

7.10.24

TENDER HEART HIGH SCHOOL, SEC-33B, CHD

CLASS - VIII SUBJECT - CHEMISTRY

CHAPTER - 1 TEACHER - ANAMIKA

Good morning to all the students!

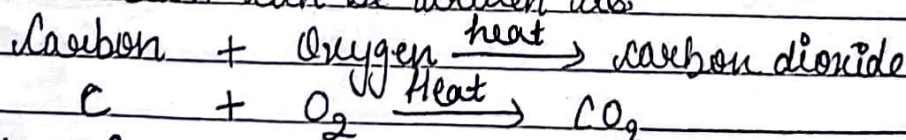
Students this lesson is for class-VIII for the subject of chemistry. Topic:- 'Chemical Equation' which is covered in chapter - 1. 'The Language of Chemistry' starting on page no-10 of your text-book titled - concise chemistry by 'Selina Publication' and is being submitted to you on 7, October, 2024.

All students may now please open page no - 10 of your notebook in front of you.

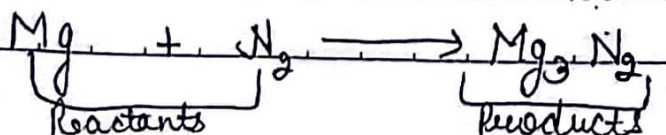
If all students are ready, then let us start with this chapter. All students may now please listen carefully.

Chemical Equation:-

A chemical reaction can be represented using the symbols and formulae of the substances involved in it. e.g - carbon burns in air to form carbon dioxide. This reaction can be written as.



Magnesium combines with nitrogen to form magnesium nitride. It can be written as.

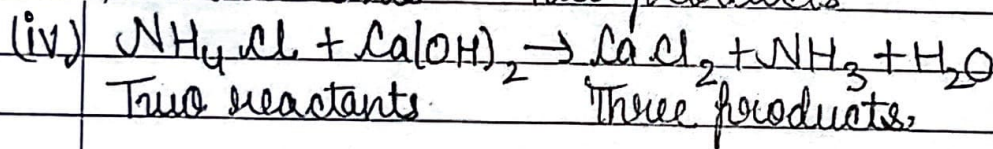
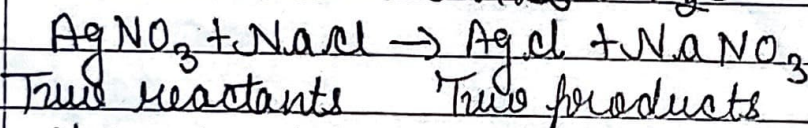
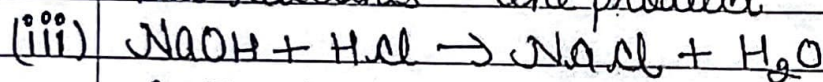
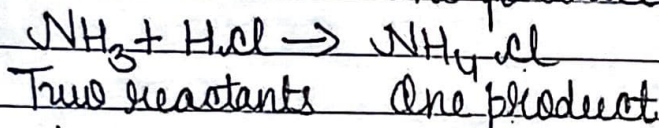
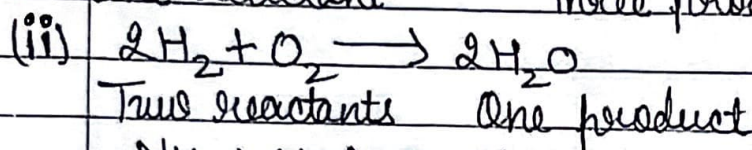
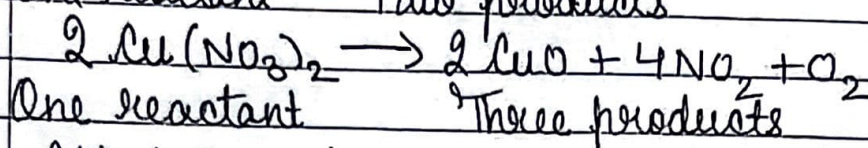
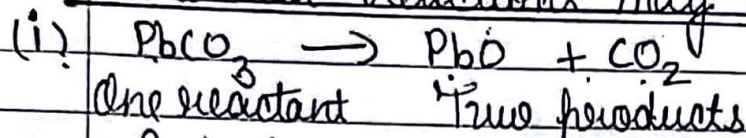


(P.T.O.)

[Substances taking part
in the chemical reaction]

[Substances formed as a
result of the reaction.]

