



61-50-22-94
(38.8)



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МОСКОВСКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ ИМЕНИ М.В.ЛОМОНОСОВА

Вариант 1

Место проведения Москва
город

ПИСЬМЕННАЯ РАБОТА

Олимпиада школьников по химии
наименование олимпиады

по химии
профиль олимпиады

Рожинской Софьи Саввичесны
фамилия, имя, отчество участника (в родительном падеже)

Дата
«01» 03 2026 года

Подпись участника
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Учетомик

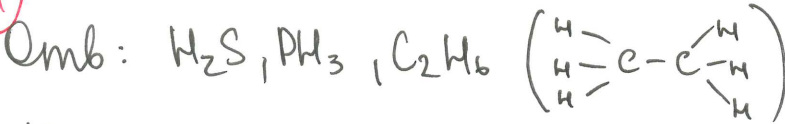
N1.

$$M(r) = 2,125 \cdot 16 = 34 \text{ г/моль}$$

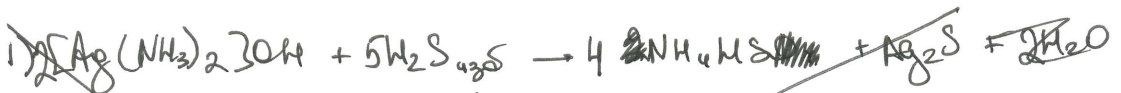
газ:

$$\text{H}_2\text{S} \quad n(e) = 16 + 2 = 18 \rightarrow n(e)_{\text{H}_2\text{S}} = n(e)_{\text{C}_2\text{H}_6} = 18$$

PH₃



N3.



5)

6)

2)

N4



$$K_P(\text{PbPbO}_2) = [\text{Pb}^{2+}][\text{PbO}^-]^2$$

$$5 \cdot 10^{-5} = x_1 \cdot (2x_2)^2$$

$$x = 0,0232 \text{ M} = [\text{Pb}^{2+}] = c(\text{PbPbO}_2)$$

$$[\text{Pb}^{2+}] = c(\text{PbPbO}_2) = 0,0232 \frac{\text{моль}}{\text{л}}$$

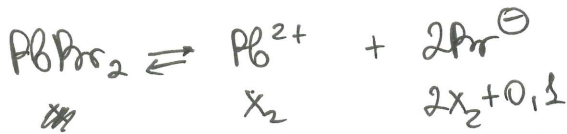
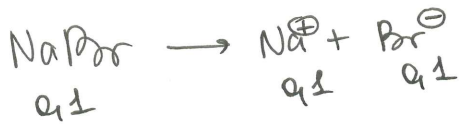
$$a(\text{PbPbO}_2) = \frac{0,0232 \cdot (207 + 80 \cdot 2)}{1 \text{ л}} = 8,514 \text{ г/л}$$

Омб: $c(\text{PbPbO}_2) = 0,0232 \text{ M}; a(\text{PbPbO}_2) = 8,514 \frac{\text{г}}{\text{л}}$

1	2	3	4	5	6	7	8
6	12	8	16	2	20	18	82

Средняя температура
Мед / Окисл

Именован



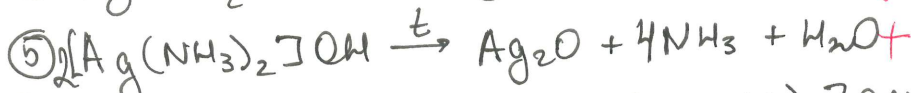
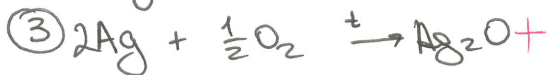
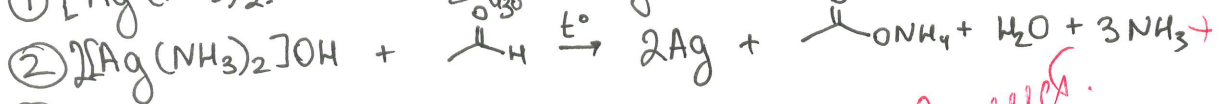
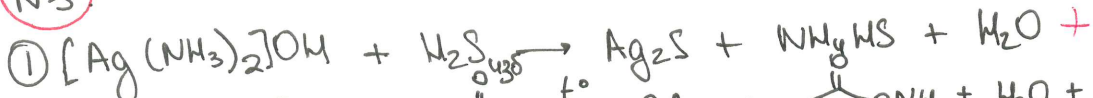
$$5 \cdot 10^{-5} = x_2 \cdot (2x_2 + 0,1)^2$$

