केन्द्रीय विद्यालय संगठन
शिक्षा एवं प्रशिक्षण आंचलिक संस्थान, चंडीगढ़
Kendriya Vidyalaya Sangathan
Zonal Institute of Education & Training , Chandigarh

Support Materials

- Hand outs
- Mind Maps
- Worksheets
- Hands on Activities

संरक्षक / PATRON
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SUBJECT – CHEMISTRY CLASSES XI & XII

“Education is not the learning of facts, but the training of the mind to think”
– Albert Einstein

Features : STUDY CUM SUPPORT MATERIAL

This support material is a supplement material to the NCERT textbook. It consists of Handouts ; Worksheets; Mind maps & Hand on activities.

HANDOUTS -

- *paper based resource to support learning.*
- *can free students from excessive note taking.*
- *have supplement information not easily available elsewhere .*
- *aid learning.*
- *increase attention of the students.*
- *help students to follow the development of an idea.*

WORKSHEETS –

- *an effective tool in ongoing efforts encouraging our students to engage their brains during class.*
- *helping students focus on an underlying big picture.*
- *bridging the gap between watching and doing.*
- *focusing students' attention in class.*
- *delivering and/or summarizing content efficiently.*
- *encouraging students to communicate their mathematical ideas.*
- *connecting new material to previously-covered material.*

MIND MAPS -

- *visual form of note taking that offers an overview of a topic & its complex information.*
- *allowing students to comprehend , create new ideas and build connections.*
- *help students brainstorm & explore any idea , concept or problem.*

- *facilitate better understanding of relationships & connections between the ideas & concepts.*
- *make it easy to communicate new ideas and thought process.*
- *allow students to easily recall information.*

HANDS ON ACTIVITIES –

- *experiential leaning that allows students to practice guided tactile learning.*
- *inspires a love of learning.*
- *encourages experimentation.*
- *facilitates comprehension.*
- *improves knowledge retention.*

- The teachers can prepare the master card by taking the important topics/points/concepts /reactions/terms etc. from this support material for quick revision during the exams.
- The material can also be used during the crash course or remedial sessions depending upon the topics of the chapter.
- The material can also be used for systematic revision of the different topics according to their level of difficulty & importance.
- The content given in the table formats can be used as worksheets or flash cards .

REMEMBER
TEACHERS ARE THE MANAGERS OF THE WORLD'S GREATEST RESOURCE - STUDENTS

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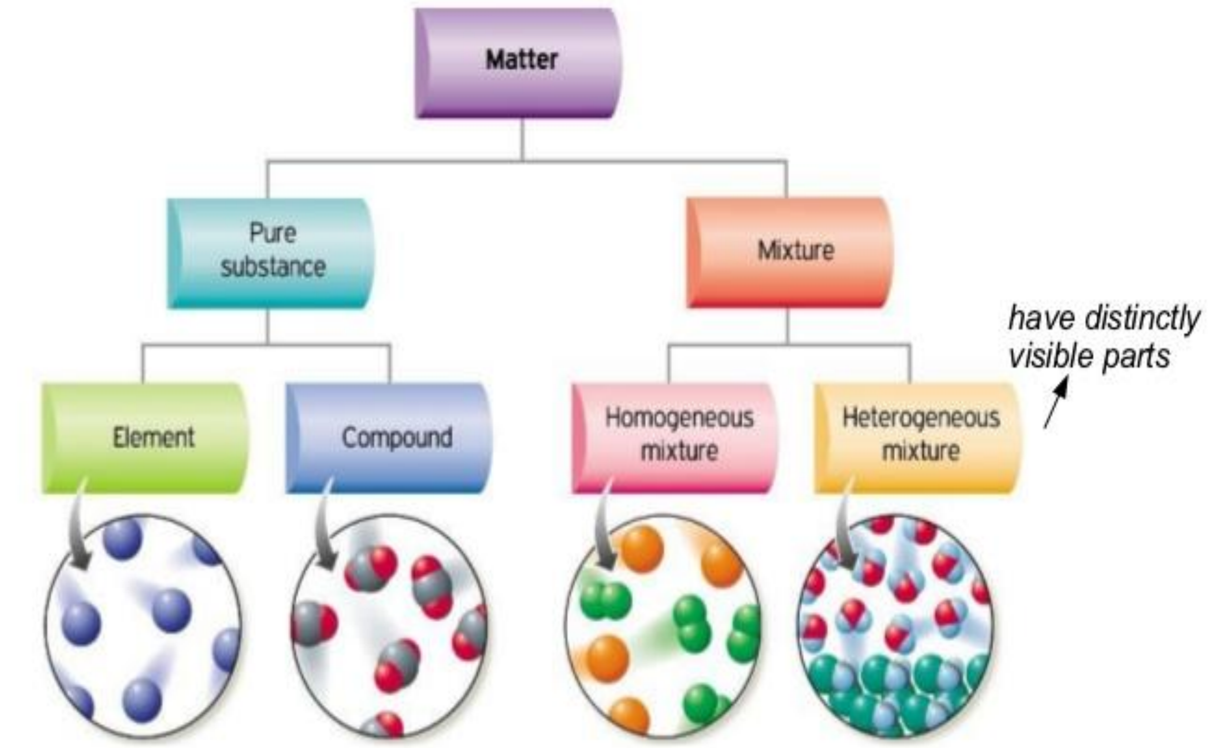
Sample Hand Outs – Class XI

