

0 090925 230002  
09-09-25-23  
(38.8)



*Химия*

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

Кузнецовой Марины Алексеевны  
фамилия, имя, отчество участника (в родительном падеже)

Дата

« 01 » марта 2026 года

Подпись участника

09-09-25-23  
(38.8)

1	2	3	4	5	6	7	Σ
6	10	8	16	14	20	20	94

Дум / ринутин  
 ММ / Числов  
 94  
 девятосмо  
 летин

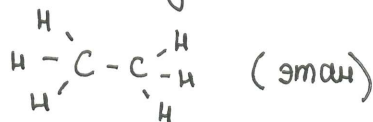
Чистовик

Задание 1

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

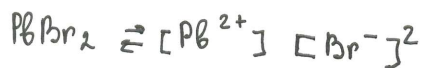
Два газообразных в-ва:  $\text{H}_2\text{S}$  и  $\text{PH}_3$   
 сероводород фосфин

Число  $\bar{e} = 18$  - это соответствует:  $\text{C}_2\text{H}_6$



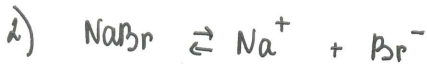
Задание 4

1)  $PP(\text{PbBr}_2) = 5 \cdot 10^{-5}$



$$S_{\pm}^{\frac{x+y}{x^x y^y}} = \sqrt[3]{\frac{K_s}{2^2}} = \sqrt[3]{\frac{5 \cdot 10^{-5}}{2^2}} = 0,0232 \text{ моль/л}$$

$$S_{\pm} = 0,0232 \cdot 367 = 8,5144 \text{ г/л}$$



$$c(\text{NaBr}) = c(\text{Br}^-) = 0,1 \text{ M}$$

Пусть  $x = [\text{Pb}^{2+}]$ ;  $(x + 0,1)^2 = [\text{Br}^-]$

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

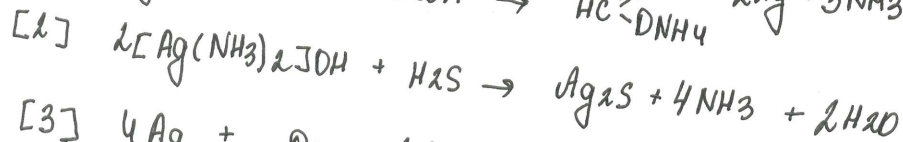
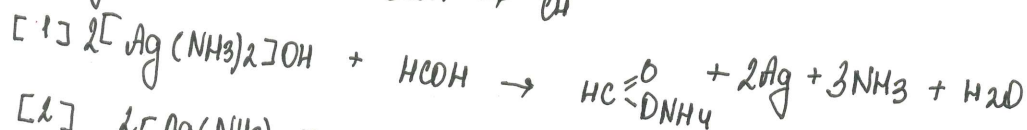
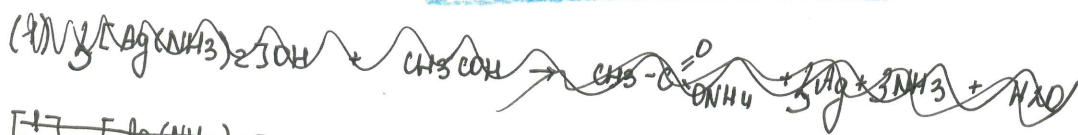
$$x_{\pm} = 4,57232 \cdot 10^{-3} \text{ M}$$

$$\frac{S_1}{x_1} = \frac{0,0232}{4,57232 \cdot 10^{-3}} = 5,076 - \text{во столько раз } \begin{matrix} \text{меньше} \\ \text{окажется} \\ \text{растворимость} \end{matrix}$$

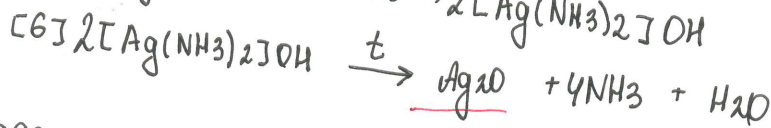
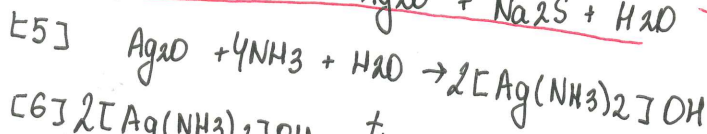
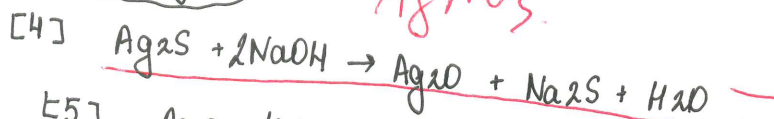
Ответ:  $S_{\pm} = 0,0232 \text{ моль/л}$   
 $S_{\pm} = 8,5144 \text{ г/л}$   
 в 5,076 раз

Чистовик

Задача 3



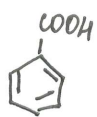
$x - \text{Ag}_2\text{O} - \text{Ag}_2\text{MO}_3$



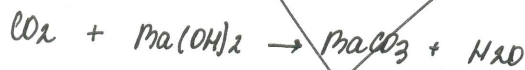
Задача 5

$w(\text{O}) = 0,1613 \Rightarrow m(\text{к-то}) = \frac{32}{0,1613} = 198,9 \text{ г/моль}$

$198,9 - m(\text{COOH}) = 77,9 \text{ г/моль} \Rightarrow \text{C}_6\text{H}_5 \Rightarrow \text{Кислота:}$

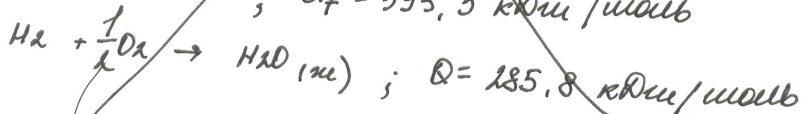
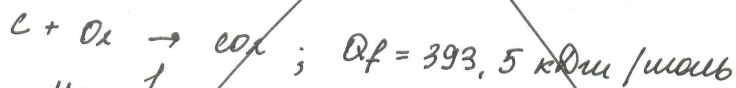