$$x_2 = 4,25 \cdot 10^{-3} \text{ M} = [\text{Pb}^{2+}]_2$$

$$\frac{[\text{Pb}^{2+}]_1}{[\text{Pb}^{2+}]_2} = \frac{0,0232 \text{ M}}{4,25 \cdot 10^{-3} \text{ M}} = 5,46 \text{ раз.}$$

Отв.: в 5,46 раз меньше. (+)

N3



Ag₂O неуст.

N2.



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Чистовик

$$m(\text{Al} - 92) = 20 \cdot 760 = 15200 \text{ кг}$$

$$0,07 = \frac{740 \cdot V \cdot 0,07}{740V + 15200}$$

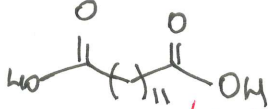
$$V =$$

см на DP . ^{Задача} №2

Задача 5.

$$M(\text{H}_n\text{X}) = \frac{16n}{0,2623} = 61n$$

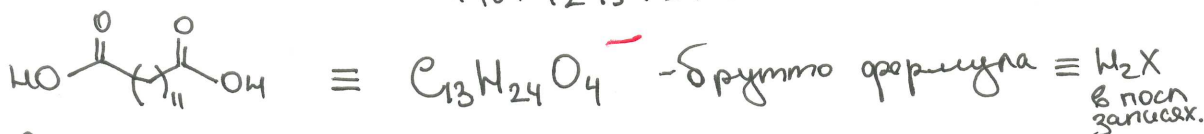
при $n=4$:



не консервант

~~$$M(\text{H}_2\text{X}) = 24$$~~

$$\omega(\text{O}) = \frac{4 \cdot 16}{4 \cdot 16 + 12 \cdot 13 + 24 \cdot 1} = 0,2623 - \text{сходится.}$$



$$n(\text{CO}_2) = n(\text{BaCO}_3) = \frac{m(\text{BaCO}_3)}{M(\text{BaCO}_3)} = \frac{13,8\text{ г}}{(137 + 60) \text{ г/моль}} = 0,07 \text{ моль}$$

$$n(\text{C}_{13}\text{H}_8\text{O}_4) = \frac{n(\text{CO}_2)}{13} = 5,4 \cdot 10^{-3} \text{ моль}$$

$$Q_{\text{ср}} = \frac{Q}{n(\text{C}_{13}\text{H}_8\text{O}_4)} = \frac{32,28 \text{ кДж}}{5,4 \cdot 10^{-3} \text{ моль}} = 5977,78 \frac{\text{кДж}}{\text{моль}} = Q_{\text{ср}}(\text{H}_2\text{X})$$

$$Q_{\text{рп}} = 12 Q_{\text{ср}}(\text{H}_2\text{O}) + 13 Q_{\text{ср}}(\text{CO}_2) - Q_{\text{ср}}(\text{H}_2\text{X})$$

