1st SEM

Envt CHEMISTRY

BRANCH - MECHANICAL

NOT BOOK

(ORGANIC CHEMISTRY)

Topic:- Aliphatic and Aromatic Hydrocarbon:-

Aliphatic Hydrocarbons :-

Defination :-

→ Aliphatic Hydrocarbons are non-aromatic organic compounds that can be either acyclic (open-chain) or cyclic (ring bonds).

Ex:- They include alkanes, alkenes (one or more double bonds) and alkynes (one or more triple bond.

Properties :-

Aliphatic Hydrocarbons are generally less stable than aromatic compounds and tend to undergo addition reactions rather than substition.

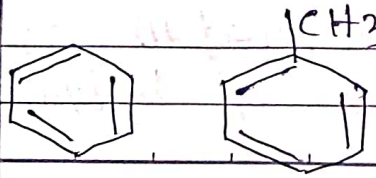
Aromatic Hydrocarbons :- (Defination)

→ Aromatic Hydrocarbons are cyclic compounds, most notably those containing a benzene ring, characterized by a delocalized pi electron system.

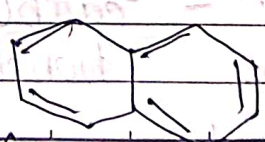
Ex:- Benzen, toluene, and naphthalene are common example,

Properties :—

→ Aromatic Hydrocarbons are generally more stable than aliphatic Hydrocarbons due to resonance stabelization of the pi electron system, They tend to undergo substitution reactions rather than addition reactions,



(Benzen)



(Polyaromatic Hydrocarbon)

Saturated and unsaturated Hydrocarbon!:-

Saturated Hydrocarbons (Alkanes):-

→ These are Hydrocarbons where all carbon-carbon bonds are single bonds.

General Formula :- C_nH_{2n+2} (for open chain alkanes-)

Ex :- methane (CH_4), ethane (C_2H_6), Propane (C_3H_8),

Reactivity :-

→ Generally less reactive than unsaturated Hydrocarbons, Primarely undergoing substitution reactions,

bonding :-

→ All carbon atoms are sp^3 hybridized,

Unsaturated Hydrocarbons :-

→ contain at least one double or Triple bond between carbon atoms,

Type :- alkenes :- contains a carbon - carbon double bond,

Formula :- C_nH_{2n}

Ex :- Ethane (C_2H_4)

Reactivity :-

→ more reactive than alkenes, undergoing addition reactions,

alkynes : contains a carbons - carbon triple bond,

Formula :- C_nH_{2n-2}

Ex :- Ethyne (C_2H_2)

Reactivity :- more reactive than alkenes, also undergoing addition reactions.

Bonding :- carbon atoms involved in double or triple bonds are sp^2 are sp hybridized respectively,

Difference between Aliphatic and aromatic :-

Aromatic compounds :-	Aliphatic compounds :-
① Aromatic compound contains a very high carbon to Hydrogen ratio,	① Aliphatic compounds contain generally low carbon to Hydrogen ratio,
② Aromatic compound contain are generally cyclic compounds	② Aliphatic compounds are generally open chain comps,
③ They burn with a sooty luminous frimes,	③ They burn with clean non-luminous flame,
④ They Posess characteristic strong odours,	④ They generally do not have strong odours,
⑤ They are not attacked by normal oxidation and reducing agents,	⑤ Unsaturated aliphatic compound are easily attacked by oxidising and reducing agents,
⑥ These compounds easely undergo addition reactions with difficulty,	⑥ Unsaturated aliphatic compounds easely undergo addition reaction but the undergo substitution react with difficulty,
⑦ Aromatic compound never undergo elimination reaction	⑦ Aliphatic saturated comp undergo elimination reaction,

(IUPAC NOMENCLATURE):-

Alkanes and cyclic alkanes :-

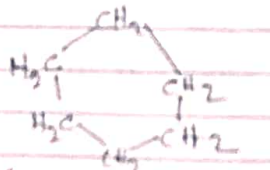
IUPAC :- International union of pure Applied chemistry.

IUPAC Nomenclature system :-

→ In 1957 IUPAC ~~envol~~ envoled systametic names to organic compounds, following are the main points of this system

1) IUPAC system has set rules for naming organic molecules from represents structures.
2) This system has is bases set rules for naming on the structure of compounds.
3) Always represent common names identify compounds while IUPAC names represents structure.
4) Most important A interesting fact this system is based on the number of the carbons in compound
5) IUPAC Names of organic compounds has this mains were can attain parents names only by conting the number of carbon considering the functional group attach to it.
6) IUPAC Names of organic compound has 3 basic parts ;-
   1) Carbon chain length.
   2) substitution (functional gp or others)
   3) chemical effect (type of compounds)

$CH_3-CH_2-CH_2-CH_2-CH_2-CH_3$
(n-Hexane)



(cyclo hexane)

ALKANES :-

→ Alkanes are hydrocarbons that contains only single bonds.

common system of Nomenclature :-

→ first fewr membess of the sevens are known by their common name.

1C = methane (derived from methanal)
2C = ethane (derived from ethal)
3C = Propane (derived from Propanoic acid)
4C = butane (derived from butyric acid)

→ Lagers alkanes named from greak prefixes with 'ane' systems,
5C = Pentane, 6C = Hexane, 7C = Heptane, etc.
9C = Nonane (derived from latin prefix)

→ Isomeric alkanes in common system are different by the Prefixes : n. iso & neo.