$Q = 31,18 \text{ кДж}$



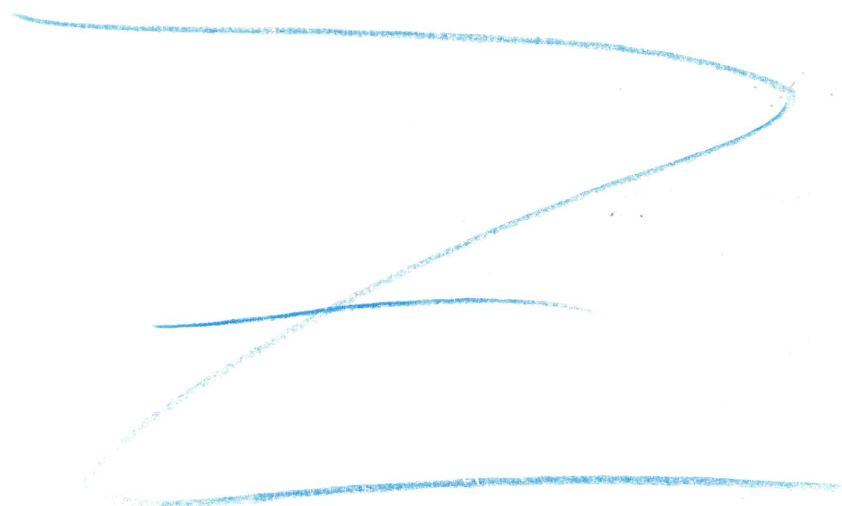
$m(\text{CaCO}_3) = 13,8 \text{ г}$

$n(\text{CaCO}_3) = \frac{13,8}{100} = 0,138 \text{ моль}$



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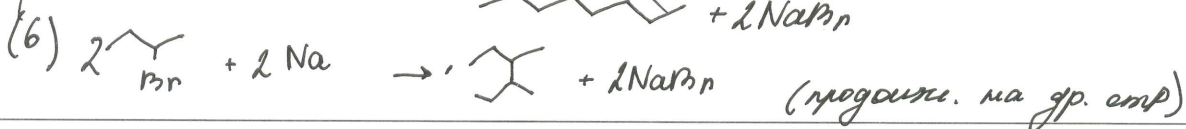
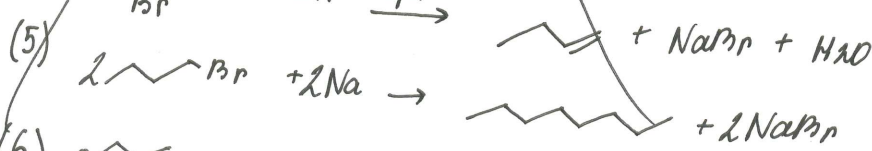
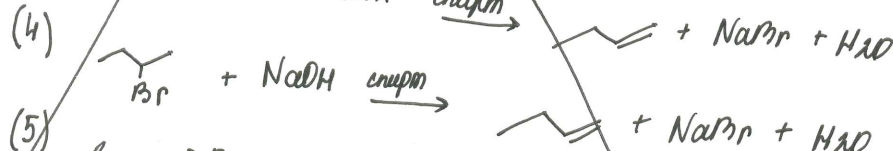
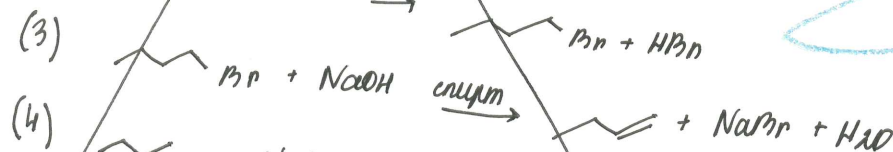
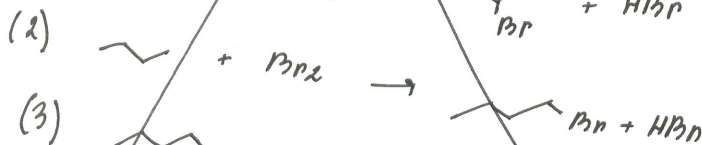
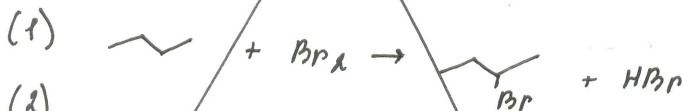
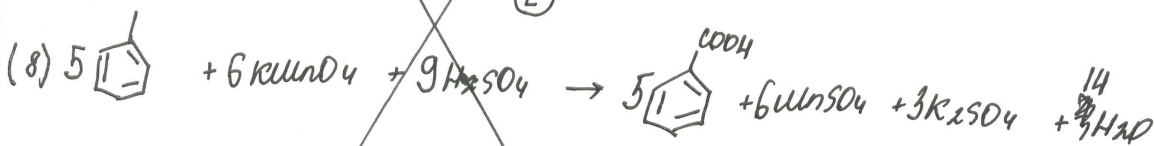
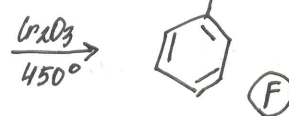
Чистовик



Задача 7

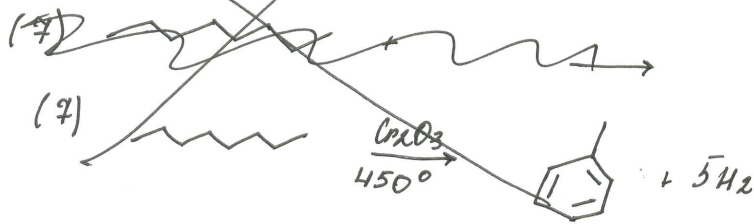
F - ароматич. углеводород и при р-ции  $K_2Cr_2O_7 + H_2SO_4$  не бeгe-  
шается  $CO_2 \Rightarrow$  c1ccccc1

Значит:

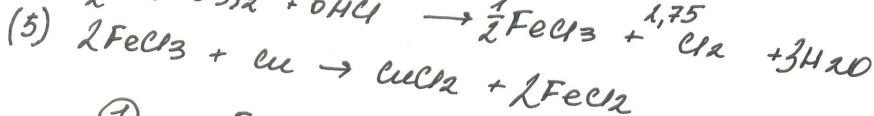
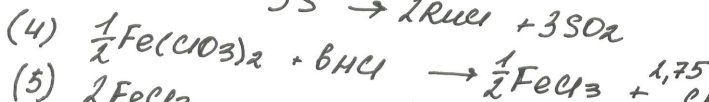
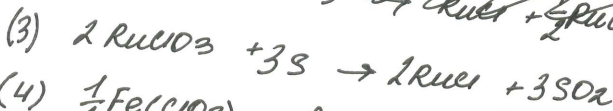
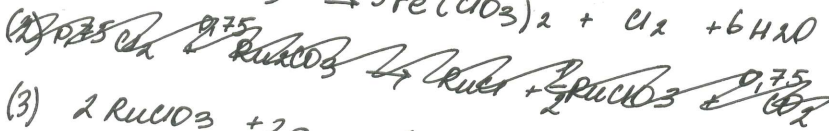
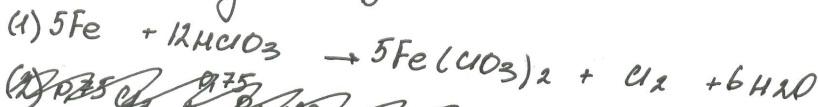


Чистовик

Задача 7 (подобрание)



Задача 6



① -  $Fe(ClO_3)_2$

② -  $FeCl_3$

③ -  $Cl_2$

④ -  $RuClO_3$

⊕

$n(Cu) = \frac{19,2}{64} = 0,3 \text{ моль} = n(FeCl_3) = 0,6 \text{ моль}$

~~$n(FeCl_3) = n(FeClO_3)_2 = 0,6 \text{ моль}$~~

~~$n(FeClO_3)_2 = n(Fe) = 0,6 \text{ моль}$~~

$m(Fe) = 0,6 \cdot 56 = 33,6 \text{ г}$

Ответ: 33,6 г



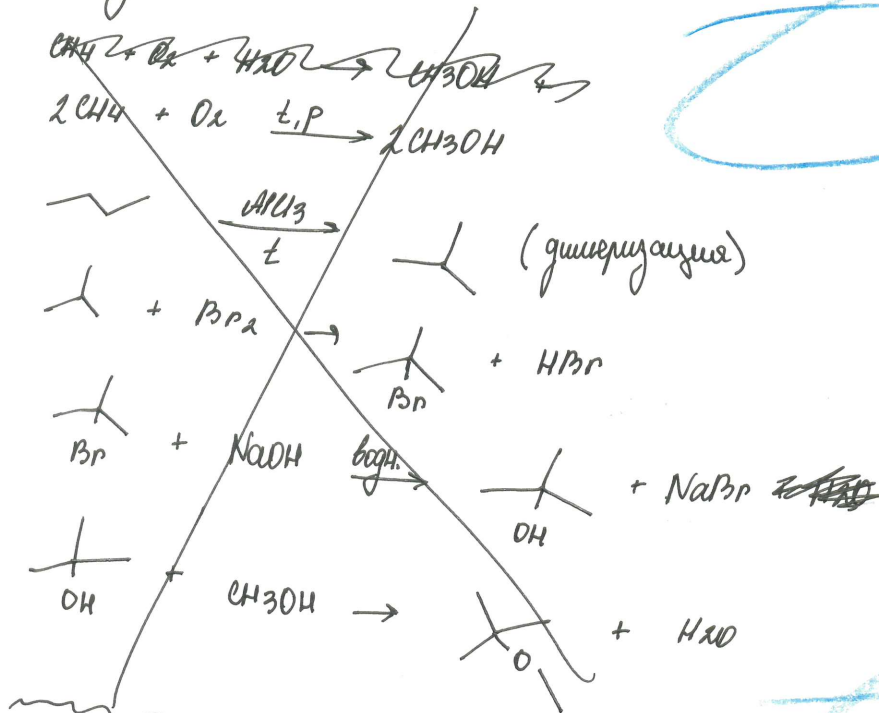
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Исходные

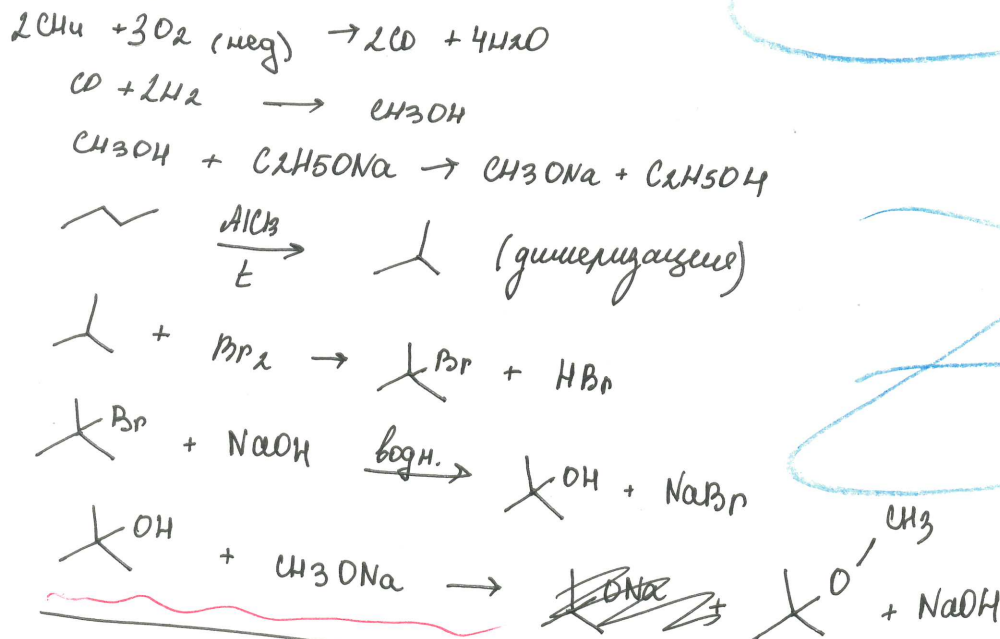
Задача 1



Синтез:



Синтез:



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

$$\Rightarrow m(\text{ШТБЭ}) = 1144 \text{ мг}$$

$$V(\text{ШТБЭ}) = \frac{1144}{740} = 1,546 \text{ мл}$$

Ответ:  $V = 1,546 \text{ мл}$

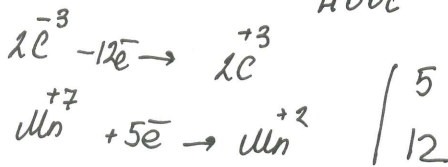
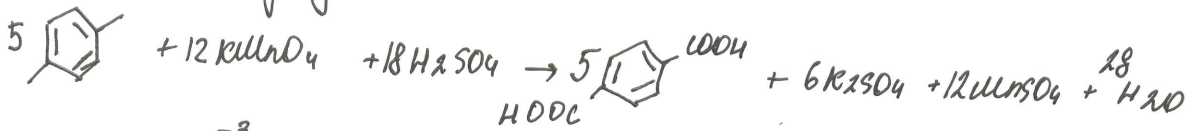
Задача 7

