



SUBJECT- CHEMISTRY

CLASS 10

CHAPTER 1: CHEMICAL REACTIONS AND EQUATIONS

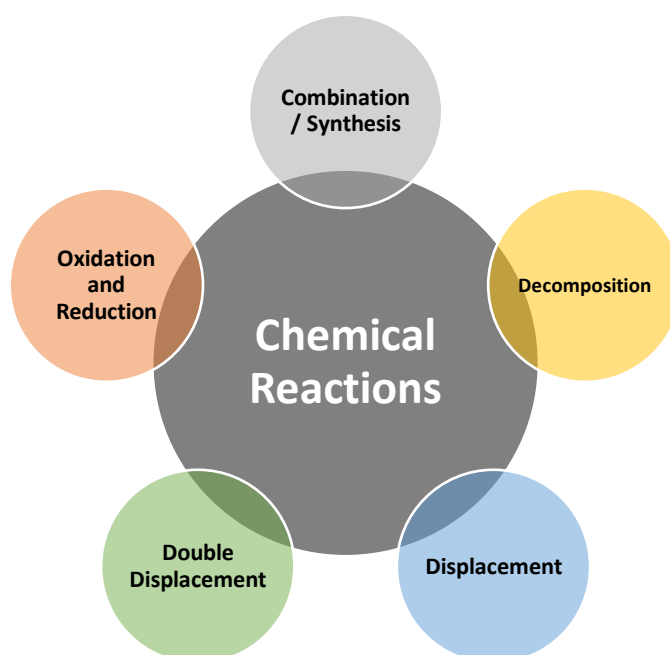
Guidelines

Dear Students

- Refer to the content below, view the links, and attempt the assignment provided at the end in your chemistry notebook.
- It would help you to read the NCERT before you begin to answer the questions.

SUB TOPICS

TYPES OF CHEMICAL REACTIONS



COMBINATION REACTIONS

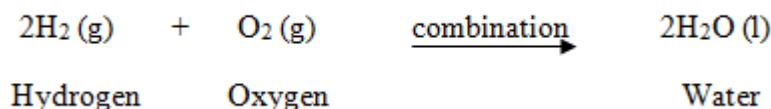


Those reactions, in which two or more substances combine to form a single substance, are called combination reactions. They are also called as Synthesis reactions as they lead to synthesis or production of a new compound.

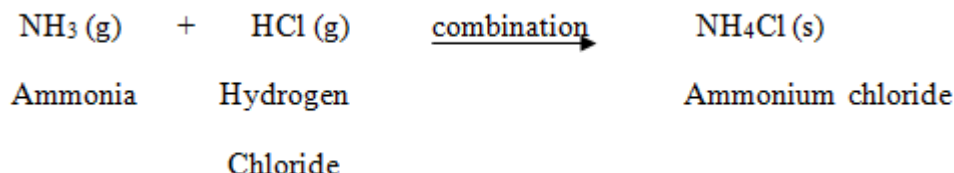
- In a combination reaction, two or more elements can combine to form a compound; two or more compounds can combine to form a new compound; or an element and a compound can combine to form a new compound.

Examples

1. Hydrogen burns in oxygen to form water:

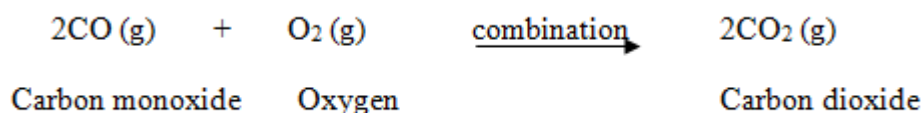


2. Ammonia reacts with hydrogen chloride to form ammonium chloride.



In this reaction, two compounds, ammonia and hydrogen chloride, combine together to produce a new compound ammonium chloride. So, this is a combination reaction.

3. Carbon monoxide reacts with oxygen to form carbon dioxide.



In this reaction, carbon monoxide compound reacts with oxygen element to form a new compound, carbon dioxide. So, this is a combination reaction.

Refer to the following link to observe the combination reaction between Quick Lime and Water. <https://www.youtube.com/watch?v=egku6aC3THI>

DECOMPOSITION REACTIONS



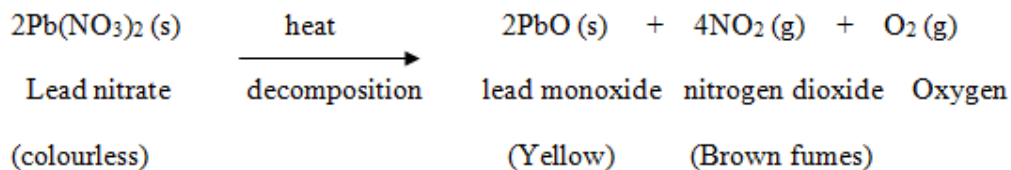
- Those reactions in which a compound splits up into two or more simpler substances are known as decomposition reactions.