Prefix n :- Used for one continous chain n- stands for normal or straight chain.

$CH_3-CH_2-CH_2-CH_2-CH_3$ n-pentane

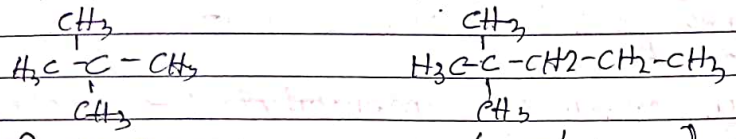
$CH_3-CH_2-CH_2-CH_2-CH_2-CH_3$ n-Hexane.

Prefix iso :- used when a methyl ($-CH_3$) attached to second last carbon of continous chain or one carbon attached to 3 other carbones.

$CH_3-CH(CH_3)-CH_3$ (Isobutane)

$CH_3-CH(CH_3)-CH_2-CH_3$ (Isopentane)

Prefix neo :- Used when two methyl ($-CH_3$) attached to second last carbon of chain or one carbon atom attached to 4 other carbones.



(Neopentane) (Neoheptane)

~~Alkane~~ **Alkyl groups** :- When one hydrogen atom removed from an alkane its known as alkyl group

$$R-H \xrightarrow{-H} R-$$

alkane alkyl group.

alkyl groups are named by dropping - 'ane' from the name of corresponding alkane & adding 'yl'

alkane $\xrightarrow[+yl]{-ane}$ Alkyl

$CH_4 \xrightarrow{-H} CH_3-$

methane methyl

$CH_3CH_3 \xrightarrow{-H} CH_3-CH_2-$

Ethane Ethyl

$CH_3-CH_2-CH_2-CH_3 \xrightarrow{-H} CH_3-CH_2-CH_2-CH_2-$

Butane n. Butyl

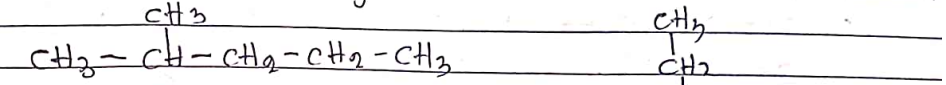
Non alkyl groups :-

→ There some common non-alkyl groups :- (as substitution on chains)

$-Br$	= Bromo	$-NO_2$	= Nitro
$-Cl$	= chloro	$-NO$	= Nitroso
$-F$	= Fluoro	$-NH_2$	= Amino
$-I$	= Iodo	$-OH$	= Hydroxy

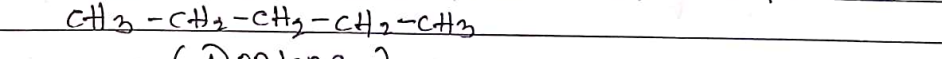
IUPAC RULES FOR NAMING ALKANES | 1 - 1 |

Rule:-1 (select the longest continuous Carbon chain



Rule-2 Name the longest chain: Parent name attain by no. of carbon & add suffix 'one'

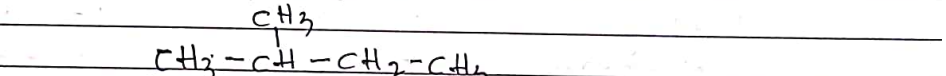
acc. No. of carbon alkane +one = Alkane
Prefix suffix parent name



(Pentone)

Rule:-3 Number the longest chain:
Numbering starts from that Carbon or end which will active numbers having lowest value to carbon corresponding substitutions.

Rule-4 :- Identify the substitution: Prefix the position of substitution with name of substitution into the Parent name (a number & name separated by Hyphen (-))



2 - methyl butane

Rule-5:-
When same substitution more than one five : identify the Prefix di (for 2), tri (for 3) tetra (for 4) penta (for 5) position of each separated by comma (,)

Rule-6:-
→ when two or more different substitutions, Write names with position no. arranged in alphabetical order,

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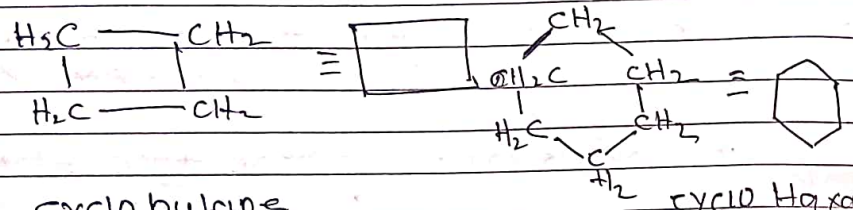
IUPAC NOMINCLATURE OF CYCLO ALKANES :+

→ cyclo alkanes are the alkanes in which carbon atom are arranged in a ring.

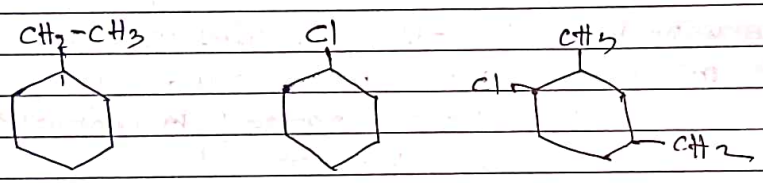


cyclo butane

cyclo Hexane

→ They are named by attaching the prefix cyclo to the name of the alkane having the same numbers of carbons in the ring

→ sustituted cyclo alkanes are named as alkyl alkanes

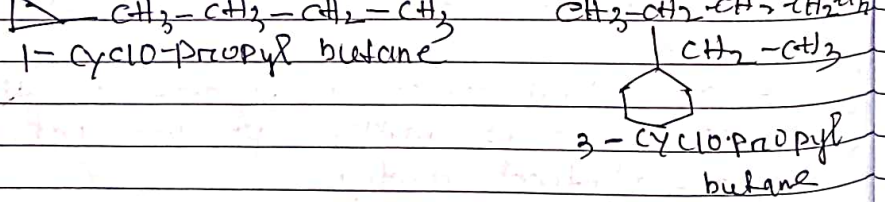


1-ethyl cyclohexane

1-chloro cyclohexane

1-chloro cyclohexane

→ same time the side chain on the ring has more carbones. name the ring so the ring is taken as substituent.