Chemical reactions may include :-

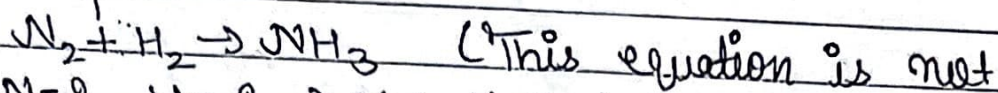


Students, let us move on the next topic of this chapter which is 'Balanced Equation'.

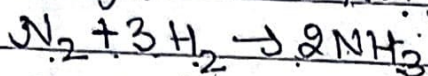
Balanced Equation :-

Students we have already studied about a chemical equation. The elements of reactant molecules are also present in the product molecules. A balanced equation is that in which the total number of atoms of each element in the reactants is the same as the number of atoms in the products.
(P.T.O.)

products formed. e.g. - $C + O_2 \rightarrow CO_2$
 Here number of carbon atoms on both side is 1,
 and number of oxygen atoms on both side is 2.
 So the equation is balanced. Now see another
 example



$N=2, H=2 \rightarrow N=1, H=3$ balanced)



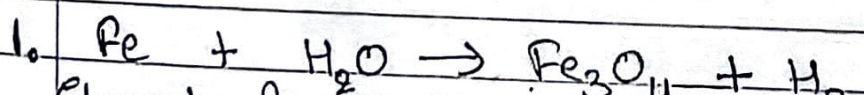
$N=2, H=(3 \times 2)=6 \rightarrow N=2, H=(2 \times 3)=6$ (Now balanced)

Balancing a Chemical Equation

We will learn to balance an equation by using hit and trial method. We do this by making the atoms of each element equal on both sides of equation.

STEPS:-

- 1) Count the number of times an element occurs on either side.
 - 2) The element with the least frequency is balanced first.
 - 3) When two or more elements have the same frequency, the metallic element is balanced first.
- Let us balance some equations.



Element, Reactant side Product side

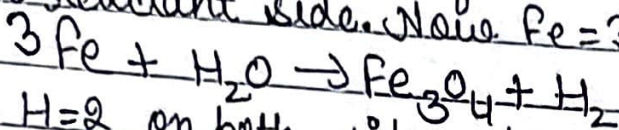
Fe,	1.	3
H,	2	2
O	1	4

(P.T.O.)

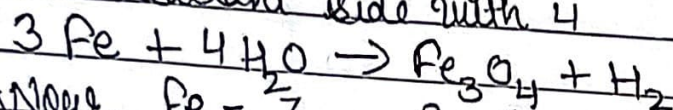
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Fe and H same frequency 4, but Fe is metal so it will be balanced first. Write 3 before Fe, on reactant side. Now Fe = 3 (on both sides)



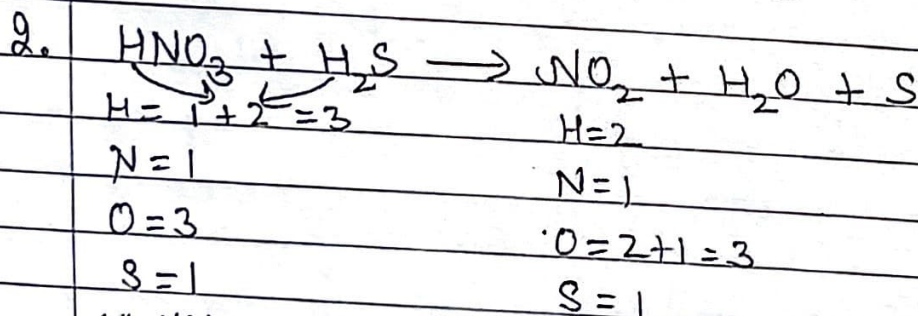
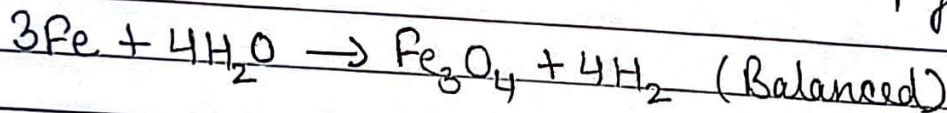
As H = 2 on both sides, let us balance O. On the product side O = 4 so we will multiply H₂O on the reactant side with 4