UNIT 1 : Some Basic Concepts Of Chemistry

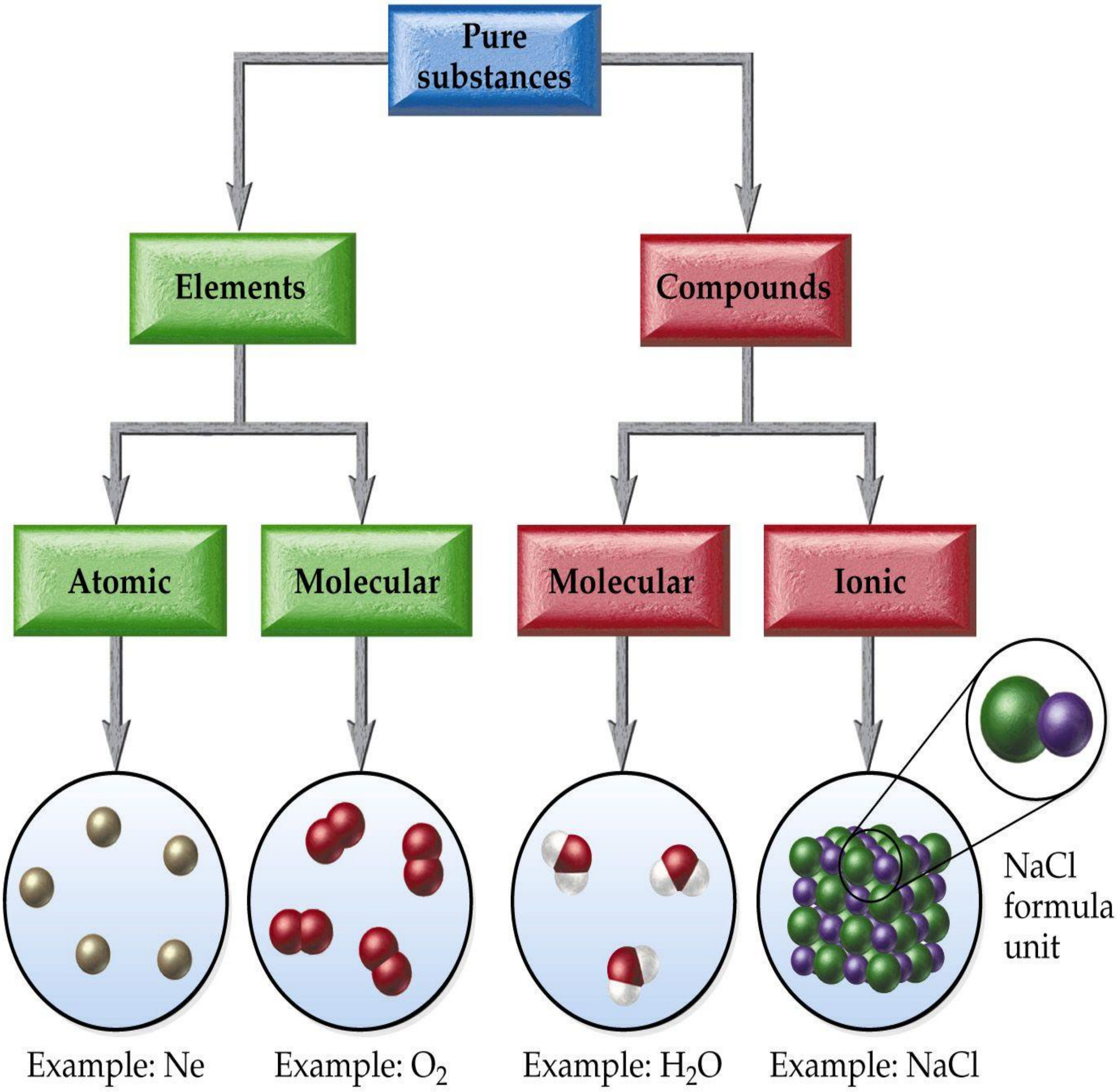
Classification of Matter



Look at a Periodic Table. There are 113 elements in the Periodic Table

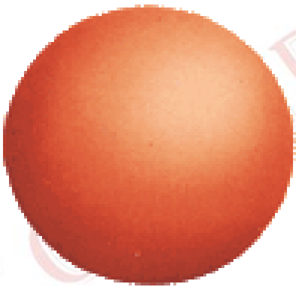
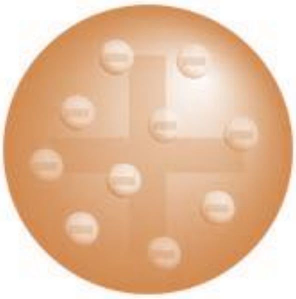
Most materials we encounter in the world are mixtures. The air we breathe is a mixture of oxygen, nitrogen, and other gases. The oceans are mixtures of water, salts and other substances

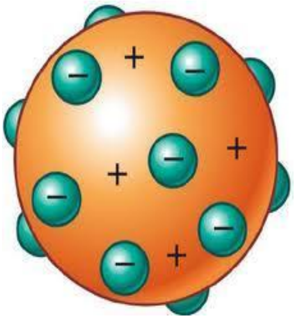
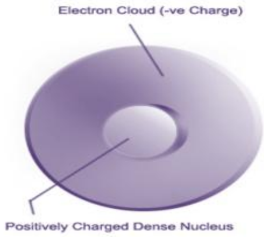
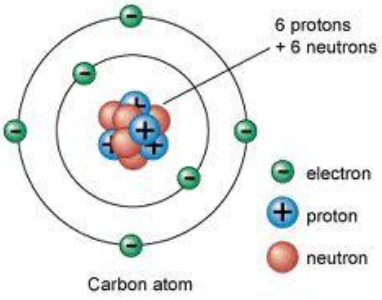
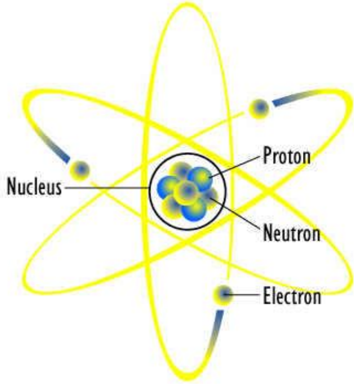
Pure Substance