Условие

F - ароматич. соед.е, не вод. из., значит: c1ccccc1 или c1ccccc1C или c1ccccc1C(C)C

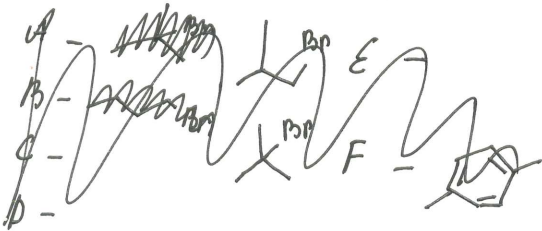
$n(\text{KMnO}_4) = 0,3 \cdot 0,4 = 0,12 \text{ моля}$

Писали р-цию для каждого из возможных вариантов и считали, подходит или нет



$n(\text{C}_6\text{H}_6) = \frac{0,12 \cdot 5}{12} = 0,05 \text{ моля}$

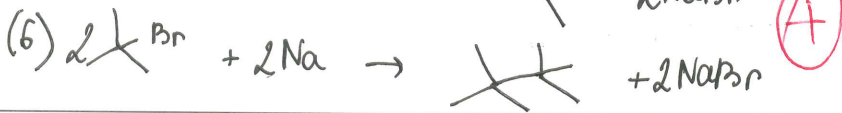
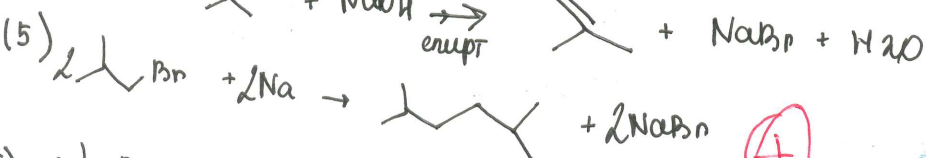
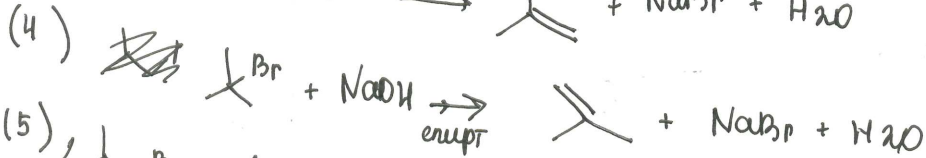
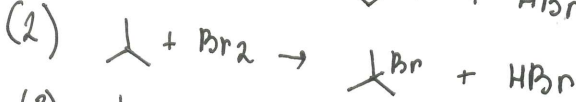
$m(\text{C}_6\text{H}_6) = 106 \cdot 0,05 = 5,3 \text{ г}$  - подходит по условию



- A - CC(C)C
- B - CC(C)C
- C - CC(C)C
- D - CCCC
- E - CC(C)(C)C
- F - c1ccccc1

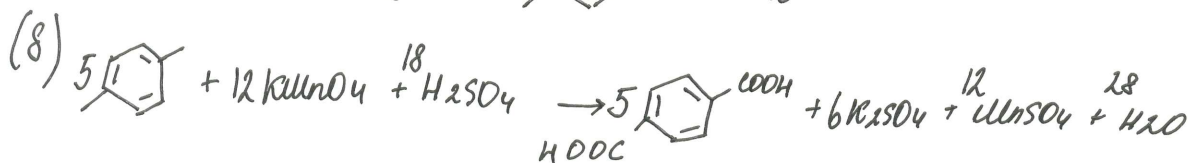
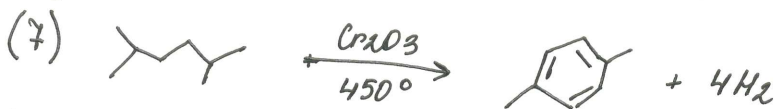


~~(4)~~



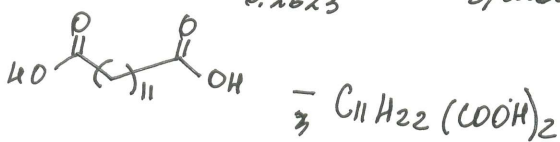
Чистовик

Задача 7

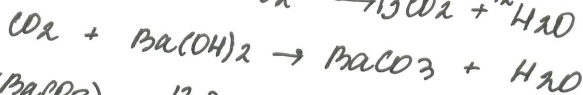
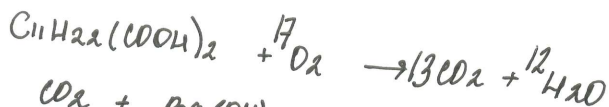


Задача 5

$n(\text{к-то}) = \frac{64}{0.2623} = 244 \text{ г/моль} \Rightarrow C_{11}H_{22}(COOH)_2$



консервант?



$n(BaCO_3) = \frac{13.8}{197} = 0.07 \text{ моль}$

~~Q<sub>сгор</sub> = Q<sub>сгор</sub>~~

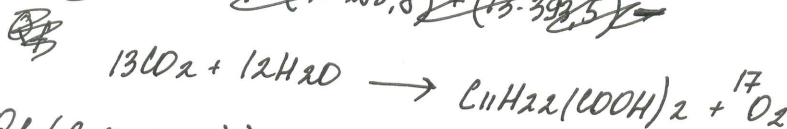
$Q_{сжиг} = n(\text{к-то}) = 5.385 \cdot 10^{-3} \text{ моль}$

$Q_f(CO_2) = 393.5 \text{ кДж/моль}$

$\frac{32.28}{5.385 \cdot 10^{-3}} = 5994.4 \text{ кДж/моль}$

$Q_f(H_2O_{ж}) = 285.8 \text{ кДж/моль}$

~~$Q_{сгор}(\text{к-то}) = (12 \cdot 285.8) + (13 \cdot 393.5)$~~



$Q_f(C_{11}H_{22}(COOH)_2) + 17 Q_f(O_2) - 13 Q_f(CO_2) - 12 Q_f(H_2O) = -32.28 \text{ кДж}$