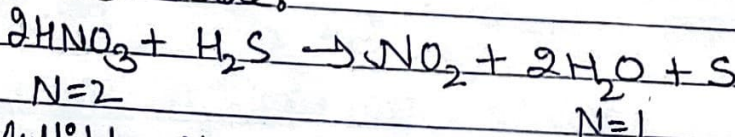
$$\begin{array}{lcl} \text{Now, Fe} = 3 & & \text{Fe} = 3 \\ \text{O} = 4 & & \text{O} = 4 \end{array}$$

$$\text{H} = (4 \times 2) = 8 \quad \text{H} = 2$$

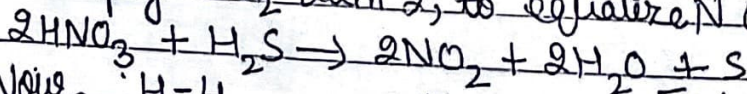
To equalize H on the product side multiply by 4.



Multiply HNO₃ with 2, to make H = 4 on reactant side and multiply H₂O with 2, to make H = 4 on product side.



Multiply NO₂ with 2, to equalize N on both sides



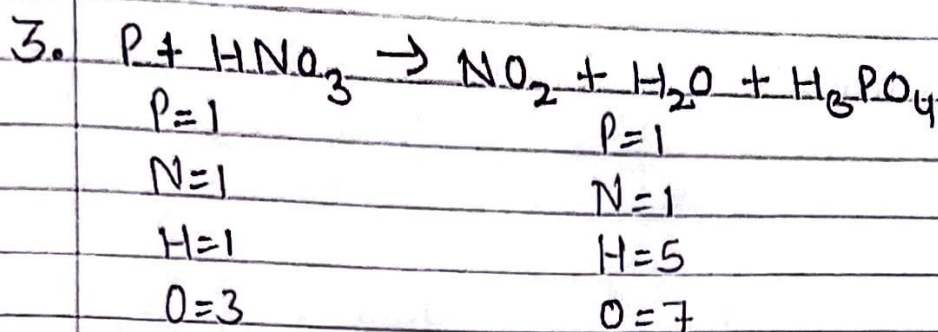
Now, H = 4, H = 4 [Balanced]

N = 2	N = 2
O = 2 \times 3 = 6	O = (2 \times 2) + 2 = 6
S = 1	S = 1

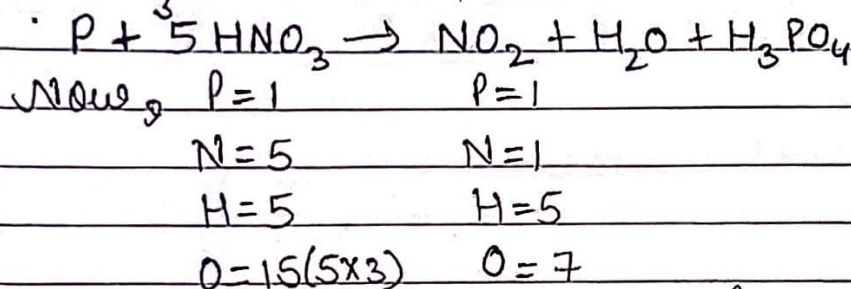
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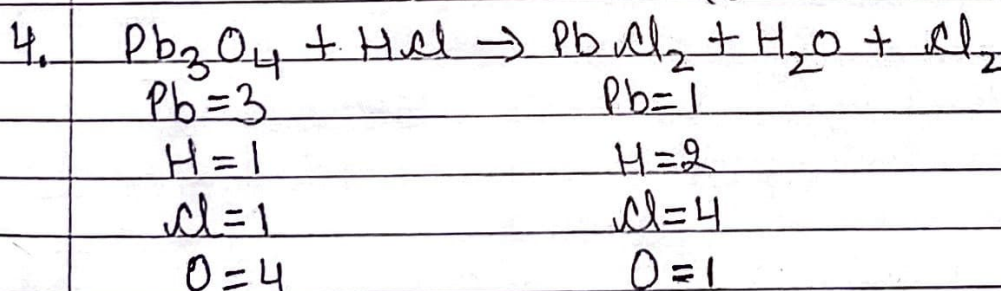
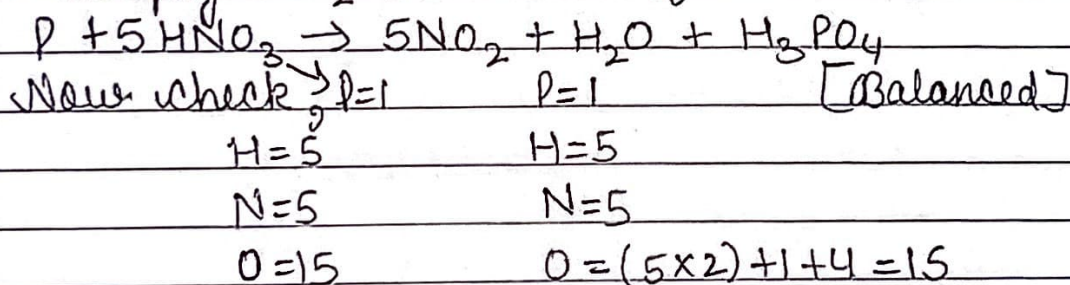
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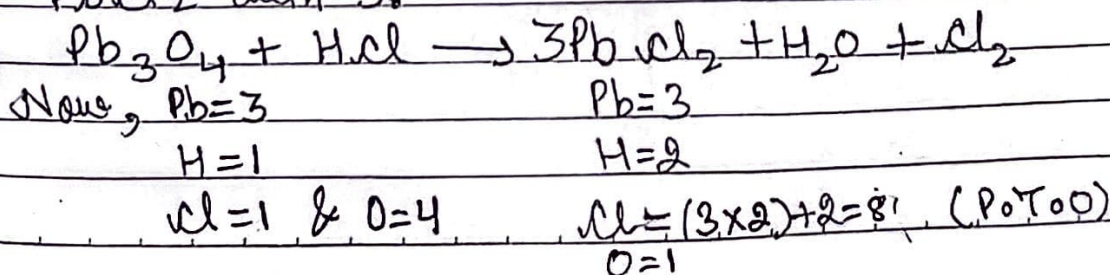
P and N are already equal, so next lower frequency is of H. To equalize H, multiply HNO_3 with 5. Now H=5 on both sides.



