

Часть 1

Олимпиада: **Химия 9 класс (1 часть)**

Шифр: **21300913**

ID профиля: **855760**

Вариант 2

Знак с ответами (чистовик)

Задача 1.

П.к. оксиды реагируют с медью, то на выходе образуются оксид меди.

Как раз под описание подходит оксид меди (II) CuO - черного цвета и оксид меди (I) - красного цвета Cu₂O.

1. X - N (азот)

A - NO₂ (оксид азота (IV))

Б - N₂O (оксид азота (I))

В - CuO (оксид меди (II))

Г - Cu₂O (оксид меди (I))

Доказательства:

1) $\nu(\text{NO}_2)$ - 1 моль

$\nu(\text{N}_2\text{O})$ - 1 моль

$\text{NO}_2 + \text{N}_2\text{O} \rightarrow 3 \text{ атома } \text{N}_2 \text{ и } 3 \text{ атома } \text{O}. 3 = 3.$

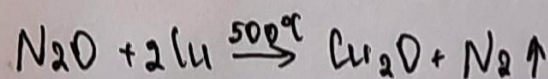
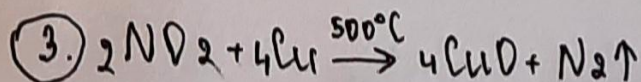
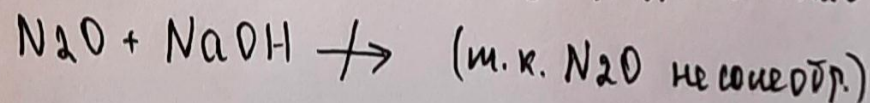
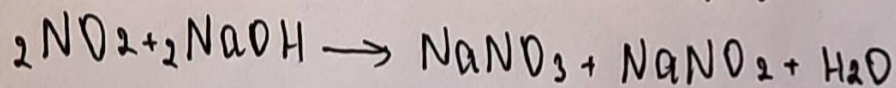
2) $\text{NO}_2 + \text{N}_2\text{O} \rightarrow 6 \text{ атомов безвеств.}$

$\frac{6 \text{ атомов}}{2 \text{ молекулы}} = 3.$

3) $\frac{M(\text{NO}_2)}{M(\text{N}_2\text{O})} = \frac{46}{44} = 1,045.$

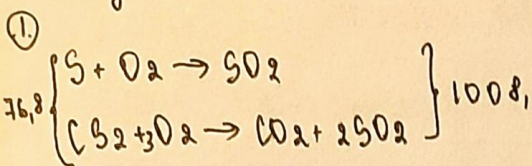
2. NO₂ - несообразующий кислотный оксид.

N₂O - несообразующий (безразличный) оксид.



Планк с ответами (Тестовик)

Задача ~ 2.



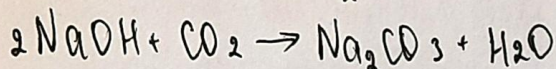
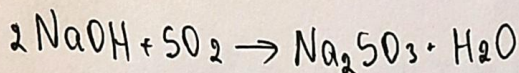
$$\begin{cases} 32x + 76y = 76,8 \\ 293x + 1075y = 1008,5 \end{cases} \quad \begin{cases} x = 0,8 - \nu(S) \\ y = 0,5 - \nu(CS_2) \end{cases}$$

$$\omega(S) = \frac{0,8 \cdot 32}{0,8 \cdot 32 + 0,5 \cdot 76} = 0,4 = 40\%$$

Ответ: $\omega(S) = 40\%$

② $m(NaOH) = 1000 \cdot 0,2 = 200 \text{ г}$

$\nu(NaOH) = 5 \text{ моль}$



$m(Na_2SO_3) = (0,8 + 2 \cdot 0,5) \cdot 126 = 226,8 \text{ г}$

$m(Na_2CO_3) = 0,5 \cdot 106 = 53 \text{ г}$

$m(H_2O) = 800 \text{ г}$

$(0,5 \cdot 2 + 0,8) \cdot 17 = 32,4 - m(H_2O \text{ из реакции})$

$5 - 2(0,5 \cdot 2 + 0,8) \cdot 40 = 56 \text{ г } NaOH$

Всего: 1168,2 г

$\omega(Na_2SO_3) = 19,4\%$

$\omega(Na_2CO_3) = 4,5\%$

$\omega(H_2O) = 71,3\%$

$\omega(NaOH) = 4,8\%$

Бланк с ответами (Чистовик)

Задача ~ 3.

