

ТРЕНАЖЕР РЕАКЦИЙ

ЕГЭ по химии

кислоты

оксиды

гидроксиды

аммиак



БОНУС:
ОВР, РИО
И СОЛИ



КУРСЫ ПОДГОТОВКИ К ЕГЭ МАЙШКОЛЫ

Углубленное **обучение с нуля** с упором на понимание. Все, что нужно для успешной сдачи экзамена:



изучим весь теоретический материал и закрепим на практике,



разберем частые ошибки



решим все задания из реального ЕГЭ,




и пойдём на ЕГЭ уверенные в своих силах.

[ПОДРОБНЕЕ О КУРСАХ](#) 



Рус Софи
8 лет готовит к ЕГЭ по русскому
89 – средний балл учеников 



Алена Клименко
12 лет готовит к ЕГЭ по биологии
80 – средний балл учеников 



Юля Неон
7 лет готовит к ЕГЭ по химии
85 – средний балл учеников 

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и бескислородные кислоты**

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 Немного мотивации

1 Заполни все пробелы в карточках

2 Пришли фото проделанной работы (нужны все страницы) нам в телеграм-бот @GoodBioBot!

3 Получи скидку **300 рублей** на один из следующих курсов:

- Годовой курс
- Любой другой курс в нашей школе

Чтобы узнать подробнее о курсах,
пишите в наш телеграм-бот:
@GoodBioBot



*** Запрещается распространение
или публикация данных материалов.**

Привет!



Это авторский тренажер от меня, Юли Неон, для того, чтобы ты научился уравнивать химические реакции и верно определять продукты!

Я проанализировала все реакции, начиная с 2012 года, которые когда-то встречались на ЕГЭ не только во второй части, но и в первой!



Я прошерстила все (а это более 1500) реакции из второй части (№29, 30 и 31) с реального ЕГЭ и выписала в этот тренажер каждую, которая была связана с оксидами, гидроксидами и кислотами. Так же здесь собраны все реакции по этим темам из сборника Д.Добротина за 2023 года.

Как работать с тренажером?

- ✧ По мере прохождения тем на годовом курсе или самостоятельно, тренируйся дописывать и уравнивать реакции в первой части файла, а для самопроверки перелистывай во вторую половину тренажера, ведь там тебя ждут не только ответы, но и пометки об особо важных реакциях!
- ✧ Для удобства я разбила все реакции по конкретным темам.
- ✧ В конце ты найдешь лист, в котором нужно записывать работу над ошибками

Как уравнивать реакцию?

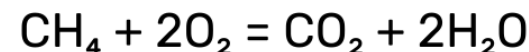
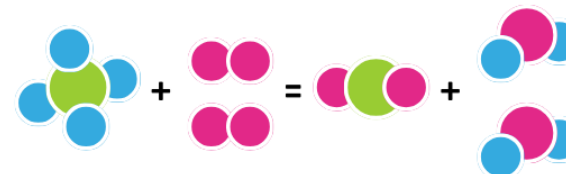


Примеры показываю на годовом курсе.

Коэффициенты показывают соотношение между числом участвующих в реакции частиц

Начинаем от самого сложного вещества. Сначала уравниваем элементы, которые встречаются реже. Если коэффициент (1,2, 3...) еще не стоит, то считаем его за 0

Расстановка коэффициентов



Кислород: $2+2=4$

1 молекула	2 молекулы	1 молекула	2 молекулы
10 молекул	20 молекул	10 молекул	20 молекул
10^{23} молекул	$2 \cdot 10^{23}$ молекул	10^{23} молекул	$2 \cdot 10^{23}$ молекул

Как уравнивать ОВР?

Проще всего в такой последовательности

- по схеме электронного баланса
- катионы Me^{n+} (NH_4^+), анионы кислотных остатков
- катионы H^+

(среда и вода в последнюю очередь)

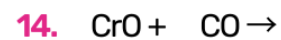
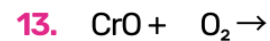
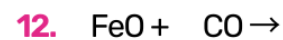
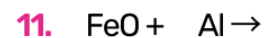
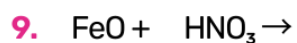
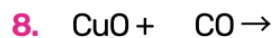
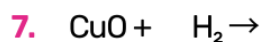
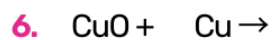
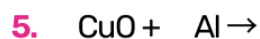
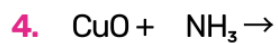
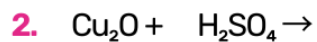
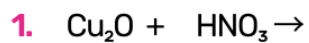
Помни, что химия - это про любовь! Не ленись считать все степени окисления по началу. Удачи тебе!



Оксиды

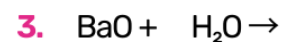
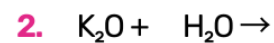
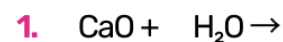
Основные оксиды

ОВР

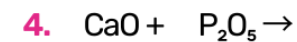
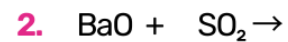
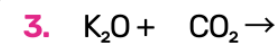
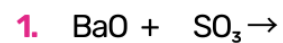


не ОВР

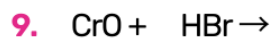
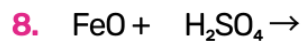
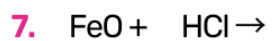
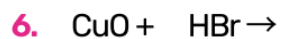
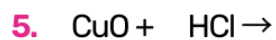
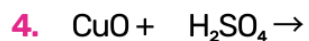
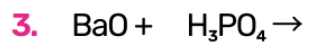
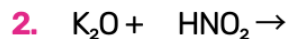
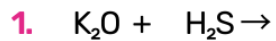
✦ с водой



✦ с кислотными оксидами



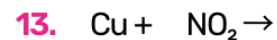
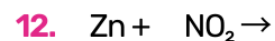
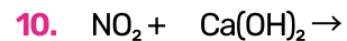
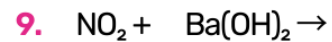
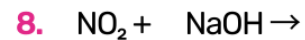
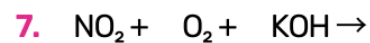
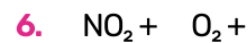
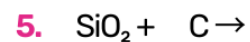
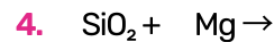
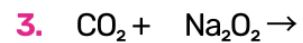
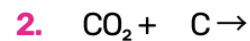
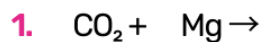
✧ с кислотами

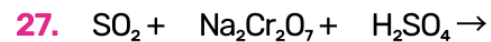
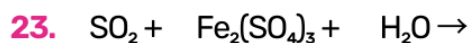
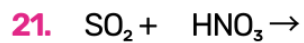
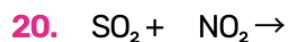
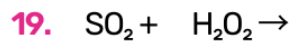
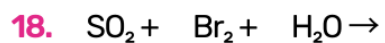
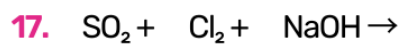
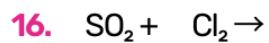
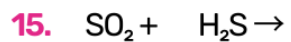
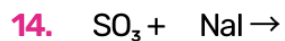


Кислотные оксиды

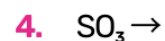
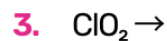
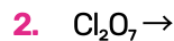
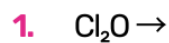
ОВР

Могут быть как окислителями, так и восстановителями





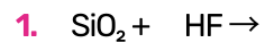
✧ Разложение



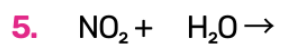
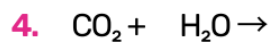
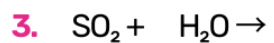
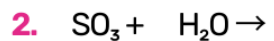
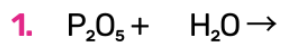
не ОВР

При взаимодействии с водой образуются кислородсодержащие кислоты – кислотные гидроксиды.

✧ с плавиковой кислотой реагирует только SiO_2

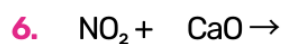
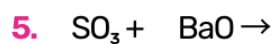
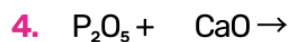
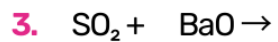
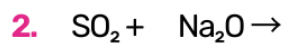
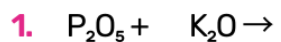


✧ с водой



ОВР

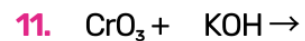
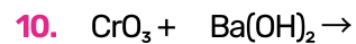
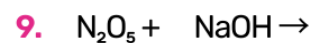
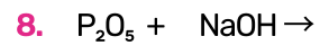
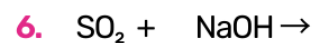
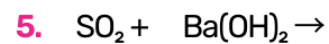
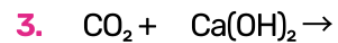
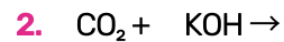
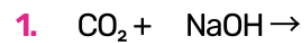
✧ с основными оксидами

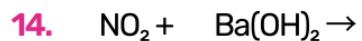
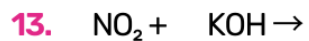
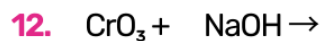


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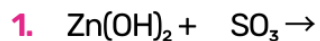
✧ со щелочами

(возможно образование кислых и средних солей)



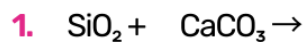


✧ с амфотерными гидроксидами

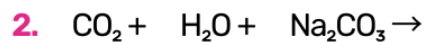
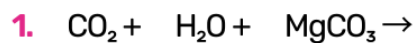