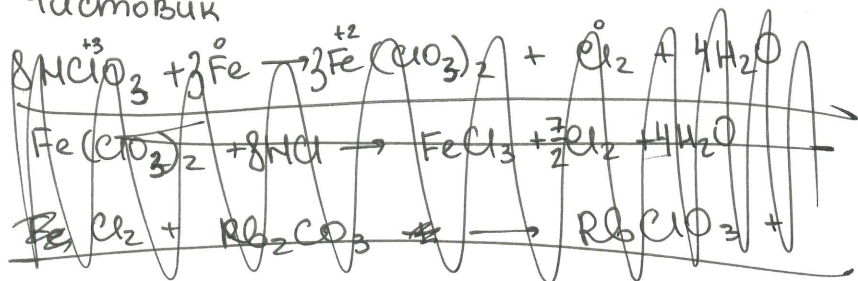
$$5977,78 = 12 \cdot 285,8 + 13 \cdot 393,5 - Q_{\text{ср}}(\text{H}_2\text{X})$$

$$Q_{\text{ср}}(\text{H}_2\text{X}) = 2567,32 \frac{\text{кДж}}{\text{моль}}$$

Ответ: $Q_{\text{ср}}(\text{H}_2\text{X}) = 5977,78 \frac{\text{кДж}}{\text{моль}}$

$$Q_{\text{ср}}(\text{H}_2\text{X}) = 2567,32 \frac{\text{кДж}}{\text{моль}}$$

Чистовик



В во в р-ре 1: $\text{Fe}(\text{ClO}_3)_2$

В во в р-ре 2: FeCl_3

X - Cl_2 - светло-зел. газ

Y - RbClO_3

$$n(\text{Cu}) = \frac{19,2\text{г}}{64\text{г/моль}} = 0,3\text{ моль}$$

$$n(\text{FeCl}_3) = 2n(\text{Cu}) \text{ (по ур-ю реакции } \textcircled{5} \text{)}$$

$$n(\text{FeCl}_3) = 0,3 \cdot 2 = 0,6\text{ моль.}$$

$$n(\text{Fe}) = n(\text{FeCl}_3) = 0,6\text{ моль (по ур-ю реакции)}$$

$$m(\text{Fe}) = n(\text{Fe}) M(\text{Fe}) = 0,6\text{ моль} \cdot 56\text{ г/моль} = \underline{33,6\text{ г.}}$$

Ответ: $m(\text{Fe}) = 33,6\text{ г.}$ +

Задача. 2.



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$m(\text{Al-92}) = 15200 \text{ кг}$

Смешан

~~$\rho(\text{Al}) = \frac{15200}{740 + 15200}$~~

~~$\rho(\text{Al}) = \frac{15200}{15200 + 740}$~~

~~$\rho(\text{Al}) = 7\% = 0,07$~~

Окисл. щело Al-92 = 92

⇓

нам нужен 0,07 % МТБЭ

~~$0,07 = \frac{m(\text{МТБЭ})}{m(\text{МТБЭ}) + m(\text{Al-92})}$~~

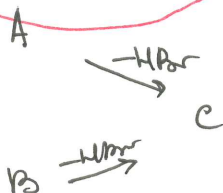
$\omega(\text{МТБЭ}) = \frac{m(\text{МТБЭ})}{m(\text{МТБЭ}) + m(\text{Al-92})} =$

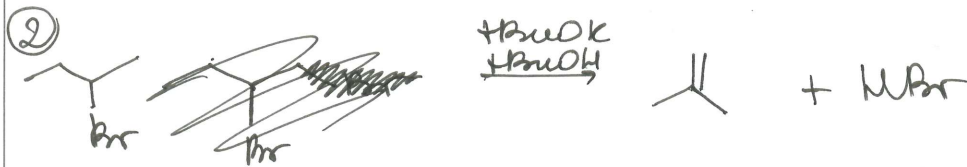
$\frac{m(\text{МТБЭ})}{m(\text{МТБЭ}) + 15200} = 0,07$

