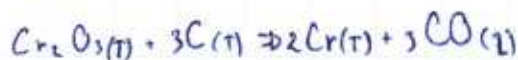
$$\frac{333}{40} = 0,08, \quad \frac{2,87}{40} = 0,07 = 0,15$$

$$\frac{0,37}{16} = 0,023 = 2,3\%$$

$$\frac{0,15}{16} = 0,009 = 0,9\%$$



N 4



$$\Delta G^\circ = -RT \ln K$$

$$T = 1000 \text{ K}$$

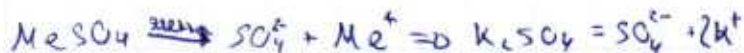
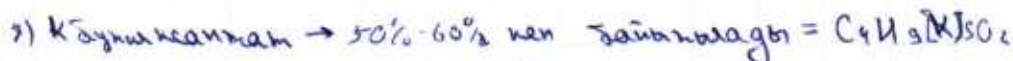
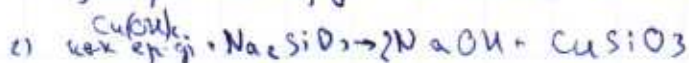
	Cr_2O_3	C	Cr	CO
ΔH_{298}	-1141	0	0	-110,6
ΔS_{298}	81,2	5,7	23,6	197,7

$$-14,05 \quad 0 \quad 0 \quad -0,55$$

$$-14,05 \cdot (-0,55) = 7,7275$$

$$\Delta G^\circ = -7,7275 \cdot 1000 \cdot 1 \cdot 9 = 64547,5$$

N 5



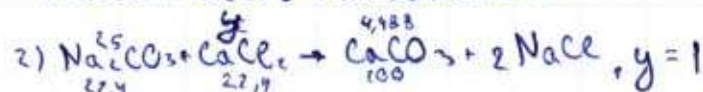
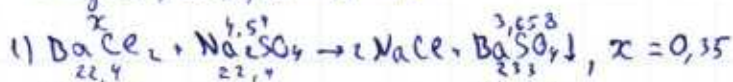
$$C = 63,63\%$$

$$2.2. = \text{нағыз металл}, 50 \text{ кн}$$

N 6

$$m(\text{MgCl}_2, \text{CaCl}_2, \text{BaCl}_2) = 4937 \text{ г}, \text{CaCl}_2 \cdot \text{BaSO}_4 = 9,411 \cdot 10^5 \cdot 7,57 \cdot 10^{-11}$$

$$V(\text{MgCl}_2, \text{CaCl}_2, \text{BaCl}_2) = 64 \text{ мл}$$



$$3) \text{MgCl}_2 = 4,937 - 1,35 = 3,587$$

$$\omega(\text{MgCl}_2) = \frac{3,587}{4,937} \cdot 100\% \approx 72,7\%, \omega(\text{CaCl}_2) = \frac{1}{4,937} \cdot 100\% \approx 2,0\%$$

$$\omega(\text{BaCl}_2) = \frac{0,35}{4,937} \cdot 100\% \approx 7\%$$

$$4) \text{BaSO}_4 + \text{MgCl}_2 + \text{CaCl}_2 = 8,245$$

$$\omega(\text{BaSO}_4) = \frac{3,658}{8,245} \cdot 100\% \approx 44\%, \omega(\text{MgCl}_2) = \frac{3,587}{8,245} \cdot 100\% \approx 43\%$$

$$\omega(\text{CaCl}_2) = \frac{1}{8,245} \cdot 100\% \approx 12\%$$