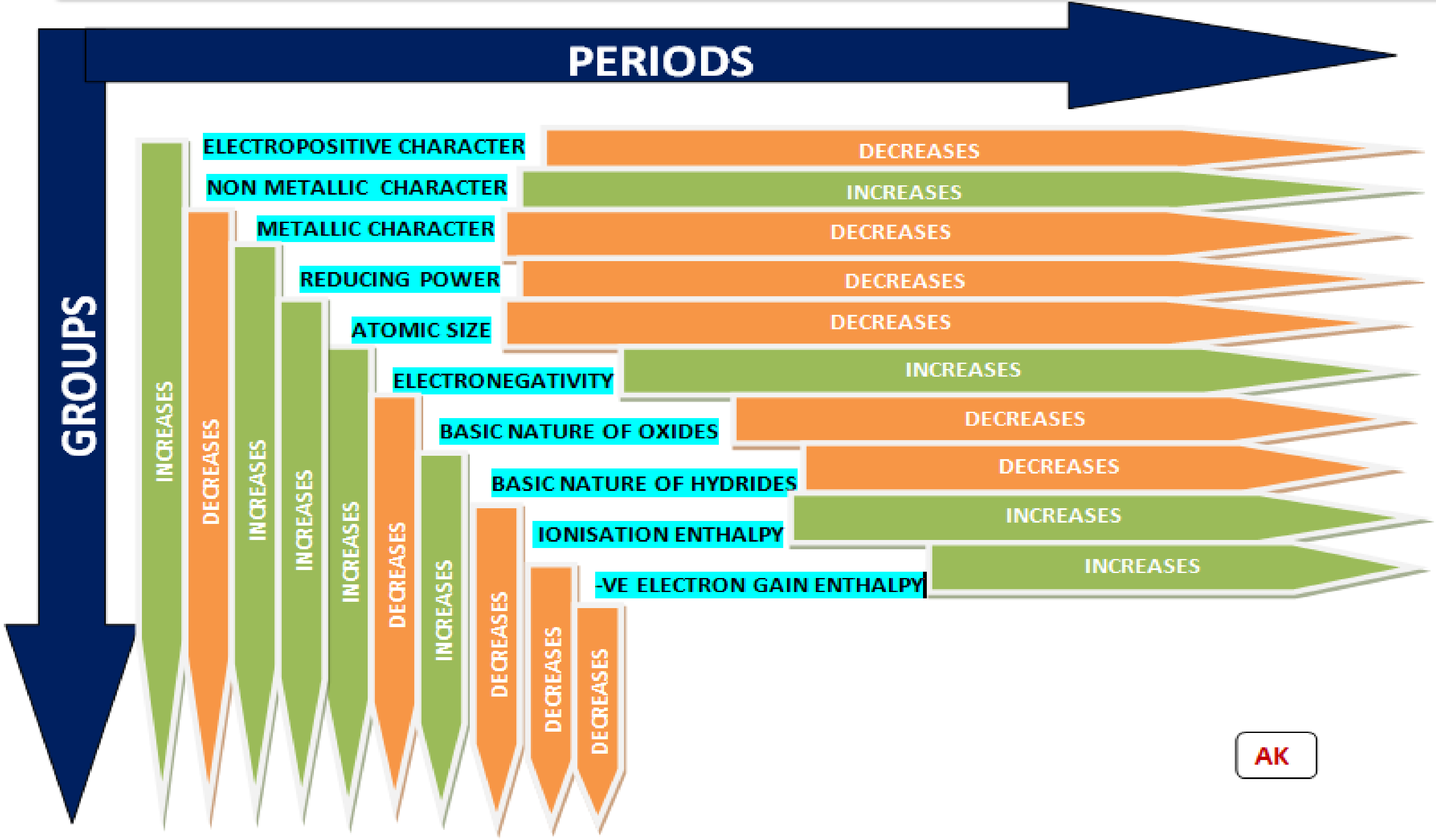
UNIT 2 : Structure Of Atom

Atomic theory time line

SCIENTIST	PROPOSED MODEL OF ATOM	To be filled by the Student	
		Features of Atomic Model	Limitations
Democritus  Greek philosopher (400 B.C)			
John Dalton  English Chemist [proposed atomic theory in 1803]	 *He proposed the Atomic theory of matter based on his experimental observations.*		
Joseph John Thomson  British Physicist and Nobel laureate	**PLUM –PUDDING MODEL** 		

SCIENTIST	PROPOSED MODEL OF ATOM	To be filled by the Student	
		Features of Atomic Model	Limitations
Eugene Goldstein **a German physicist** 	 		
Sir Earnest Rutherford  **Nobel prize 1908**	 **Rutherford's Nuclear Model of the Atom**		
James Chadwick  **English Physicist & Nobel laureate**	 		
Danish physicist **Niel Bohr** 	 		