① I соль - KCl ; Металл K (калий)

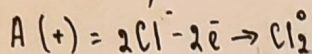
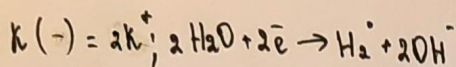
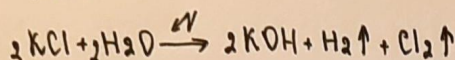
II соль - $CaCl_2$; Металл Ca (кальций)

Доказательства:

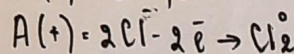
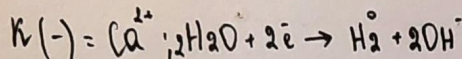
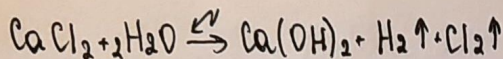
$$\omega(Cl_2) = \frac{35,5}{39 + 35,5} = 0,4765 = 47,65\% - \text{в } KCl$$

$$\omega(Cl_2) = \frac{71}{40 + 71} = 0,6396 = 63,96\% - \text{в } CaCl_2$$

② KCl :



$CaCl_2$:



На аноде выделяется Cl_2 , на катоде H_2 .

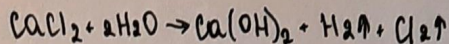
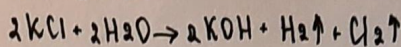
Дано:

$$V(Cl_2) = 8,96$$

$$m(\text{соль}) = 48,2$$

Найти: $V(H_2)$

Решение:



$$V(Cl_2) = \frac{8,96}{22,4} = 0,4 \text{ моль}$$

$$m(KCl) = x; m(CaCl_2) = y.$$

$$\begin{cases} x + y = 48,2 \\ \frac{x}{78,5} : 2 + \frac{y}{111} = 0,4 \end{cases} \quad x = 12,85 \text{ (м(KCl))}$$

$$y = 35,35 \text{ (м(CaCl}_2\text{))}$$

$$V(KCl) = 0,16 \text{ моль} \quad V(H_2) = 0,16 : 2 + 0,32 = 0,4 \text{ моль}$$

$$V(H_2) = 0,4 \cdot 22,4 = 8,96 \text{ л}$$

Ответ: 8,96 л - $V(H_2)$

④ Дано:

$$m(KCl) = 0,01285 \text{ кг}$$

$$m(CaCl_2) = 0,03535 \text{ кг}$$

$$F = 96500 \text{ Кл/моль}$$

$$I = 4 \text{ А}$$

$$x - t$$

n - валентности

Решение:

$$1) m = \frac{1}{F} \cdot \frac{M}{n} \cdot I \cdot t$$

$$0,01285 = \frac{1}{96500} \cdot \frac{78500}{2} \cdot 4 \cdot x$$

$$x = 4 \text{ с} - \text{для } KCl$$

$$2) 0,03535 = \frac{1}{96500} \cdot \frac{111000}{2} \cdot 4 \cdot x$$

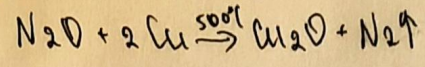
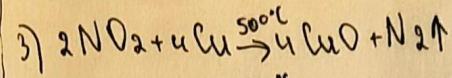
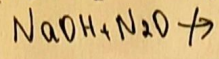
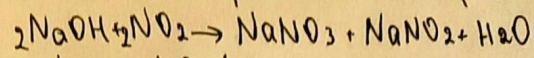
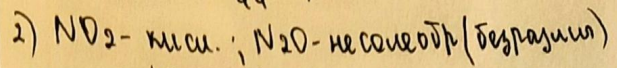
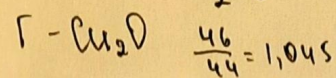
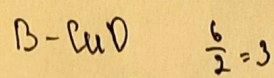
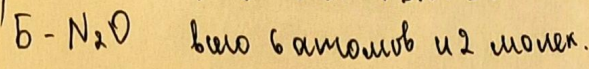
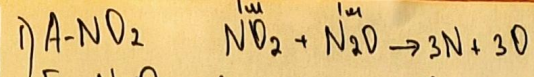
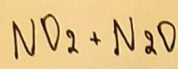
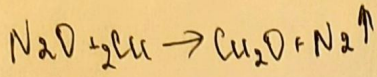
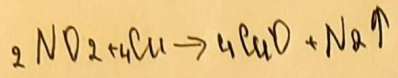
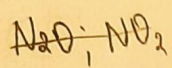
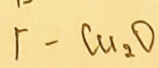
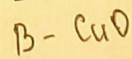
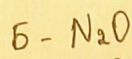
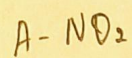
$$x = 0,015 \text{ с} - \text{для } CaCl_2$$