✧ с солями

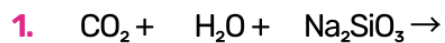
- SiO_2 реагирует с карбонатами и сульфитами, вытесняя более летучий оксид из состава соли



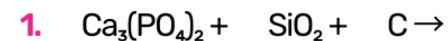
- Возможность образования кислых солей



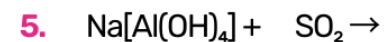
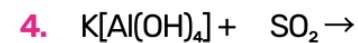
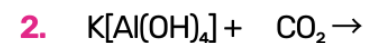
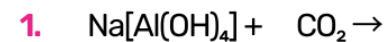
- Раствор уголекислоты с силикатами



- Получение фосфора

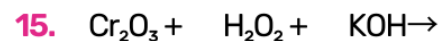
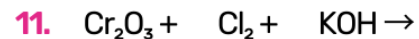
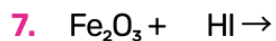
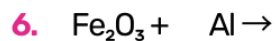
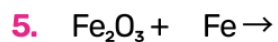
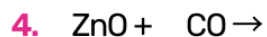
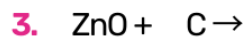
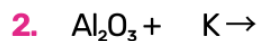
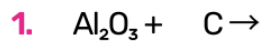


✧ Разрушение комплексных солей при пропускании углекислого и сернистого газов



Амфотерные оксиды

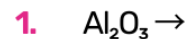
ОВР



✧ Разложение

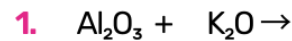


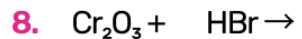
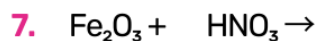
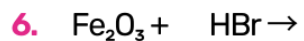
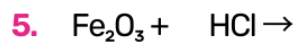
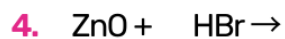
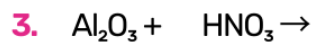
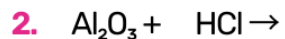
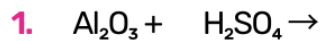
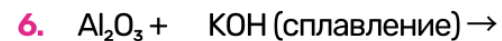
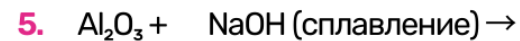
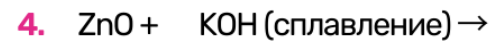
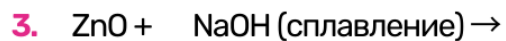
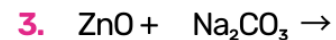
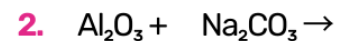
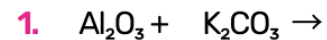
✧ Электролиз

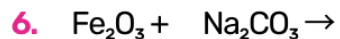
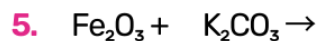
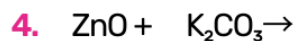


не ОВР

✧ с основными оксидами

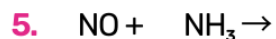
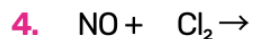
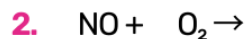
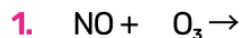


✧ **с кислотами**✧ **со щелочами**✧ **с карбонатами и гидрокарбонатами**

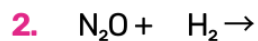
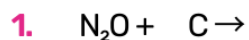


Несолеобразующие оксиды

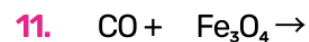
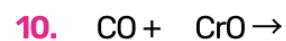
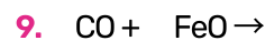
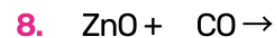
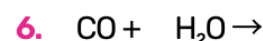
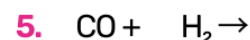
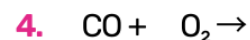
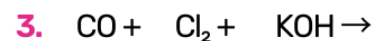
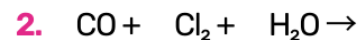
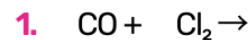
✧ **Оксид азота (II)** \rightarrow окись азота, в зависимости от условий может проявлять как окислительные, так и восстановительные свойства

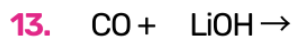
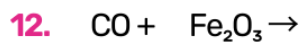


✧ **Оксид азота (I)** \rightarrow закись азота обычно переходит в азот



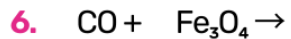
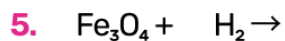
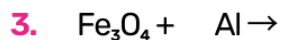
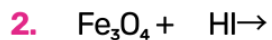
✧ Угарный газ обычно является восстановителем



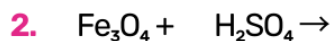
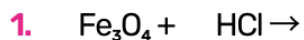


Железная окалина

ОВР

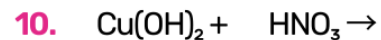
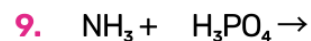
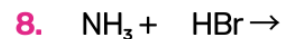
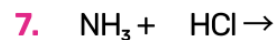
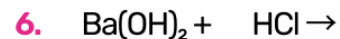
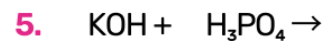
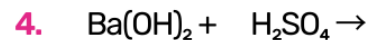
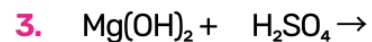
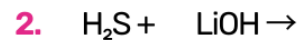
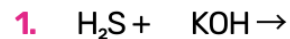


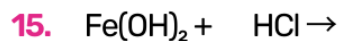
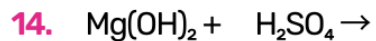
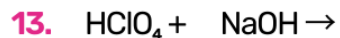
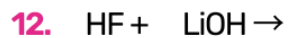
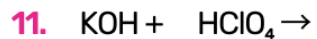
не ОВР



Гидроксиды и бескислородные кислоты

Нейтрализация (кислота + основание)

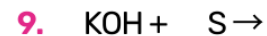
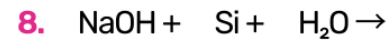
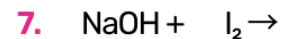
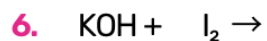
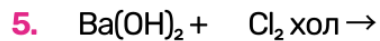
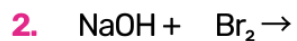
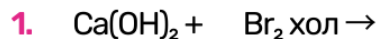




Щелочи

С простыми веществами

✧ С неметаллами

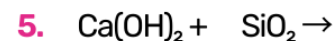
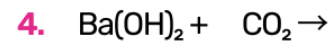
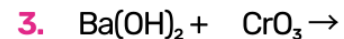
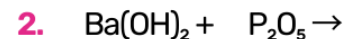
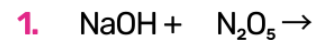


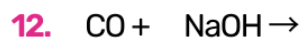
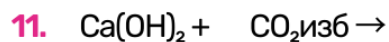
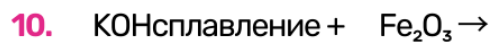
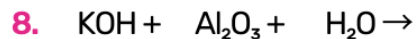
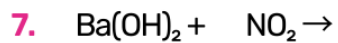
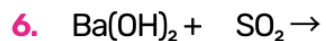
✧ С металлами



✧ С оксидами*

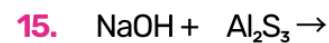
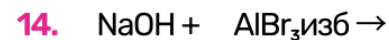
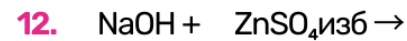
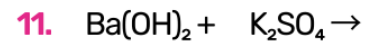
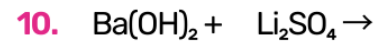
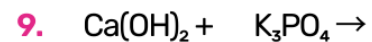
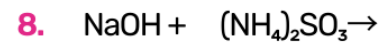
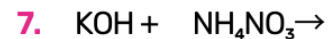
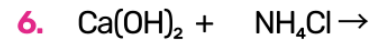
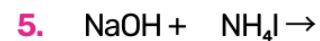
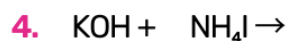
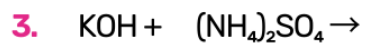
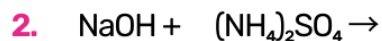
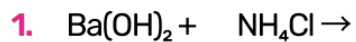
*остальные реакции в блоке с оксидами

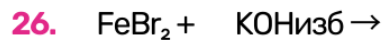
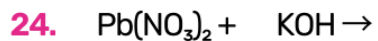
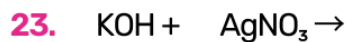
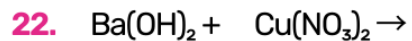
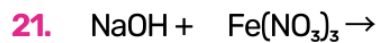
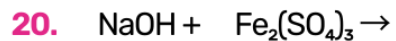
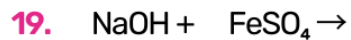
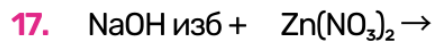




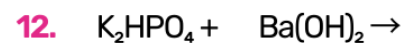
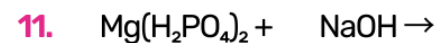
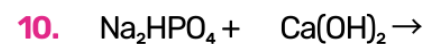
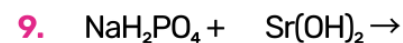
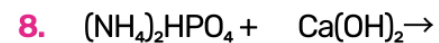
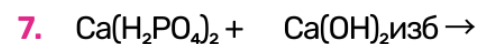
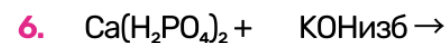
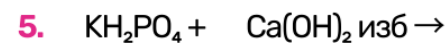
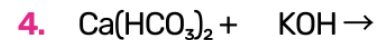
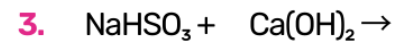
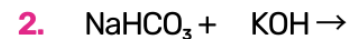
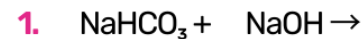
✦ С солями

