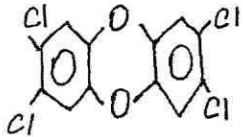


Задание 1.1

A:



2,3,7,8-тетрахлордифензо-пара-диоксин

$$M(\text{вещ-ва}) = 322 \text{ г/моль}$$

$$(\text{C}_{12}\text{H}_4\text{O}_2\text{Cl}_4)$$

$$\begin{cases} 322 \cdot n(A) + 219,5 \cdot n(B) = 100 \\ \frac{n(A)}{n(B)} = 10 \end{cases}$$

$$n(A) = 0,291 \text{ моль}$$

$$n(B) = 0,0291 \text{ моль}$$

$$M(\text{см}) = (0,291 \cdot 4 + 0,0291 \cdot 3) \cdot 35,5 = (1,164 + 0,0873) \cdot 35,5 = 44,42$$

Ответ: 44,42

Задание 2.1

$$m(\text{карбонатина}) = 10 \cdot 5 = 50 \text{ г}$$

$$0,5 = \frac{50}{5 + V} \quad V = 95 \text{ мл - р-ра NaCl } 0,9\%$$

$$1 = \frac{1}{L} \cdot \frac{C_0}{C}$$

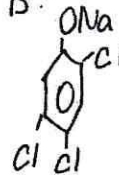
-реа-я 1-го порядка

$$L^{1/2} = \frac{C_0}{C}$$

$$\frac{L^2}{16} = \frac{1}{28} \cdot \frac{C_0}{2 C_0}$$

$$L = 0,2973 = 29,73\% \quad \text{Ответ: } 29,73\%$$

B:



2,4,5-трихлорфенолят натрия

$$M(\text{вещ-ва}) = 219,5 \text{ г/моль}$$

$$(\text{C}_6\text{H}_2\text{Cl}_3\text{ONa})$$

$$n = \frac{m}{M}$$

| | |
|----|----|
| 1 | 6 |
| 2 | 6 |
| 3 | 4 |
| 4 | 4 |
| 5 | 10 |
| 6 | 5 |
| 7 | 12 |
| 8 | 8 |
| 9 | 12 |
| 10 | 18 |

Задание 3.1

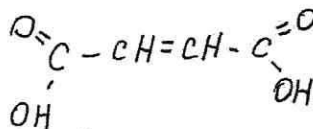
$$n = \frac{m}{M}, w(\%) = \frac{Ar(\text{Э}) \cdot n}{M(\text{В})} \cdot 100\%$$

$$n(\text{KOH}) = 2 \cdot \frac{20}{1000} = 0,04 \text{ моль}$$

$$n(\text{Br}_2) = \frac{160 \cdot 0,02}{160} = 0,02 \text{ моль}$$

$$M = \frac{2,32}{0,02} = 116 \text{ г/моль}$$

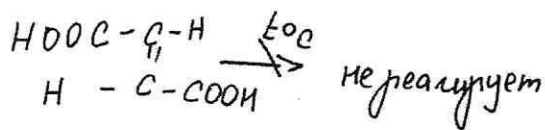
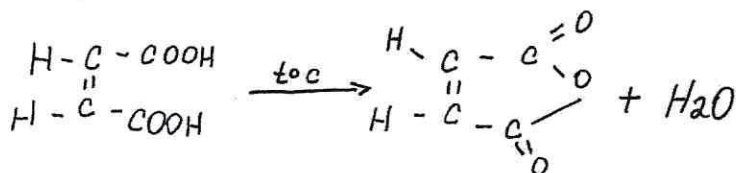
$n(\text{KOH}) : n(\text{Br}_2) = 2 : 1 \Rightarrow$ неупределенная дикарбоновая к-та