1-cyclo-propyl butane

3-cyclopropyl butane

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(INORGANIC CHEMISTRY)

Metallurgy :- ; Definition of mineral :+

Introduction :- Metallurgy . in the context of mineral engineering, focuses on the science and technology of extracting metals from their ores and refing them for practical

This field encompasses the study of metal properties , alloy formation, and th processes involved in separting metals from mineral,

Metallurgy :-

→ It's the art and science of obtaing metals fro their ores (naturally occurring mineral deposits) and modifing them for various application. This include understanding the chemical and physical properties of metals, developing new alloys (metal mixtures) and finding ways to recycle metals,

Mineral Engineering :-

→ This field is broader, encompassing all aspects of mineral resources, it involved the scientif and engineering principle used to locate, extract, process, and refine minerals the's can include everything from geological exploration to the desing of mining and minerals processing Plants,

In essence, metallurgy is a specialized area within mineral engineering, focusing specifically on the metallic compounds in of mineral resources, while minera engineering cover the entire spectrum o of mineral related activities, metallurgy.

GENERAL METHOD OF EXTRACTION OF METAL :-

⇒ METAL :-

⇒ The elements which are hard, ductile, good conductors of heat and electrocity, electropositive in nature, and Possess shining lustrouse and they have high meting and bilong point

Preperation of metals are :-

① Metal are hard → They are hard because metals ~~Rom~~ conmat be at with Knife,

② Metals are ductile → Dectility is the abrility which allat the metal to be drawn into thin wires

③ Metals have high melting and boling point

④ Metals are good conductor of heat and electrocity

⑤ Ex :- of metal → copper, iron, gold, etc.

Non - Metals :-

→ The elements which are dull in appearence, soft Poor conducter of hut and electrocity, low milting and boiling point. and they are electro megnetic in nature

Ex → sulphate, Phesphars, oxygen, etc,

Preperation of non-metals are →

(1) Non-metals are soft → They can be easily at with a knife

(2) Non-metals are not mallcule → It amount be beaten into thin sheets.

(3) non-metals are not ductile → They comment be beaten into thin wares.

(INDUSTRIAL CHEMISTRY) :-

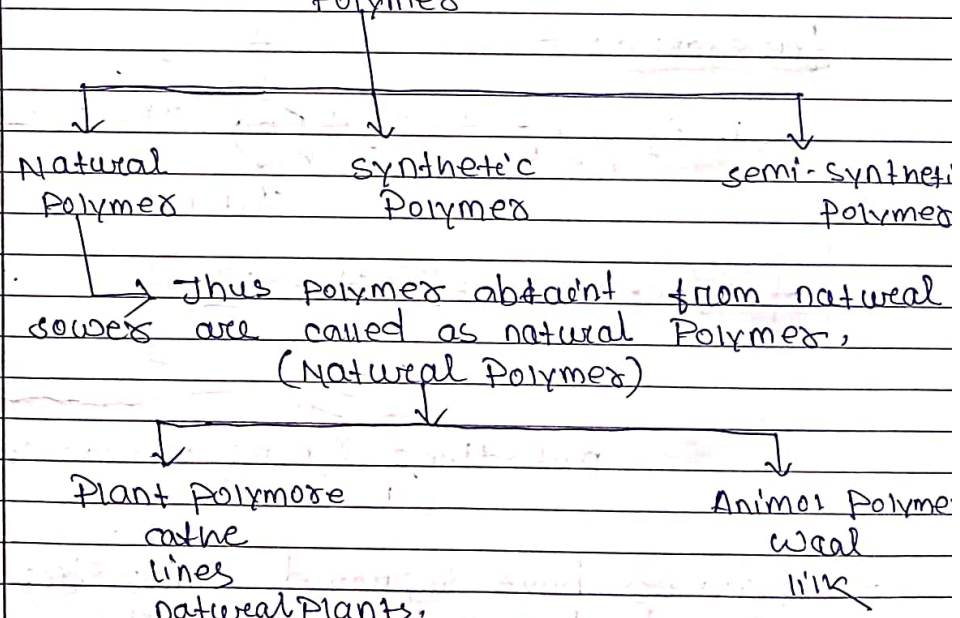
chapter: 13: Polymer :-

→ A substance which has a Molecular structure (biut is black) completely from a large number of similar units bonded to gether, for large example - elastics. and rans, know as Polymers,

A Polymers its large molecule, or macromolecule composed of many repeacted subunits, Polymers play an assential role an everyday life,

These are two Types synthetic and natural Polymer

→ such Polystyren such as DNA, Proteins etc Polymer both natural and synthetic are mod by Polymmerization of mony small molecul known as monomers,



→ Thus polymer obtaint from natural sowes are called as natural Polymer,

(Natural Polymer)

