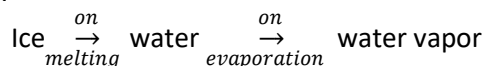


Chemistry
Class-9
The Chemical reactions
Teacher—Ashim Kumar

The Chemical reactions:

Physical change:

The kind of changes where only appearance changes but no new substances form is called physical change.



Chemical change:

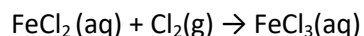
The kind of changes where new substance gets formed is called chemical change.

- ❖ When wood burns, chemical reaction take place and new substances form.(like—coal or ash)
- ❖ When methane gas is burn in oxygen---CO₂,water vapor and heat energy is produced.

Addition reaction:

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

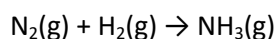
For example—chlorine gas adds with Iron(II) chloride and produces Iron(III) chloride.



Synthesis reaction:

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

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

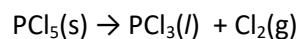


In Synthesis reaction, the product is always a compound.

Decomposition reaction:

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

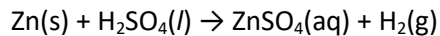
For example—When heat is applied on phosphorus pentachloride, It decomposes into phosphorus trichloride and chlorine gas.



Substitution reaction:

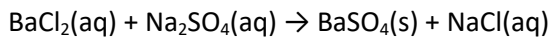
The reaction in which an atom or a group is replaced by another atom or a group is called Substitution reaction.

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



Double displacement or substitution reaction:

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

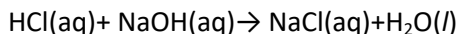


In this reaction—The cations are Ba^{2+} and Na^+ and the anions are Cl^- and SO_4^{2-} . If we swap the anions or cations we get as products $\text{BaSO}_4(\text{s})$ and $\text{NaCl}(\text{aq})$.

Neutralization reaction:

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

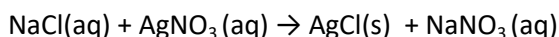
Example: In aqueous solution, HCl and NaOH reacts and form NaCl and water. NaCl remains dissolved in reaction container.



Precipitation reaction:

A chemical reaction in which cation and anion combine together to form an insoluble ionic solid is called precipitation reaction.

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

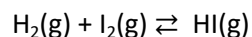


The solid substance that is form in precipitation reaction is called "precipitate".

Reversible reaction:

The reaction in which the reactants form the product and the products can also form reactants is called reversible reaction.

Example— hydrogen and iodine reacts each other produce hydrogen iodide and this produce hydrogen iodide again converts into hydrogen and iodine.



irreversible reaction:

The reaction in which the reactants are completely form to the product are called Irreversible reaction.

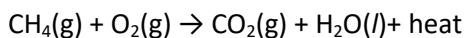
Example— Calcium carbonate, when heated it breaks into solid lime stone, CaO and gaseous carbon dioxide.



Combustion reaction:

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

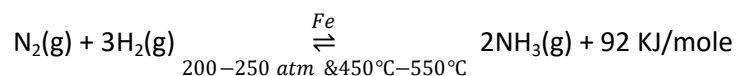
Example– Natural gas or methane reacts with oxygen of air and produces carbon dioxide and water.



Exothermic reaction: [exo=release]

The chemical reaction that release energy during the reaction is called exothermic reaction.

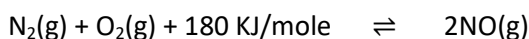
Example– In the Heber process, 1 mole nitrogen and 3 moles hydrogen produce 2 mole ammonia and release 92 kJ/mole of heat.



Endothermic reaction: [endo=absorb]

The chemical reaction that absorbed energy during the reaction is called endothermic reaction.

Example– 1 mole nitrogen and 1 mole oxygen react and produce 2 moles nitric acid and absorb 180 KJ/mole of heat.

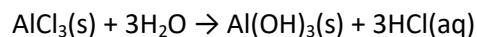


Hydrolysis reaction:

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 consider as hydrolysis and precipitation reaction.

Hydration reaction:

A chemical reaction in which water molecules attached with a substance.

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

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

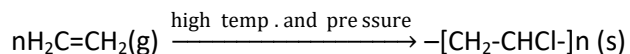
The water molecules that combine with ionic compound is called Lattice water/hydrate water.

Polymerization reaction:

Monomer means—one, poly means—lots/many

The reaction in which lots of monomers get join together to form a polymer is called Polymerization reaction.

Example—on high temp. and pressure innumerable molecules of vinyl chloride combine together and form poly vinyl chloride (PVC) of heavy atomic mass.



Isomerization or rearrangement reaction:

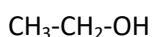
Iso—same, meros--parts.

The reaction in which atoms or groups of a compound are rearranged themselves to form a new product which has exactly the same atoms but different structure and hence their physical and chemical properties are different is known as isomerization reaction.

Isomer--- atoms of a compound having same molecular formula but different structural formula, then each formula is called isomer.

Example:

Molecular formula, $\text{C}_2\text{H}_6\text{O}$.

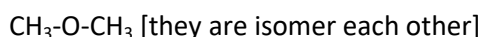


Name: ethanol

Physical status: liquid

boiling point: 78°c

Solubility: soluble in water



Name: Di methyl ether

Physical status: gaseous

boiling point: -24°c

Solubility: sparingly soluble in water

Home work:

- Difference between physical and chemical changes.
- Definition with example---substitution reaction, double displacement reaction, polymerization reaction, isomerization reaction and precipitation reactions.