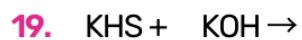
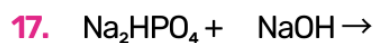
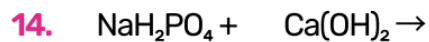
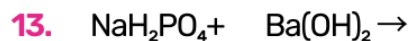
• со средними



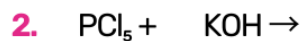
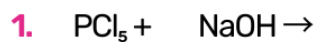


• С кислотными солями





✧ С бинарными соединениями



С амфотерными гидроксидами смотри ниже

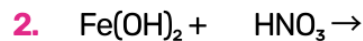
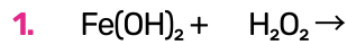
С кислотами смотри в нейтрализации, но не забудь, что может получаться и кислая соль при избытке кислоты, если кислая соль существует

Нерастворимые основания

✧ Разложение

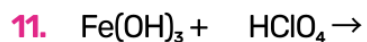
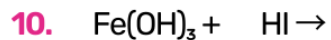
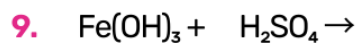
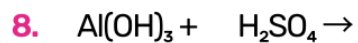
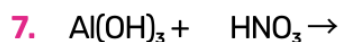
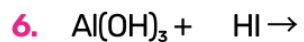
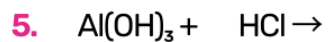
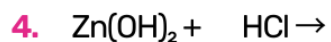
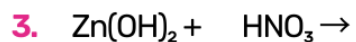
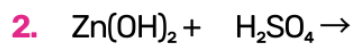
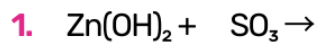


✧ ОВР

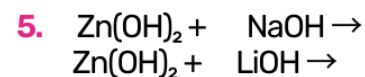
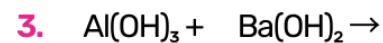
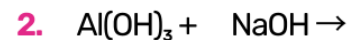
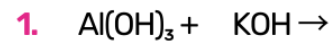


Амфотерные гидроксиды

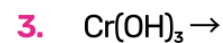
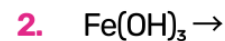
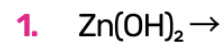
✧ С кислотами и кислотными оксидами



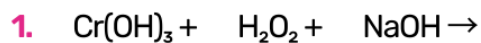
✧ Со щелочами



✧ Разложение



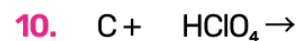
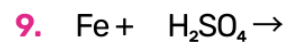
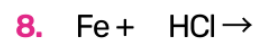
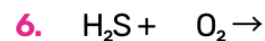
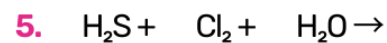
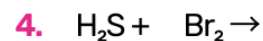
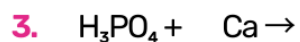
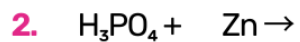
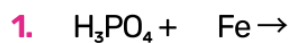
✧ ОВР



Кислоты

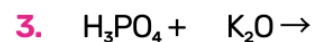
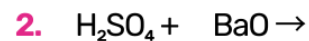
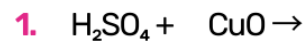
С основными гидроксидами смотри в нейтрализации, но не забудь, что может получаться и кислая соль при избытке кислоты, если кислая соль существует. Самфотерными гидроксидами смотри выше в блоке с амфотерными

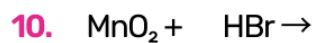
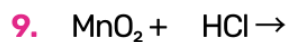
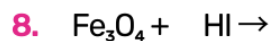
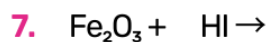
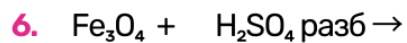
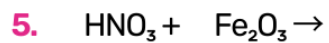
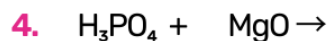
✧ С простыми веществами (ОВР)



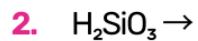
✧ С оксидами*

*остальные реакции в блоке с оксидами



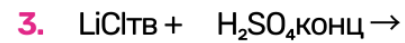
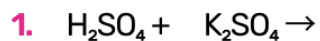


✧ Разложение

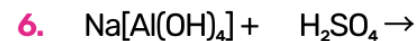
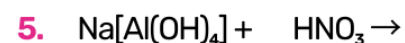
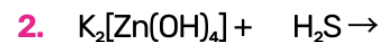
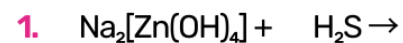


✧ С солями

- Возможность образования кислых солей

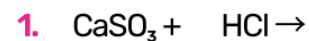


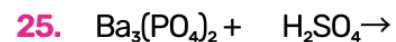
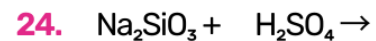
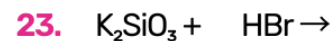
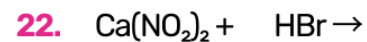
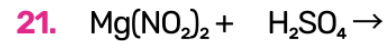
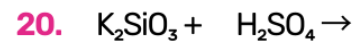
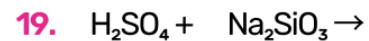
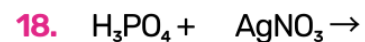
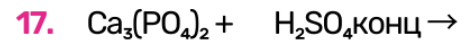
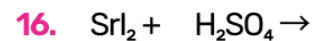
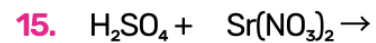
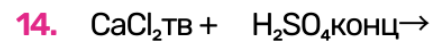
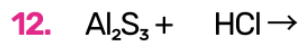
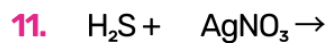
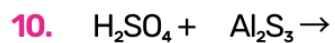
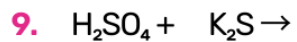
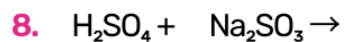
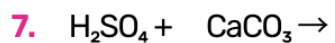
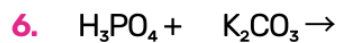
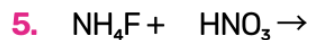
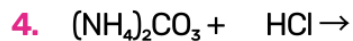
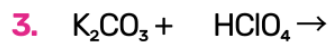
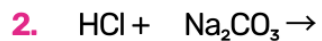
✧ С комплексными солями

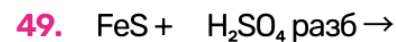
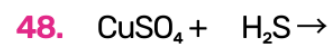
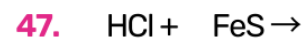
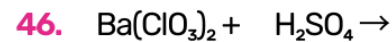
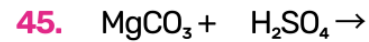
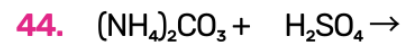
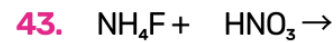
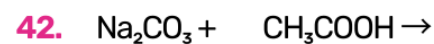
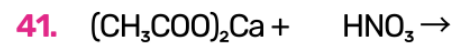
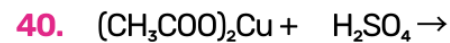
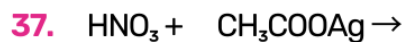
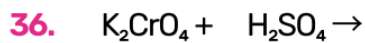
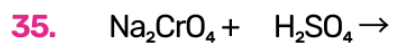
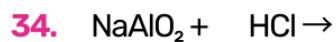
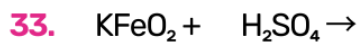
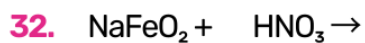
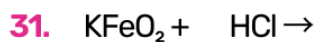
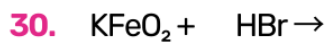
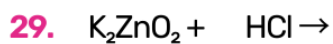
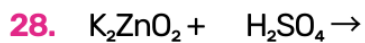
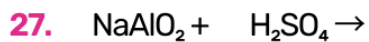
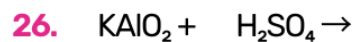


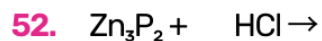
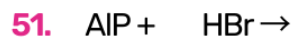
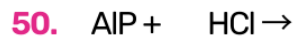
РНО

✧ Со средними солями

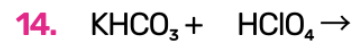
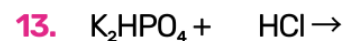
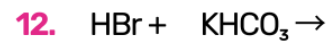
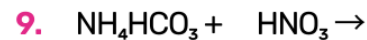
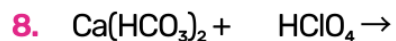
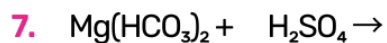
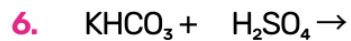
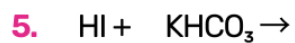
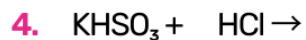
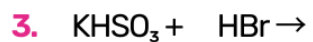
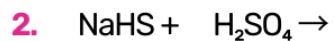
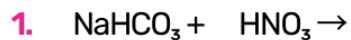




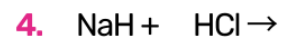
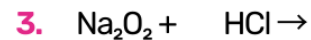
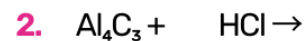
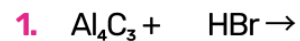