Synthetic Polymers :—

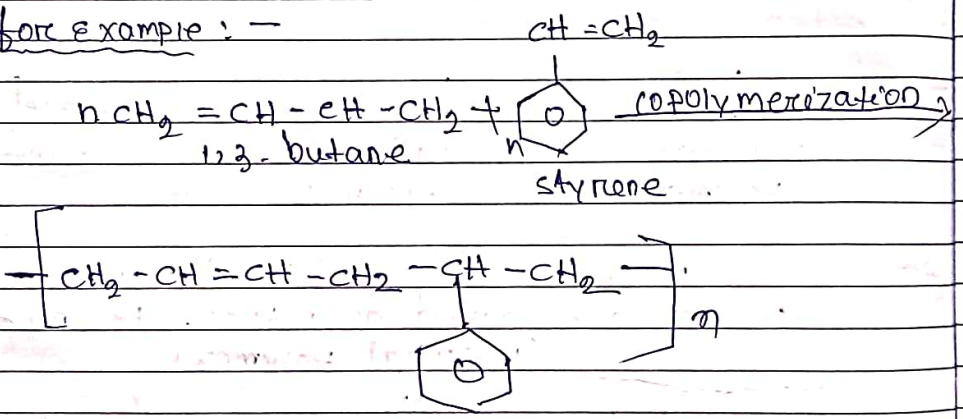
→ The synthetic Polymers which as Prepared in the laboratars are called synthetic Polymers, Thus are also called man-made polymer

ex:- Poly-sthylite PVC, Nylon, Tef (om)

Polymerization :—

→ The Polymers obtained from two or more different monomers units are called Co Polymers can be Prepared by chain growth as well as step growth Polymores Polymerization

for example :—



Butadiene styrene copolymers.
[Buna-S]

- Copolymers have improved Properties as compared to the homo polymers

Type of Polymerization reaction :—

→ The chemical reaction in which hi high molecules mass molecules are formed from monomers is known as Polymores ;

There are two basic type of polymerization

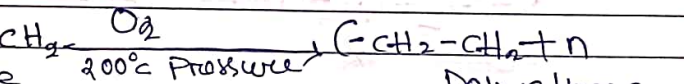
① chain - reaction (or addition) Polymerization
② step - reaction (or. condenstion) Polymerization

① chain reaction Polymerization :—

→ chain reaction Polymerization its also known as chain growth Polymerization or addition, Polymerization ,

chain Polymerization in which Unsaturated monomer molecule add on active site of a gravity Polymers chain one at a time growth of the Polymers accurs only at one side Addition of each monomer

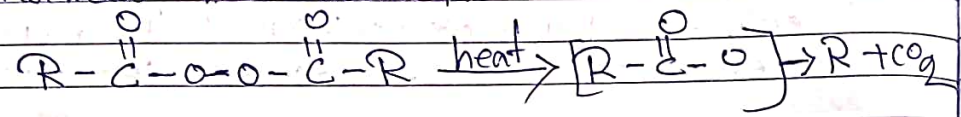
These Plastics (Polymores made) by chain Growth Polymerization, A Example of chain growth Polymerization ,

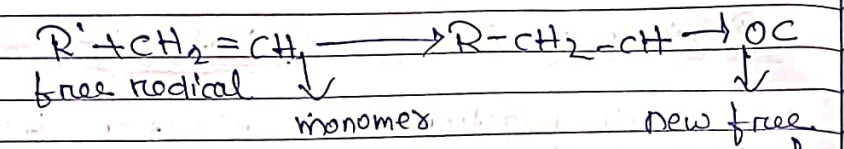


Mechanism :— chain - growth or addition Polymerization usually has the following steps.

(a) chain initiation :— In this step, an initiation us used which starts the chemical Procex, Typically initiation incud any organics compounds.

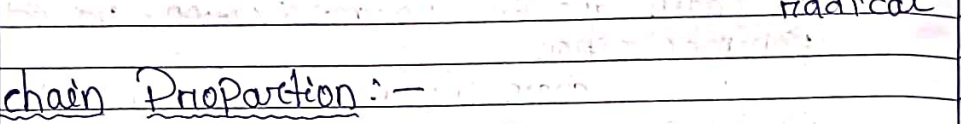
e.g. ozo (-N=N-), disulphide (-S-S-) or Peroxide (-O-O). example - benzoil in this step by Peroxide (initiation) free radical its dromed,



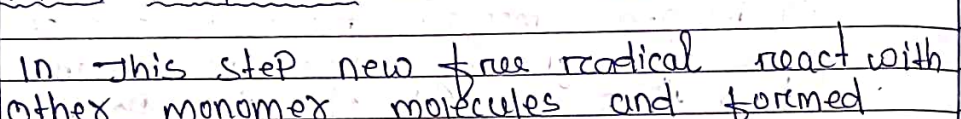


(b) chain Proparction :-

→ In this step new free radical react with other monomer molecules and formed big free radical this Process being



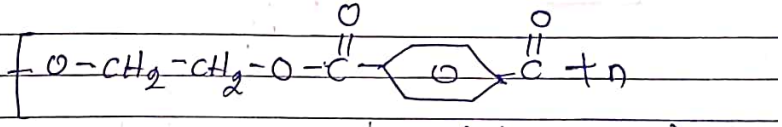
or



② step-reaction Polymerization :-

→ step reaction Polymores and Polymerization is also known as condensation or step-growth mechanism step growth Polymerization in which monomer molecules contain one or more same or to different functional group and react to form long chain Polymores,

for ex :- Polyester → Polyestes, has high glass transition temperature (Tg) and high melting Paint (Tm), eg, cadi. Polyester tercilene,