GENERAL TRENDS - PERIODIC TABLE

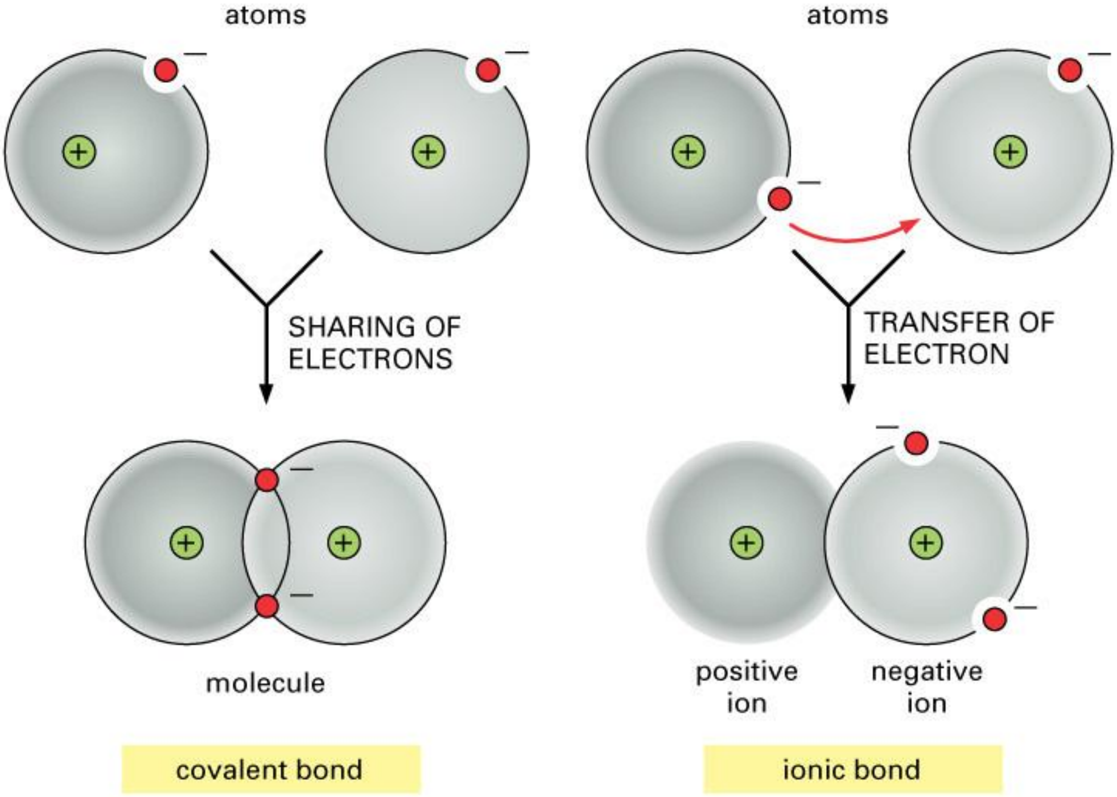


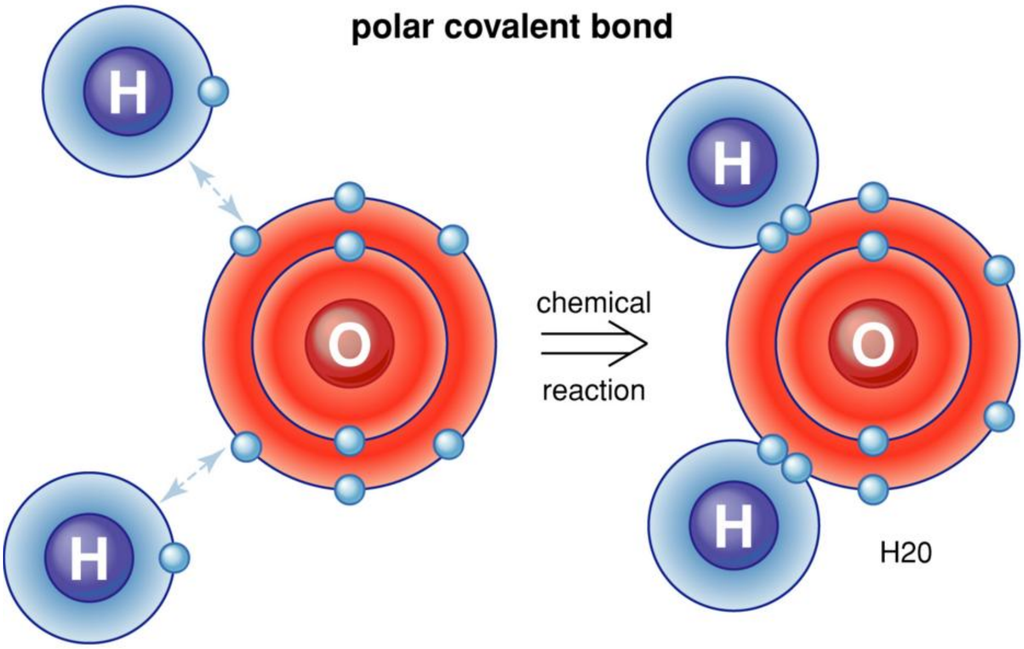
	PERIODS	GROUPS
ELECTROPOSITIVE CHARACTER	DECREASES	INCREASES
NON METALLIC CHARACTER	INCREASES	DECREASES
METALLIC CHARACTER	DECREASES	INCREASES
REDUCING POWER	DECREASES	INCREASES
ATOMIC SIZE	DECREASES	INCREASES
ELECTRONEGATIVITY	INCREASES	DECREASES
BASIC NATURE OF OXIDES	DECREASES	INCREASES
BASIC NATURE OF HYDRIDES	DECREASES	DECREASES
IONISATION ENTHALPY	INCREASES	DECREASES
-VE ELECTRON GAIN ENTHALPY	INCREASES	DECREASES