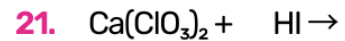
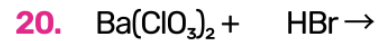
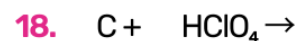
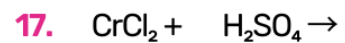
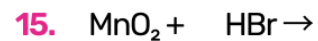
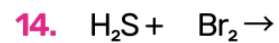
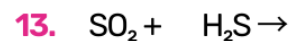
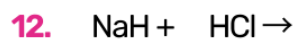
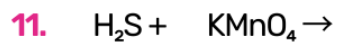
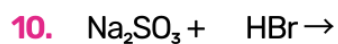
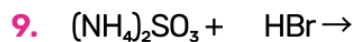
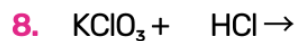
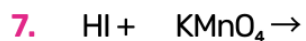
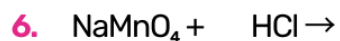
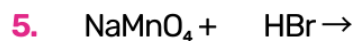
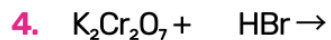
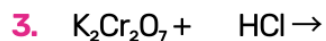
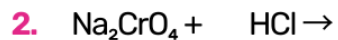
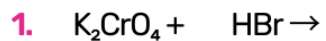


✧ **С кислотными солями**



✧ **С бинарными соединениями**

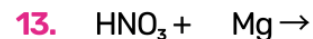
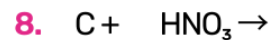
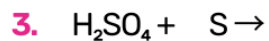


✧ **ОВР без участия кислот-окислителей**

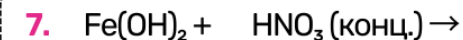
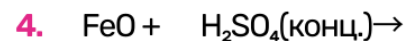
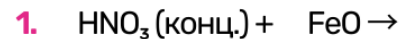
ОВР с кислотами-окислителями

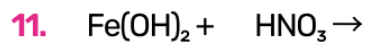
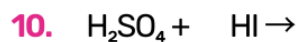
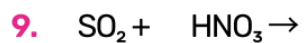
К ним относятся: серная только концентрированная кислота и азотная любой концентрации

✧ С простыми веществами

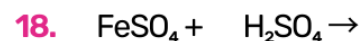
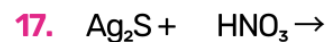
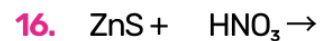
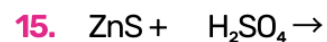
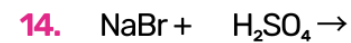
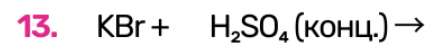
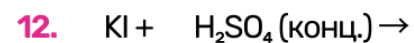
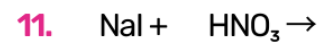
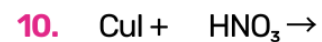
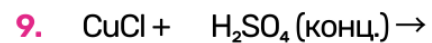
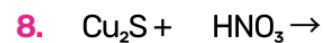
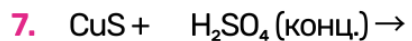
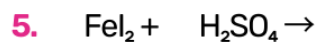
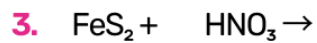
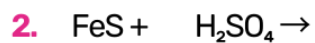


✧ С оксидами/гидроксидами/кислотами

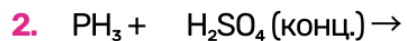




✧ **С солями**

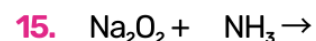
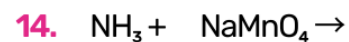
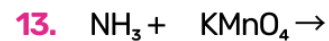
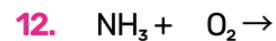
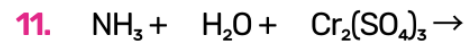
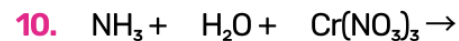
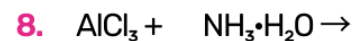
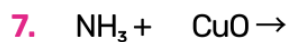
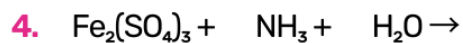
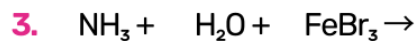
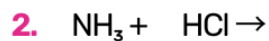
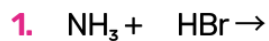


✧ С бинарными соединениями



Аммиак

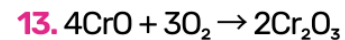
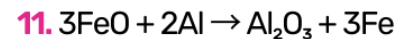
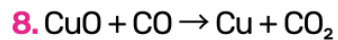
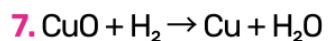
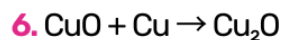
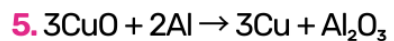
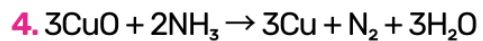
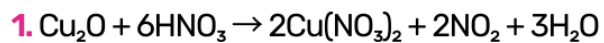
- Обычная формулировка в 31 номере: аммиак пропустили через раствор...



Ответы Оксиды

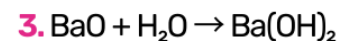
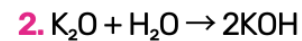
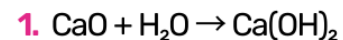
Основные оксиды

ОВР



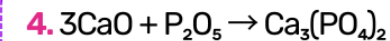
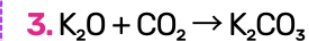
не ОВР

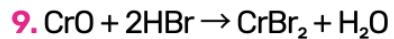
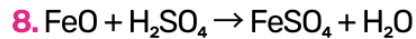
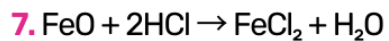
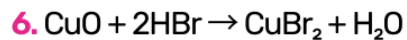
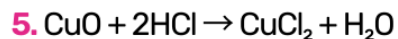
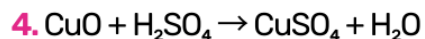
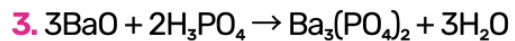
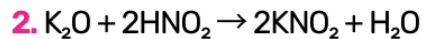
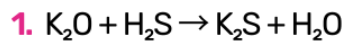
✧ с водой



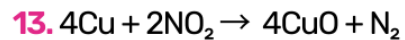
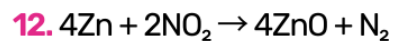
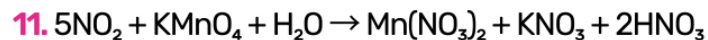
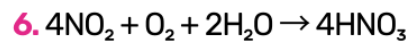
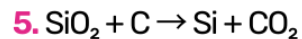
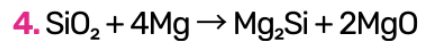
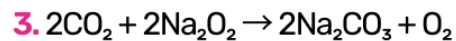
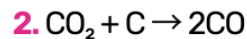
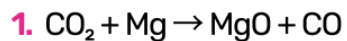
Важно: только сильные оксиды, которым соответствуют растворимые основания - щелочи

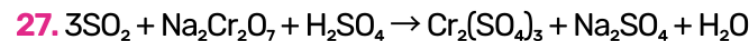
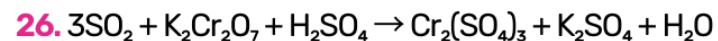
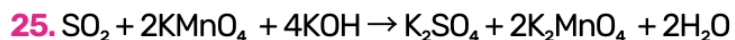
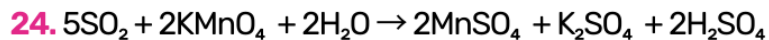
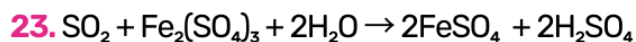
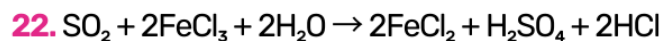
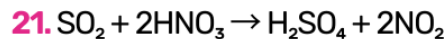
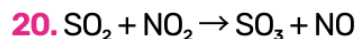
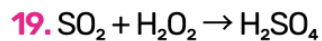
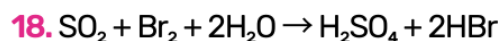
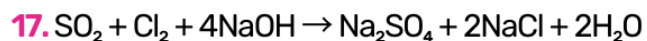
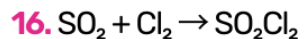
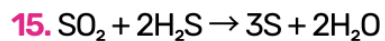
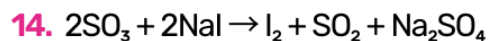
✧ с кислотными оксидами



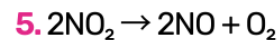
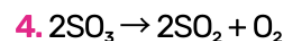
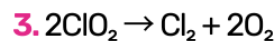
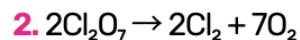
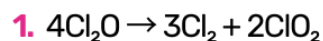
✧ **с кислотами****Кислотные оксиды****ОВР**

Могут быть как окислителями, так и восстановителями





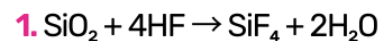
✧ Разложение



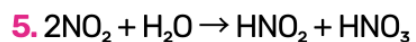
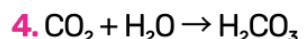
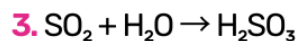
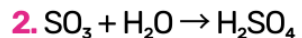
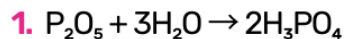
не ОВР

При взаимодействии с водой образуются кислородсодержащие кислоты – кислотные гидроксиды.