(terciline)

chapter (1) LUBRICANTS :-

Definition :→ The Process of minimising friction resistance between moving as sliding surface by the introduction of Lubricants i between them is called Lubrication,

IMPORTANT FUNCTION OF LUBRICANT :-

① Lubricant avaids direct contact between the rubbing surfaces and reduces surface deformatic wear, tear,

② It acts as a coolant by reducing loss of energy in the form of heat

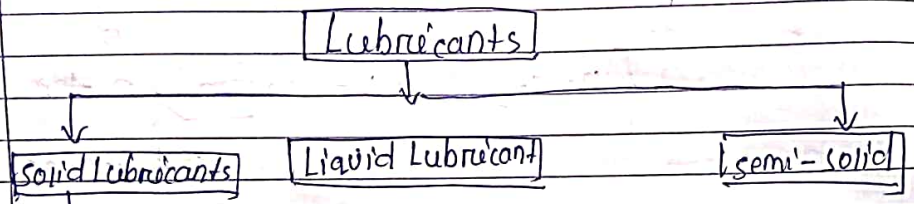
③ Lubricant enhances efficiency of a machine by reducing wastage of energy and expansion metal by Local frictional Heat,

④ It avaids suiguse and relative motion of moving surface, such that running cost of the machine

⑤ The Lubricants used between Piston and the cyclinder wall of an internal combustion engine acts as a seal and can preyent th Leakage of gass from the cylinder under high Pressure,

⑥ It Prevents from corrosion also

Classification of Lubricants :-



① → Graphite
② → MoS_2
→ These are used in following condition -
→ When operating temperature or load is too high
→ These is a need to avoid combustion Lubricant

Liquid Lubricants or oils :-
→ Animal and vegetable oils
→ mineral or Petroleom oils
→ Blended oils.

Properties of Good oils :-
→ Low Prossure
→ High B.P.
→ Low freezing Points.
→ non-corrosive Properdy
→ Stabity

Greases or semi-solid Lubricants :-
→ Greases are Prepared by saponification of fat within alkali, followed by adding heat Lubricating oil under agition.
→ These are used in following conditions.
→ where oil connat remain in Place due to high load speed, sudden jecks etc.
→ calcium based Greases are cup-greases
→ Soda base Greases

chapter(12) **FUEL :-**

INTRODUCTION OF FUEL :-

DEFINITION :-

→ A fuel is combastible substance which on Proper burning in air liberates huge amounts of heat, that can be used economically for domestic and industrial purpose.

fuel + O_2 ⟶ Product + Heat ⟶ chemical (combustion) fuel

$C + O_2 \longrightarrow CO_2 + Heat$

$H_2 + \frac{1}{2}O_2 \longrightarrow H_2O + Heat$

Classification :-

chemical fuels

on the bases of occurance

Primary natural fuel — secondary or derived fuel

on the basis of Physical state.

	solid fuel	Liquid fuel	Gaseous fuel	solid fuel	Liquid fuel	Gases fuel
Ex :-	wood, peat	e.g - crude oil	e.g - Natural gas	e.g - coal, charcool, cake	- Petrol, - Tar, - Dark	- oil fuel, coal.

Properdies of A wood fuel :-

→ ① High calarific value
② moderate Ignition temperdwees
③ high amount of fixed carbon
④ Less amount of maistare.
⑤ less amounts of combustable substance
⑥ Easily availabie
⑦ Ecofrendly
⑧ Economic
⑨ Low ash compunents,

Definition of calorific value of fuel :-

→ The total amount of heat liberated, when unit mass/volum be of the fuel burnel completely

Types :-

① Higher or Gross calorific value (H.C.V or G.C.V)
② Lower or Net calorific value (L.C.V or N.C.V)

Higher or Gross calorific value (GCV or HCV) :-

→ The amount at heat liberated when unit mass/valvene at the fuel burnt completely and Products of combustion have cooled at room temperal,

lower or Net calorific value (NCV or L.C.V) :-

→ The amount of heat liberated when unit mass/volume of the fuel burnt completely and Products of combustion are allowed to escape

L.C.V = H.C.V − latent heat of water vapaur for

$H_2 + \frac{1}{2}O_2 \longrightarrow H_2O$

1 part — 9 part

L.C.V = H.C.V — weight of Hydrogen x 9 x latent heat of steam

General methods of extraction :-

(i) **Ore Dressing :-** An ore is made of valuable
→ Particle and gangue, but pure ore is required by users,
The process for libration of valuable constituent from the associated unwanted constituents of mineral is called mineral dressing, ore dressing or benificiation,
→ mineral beneficiation is a physical process with out chaning the inherent physical identity or chemical identity,

(ii) **Gravity separation :-**

→ Particles of ores are varying in size, shape and specific gravety, these Particles are separated by allowing them to settle in Liquid separation is Possible through action of gravetational force, Particles having high specific gravety will first settledown at the bottom of liquid,

i) It is device for pulsation of liquid,
ii) sieve acts as platform for solid particles
iii) Particles on sieve ascillate upward and downward movement of water in jig,
iv) Particles of high specific gravity settle down fist on sieve - Lighter particles settle late above the bed of heavy Particles,

Froth flotation :-

→ Heavier Particles are made to float against lighter particles in an aqueous solution of ores,

→ Particles of ores have inherent Preferential wattability they may have hydrophilic or Hydrophobic surface (tend to repel water) these Hydrophilic or Hydrophobic surface of minerabies can be achieved or modify with the use of regents,