пре реакции с Br_2 и с NaOH

$$w(\text{O}) = \frac{16 \cdot 4}{116} \cdot 100\% = 55,17\%$$

$$n(\text{H}_2\text{O}) = \frac{0,2}{18} = 0,0111 \text{ моль}$$



$$w(\text{цис-изомера}) = \frac{0,0111 \cdot 116}{2,32} \cdot 100\% = 55,56\%$$

$$w(\text{транс-изомера}) = 100 - 55,56 = 44,44\%$$

Ответ: $w(\text{цис-изомера}) = 55,56\%$; $w(\text{транс-изомера}) = 44,44\%$

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Задача ч.1

$$M(\text{желтого осадка}) = \frac{127 \cdot n}{0,967} = 131,33_n \text{ г/моль}$$

$$n = \frac{m}{M}$$

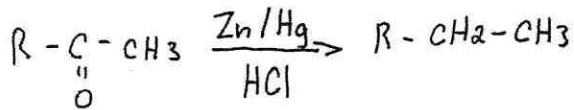
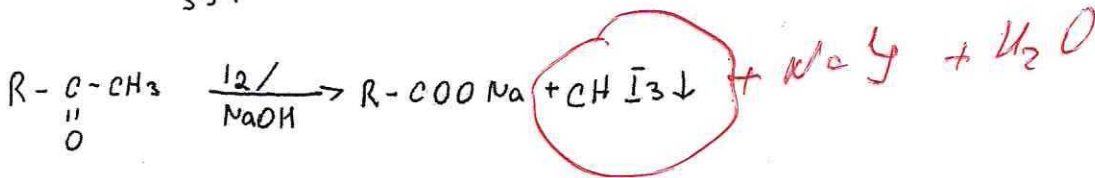
$$M = \frac{m}{n}$$

$$\omega(\text{I}) = \frac{An(\text{I}) \cdot n}{M} \cdot 100\%$$

Если $n = 3$, то $M(\text{желтого осадка}) = 394 \text{ г/моль}$

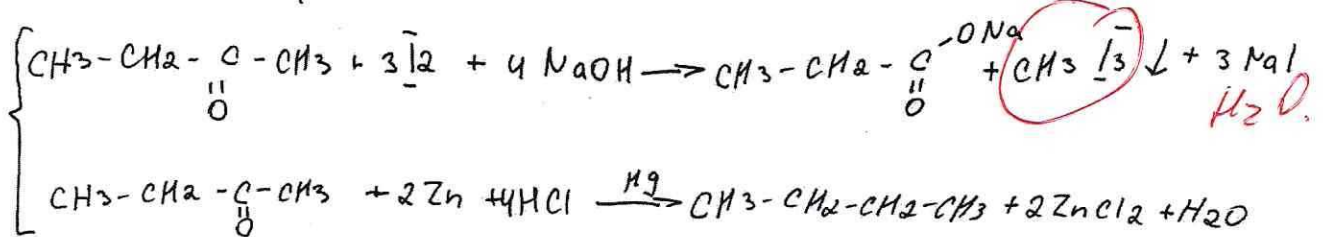
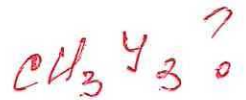
Желтый осадок = $\text{CHI}_3 \downarrow$

$$\omega(\text{I}) = \frac{12}{394} \cdot 100\% = 3,05\%$$



$$n(\text{CHI}_3) = \frac{19,7}{394} = 0,05 \text{ моль} = n(\text{R-COONa})$$

$$M(\text{R-COONa}) = \frac{4,8}{0,05} = 96 \text{ г/моль} \Rightarrow \text{CH}_3-\text{CH}_2-\text{COONa}$$



$$\eta = \frac{2,61}{0,05 \cdot 58} \cdot 100\% = 90\% \text{ (выход реакции)}$$

$$m(\text{I}_2) = 0,05 \cdot 3 \cdot 254 = 38,1 \text{ г}$$

Ответ: выход реакции = 90%, $m(\text{I}_2) = 38,1 \text{ г}$

Задание 5.1

$$K_s^0 = [Ca^{2+}] \cdot [OH^-]^2 = 6,2 \cdot 10^{-6} = S \cdot (2 \cdot S)^2 = 4 \cdot S^3$$

$$S = \sqrt[3]{\frac{K_s^0}{4}} = \sqrt[3]{\frac{6,2 \cdot 10^{-6}}{4}} = 0,0116 \text{ моль/л}$$

$$0,0116 = \frac{2}{74 \cdot \nu(H_2O)} \Rightarrow \nu(H_2O) = 2,335 \text{ л}$$

$$[OH^-] = 2 \cdot S = 2 \cdot 0,0116 = 0,0231 \text{ моль/л}$$

$$pOH = -\lg [OH^-] = 1,64$$

$$pH = 14 - pOH = 12,36$$

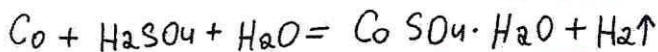
Ответ: $\nu(H_2O) = 2,335 \text{ л}$, $pH = 12,36$