✧ с плавиковой кислотой реагирует только SiO_2



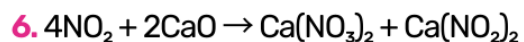
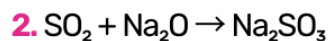
✧ с водой



ОВР

Важно: $SiO_2 + H_2O$
не взаимодействуют

✧ с основными оксидами

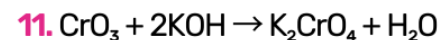
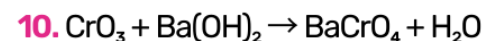
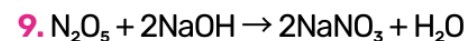
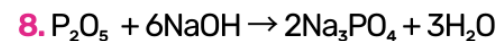
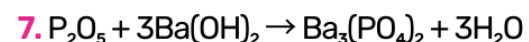
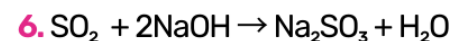
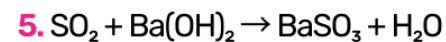
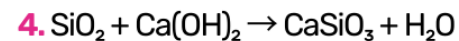
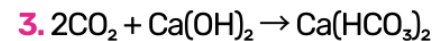
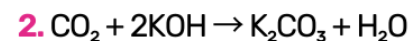
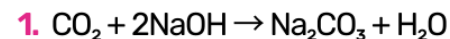


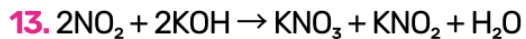
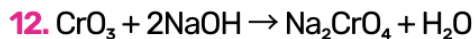
ОВР

Важно: NO_2 и ClO_2
образуют сразу две соли, протекает реакция с изменением степени окисления

✧ со щелочами

(возможно образование кислых и средних солей)



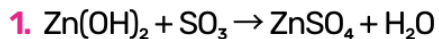


ОВР



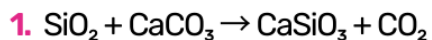
ОВР

✧ с амфотерными гидроксидами

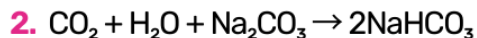


✧ с солями

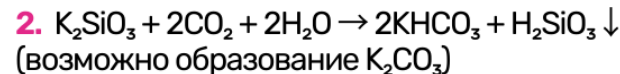
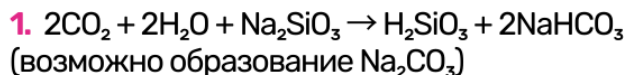
- SiO₂ реагирует с карбонатами и сульфитами, вытесняя более летучий оксид из состава соли



- Возможность образования кислых солей



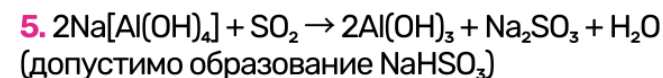
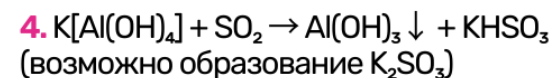
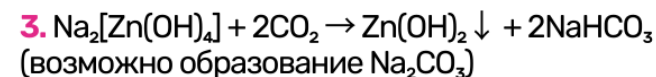
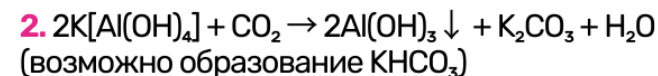
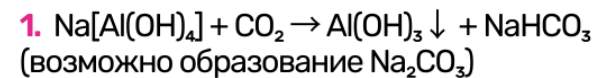
- Раствор углекислоты с силикатами



- Получение фосфора

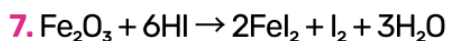
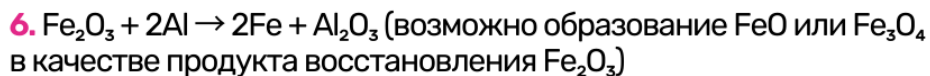
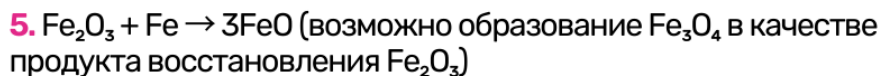
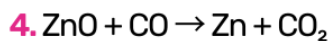
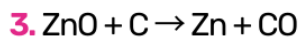
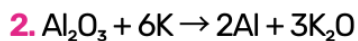
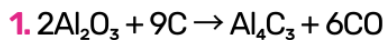


✧ Разрушение комплексных солей при пропускании углекислого и сернистого газов

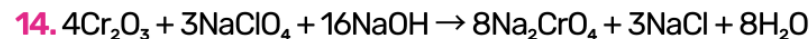
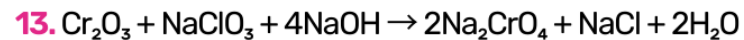
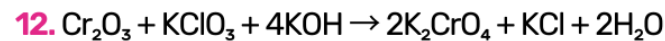
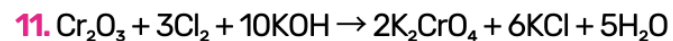
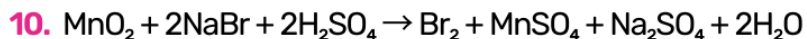
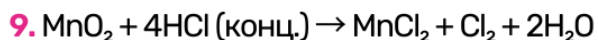
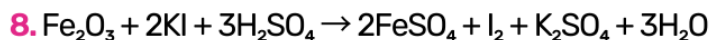


Амфотерные оксиды

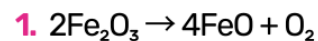
ОВР



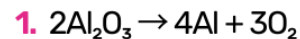
Важно: FeI_3 не существует в таблице растворимости, не устойчив и распадается на $\text{FeI}_2 + \text{I}_2$



✧ Разложение



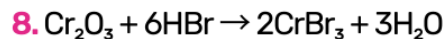
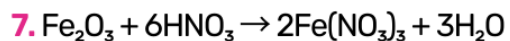
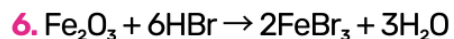
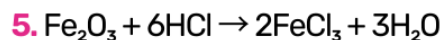
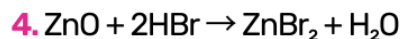
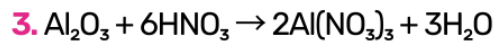
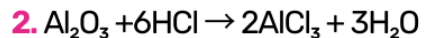
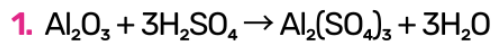
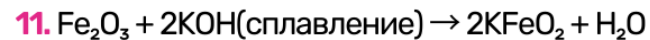
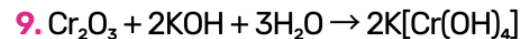
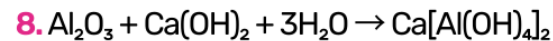
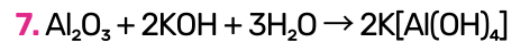
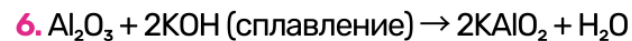
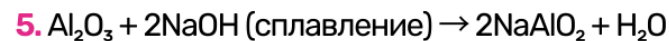
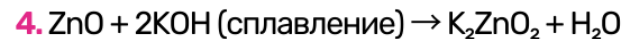
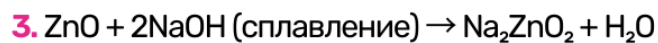
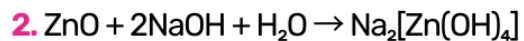
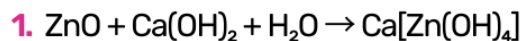
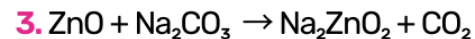
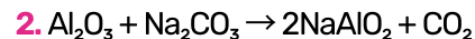
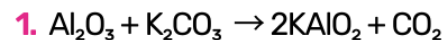
✧ Электролиз

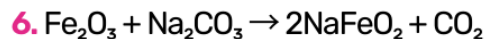
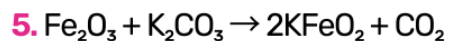
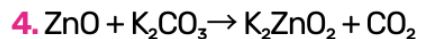


не ОВР

✧ с основными оксидами

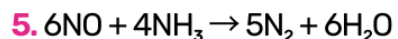
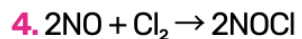
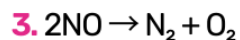
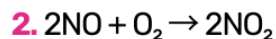
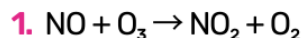


✧ **с кислотами**✧ **со щелочами**✧ **с карбонатами и гидрокарбонатами**

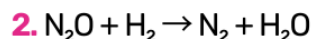
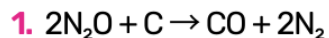


Несолеобразующие оксиды

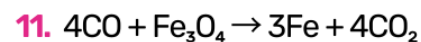
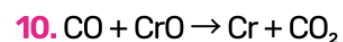
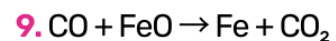
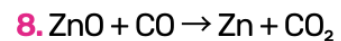
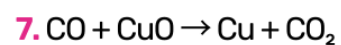
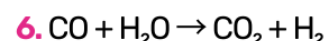
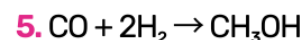
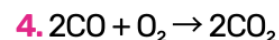
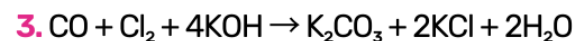
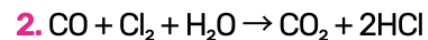
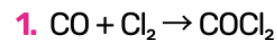
✧ **Оксид азота (II)** → окись азота, в зависимости от условий может проявлять как окислительные, так и восстановительные свойства