$m(\text{МТБЭ}) = 1144,1 \text{ кг}$

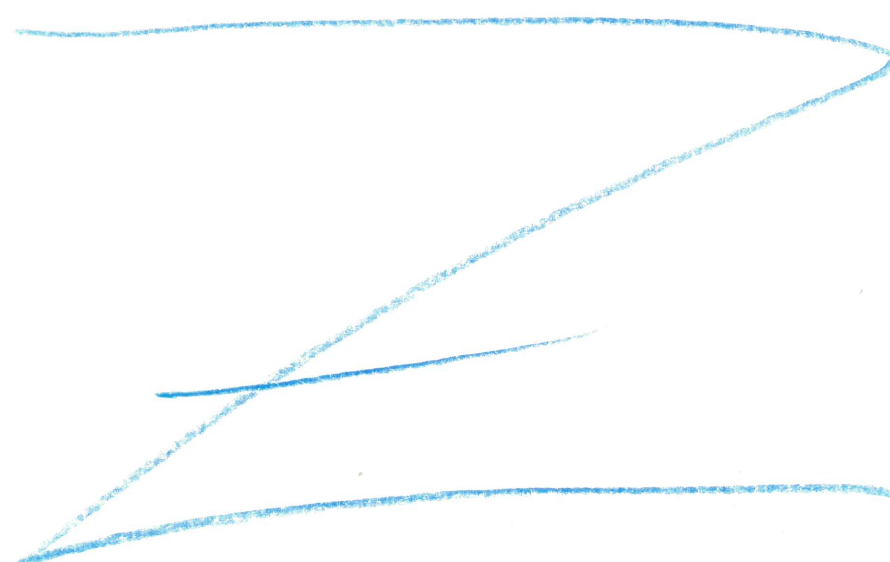
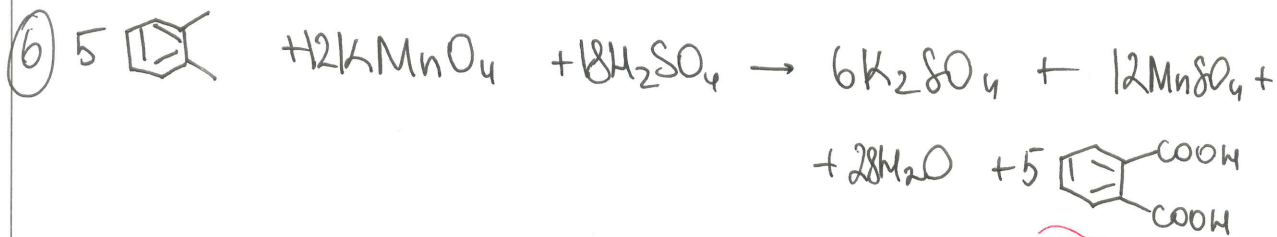
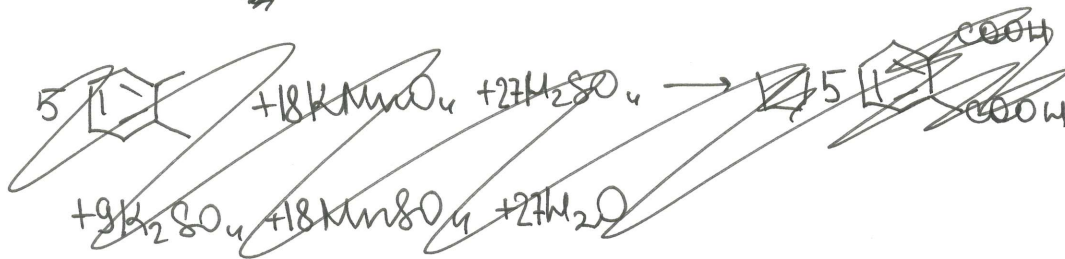
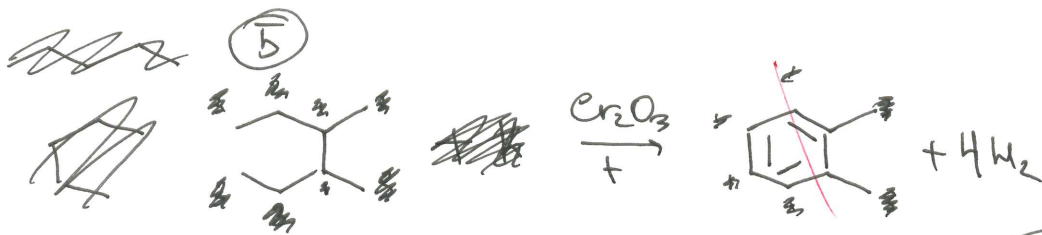
$V(\text{МТБЭ}) = \frac{m(\text{МТБЭ})}{\rho(\text{МТБЭ})} = \frac{1144,1 \text{ кг}}{740 \text{ кг/м}^3} = 1,55 \text{ м}^3$