Задание 6.1

$$M(NaXO_2) = \frac{23 + 16 \cdot 2}{1 - 0,5175} = 114 \text{ г/моль}$$

$$NaXO_2 - NaCoO_2 \quad X = Co \quad \omega(Co) = \frac{59}{114} \cdot 100\% = 51,8\% \quad (\text{как в задаче})$$

— по формуле молярная масса?

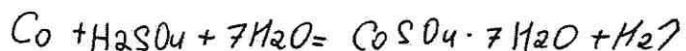


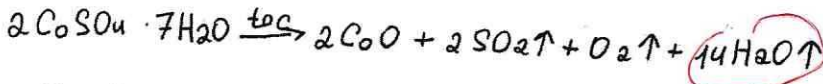
$$\frac{(4 + X) \cdot 16}{2 \cdot X \cdot 1} = 12,57 \text{ (раз)}$$

$$X = 7 \Rightarrow CoSO_4 \cdot 7H_2O \text{ (А) (голубого цвета)}$$

$$pV = nRT$$

$$n(\text{газов}) = \frac{1 \cdot 4,4}{0,082 \cdot 298} = 0,18 \text{ моль}$$

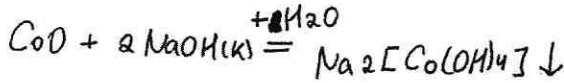




н.у. H_2O - не считаем.

B = CoO (темно-зеленого цвета)

C = $\text{Na}_2[\text{Co}(\text{OH})_4]$



$$\left(\frac{n}{m} = \frac{V}{V_m}, V_m = 22,4 \text{ л} \right)$$

$$n(\text{CoSO}_4 \cdot 7\text{H}_2\text{O}) = \frac{0,13}{17} \cdot 2 = 0,0212 \text{ моль}$$

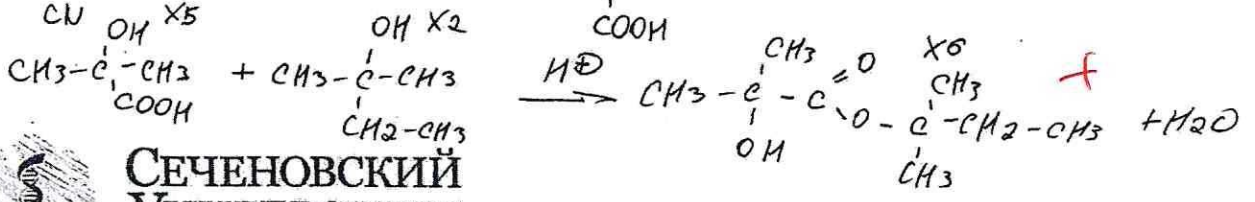
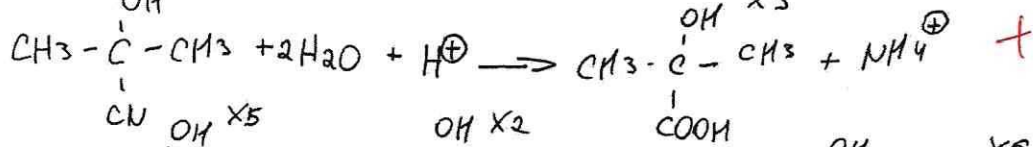
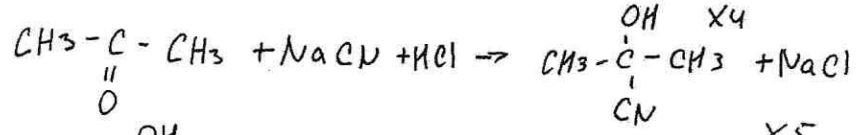
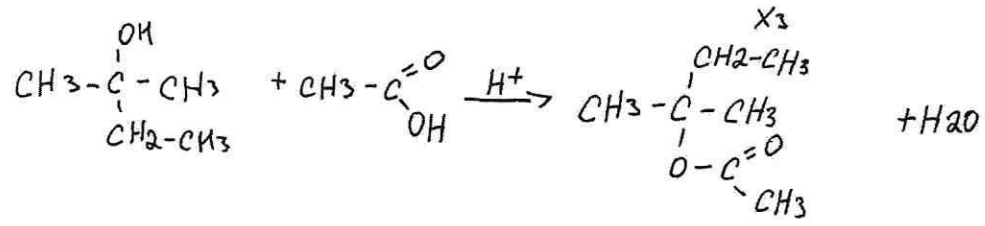
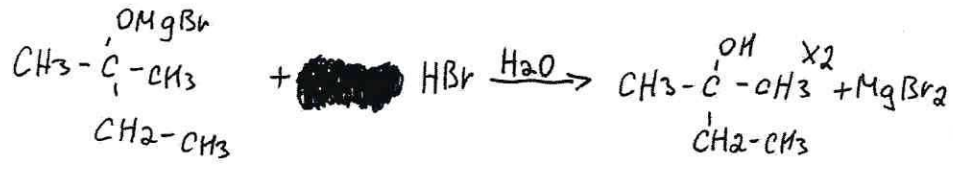
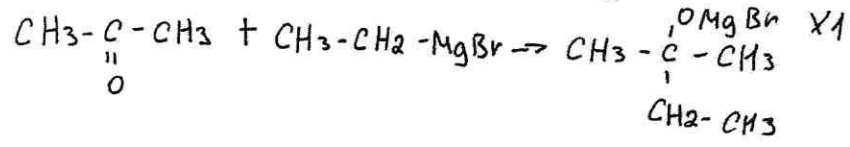
$$\frac{4,4}{22,4} = 0,196$$

