



Chemistry

Class-9

Chapter-7

Chemical reactions

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Lecture sheet with worksheet-3

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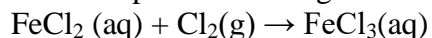
Unit-1:Types of redox reactions

There are some types of reactions where oxidation-reduction occur. That means these reactions involve electron exchange.

Addition reaction:

The reaction in which two or more reactants combine together to form a new product is called addition reaction.

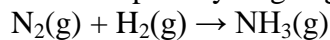
For example—chlorine gas adds with Iron(II) chloride and produces Iron(III) chloride.



Synthesis reaction:

The reaction in which two or more simpler reactants combine together to form a more complex single product is called synthesis reaction.

For example—hydrogen gas combines with nitrogen gas, forms ammonia gas.



In synthesis reaction, the product is always a compound.

Decomposition reaction:

The reaction in which a compound breaks into one or more elements or molecules is called decomposition reaction.

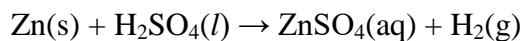
For example—When heat is applied on phosphorus pentachloride, it decomposes into phosphorus trichloride and chlorine gas.



Substitution reaction:

The reaction in which an atom or a group is replaced by another atom or a group from a compound is called substitution reaction.

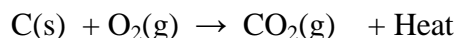
For example—Zinc metal displaces hydrogen from sulfuric acid to form zinc sulfate and hydrogen gas.



Combustion reaction:

A chemical reaction in which a compound or element react with oxygen to form new product and heat is called combustion reaction.

Example– Natural gas or methane reacts with oxygen of air and produces carbon dioxide and water.



Exercise-1:

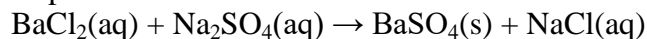
1. How many types of reactions could be included in the following reactions? Explain-

- i) $\text{N}_2(\text{g}) + \text{H}_2(\text{g}) \rightleftharpoons \text{NH}_3(\text{g}) \quad \Delta H = -\text{ve}$
- ii) $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g}) \quad \Delta H = +\text{ve}$
- iii) $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g})$
- iv) $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$
- v) $\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{SO}_3(\text{g})$
- vi) $\text{Mg} + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{H}_2$
- vii) $2\text{Mg}(\text{s}) + \text{O}_2(\text{g}) \rightarrow 2\text{MgO}$

Unit-2: Types of non-redox reactions

Double displacement or substitution reaction:

The reaction in which two elements exchange their position in two compounds is called double displacement reaction.

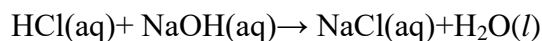


In this reaction, the cations are Ba^{2+} and Na^+ and the anions are Cl^- and SO_4^{2-} . If we swap the anions or cations we get as products $\text{BaSO}_4(\text{s})$ and $\text{NaCl}(\text{aq})$.

Neutralization reaction:

The reaction in which acid and base reacts each other to form salt and water is called Neutralization reaction.

Example: In aqueous solution, HCl and NaOH reacts and form NaCl and water. NaCl remains dissolved in reaction container.



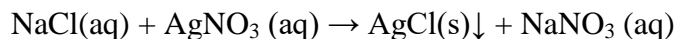
The neutralization reactions are exothermic. Heat always evolves from neutralization reactions.

Precipitation reaction:

A chemical reaction in which two soluble compounds (ionic salts) are mixed in a certain solvent to form an insoluble compound (salt) is called precipitation reaction.

OR, precipitation reaction reactions occur when cations and anions in aqueous solution combine to form an insoluble ionic solid called a precipitate.

Example-When silver nitrate solution is mixed with sodium chloride, they react and produce silver chloride and sodium nitrate.



The solid substance that is form in precipitation reaction is called “precipitate”.

Hydrolysis reaction:

Hydro-water, lysis—break apart

A chemical reaction in which a compound reacts with water to produce or form a new compound.

Example– Aluminium chloride reacts to water and produces Aluminium hydroxide and hydrochloric acid.



In this type of reaction, if any compound makes precipitate, the following reaction can be considered as hydrolysis and precipitation reaction.

Hydration reaction:

A chemical reaction in which one or more water molecules attach with a compound to form crystal lattice.



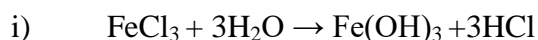
$\text{CuSO}_4 \rightarrow$ anhydrous \rightarrow colorless powder

$\text{CuSO}_4 \cdot 5\text{H}_2\text{O} \rightarrow$ bright blue crystals

The water molecules that combine with ionic compound is called lattice water/hydrated water.

Exercise-2:

1. Though both the following reactions occur in presence of water but their types are different-analyze it.



2. How many types of reactions could be included in the following reactions? Explain-