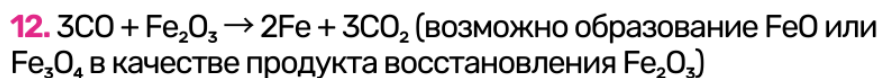


✧ **Оксид азота(I)** → закись азота обычно переходит в азот



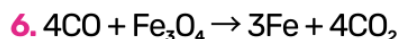
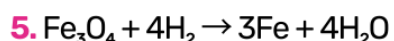
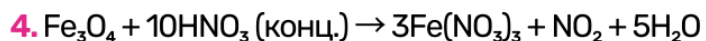
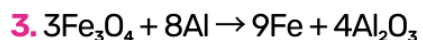
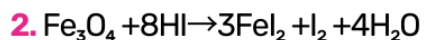
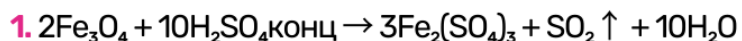
✧ Угарный газ обычно является восстановителем



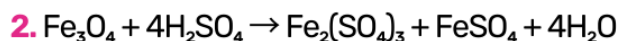


Железная окалина

ОВР

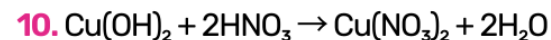
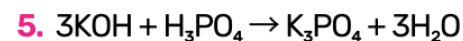
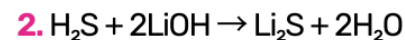
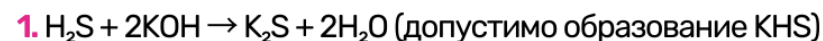


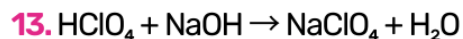
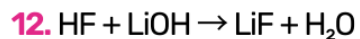
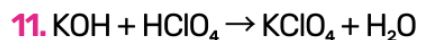
не ОВР



Гидроксиды и бескислородные кислоты

Нейтрализация (кислота + основной гидроксид)

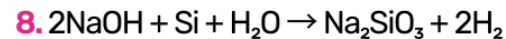
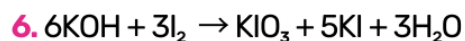
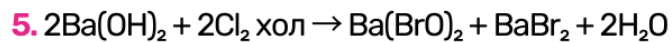
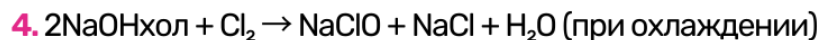
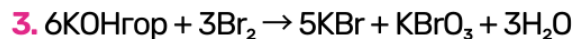
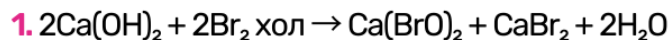




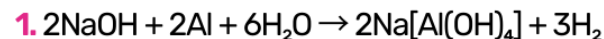
Щелочи

С простыми веществами

✧ С неметаллами

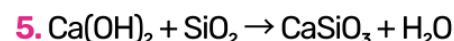
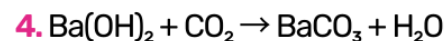
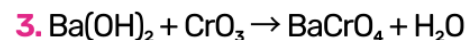
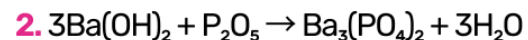
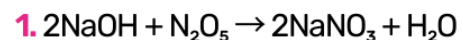


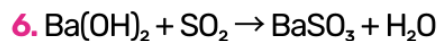
✧ С металлами



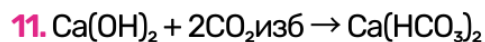
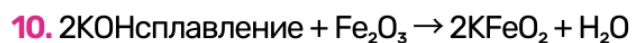
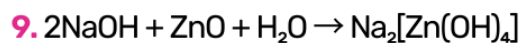
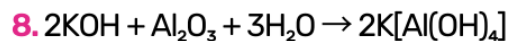
✧ С оксидами*

*остальные реакции в блоке с оксидами



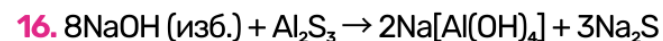
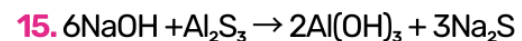
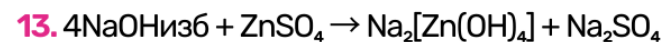
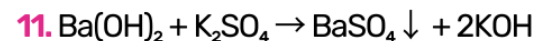
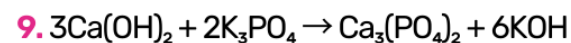
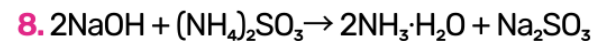
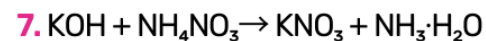
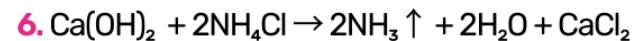
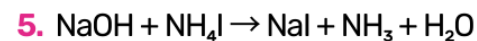
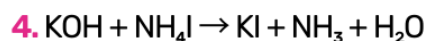
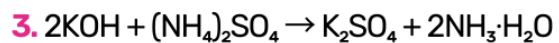
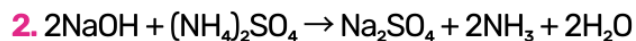
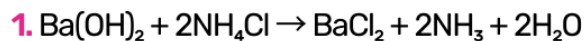


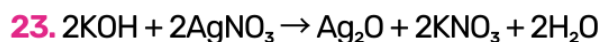
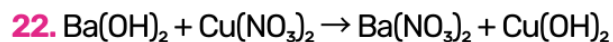
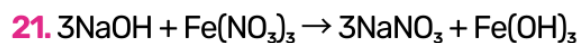
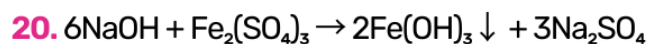
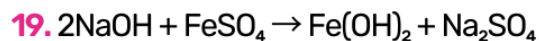
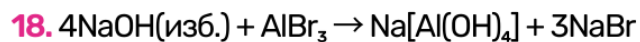
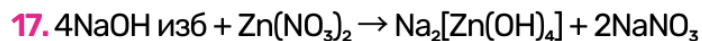
OBP



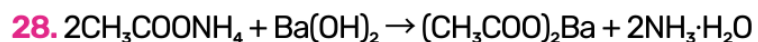
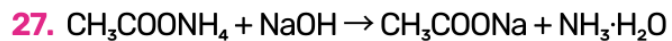
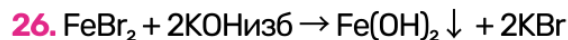
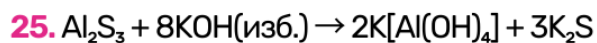
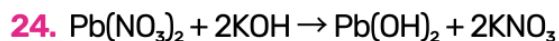
✦ С солями

- со средними

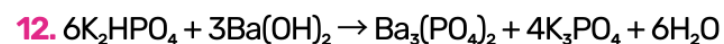
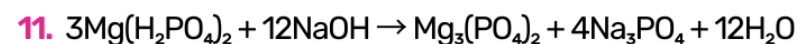
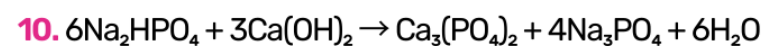
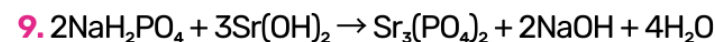
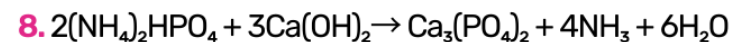
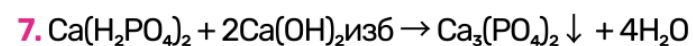
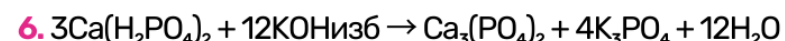
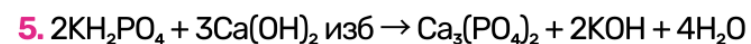
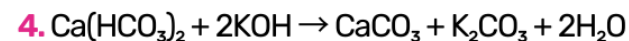
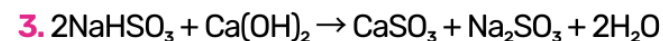
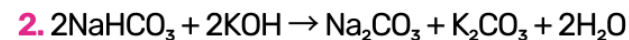
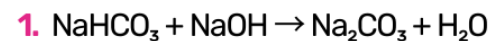


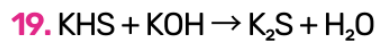
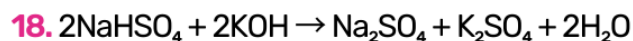
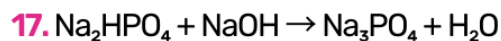
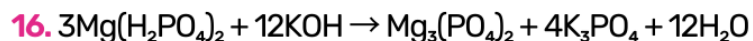
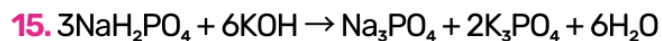
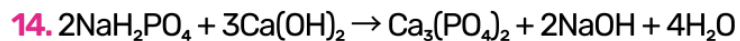
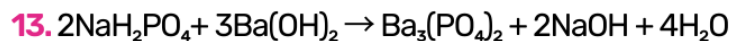


Важно: AgOH не существует в растворе

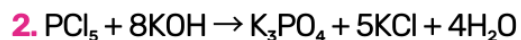


• С кислотными солями





✧ С бинарными соединениями



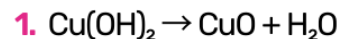
С амфотерными гидроксидами смотри ниже

С кислотами смотри в нейтрализации, но не забудь, что может получаться и кислая соль при избытке кислоты, если кислая соль существует

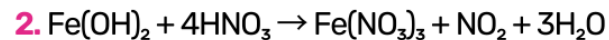
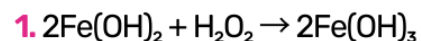
Важно: Щелочи плавятся без разложения, кроме LiOH