$x - 13 \cdot 393.5 - 12 \cdot 285.8 = -32.28$

$Q_f(C_{11}H_{22}(COOH)_2) = 8512.8 \text{ кДж/моль}$

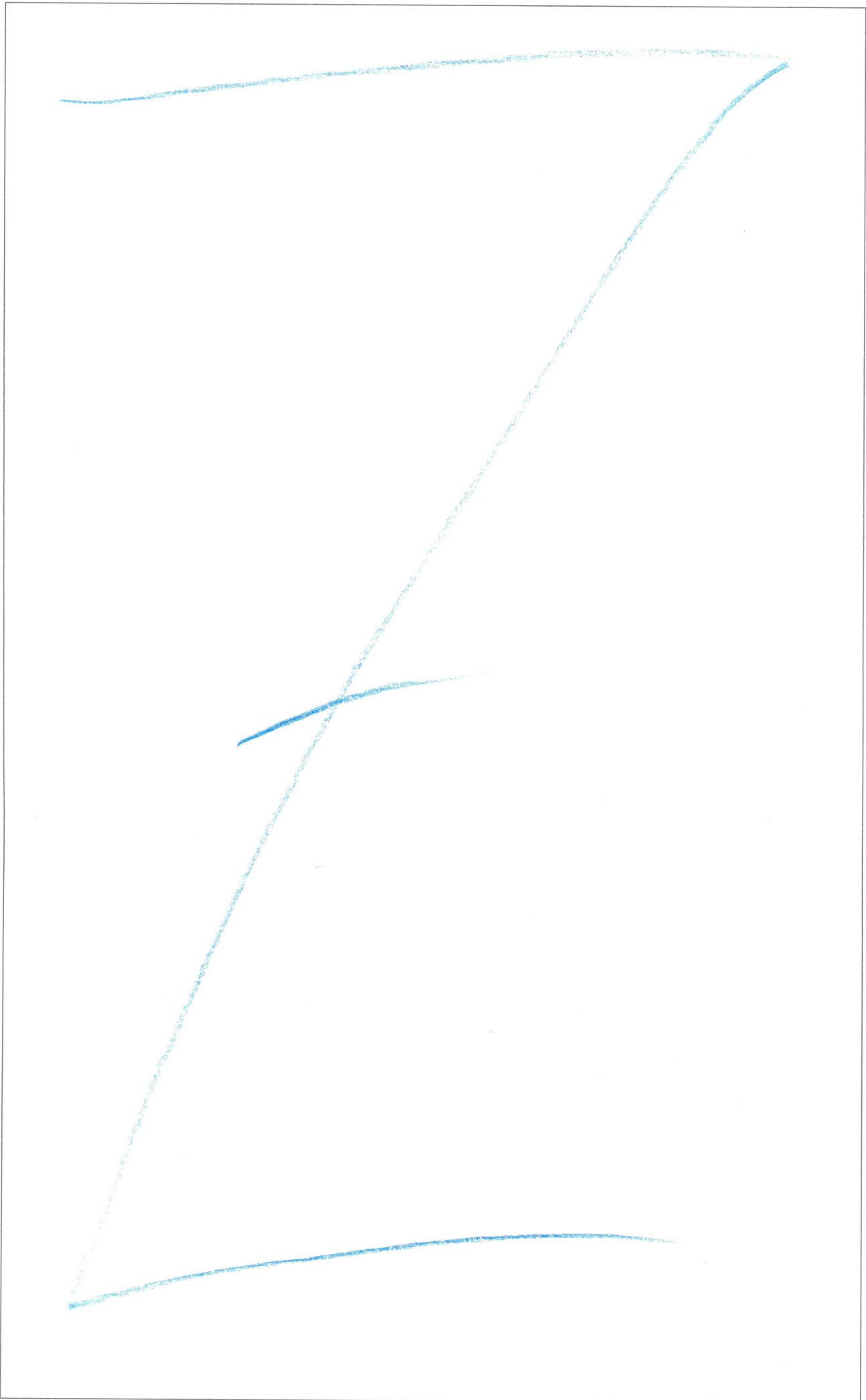
$Q_{сжиг}(C_{11}H_{22}(COOH)_2) + 17 Q_f(O_2) - 13 Q_f(CO_2) - 12 Q_f(H_2O) = -5994.4$