Decomposition reactions are carried out by applying heat, light or electricity.

- When a decomposition reaction is carried out by heating, it is called 'Thermal Decomposition'.

- Example:

1. When lead nitrate is heated strongly, it breaks down to form simpler substances like lead monoxide, nitrogen oxide and oxygen.



Refer to the following link to view decomposition of lead nitrate:
<https://www.youtube.com/watch?v=KusHVpjqO4>

2. Decomposition reaction of ferrous sulphate crystals by the action of heat



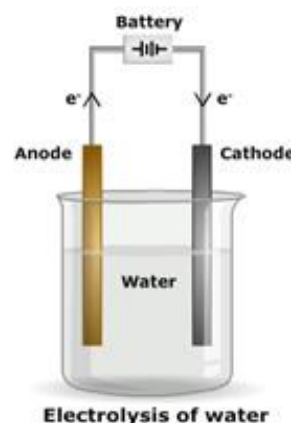
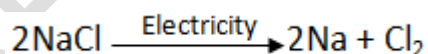
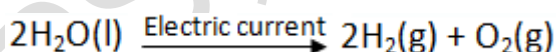
Refer to the following link to view decomposition of ferrous sulphate:
<https://www.youtube.com/watch?v=UndMvcd7ZqY>

- **Some decomposition reactions are carried out by using electricity.**

Example: When electric current is passed through acidified water, it decomposes to give hydrogen gas (at cathode) and oxygen gas (at anode).

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The decomposition reaction which takes place by the action of electricity is called Electrolytic Decomposition.

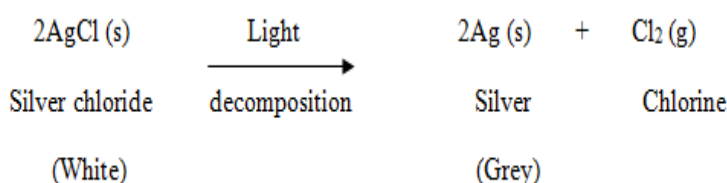


Refer to the following link for electrolysis of water:
<https://www.youtube.com/watch?v=qHxDHu9wGAw>

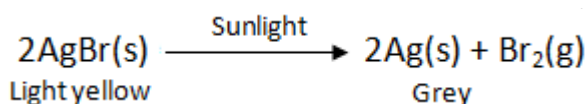
- The decomposition reactions which are carried out by light energy are called as **Photolytic Decomposition Reactions / Photo Decomposition / Photochemical Decomposition**.

Examples

1. When silver chloride is exposed to light, it decomposes to form silver metal and chlorine gas.



2. Silver bromide also decomposes in the same way. This reaction forms the basis of Black and White photography.



Did you know?

Photolysis occurs in the atmosphere wherein ozone molecules are broken down into oxygen molecule and atomic oxygen.

Uses of Decomposition Reactions:

- The decomposition reactions carried out by electricity are used to extract several metals from their naturally occurring compounds like chlorides and oxides. For example, sodium metal is extracted by the electrolysis of molten Aluminum oxide.
- Thermal Decomposition of Mercuric Oxide produces mercury and oxygen.

Q. Why are decomposition reactions called the opposite of combination reaction?

A. We know a combination reaction to be a chemical reaction in which two or more substances combine together to produce a new compound. Whereas in a decomposition reaction, a single reactant is broken down to form multiple products.

Q. Why are decomposition reactions mostly endothermic in nature?

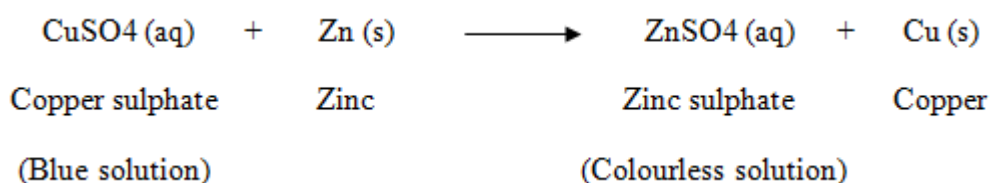
A. Most decomposition reactions require energy either in the form of heat, light or electricity. Absorption of energy causes breaking of the bonds present in the reacting substance which decomposes to give the product.