Multiply NO_2 with 5 to equalize N.



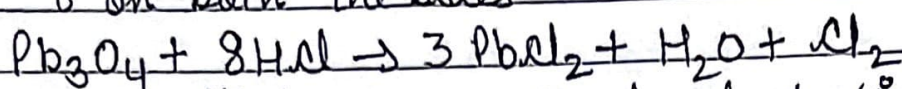
To make Pb=3 on reactant side, multiply $PbCl_2$ with 3.



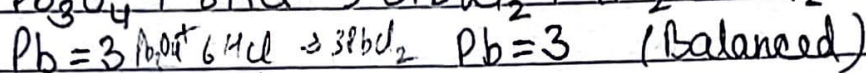
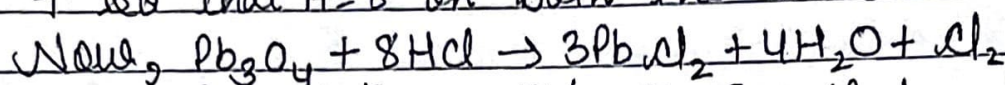
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If we multiply HCl with 8, Cl will become 8 on both the sides



Now, multiply H_2O on the product side by 4 so that H=8 on both the sides.



$$\text{O} = 4$$

$$+ 3\text{H}_2\text{O} \quad \text{O} = 4$$

$$\text{H} = 8$$

$$+ 3\text{Cl}_2 \quad \text{H} = 8$$

$$\text{Cl} = 8$$

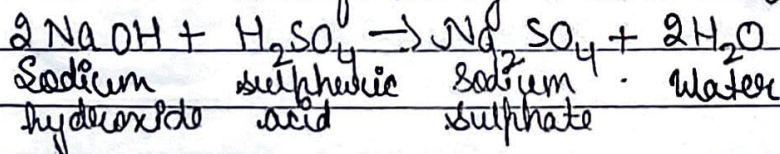
$$\text{Cl} = 8$$

When there are many elements in an equation, start balancing with the atoms of lower frequency, the elements with higher frequency get balanced automatically.

Now, let us discuss the next topic of this chapter which is 'Information conveyed by a balanced chemical equation'

Information conveyed by a balanced chemical equation.

Look at the following balanced equation.



The above equation tells us,

1. about the reactants and products formed in the reaction.
2. The number of molecules of all the substances involved like here we can see 2 molecules of sodium.