$x + 17 \cdot 0 - 13 \cdot 393.5 - 12 \cdot 285.8 = -5994.4$

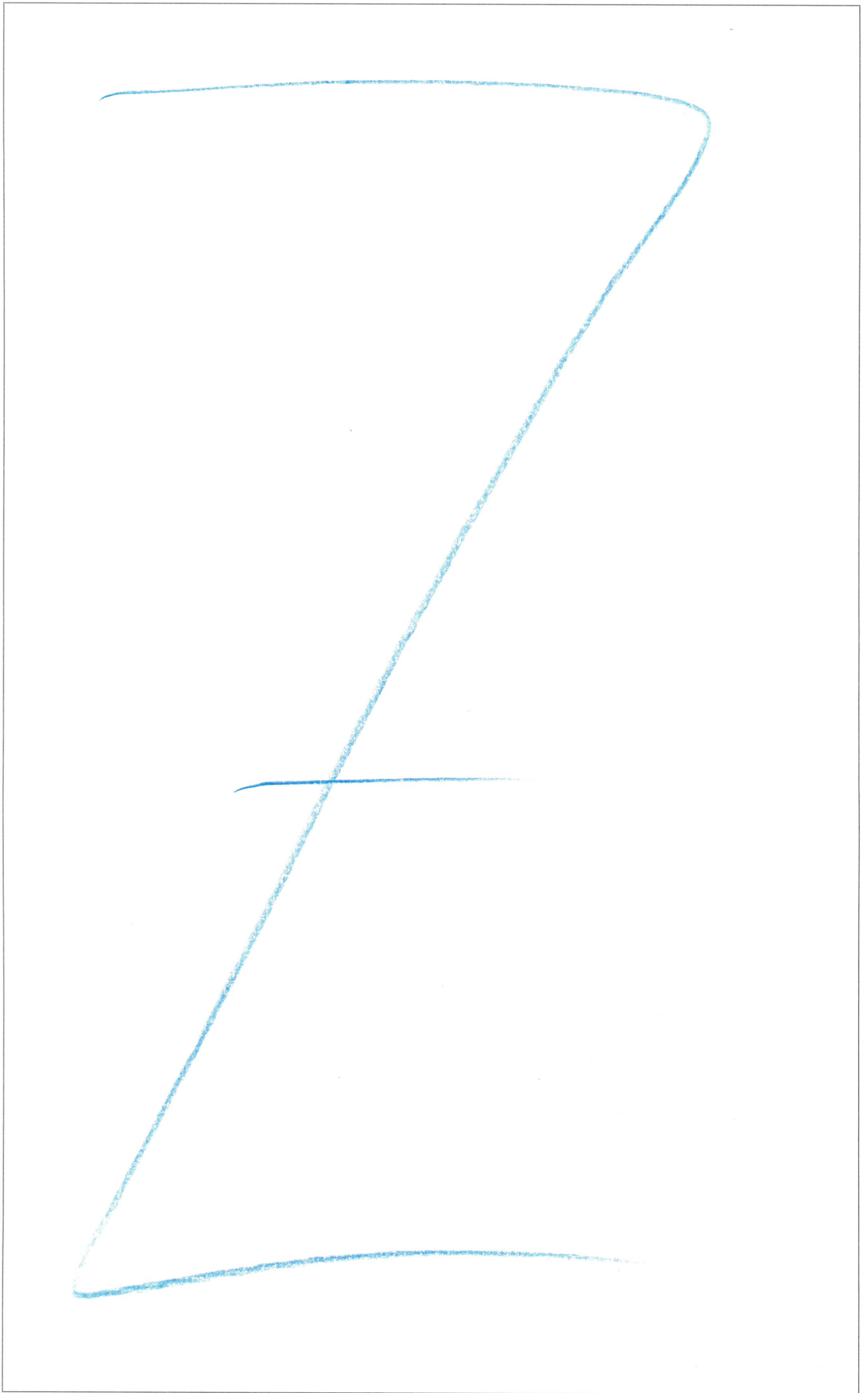
$Q_{сжиг}(C_{11}H_{22}(COOH)_2) = 2550.7 \text{ кДж/моль}$

$Q_{сгор}(C_{11}H_{22}(COOH)_2) = -14539.5 \text{ кДж/моль}$

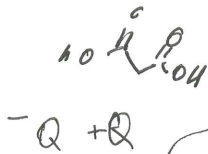
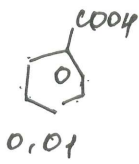
ЛИСТ-ВКЛАДЫШ



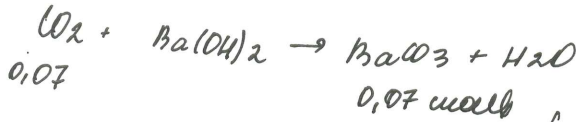
Подписывать лист-вкладыш запрещается! Писать на полях листа-вкладыша запрещается!



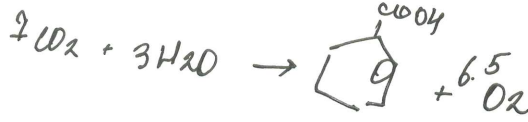
Черновик



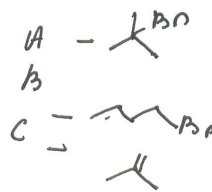
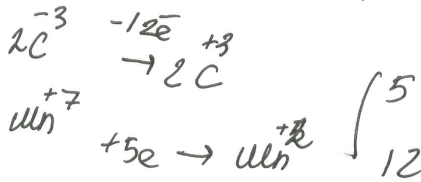
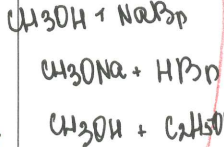
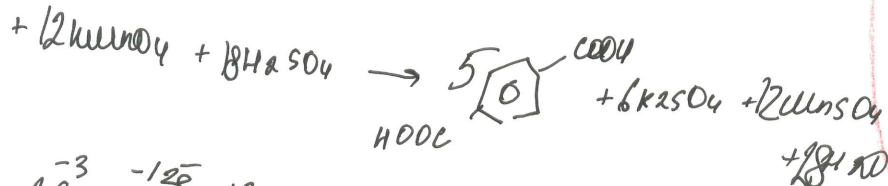
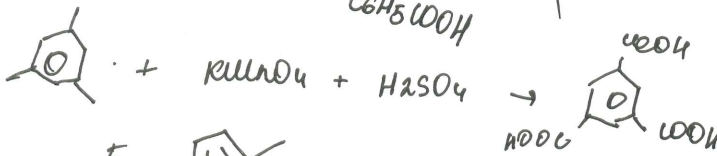
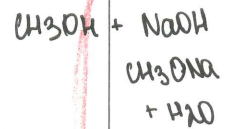
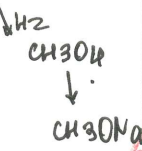
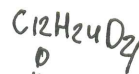
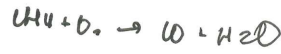
$X_2 = 4.25 \cdot 10^{-3}$   
PB  $\frac{0.0252}{4.25 \cdot 10^{-3}} = 5.48$



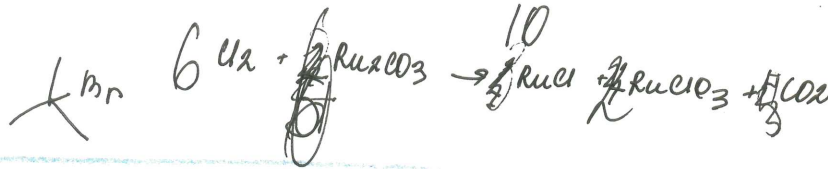
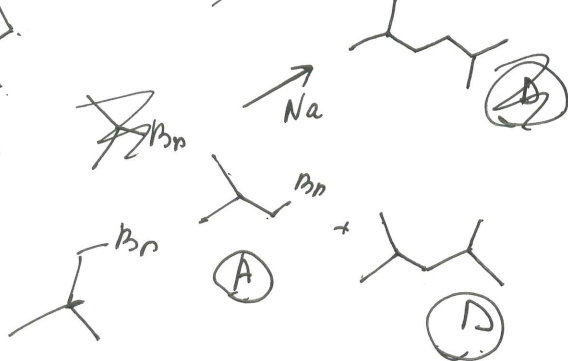
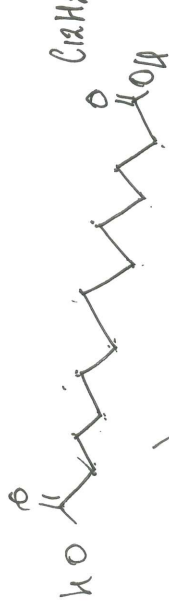
$Q_{CO_2} = \frac{32.18}{0.01} = 3218 \text{ кДж/моль}$