$$V_{\text{CO}} = \frac{0,196 \cdot 2}{3} = 0,261 \text{ л}$$

$$m(\text{CoSO}_4 \cdot 7\text{H}_2\text{O}) = 0,0212 \cdot 281 = 5,957$$

$$m(\text{Na}_2[\text{Co}(\text{OH})_4]) = 0,0212 \cdot 173 = 3,66 \text{ г}$$

Задание 7.1



18.1

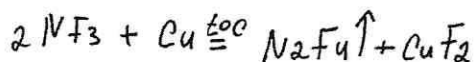
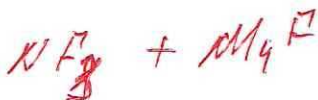
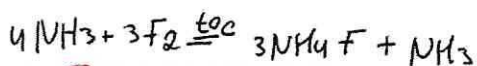
$$17x + 38(1-x) = 26$$

$$x = 0,5714$$

$$n(\text{NH}_3) : n(\text{F}_2) = 0,5714 : (1 - 0,5714) = 1,33 : 1 = 4 : 3$$

$$M(\text{газа}) = 3,168 \cdot 22,4 = 71 \text{ г/моль} \quad \text{газ 1} = \text{NF}_3 \uparrow$$

$$M(\text{газа 2}) = 71 \cdot 1,486 = 104 \text{ г/моль} \quad \text{газ 2} = \text{N}_2\text{F}_4 \uparrow$$



+

$$n(\text{NF}_3) : n(\text{CuF}_2) = 6 : 1$$

$$w(\text{NF}_3) = \frac{6 \cdot 67}{6 \cdot 67 + 1 \cdot 108} \cdot 100\% = 68,52\%$$

$$w(\text{CuF}_2) = 100 - 68,52\% = 31,48\%$$

19.1

$$\frac{12}{13} M_1 + \frac{1}{13} M_2 = 74$$

$$12M_1 + M_2 = 962$$

$$M_1 = 71 \text{ г/моль} - \text{K}_2\text{O}$$

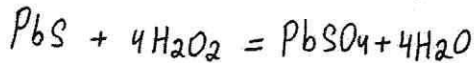
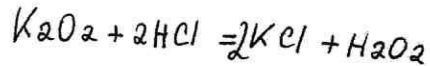
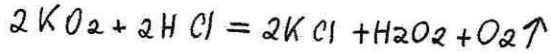
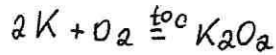
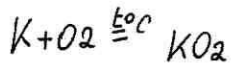
$$M_2 = 110 \text{ г/моль} - \text{K}_2\text{O}_2$$