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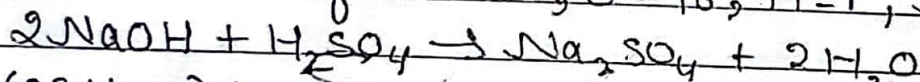
hydroxide react with 1 molecule of sulphuric acid to give 1 molecule of sodium sulphate and 2 molecules of water.

3. Chemical composition of each compound like, sodium sulphate (Na_2SO_4) contains 2 atoms of sodium, one atom of sulphur and 4 atoms of oxygen.

4. Every atom has a fixed mass called as atomic mass. When we add the atomic masses of all the elements of a molecule we get the molecular mass.

A balanced equation will tell us molecular mass of reactants and products formed. In a balanced equation, Mass of reactants = Mass of products

Atomic mass of Na = 23, O = 16, H = 1, S = 32,



$$2(23+16+1) + 1 \times 2 + 32 + 16 \times 4 \rightarrow 2 \times 23 + 32 + 16 \times 4 + 2(1 \times 2 + 16)$$

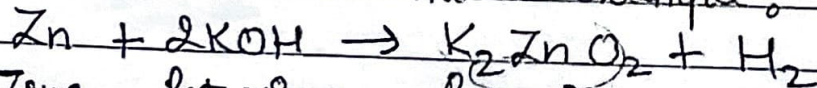
$$2 \times 40 + 98 \rightarrow 142 + 36$$

$$178 = 178$$

Mass of reactants = Mass of products

It proves the law of conservation of mass.

Let us take one more example:



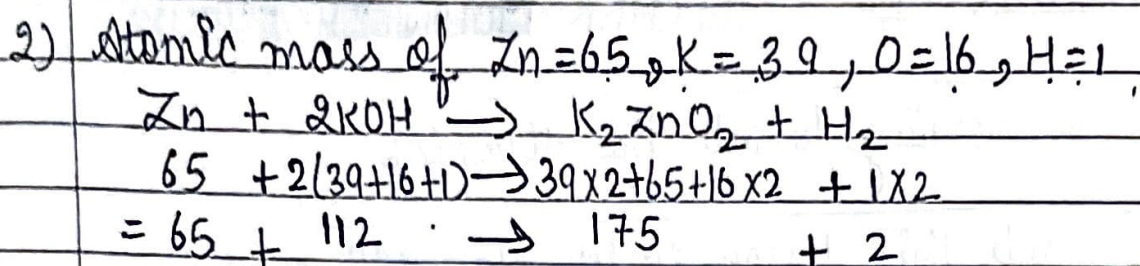
Zinc Potassium Potassium Hydrogen
hydroxide zincate

Information conveyed by the above equation:
1) One atom of zinc reacts with 2 molecules of potassium hydroxide to give one molecule of potassium zincate and one molecule of hydrogen.

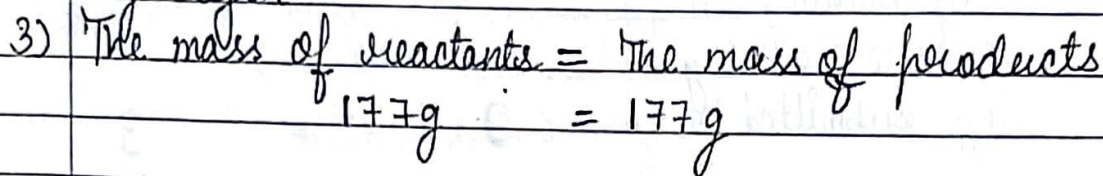
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65g of Zinc reacts with 112g of potassium hydroxide
give 175g of potassium zincate and 2g of hydrogen



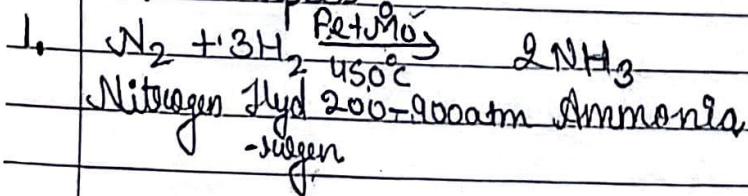
Limitation of a chemical equation:-

A chemical equation cannot tell us

- 1) The reactant and products are solid, liquid or gas.
- 2) The speed of the reaction (slow rate or fast rate)
- 3) Time taken for completion of the reaction
- 4) During the reaction heat was released or absorbed
- 5) The reaction is reversible or irreversible.
- 6) The reaction is completed or is incomplete.