DISPLACEMENT REACTIONS



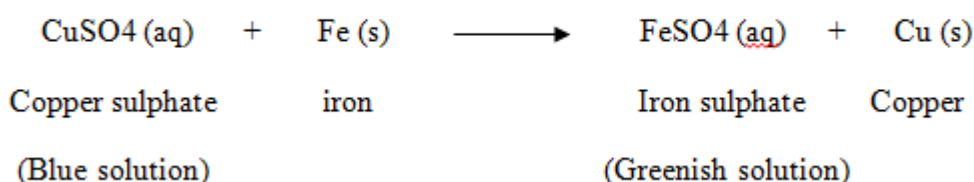
- Those reactions in which one element takes the place of another element in a compound are known as displacement reactions.
- In general, a more reactive element displaces a less reactive element from its compound.
Examples:

1. **When a strip of zinc metal is placed in copper sulphate solution, zinc sulphate solution and copper are obtained.**



In this reaction, zinc displaces copper from copper sulphate compound so that copper is free. This displacement reaction takes place because zinc is more reactive than copper.

2. **When a piece of iron metal (or iron nail) is placed in copper sulphate solution, iron sulphate solution and copper metal are formed.**



In this reaction, iron displaces copper from copper sulphate solution. The deep blue colour of copper sulphate solution fades due to the formation of green solution of iron sulphate. A red-brown coating (or layer) of copper metal is formed on the surface of iron metal (or iron nail).

This displacement reaction takes place because iron is more reactive than copper.

Refer to the following link to view displacement of copper sulphate:
<https://www.youtube.com/watch?v=Kwf3vUnaXDo>

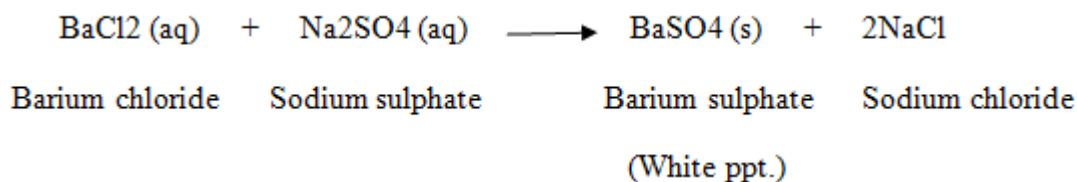
DOUBLE DISPLACEMENT REACTIONS



- Those reactions in which two compounds react by an exchange of ions to form two new compounds are called double displacement reactions.

Example

When barium chloride solution is added to sodium sulphate solution, a white precipitate of barium sulphate is formed along with sodium chloride solution.



In this reaction, two compounds barium chloride and sodium sulphate react to form two new compounds, barium sulphate and sodium chloride. An exchange of ions takes place in this reaction.

In this reaction, barium sulphate is formed as a white, insoluble solid called precipitate which separates out suddenly from the solution.

Refer to the following link to view double displacement:
<https://www.youtube.com/watch?v=O22W1ffjZCc>

Note: Any reaction in which an insoluble solid called precipitate is formed that separates from the solution is called a Precipitation Reaction.

Assignment

Q1. Write a balanced chemical equation for each of the following reactions and also classify them:

(a) Lead acetate solution is treated with dilute hydrochloric acid to form lead chloride and acetic acid solution.

(b) A piece of sodium metal is added to absolute ethanol to form sodium ethoxide and hydrogen gas.

(c) Iron (III) oxide on heating with carbon monoxide gas reacts to form solid iron and liberates carbon dioxide gas.

(d) Hydrogen sulphide gas reacts with oxygen gas to form solid sulphur and liquid water.

Q2. Why do we store silver chloride in dark coloured bottles?

Q3. A solution of potassium chloride when mixed with silver nitrate solution, an insoluble white substance is formed. Write the chemical reaction involved and also mention the type of chemical reaction.

Q4. On adding a drop of barium chloride solution to an aqueous solution of sodium sulphate, a white precipitate is obtained.

(a) Write a balanced chemical equation of the reaction involved.

(b) What other name can be given to this precipitation reaction?

LET'S SUMMARIZE

Type of Reaction	Explanation	General Equation (General form of change occurrences)	Example
Synthesis/ Combination	Reaction in which two or more simpler substances (elements) combine chemically to give a compound.	$A + B \rightarrow AB$	$2H_2 + O_2 \rightarrow 2H_2O$
Decomposition	Reaction in which a compound is broken down into simpler substances (elements).	$AB \rightarrow A + B$	$2H_2O \rightarrow 2H_2 + O_2$
Substitution (Single replacement)	Reaction in which an atom or group of atoms is replaced by another atom or group.	$A + BC \rightarrow AC + B$ OR $A + BC \rightarrow BA + C$	$Zn + 2HCl \rightarrow ZnCl_2 + H_2$ OR $Cl_2 + 2NaBr \rightarrow 2NaCl + Br_2$
Precipitation (Double replacement)	Reaction in which a solid compound is formed when solutions of two soluble compounds are mixed.	$AB + CD \rightarrow AD + CB$	$AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$

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