$$X = \text{K}_2\text{O} \quad Y = \text{K}_2\text{O}_2 \quad A = \text{O}_2$$



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$$n(PbS) = \frac{2,51}{239} = 0,0105 \text{ моль}$$

$$n(H_2O_2) = 0,0105 \cdot 4 = 0,042 \text{ моль}$$

$$\begin{cases} 0,5n(KO_2) + n(K_2O_2) = 0,042 \\ \frac{n(KO_2)}{n(K_2O_2)} = 12 \end{cases}$$

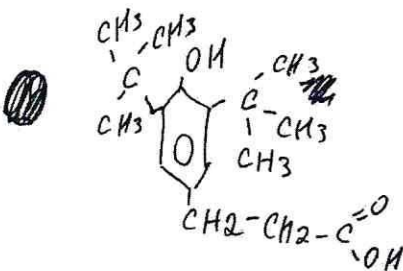
+

$$n(KO_2) = 0,072 \text{ моль} ; n(K_2O_2) = 0,006 \text{ моль}$$

$$m(K) = (0,072 + 0,006 \cdot 2) \cdot 39 = 3,276 \text{ г}$$

$$V(O_2) = \frac{0,072}{2} \cdot 22,4 = 0,8064 \text{ л}$$

Задача 10.1

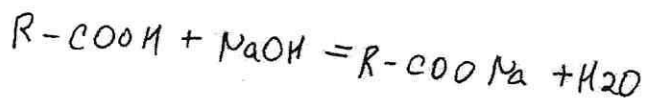
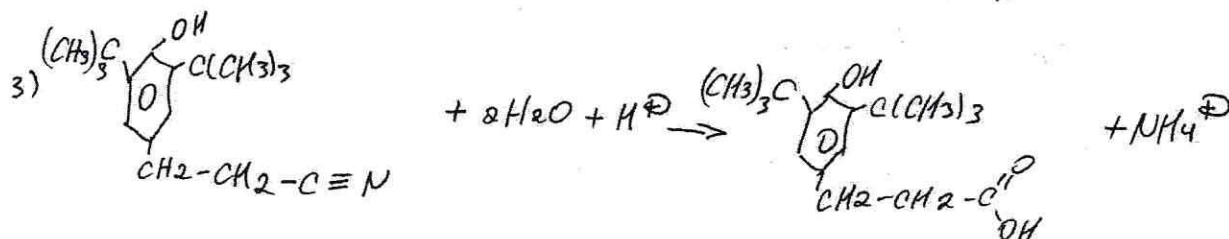
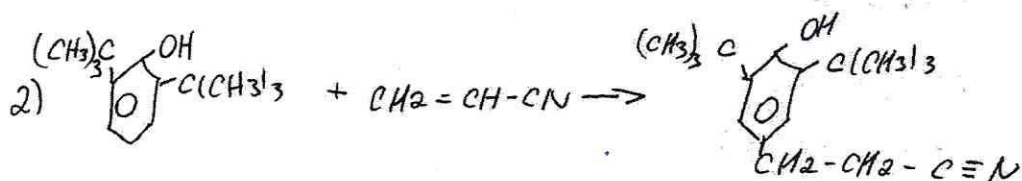
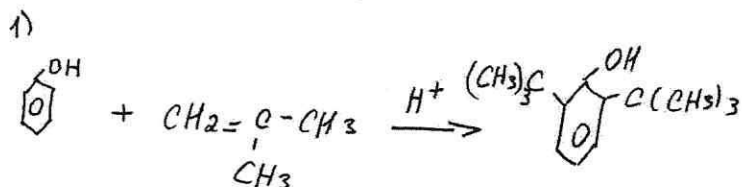


фенилоксановая к-та



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$$c = \frac{6,80 \cdot 0,1}{10,0} = 0,068 \text{ моль/л}$$

$$m = 0,068 \cdot \frac{50}{100} \cdot 272 = 0,9452 \text{ г}$$

(грензачюваа к-та)

$$\omega = \frac{0,9452}{0,995} \cdot 100\% \approx 95\%$$

Ответ: ω (к-та) = 95%