Making chemical Equation more informative:-

We can make a chemical equation more informative by writing the temperature, pressure, catalyst etc, above or below the arrow ($\rightarrow$) separating reactants and products. Let us see in examples:-

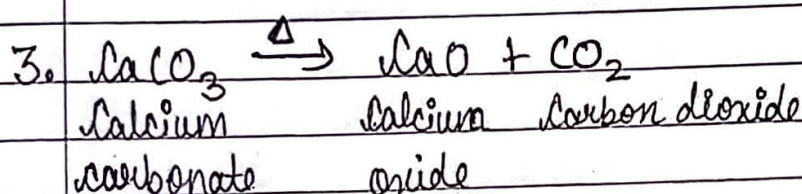
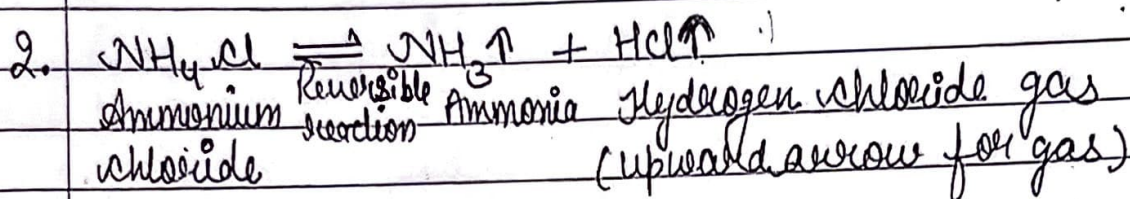


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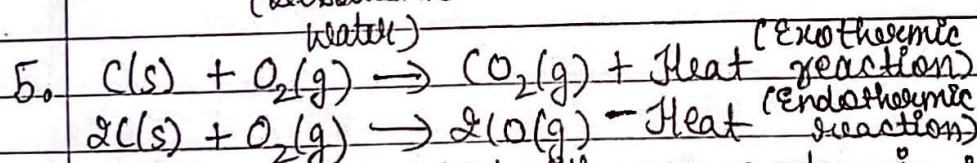
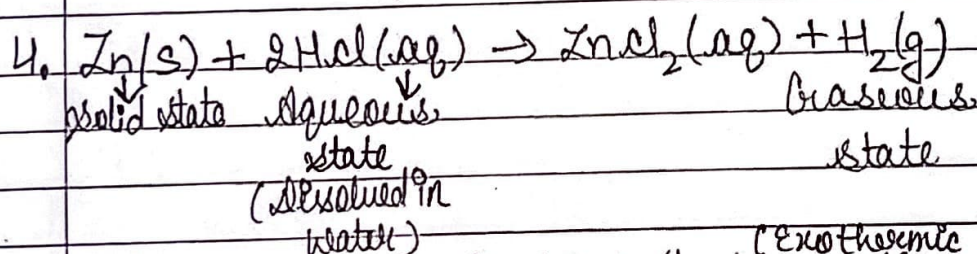
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Fe $\rightarrow$ catalyst, Molybdenum (Mo) $\rightarrow$ Promoter
 Temperature required $\approx 450^\circ\text{C}$, Pressure $\rightarrow$ 200 to 900 Atmosphere

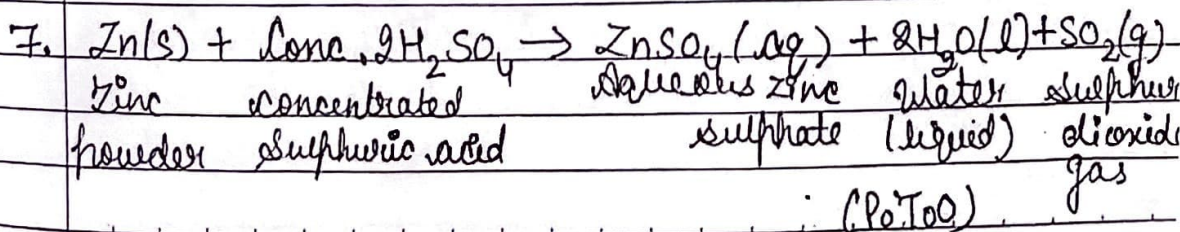
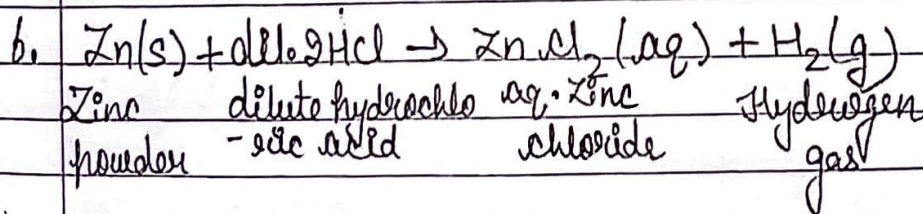