Magnetic separation :-

→ Some minerals are attracted by magnet, this is the natural susceptibility of minerals, but minerals have varying magnetic Particle get deflected toward soeree of forue but non magnetic Particles travel unaffected, minerals one another,

Electrostatic separation :-

→ mineral may be composed of conductor on non conductors Particles, mineral may acquire electrostatic charge in electric field, When ore Particle in introduced in electrostatic field, conducting Particles does not retain charge remain unaffected and non conducting Particles retain charge and pinned down on the rotor in the field,

(iii) Oxidation (Calcinations, Roasting) :-

→ Roasting :- It is Process in which sulphide ores of the metals are converted into oxides by heating them in the Presence of excess air, for example :-

zinc sulphide is converted into zinc oxide by Roasting,

$$2ZnS(s) + 3O_2(g) \xrightarrow[\text{roasting}]{\text{heat}} 2ZnO(s) + 2SO_2(g)$$

Calcination :- it is the Process in which carbonate ores of the metals are decomposed into oxide by heating them in the absence or limited air

for example :-

zinc carbonate is decomposed into zinc oxide and carbon dioxide by calcination,

$$ZnCO_3(s) \xrightarrow[\text{Calcination}]{\text{heat}} ZnO(s) + CO_2(g)$$

(iv) flux and slag :-

→ A flux is a chemical substance added to the concentrated ore during smelting in order to remove the gangue to form easily fusible slag,

→ slag is a waste Product formed by combination of a flux and gangue during the extraction of metals by smelting Process,

In extraction of copper from copper Pyrite

SiO_2 + FeO ⟶ $FeSiO_3$
(flux) (impure) ↓ (slag)

Flux
- Acidic
- Basic

CaO + ⟶

CaO + SiO_2 ⟶ $CaSiO_3$
(Basic flux) (Acidic gangues) (slag)

SiO_2 + FeO ⟶ $FeSiO_3$
(Acidic flux) (Basic gangue) (slag)

Smelting :-

→ The Process of extracting the impure molten metal from its ore at a high temp using suitable flux and a reducing agent like carbon, hydrogen etc,

$M_xO_y + yC \xrightarrow{\Delta} xM + yCO$

$M_xO_y + yCO \xrightarrow{\Delta} xM + yCO_2$

Ex:- $SnO_2 + 2C \xrightarrow{1473K} Sn + 2CO\uparrow$

$Fe_2O_3 + 3CO \xrightarrow{823K} 2Fe + 3CO_2\uparrow$

Refining of metal :-

→ The process of purifing the crude metal is called refing. Depending upon the nature of metal & nature of impurities following methods used for refining :

(a) Liquation
(b) Zone refing
(c) Electrolytic Refining

(a) Liquation :-

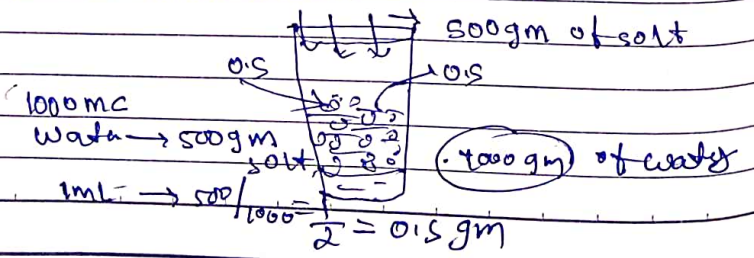
→ Based upon melting point difference
→ When the M.P of the metal lower than the impurities, this technique is used.

→ Low melting points metals such as Bi, Hg, Sn, Pb etc are refined by the process,

chapter-8 Alloys :-

→ The homogenous mixture of two or more metal metal and a non-metal is called an alloy.
Ex:- brass is an alloy of copper (Cu) and zinc (Zn), similarly, steel is mainly an alloy of iron (Fe) and carbon (C).

→ Amalgam - An amalgan is an alloy of mercury and one or more metals



Properties of alloy :-

(i) They are harder than their constituents but less ductile and malleable.

(ii) They are resistance to corrosion.

(iii) The melting point of an alloy may be higher or lower than any of its constituents

(iv) The properties of an alloy are much more improved and pronounced than those of its constituents, for example :- aluminium, is light and very strong

(v) The colour of an alloy is difference from the which it is formed,
for example :- both silver and zinc are almost white but the alloy formed from them are pink in colour.

PHYSICAL CHEMISTRY :-

Chapter-2 chemical bonding :-

→ The attractive force which hold various constituents (atoms ions, etc). together in different chemical species is called a chemical bonding.

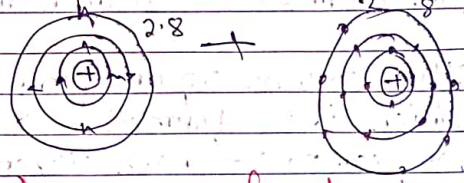
c. sharing H – H → covalent bond.

c. transfer :

Ionic bond ← 11^{Na} → Na^+

$1s^2 2s^2 2p^6 3s^1$ $\quad$ $_{17}Cl \rightarrow 1s^2 2s^2 2p^6 3s^2 3p^5$

2.8 $\quad$ 2 8 7



chemical bonding & molecular structure :-

chemical bonding
- → Ionic bond
- → covalent bond
- → Fajan Rule
- → coordinate bond or dative bond
- → Hybridisation and Type → s+p → sp; s+p² → sp²
- → vander waal force

covalent bond → sharing of an e⁻ →
- → valence bond theory (V.B-T)
- → molecular orbital theory (MOT)
- → VSEPR (valence shell electronic pair repulsion)

v. w force →
- → Dispersion force / London force
- → Dipole Dipole Attraction force
  - H – Cl (+δ –δ) Dipole
  - H – Cl (+δ –δ) Dipole
- → Hydrogen bonding