$n = \frac{M_{CO_2}}{M_{CO_2} + M_H} = 0.07$



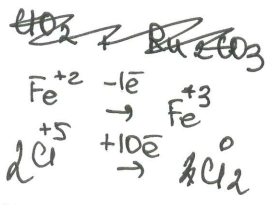
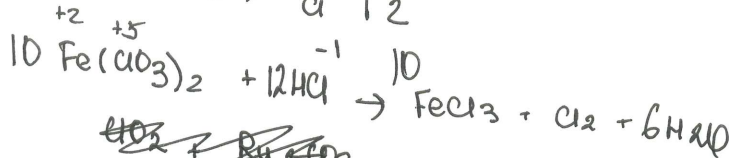
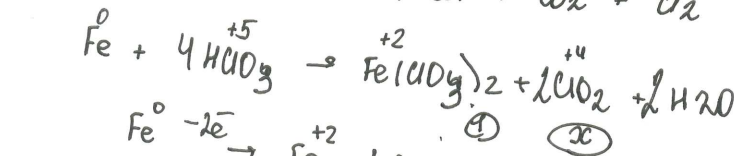
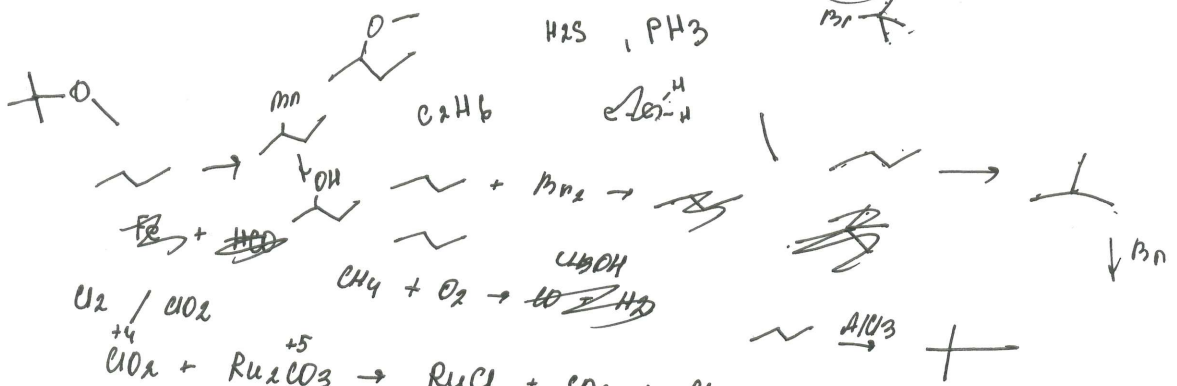
$M = \dots = 0.07$



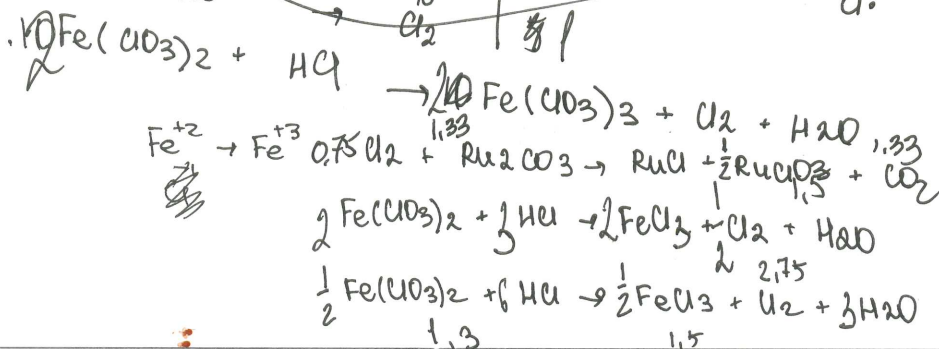
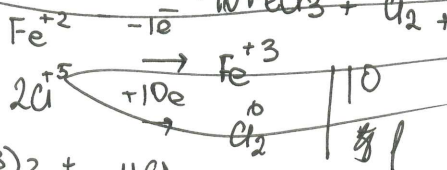
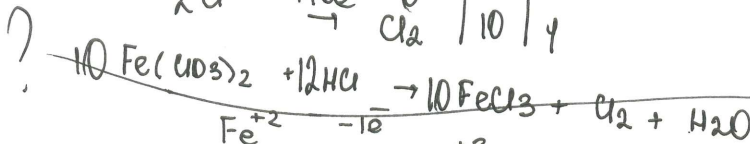
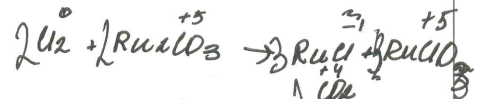
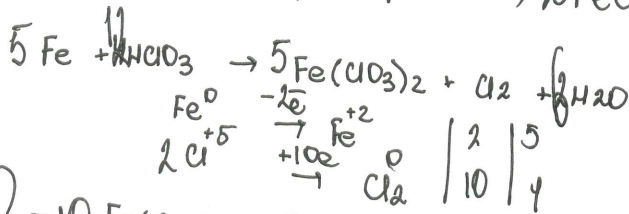
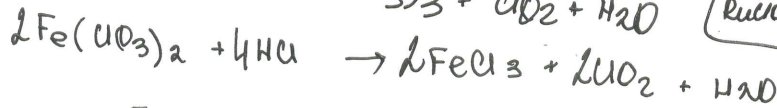
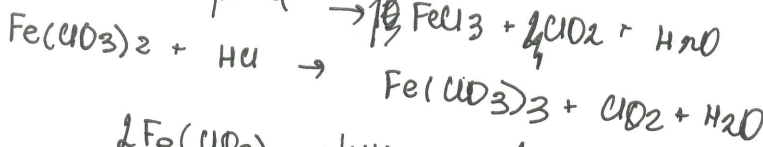
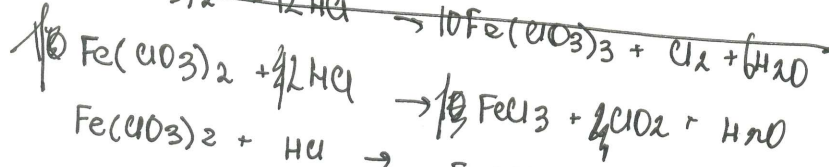
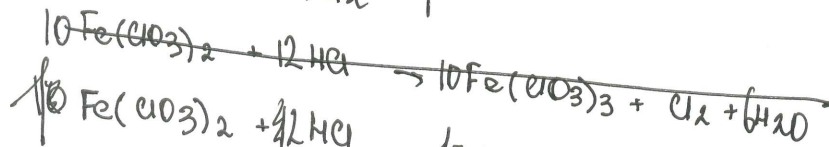
2017