Нерастворимые основания

✧ Разложение

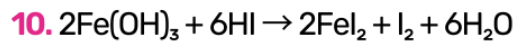
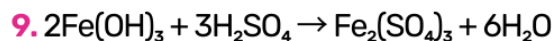
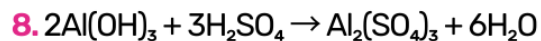
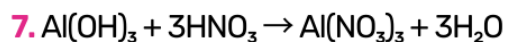
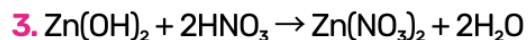
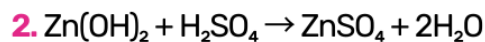
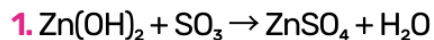


✧ ОВР

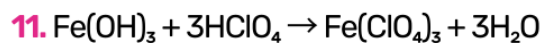


Амфотерные гидроксиды

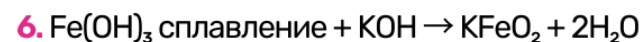
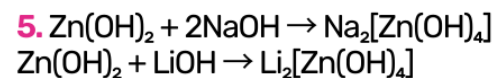
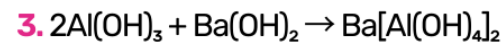
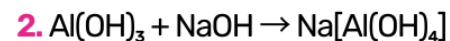
✧ С кислотами и кислотными оксидами



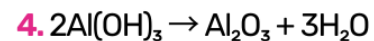
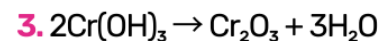
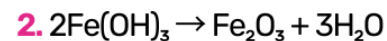
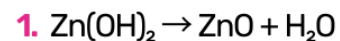
OBP



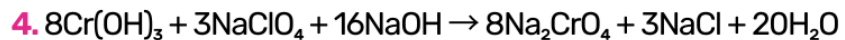
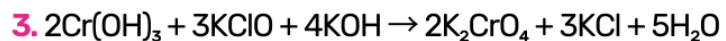
✧ Со щелочами



✧ Разложение



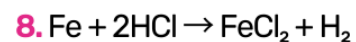
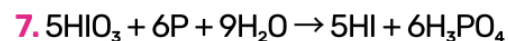
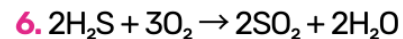
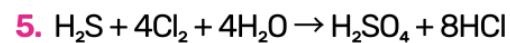
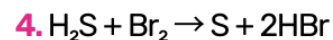
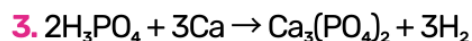
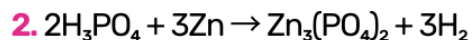
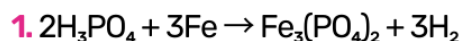
✧ ОВР



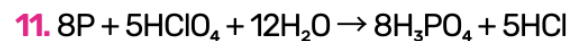
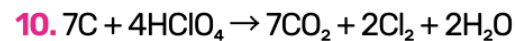
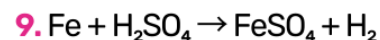
Кислоты

С основными гидроксидами смотри в нейтрализации, но не забудь, что может получаться и кислая соль при избытке кислоты, если кислая соль существует. **С амфотерными гидроксидами** смотри выше в блоке с амфотерными

✧ С простыми веществами (ОВР)

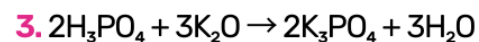
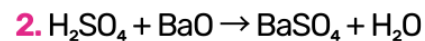
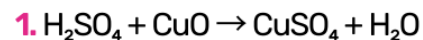


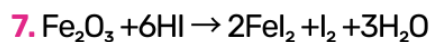
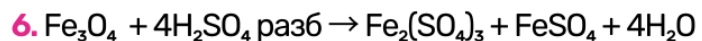
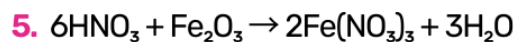
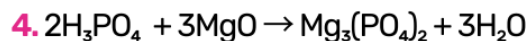
Важно: Железо приобретает степень окисления +2, а не +3!



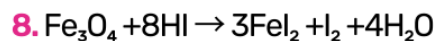
✧ С оксидами*

*остальные реакции в блоке с оксидами





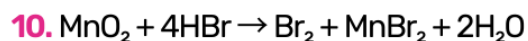
ОВР



ОВР

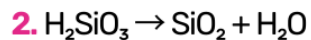
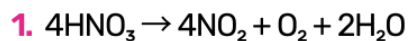


ОВР



ОВР

✧ Разложение



✧ С солями

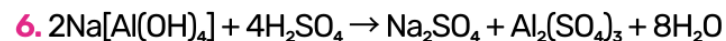
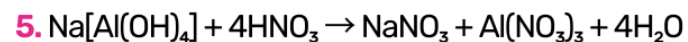
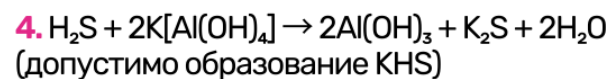
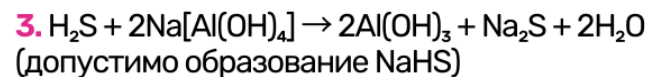
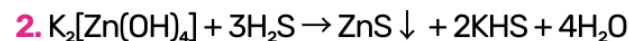
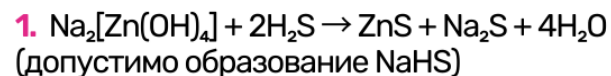
- Возможность образования кислых солей



неОВР

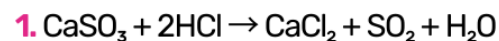


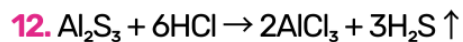
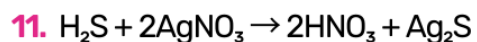
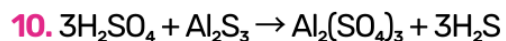
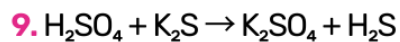
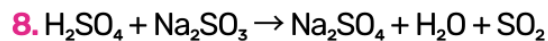
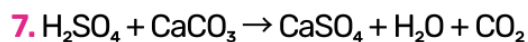
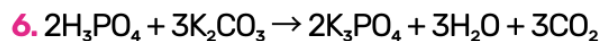
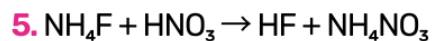
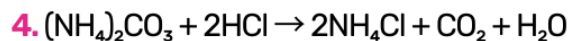
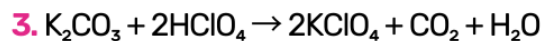
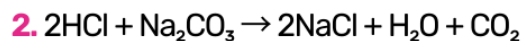
✧ С комплексными солями



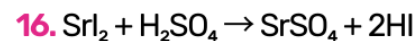
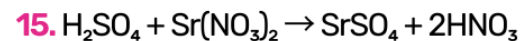
✧ РИО

- Со средними солями

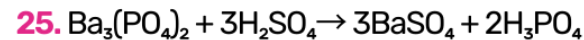
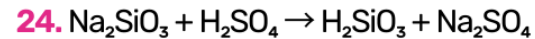
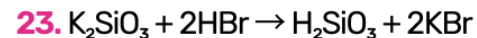
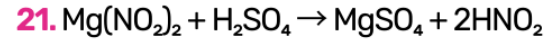
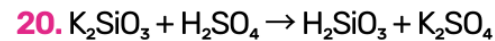
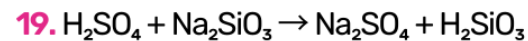
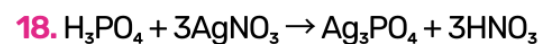


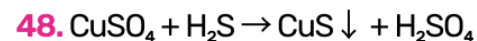
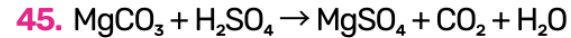
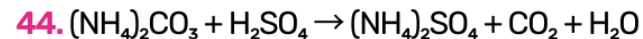
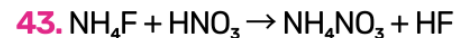
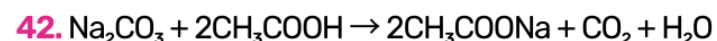
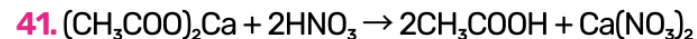
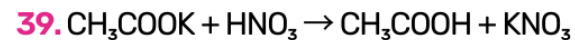
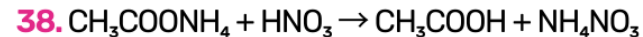
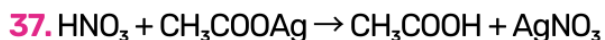
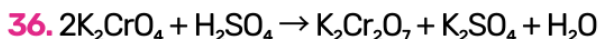
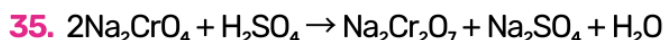
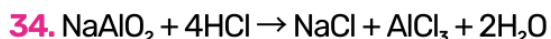
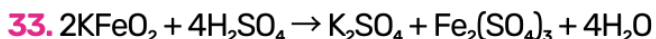
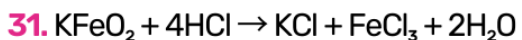
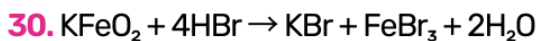
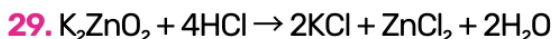
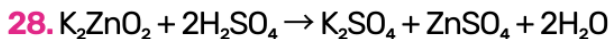
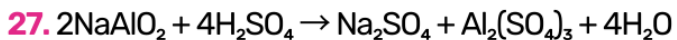
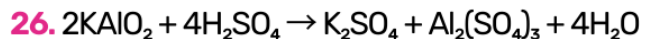