Задача 7.



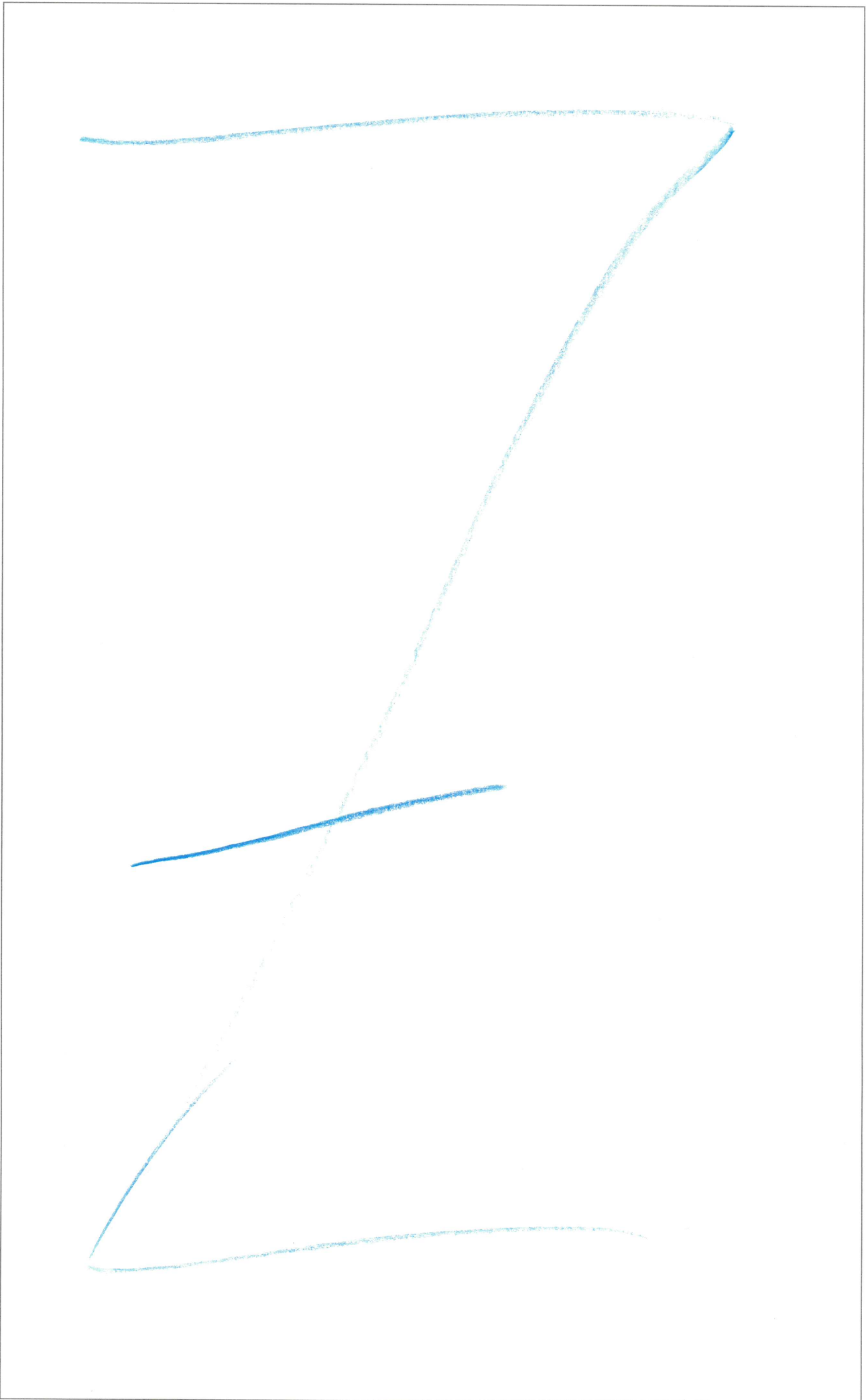


7





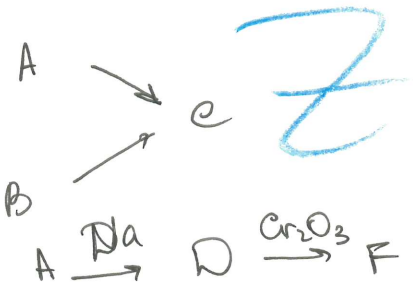
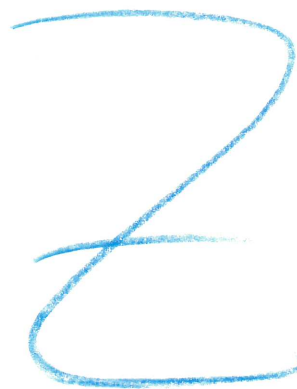
ЛИСТ-ВКЛАДЫШ



Подписывать лист-вкладыш запрещается! Писать на полях листа-вкладыша запрещается!

Черновик

~~еа~~



$$m = 15200$$