Attraction force

H – F
O
N
Cl – Ran

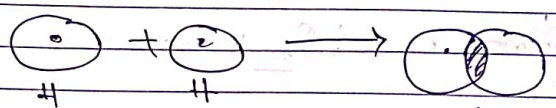
covalent and coordinate bond :-

covalent bond :-

→ The chemical bond formed by the mutual (qual) sharing of valence electrons between two atom is called covalent bond and the compound formed is called covalent compound.

→ The number of electrons shared by an atom during covalent bond formation is called covalent may be formed between the atoms similar or dissimilar elements,
Then a single, double and a triple bond are formed respectively.

example :- formation of H_2 molecule. The electronic configuration of H is $1^H - 1s^1$



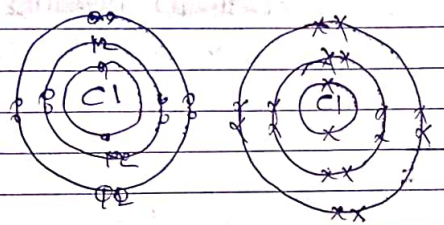
H H $\quad$ H_2

H· + ·H ⟶ H – H

Ex-2 Formation of Cl_2 molecule:-

$17^{Cl} - 1s^2 2s^2 2p^6 3s^2 3p^5$

→ The electronic configuration indicates the presence of 7 valence electron in Cl and requiring one more electron to become octet.



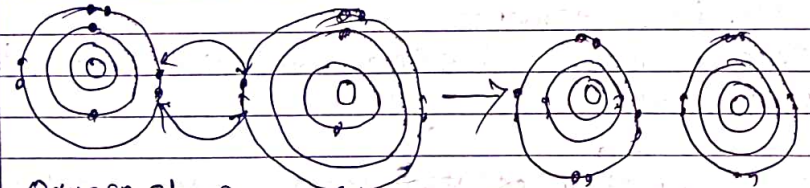
(Formation of Cl_2 molecule)

Ex-3 Formation of O_2 molecule :-

The electronic configuration of 'O' is

$8^O - 1s^2 2s^2 2p^4$

→ The electronic configuration indicates the presence of 6 valence in 'O' and requires two more electrons to becomes octet.



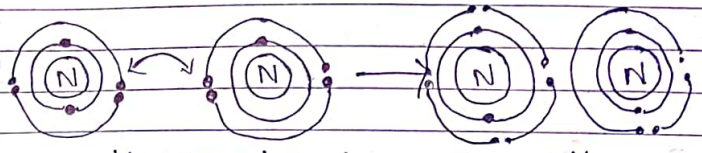
Oxygen atom O Oxygen atom O Oxygen molecule stable

(formation of O_2 molecules)

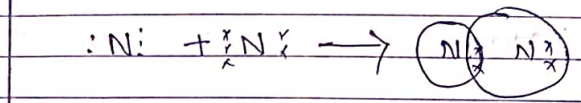
Ex-4 formation of N_2 molecule:-

$7^N - 1s^2 2s^2 2p^3$

→ The electronic configuration indicate the presence of 5 valence electrons in 'N' and required three more electrons to become octet.



Nitrogen atom N Nitrogen molecule N

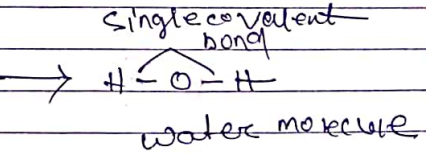


N_2 molecule

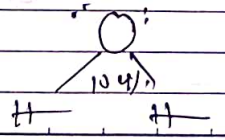
Ex-5 formation of H_2O molecule:-

$8^O - 1s^2 2s^2 2p^3$

→ The electronic configuration indicate the presence of 6 and 1 valence electrons in 'O' and 'H' respectively, The central 'O' and requires two more electrons to becomes octet while each Hydrogen atom,



(formation of H_2O molecules)

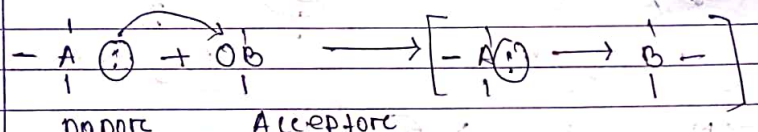


coordinate bond :-

→ The chemical bond formed by the partial sharing of a lone pair of electrons between two atoms,

Conditions for the formation of coordinate:-

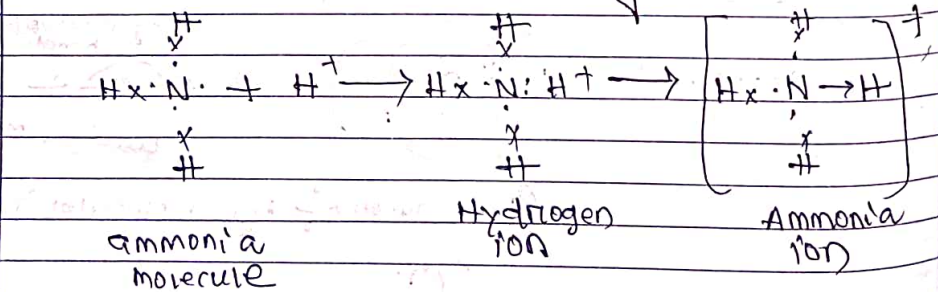
→ one of the participating atoms should have at least one lone or unshared pair of electrons.