$$4 + 0,015 = 4,015 \text{ с} \approx 0,00112 \text{ ч}$$

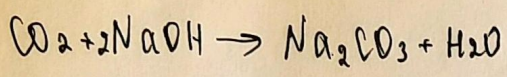
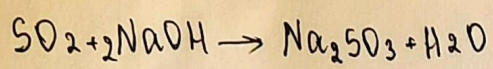
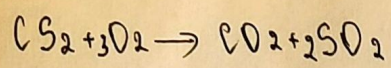
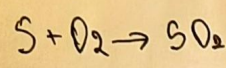
Ответ: 0,00112 ч

3/3

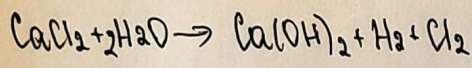
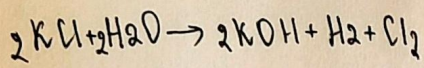
20 44 46 40 42



~ 2.



~~KCl~~



m(KCl) = x

m(CaCl₂) = 48,2 - x

D(KCl) = $\frac{x}{78,5}$; D(Cl₂) = $\frac{x}{157}$

D(CaCl₂) = $\frac{48,2 - x}{111}$; D(Cl₂) = $\frac{48,2 - x}{111}$

m(KCl) = 12,85

m(CaCl₂) = 35,35

D(Cl₂) = 0,08

D(Cl₂) = 0,32

12,85 = x

y = 35,3548

$\frac{I}{II} - K$

$\frac{I}{II} - Ca$

$\begin{cases} x + y = 48,2 \\ \frac{x}{157} = \frac{y}{111} \end{cases}$
 $0,00637x + 0,009y = 0,4$

$m = \frac{1}{F} \cdot \frac{M}{n} \cdot I \cdot t$

$12,85 = \frac{1}{96500} \cdot \frac{0,01285}{1} \cdot 4 \cdot x$

$0,03535 = \frac{1}{96500} \cdot \frac{111000}{2} \cdot 4 \cdot x$

20

$\frac{78,5}{1000}$

785000

$\frac{0,015}{4}$
 4,015

0,00112

Часть 2

Олимпиада: **Химия 9 класс (2 часть)**

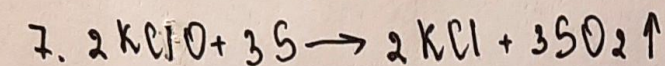
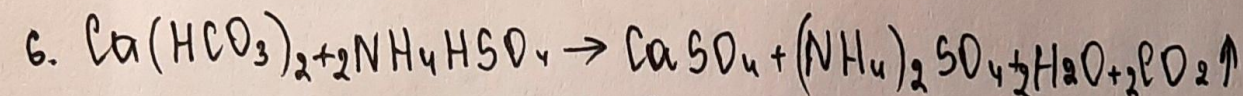
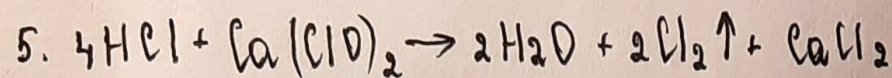
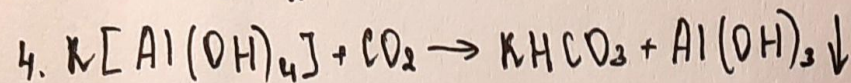
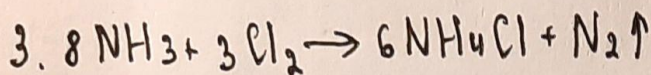
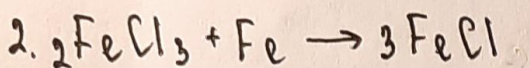
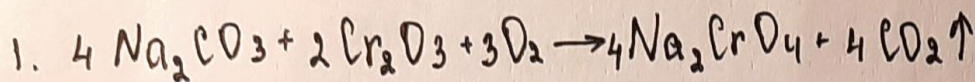
Шифр: **21300913**