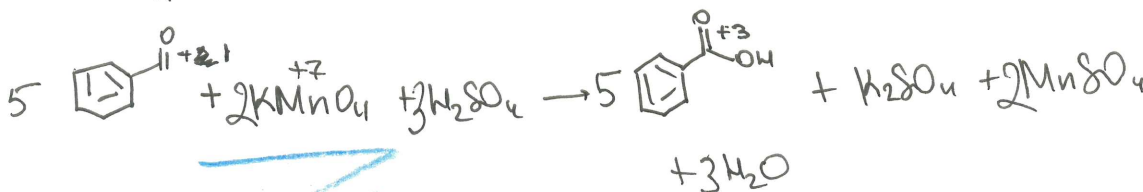
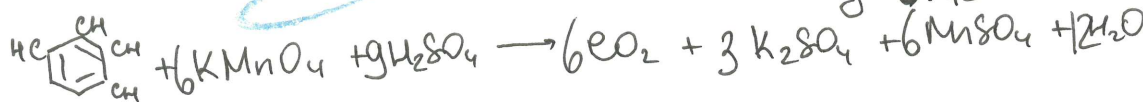
$$m(\text{MTБЭ}) = 740V$$

$$m(\text{MTБЭ}) = 740 \cdot 0,07V =$$

$$0,07 = \frac{x}{15200 + y}$$

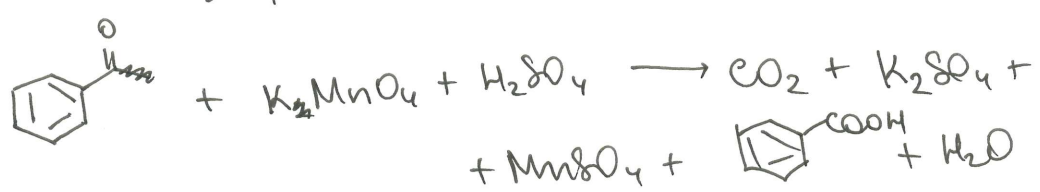
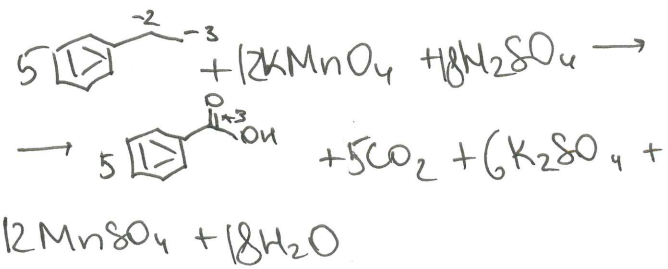
$$1064 + 0,07y = x \quad y = \frac{x - 1064}{0,07}$$