AK

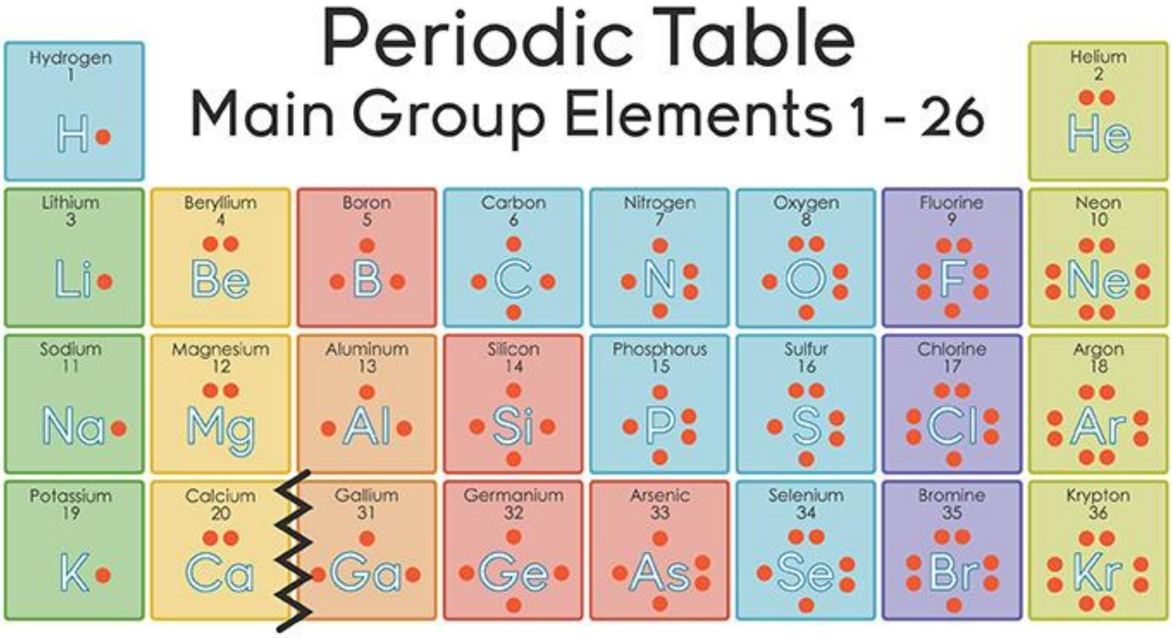
UNIT 4 : Chemical Bonding

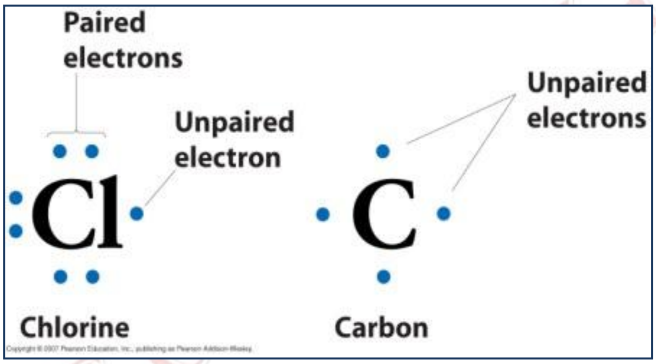
Ionic & Covalent Bond

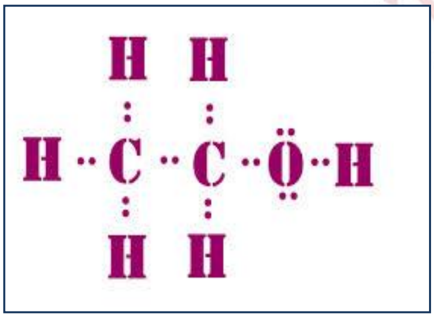


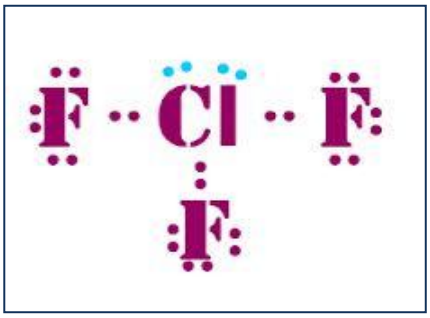


Lewis Dot Structure

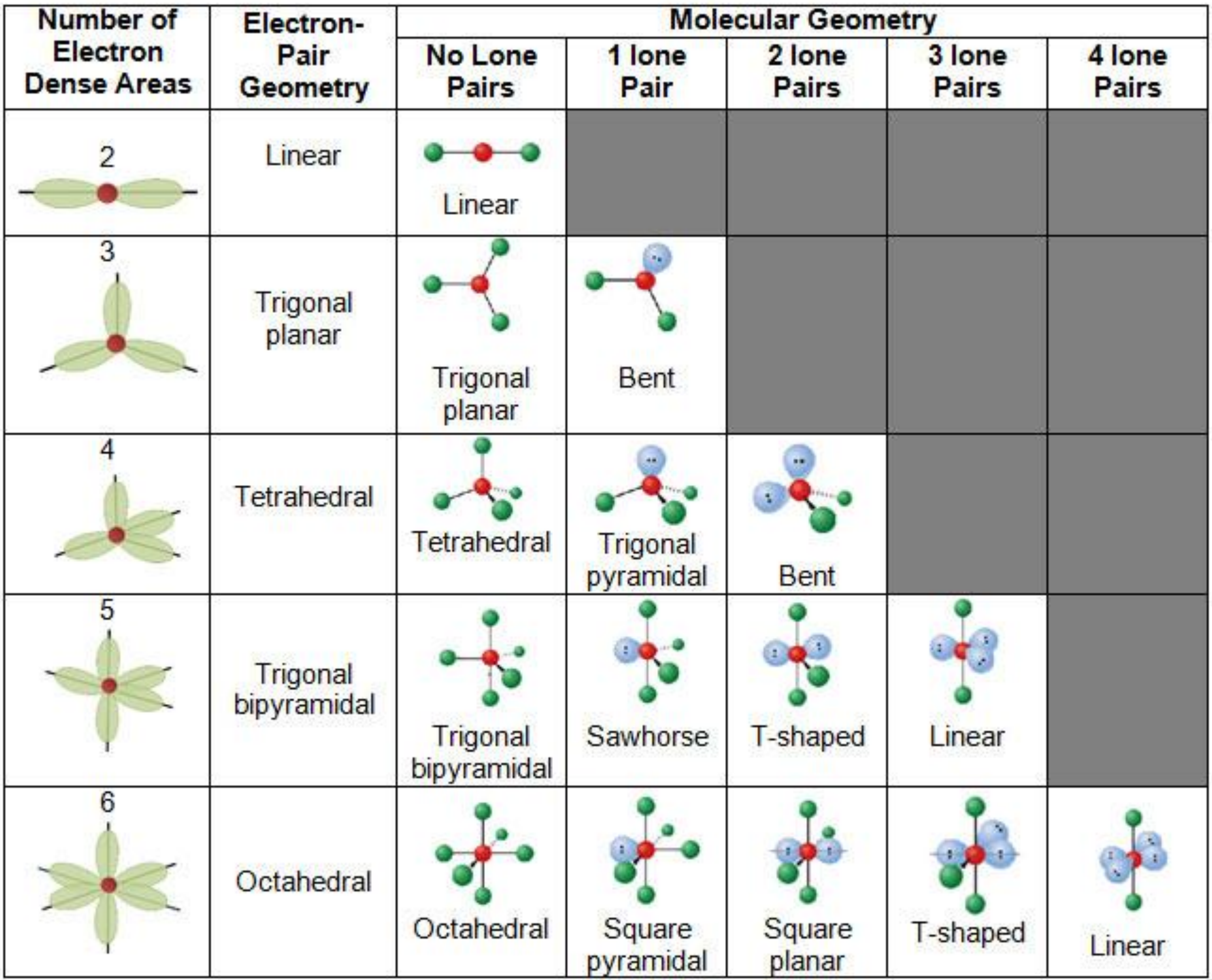




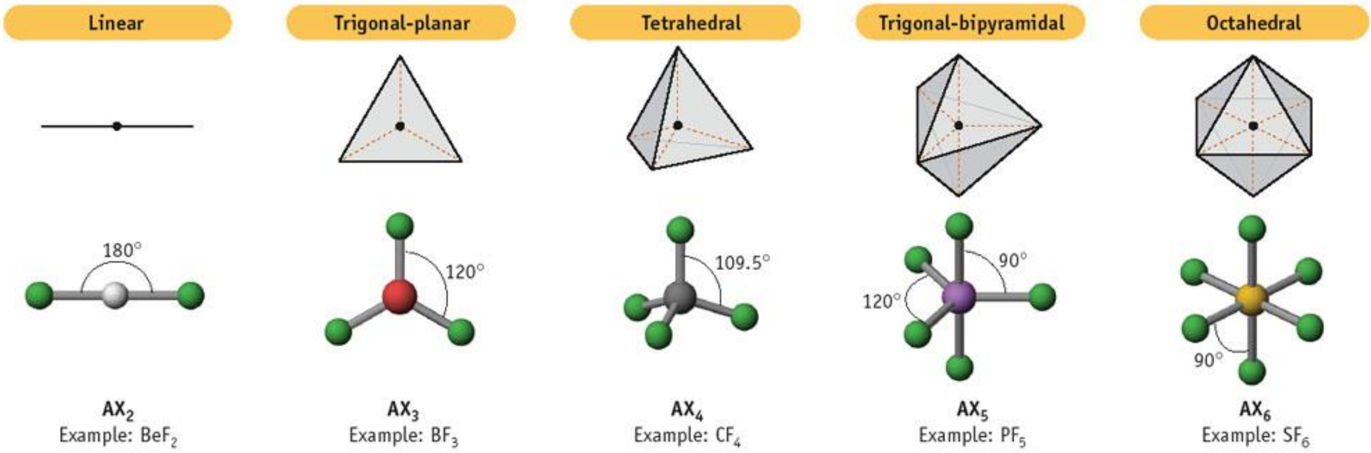




Shapes of Molecules

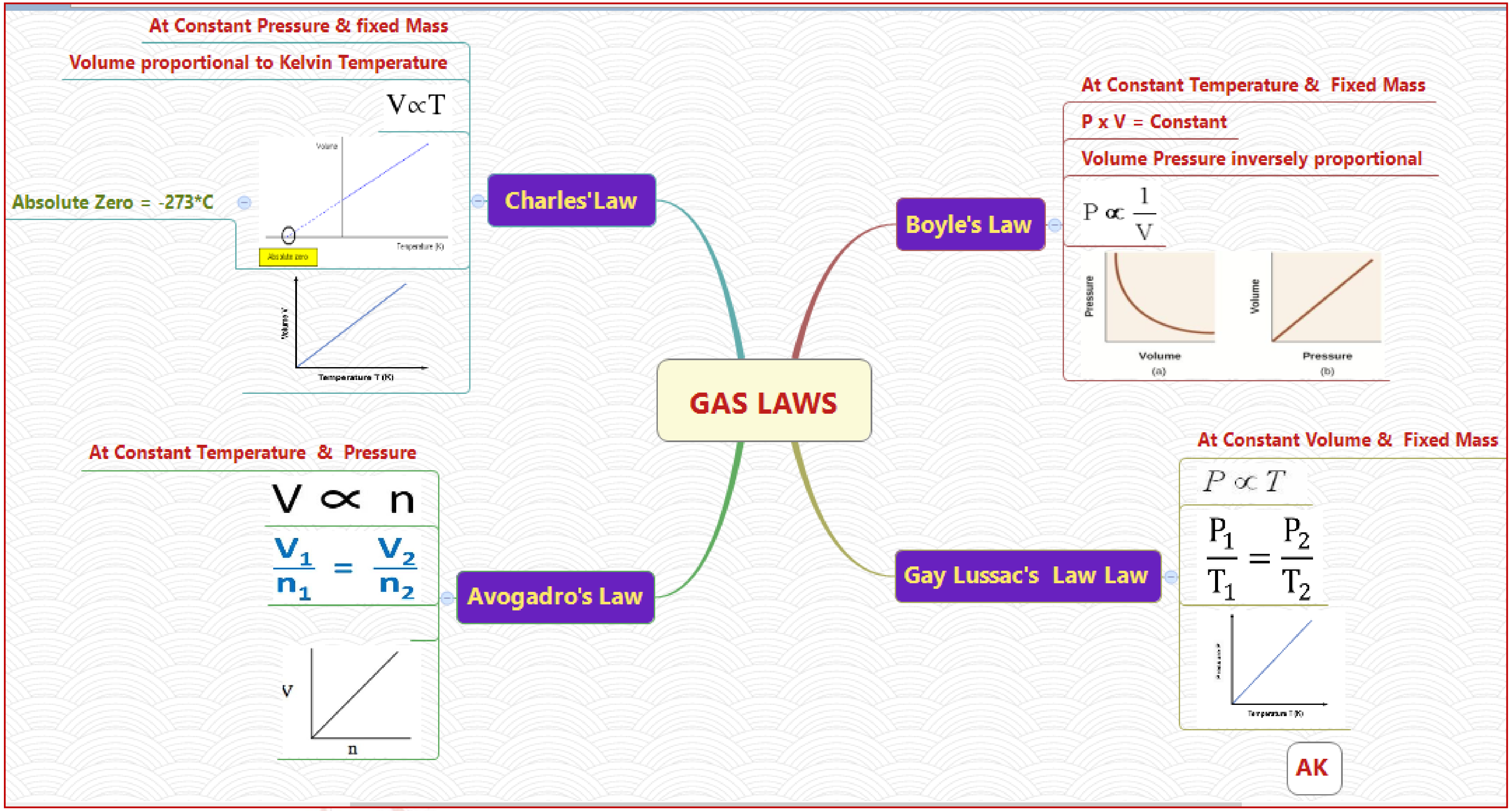


Number of Electron Dense Areas	Electron-Pair Geometry	Molecular Geometry				
		No Lone Pairs	1 lone Pair	2 lone Pairs	3 lone Pairs	4 lone Pairs
2	Linear	Linear				
3	Trigonal planar	Trigonal planar	Bent			
4	Tetrahedral	Tetrahedral	Trigonal pyramidal	Bent		
5	Trigonal bipyramidal	Trigonal bipyramidal	Sawhorse	T-shaped	Linear	
6	Octahedral	Octahedral	Square pyramidal	Square planar	T-shaped	Linear