Черновик

①  $\mu = 16 \cdot 2,125 = 34 \text{ г/моль}$

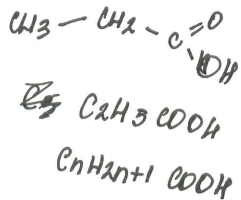
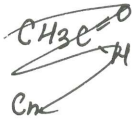


- N1 ✓
- N2 расчит
- N3 ✓
- N4. 2n
- N5 ⊖
- N6 ✓ (
- N7 ?

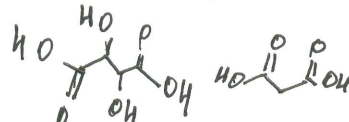


Черновик

(5)

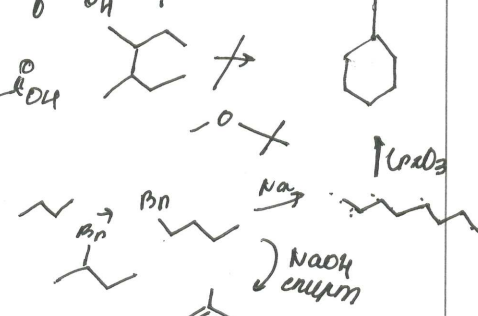
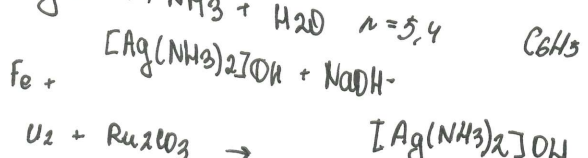


5, 45

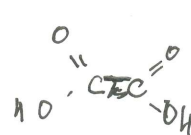
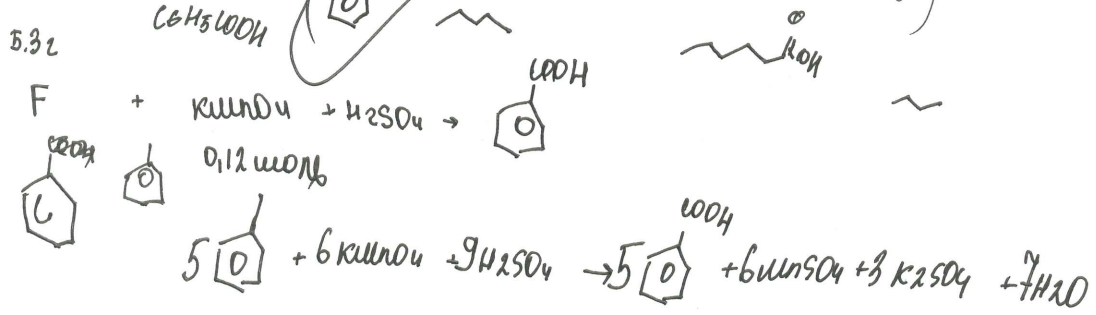
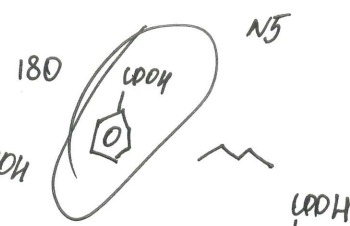
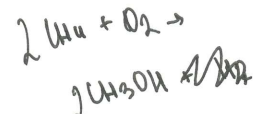
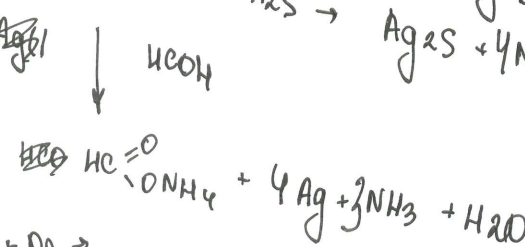
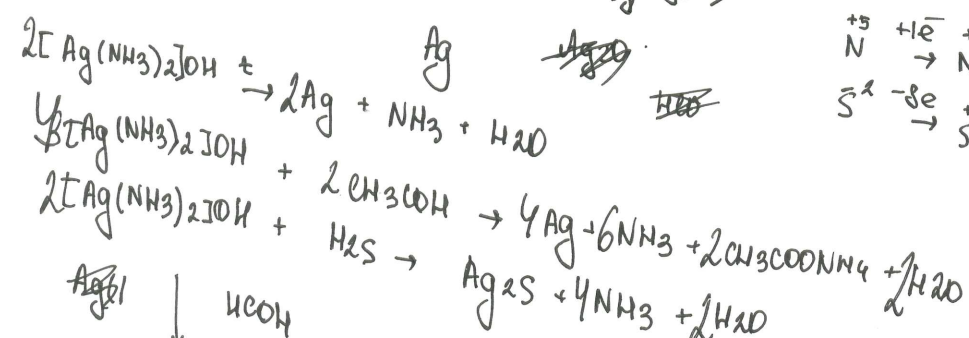


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[Ag(NH<sub>3</sub>)<sub>2</sub>]OH → Ag<sub>2</sub>O + 4NH<sub>3</sub> + H<sub>2</sub>O  
12n + 2n + 1 + 12 + 32 + 1 = 0, 2623



4Ag<sub>2</sub>S + 8HNO<sub>3</sub> → 3AgNO<sub>3</sub> + 4H<sub>2</sub>SO<sub>4</sub> + 2NO<sub>2</sub>  
Redox balance:  
N: +5 → +4 (x4) = -4e  
S: -2 → +6 (x2) = +8e  
Total: 8e



C: -3 - 6e → +3 C  
Mn: +7 + 5e → Mn<sup>2+</sup>