ID профиля: **855760**

Вариант 2

Баланс с ответами (Чистовик)

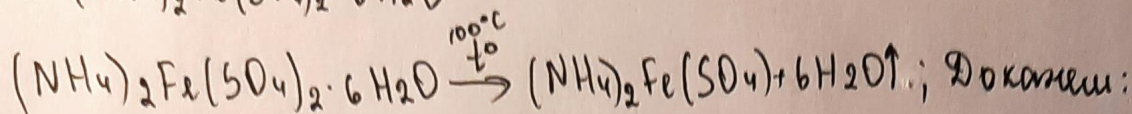
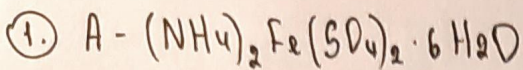
Задача 4.



1/2

Планк ответов (Чистовик)

Задача 5.



$$m(\text{соль}) = 39,2 \text{ г}$$

$$n(\text{H}_2\text{O}) = 0,6 \text{ моль}$$

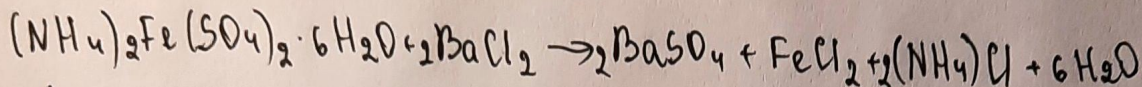
$$m(\text{H}_2\text{O}) = 39,2 \cdot 27,55 = 10,1$$

$$n(\text{соль}) = 0,1 \text{ моль}$$

$$m(\text{Feзввз.}) = 28,4 \text{ г}$$

$$M(\text{соль}) = \frac{39,2}{0,1} = 392 \text{ г/моль}$$

392 - Молярная масса $(\text{NH}_4)_2\text{Fe}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$

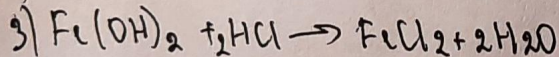
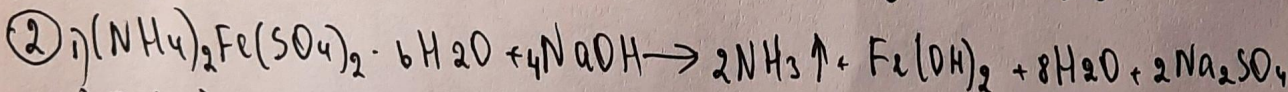


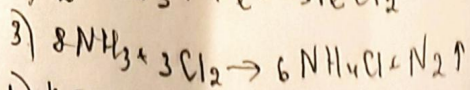
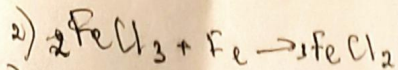
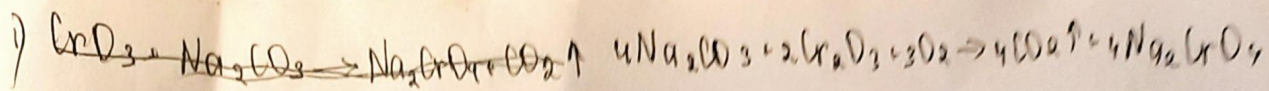
$$m(\text{соль}) = 39,2 \text{ г}$$

$$n(\text{соль}) = 0,1 \text{ моль}$$

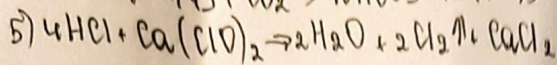
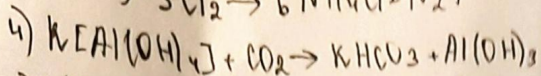
$$n(\text{BaSO}_4) = 0,2$$

$$m(\text{BaSO}_4) = 0,2 \cdot 233 = 46,6 \text{ г. Масса как и в условии задачи.}$$