неОВР



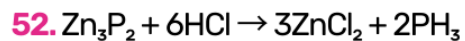
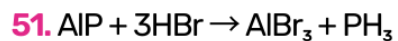
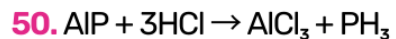
неОВР



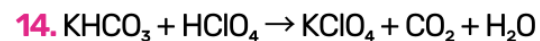
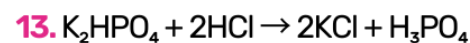
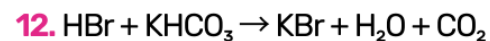
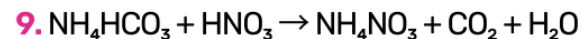
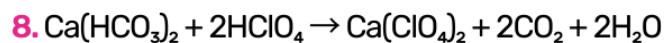
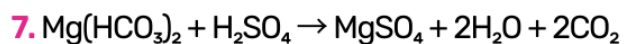
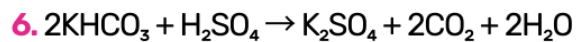
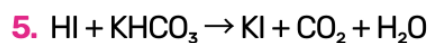
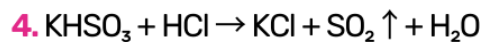
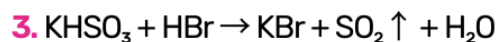
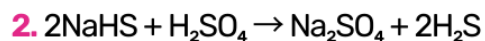
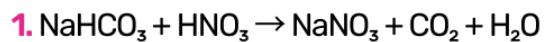


Важно: CuS, PbS, HgS, Ag₂S не реагируют с кислотами-неокислителями

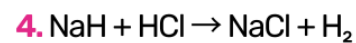
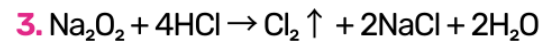
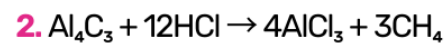
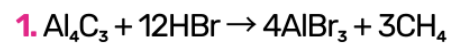
Важно: если бы кислота была конц, то OBP

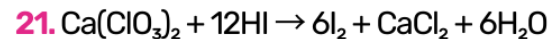
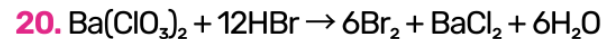
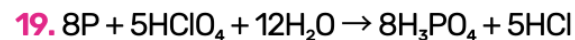
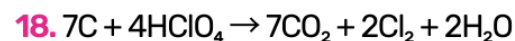
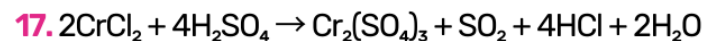
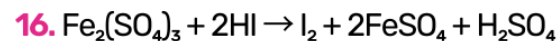
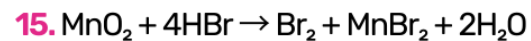
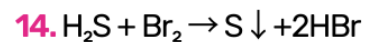
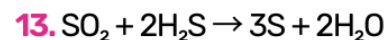
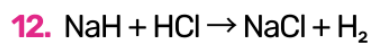
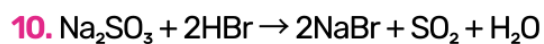
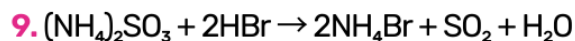
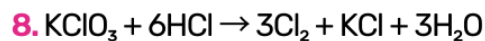
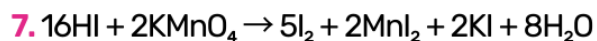


✧ С кислотами солям



✧ С бинарными соединениями



✧ **ОВР без участия кислот-окислителей**

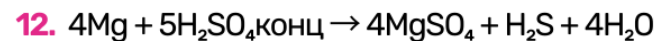
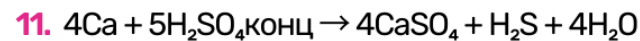
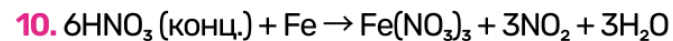
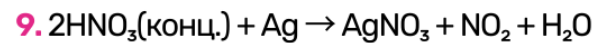
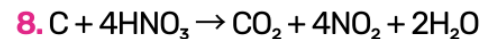
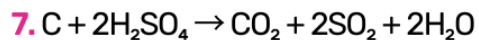
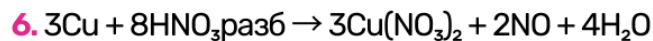
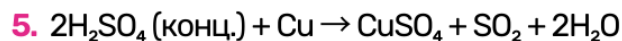
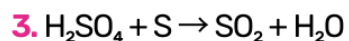
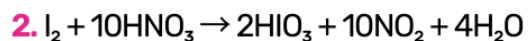
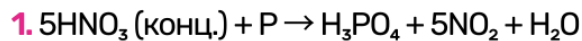
ОВР с кислотами-окислителями

К ним относятся: серная только концентрированная кислота и азотная любой концентрации

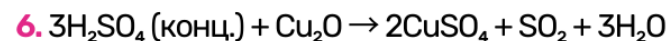
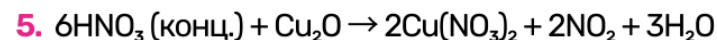
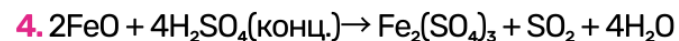
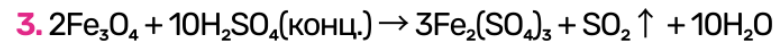
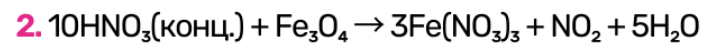
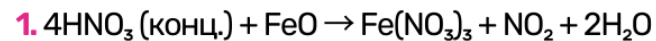
Важно: ОВР идет, если второе вещество может быть восстановителем, иначе предполагаем РИО

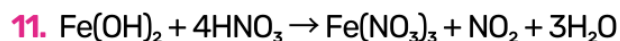
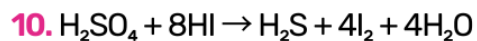
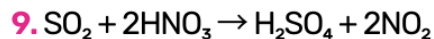
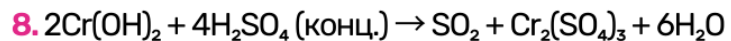
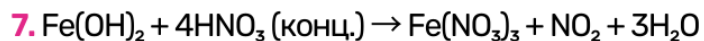
✧ С простыми веществами

Важно: С кислотами-окислителями взаимодействуют неметаллы: С, S, P, I₂ и металлы, кроме Au, Pt, Fe, Cr, Al пассивируются кислотами-окислителями, с ними реакция идет только при нагревании

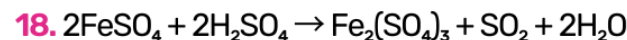
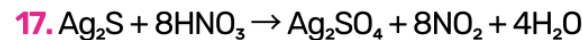
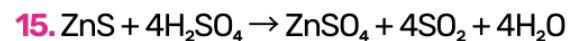
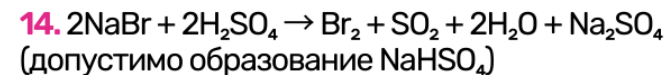
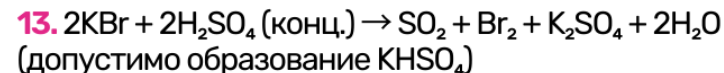
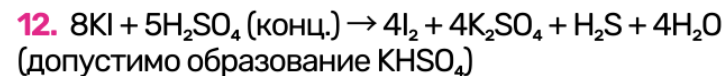
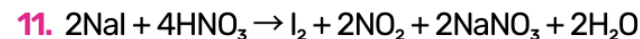
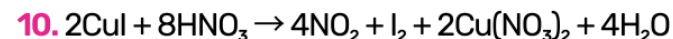
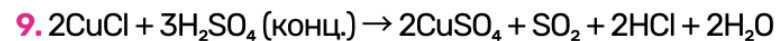
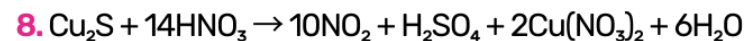
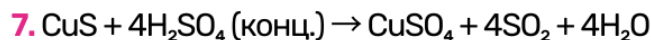
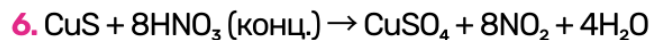
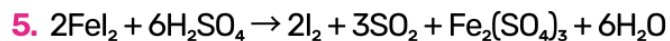
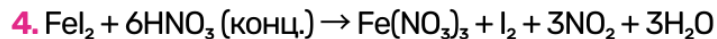
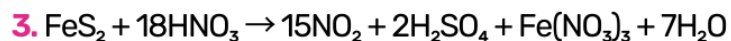
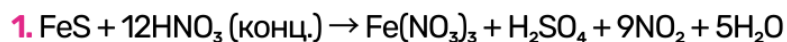


✧ С оксидами/гидроксидами/кислотами

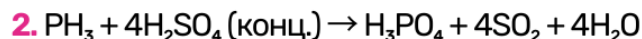
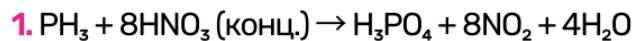




✧ С солями



✧ С бинарными соединениями



Аммиак

- Обычная формулировка в 31 номере: аммиак пропустили через раствор...