Ex-1 formation of ammonium ion (NH_4^+).

→ Ammonium ion (NH_4^+) is formed by the combination of NH_3 and H^+ ion. $NH_3 + H^+ \rightarrow NH_4^+$

Ammonia (NH_3) contains a lone pair of electrons over 'N' while 'H' ion contain no electron and requires two electron to become duplet,
Thus the unshared pair of electrons over nitrogen in NH_3 is partially



chapter-2 : Acid base Theory :-

Introduction :-

→ There are many particle methods to identify a substance as an acid or a base, The particle include use of p^H mater. indicator. litmus paper chemical reaction. etc However, Theoretically it is now possible to know whether a substance is acid or a base,

Arrhenius Theory :-

→ According to Arrhenius theory Acids are the substance which produce H^+ ions in aqueous solution while bases are the substance which produce OH^-

Ex:- $HCl \xrightarrow{water} H^+(aq) + Cl^-(aq)$

HNO_3, H_2SO_4, CH_3COOH, etc.

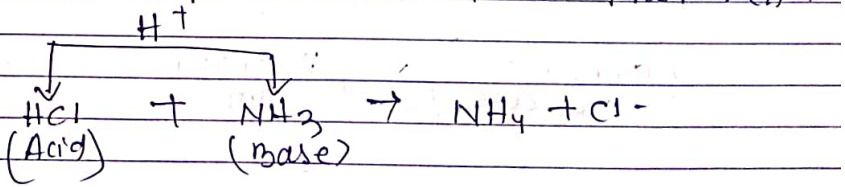
Ex-2

$NaOH_{(s)} \xrightarrow{water} Na^+(aq) + OH^-(aq)$

$LiOH$, KOH, NH_4OH, $Ca(OH)_2$, $Al(OH)_3$ etc,

Lowry Theory :-

→ According to Brosted-Lowry theory Acids are the substance which donate a proton (H^+ ion) to any other substance, while bases are substance which accept a proton (H^+ ion)



Since, HCl has donated a proton (to NH_3), it acts as an acid. on the other hand, NH_3 has accepted a proton from HCl and thus it acts as ba

Lewis Teory :-

→ According to Lewis theory Acids are the substance (molecule) which can accepted a pair of electrons from any other substance while bases are the substance,

Ex:- (i) cation like CH_3^+, H^+, etc.

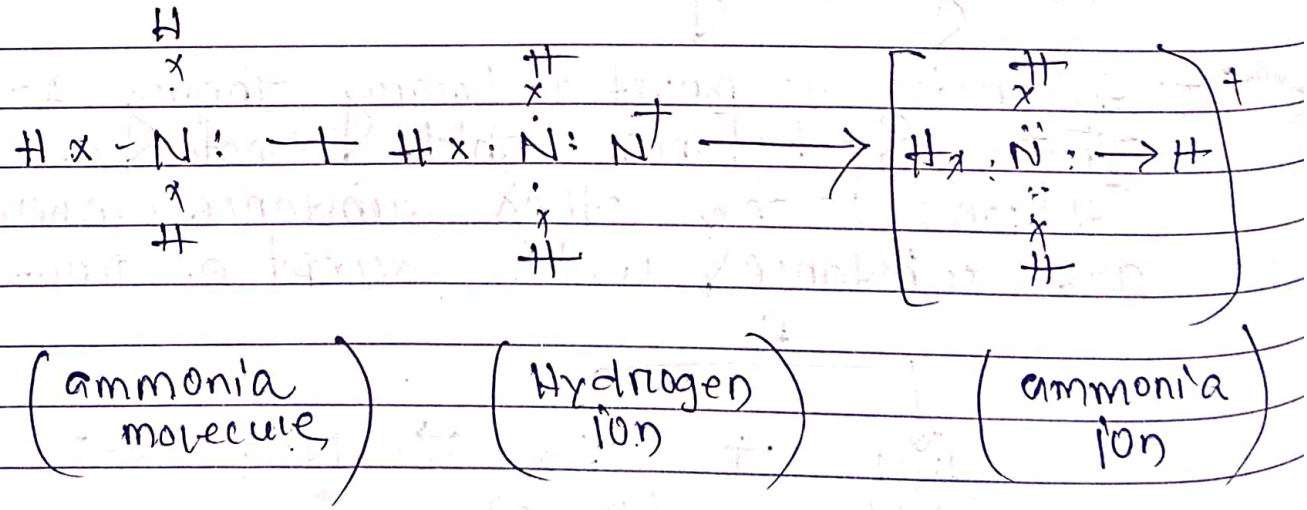
(ii) Neutral molecules conting electron deficient are Lewis acids,

BF_3, $AlCl_3$, $FeCl_3$, $ZnCl_2$, etc.

(iii) Neutral molecular coataining vacant d-orbitals in the central atom for the accommodation of incoming electrons act as Lewis acids, for ex:-

SiF_4, $SiCl_4$, etc,

(iv) The molecules having multiple bonding (= or ≡) between the atoms of different elements are acidic in nature, for example : CO_2, (O=C=O). SO_2 etc,



(ammonia molecule) (Hydrogen ion) (ammonia ion)