$$y = 14,3x - 15200$$

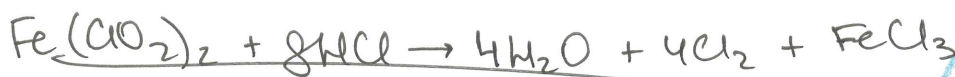
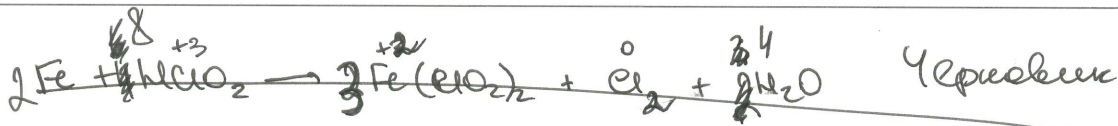


$$n(\text{F}) = \frac{5 \cdot 0,12}{n}$$

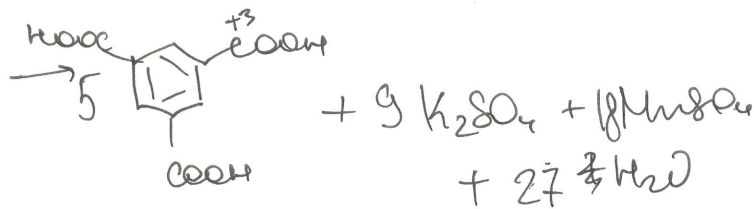
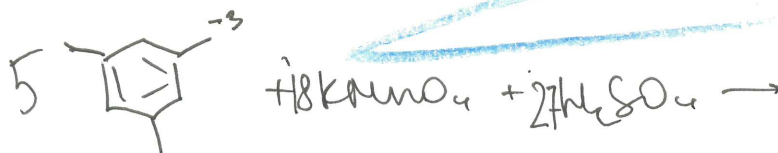
$$M(\text{F}) = \frac{5,3n}{5 \cdot 0,12}$$



$$0,05 \cdot x = 0,012$$



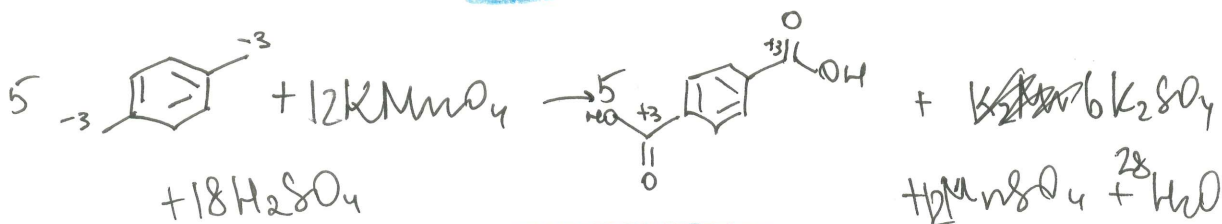
1
2
3
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7



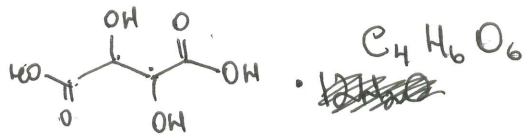
15200

$$0,07 = \frac{x}{x+15200}$$

x =

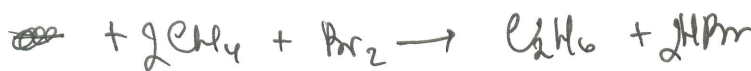
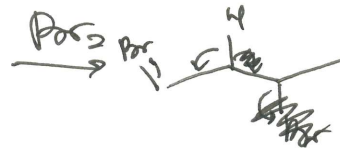