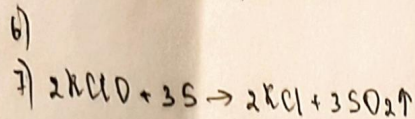
260g 41g



28,400g

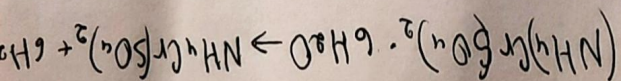
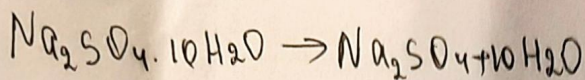
46

28



142,002

10,8

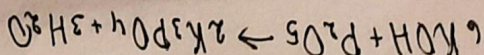
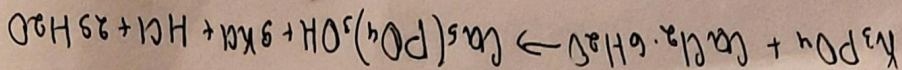


6,6g

1,0

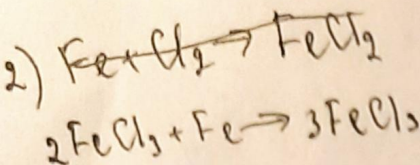
262

370

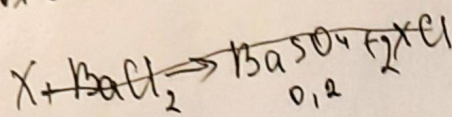
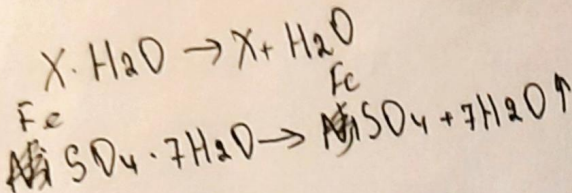


~4.

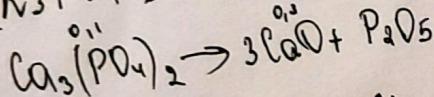
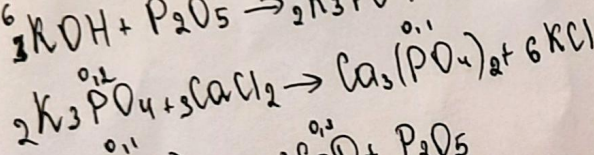
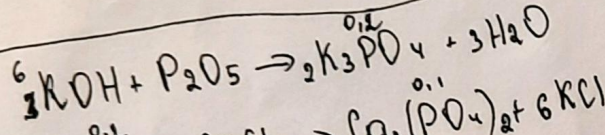
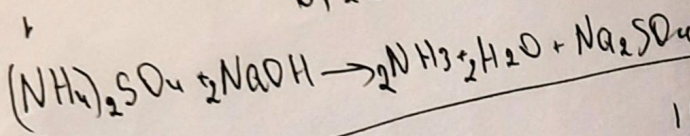
1



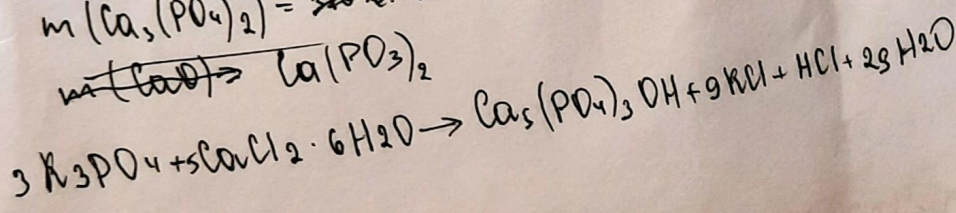
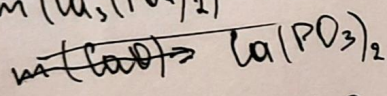
30,28 28,4



$$D(\text{H}_2\text{O}) = \frac{28,4}{0,2254} = 125,99$$



$$m(\text{Ca}_3(\text{PO}_4)_2) = 31$$



16,8

0,3

0,1