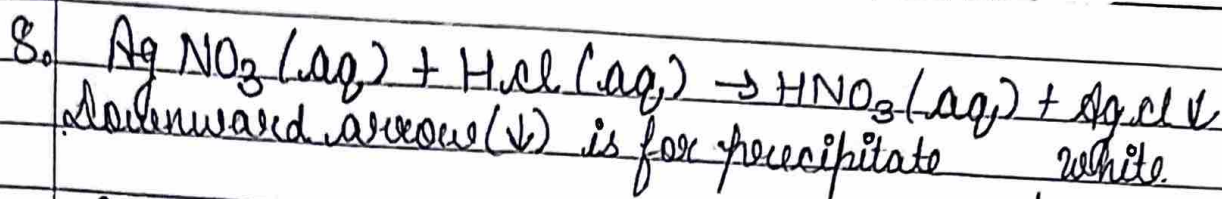
$\Delta \rightarrow$ Symbol for heat, Calcium carbonate decomposition on heating



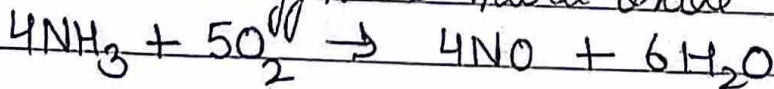
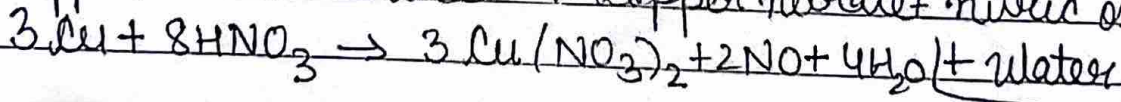
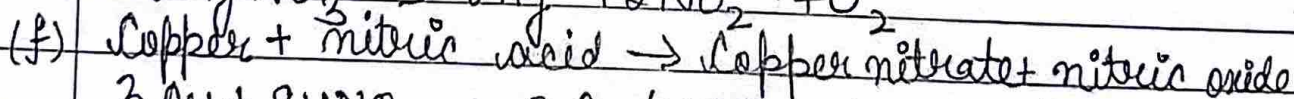
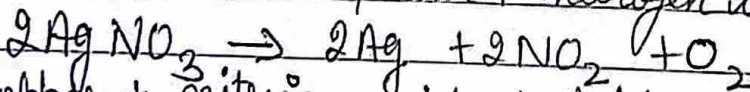
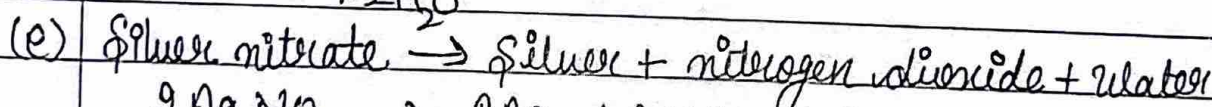
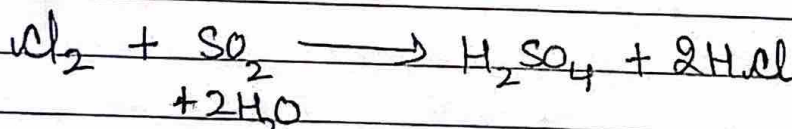
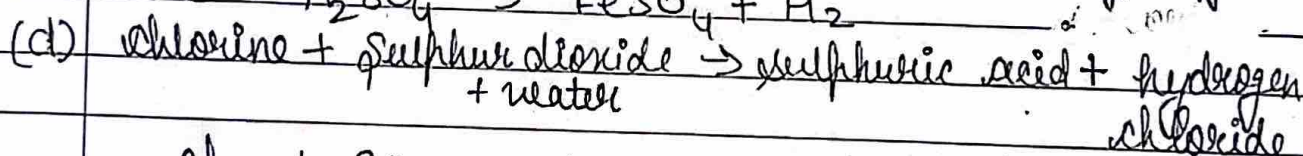
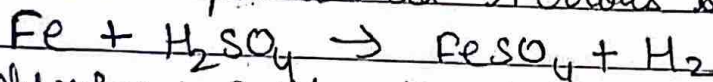
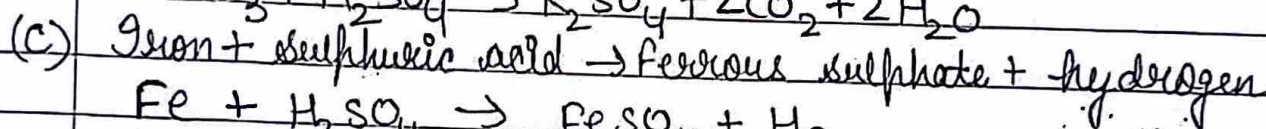
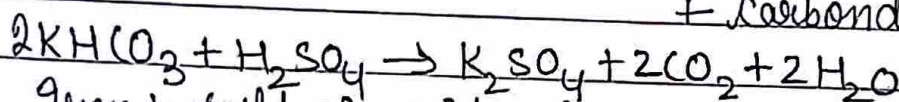
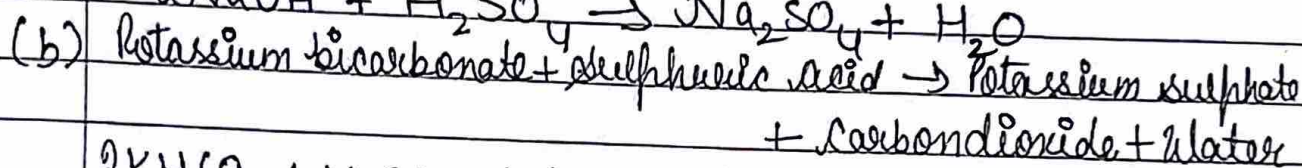
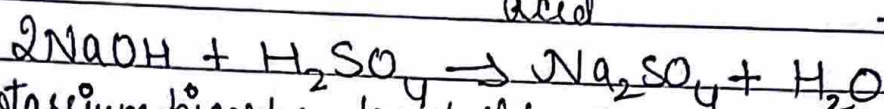
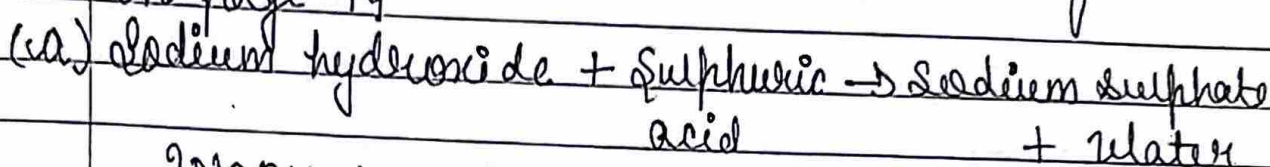
Dilute acid $\rightarrow$ Acid with more water in it.

Concentrated acid $\rightarrow$ Acid with less water in it.





Let us solve some more equations given on page - 19



Now, I will give you three a very short questions. You will get a three minutes break to write the answers.

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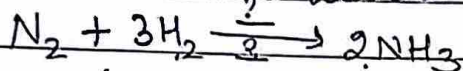
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The Questions are:-

Q1:- Balance the given equation; $\text{Ca} + \text{N}_2 \rightarrow \text{Ca}_3\text{N}_2$

Q2:- In a balanced equation, Mass of reactants -

Q3:- In the given equation tell the catalyst and temperature under which it will proceed.



I hope you all have written the answers by now.
Let us check the answers now.

Ans1:- $3\text{Ca} + \text{N}_2 \rightarrow \text{Ca}_3\text{N}_2$

Ans2:- Mass of Products

Ans3:- $\text{N}_2 + 3\text{H}_2 \xrightarrow[\text{200-900 atm}]{\text{Fe+Mo, 450}^\circ\text{C}} 2\text{NH}_3$

Students, Now I am ending the lesson for today
by giving 'Instructions' and 'Homework'

You all are required to read the lesson
again and revise all the reactions which we have
done in today's lesson

Do Q-1, 4, 5 of Exercise 1(B) given on pg-no.15 of your
chemistry notebook.

ANAMIKA

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