Чернолим

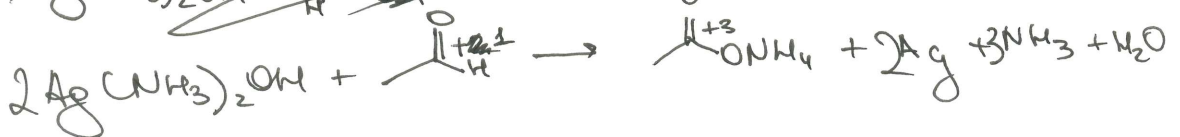
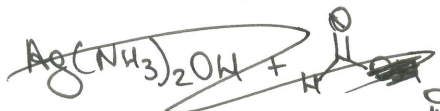


$n(Al_2O_3) = 0,07 = n(CO_2)$

122 -



$m(Ag_2) = 15200 \text{ кг}$

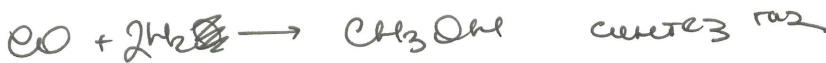
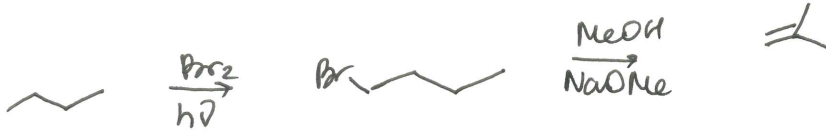
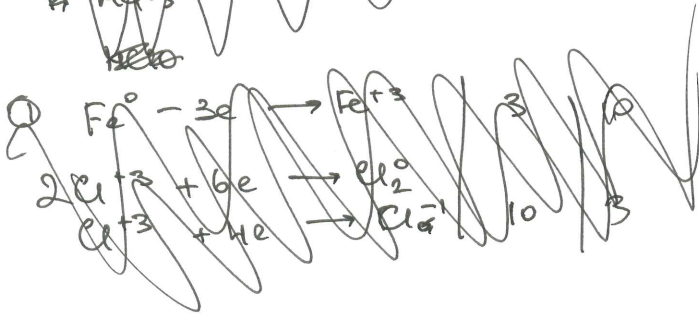
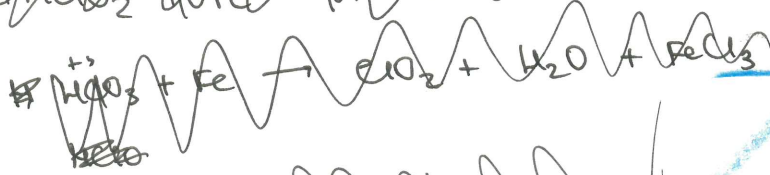


$3 \cdot 2 + 1 + 8 + 1 = 3 + 4 + 3$

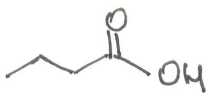
Черновик

N2.

$m(\text{Al-92}) = 15200 \text{ кг}$

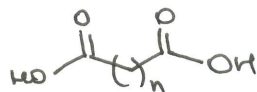
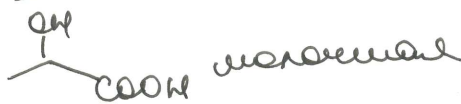
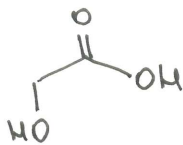


122



~~$122 - 16 \cdot 2 - 1 - 12 =$~~

~~$77 = 12x + 2x + 1 =$~~



~~$244 - 32 \cdot 2 - 2 - 12 \cdot 2 =$~~