UNIT 5: States of Matter

The Gas Laws



GAS LAWS

Charles'Law

At Constant Pressure & fixed Mass

Volume proportional to Kelvin Temperature

$V \propto T$

Absolute Zero = -273*C

Boyle's Law

At Constant Temperature & Fixed Mass

P x V = Constant

Volume Pressure inversely proportional

$P \propto \frac{1}{V}$

Avogadro's Law

At Constant Temperature & Pressure

$V \propto n$

$$\frac{V_1}{n_1} = \frac{V_2}{n_2}$$

Gay Lussac's Law Law

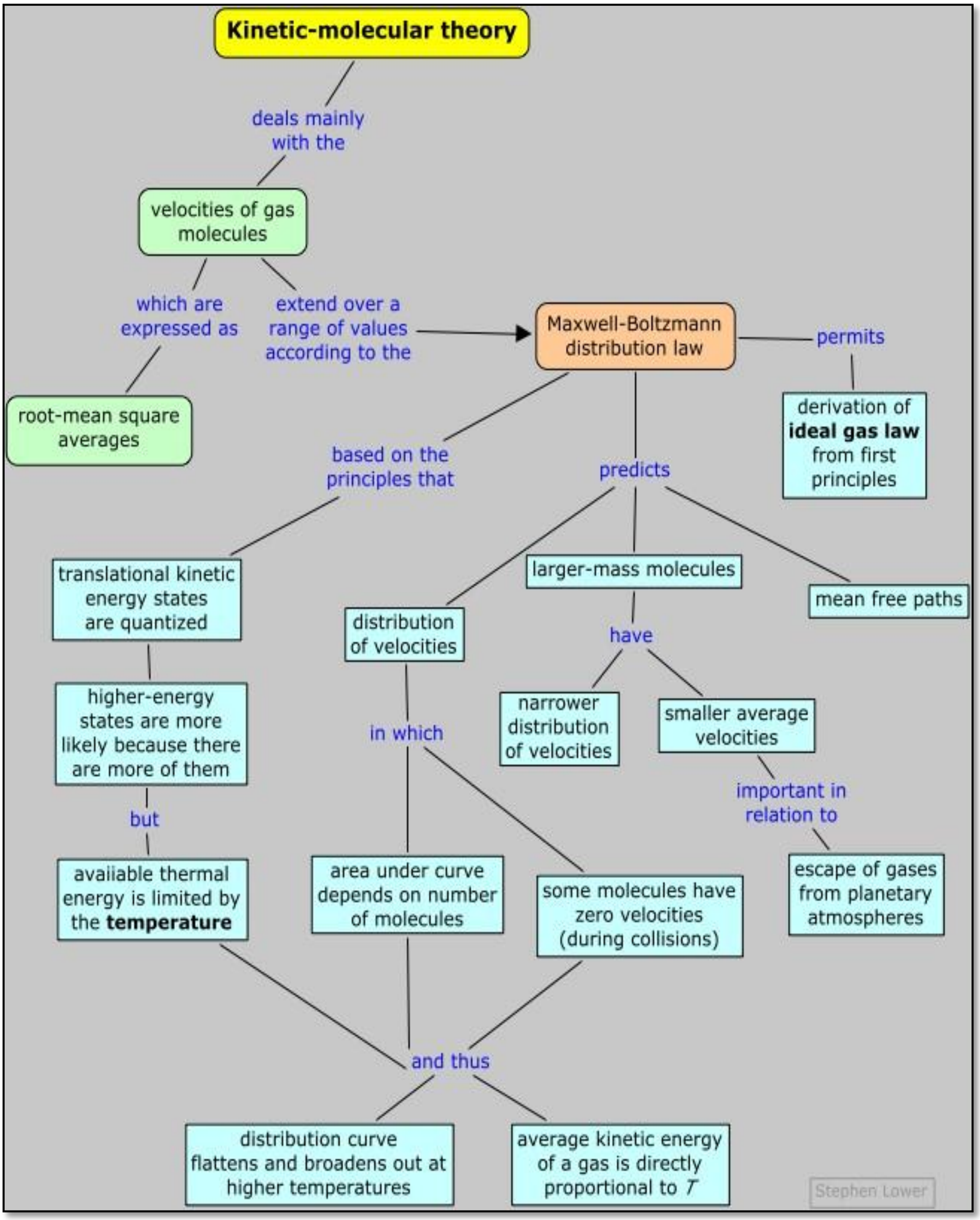
At Constant Volume & Fixed Mass

$P \propto T$

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

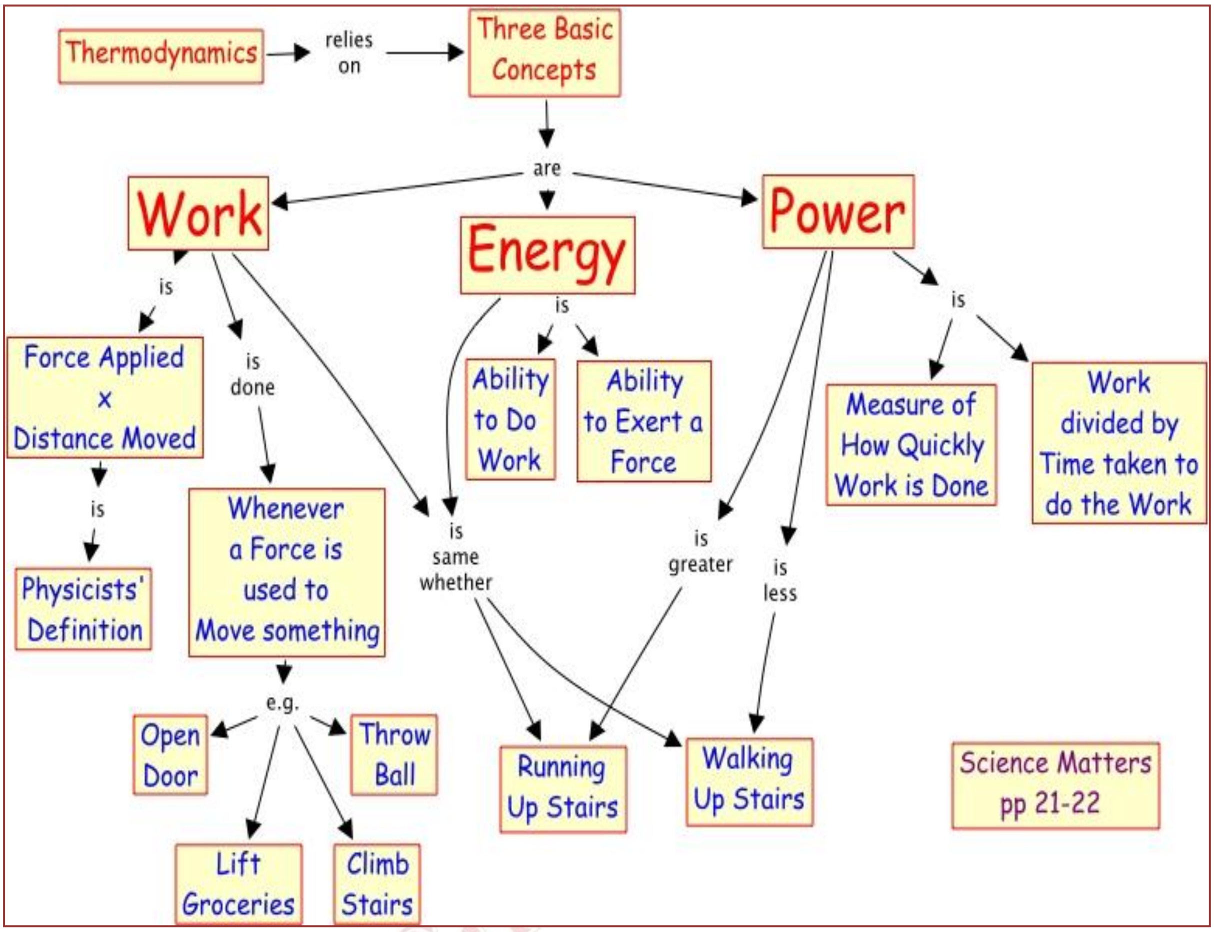
AK

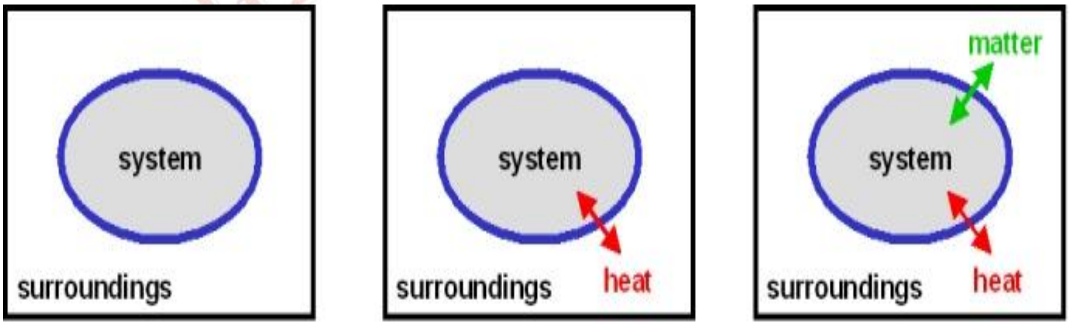
Kinetic Molecular Theory



Unit : 6 Thermodynamics

Basis of Thermodynamics



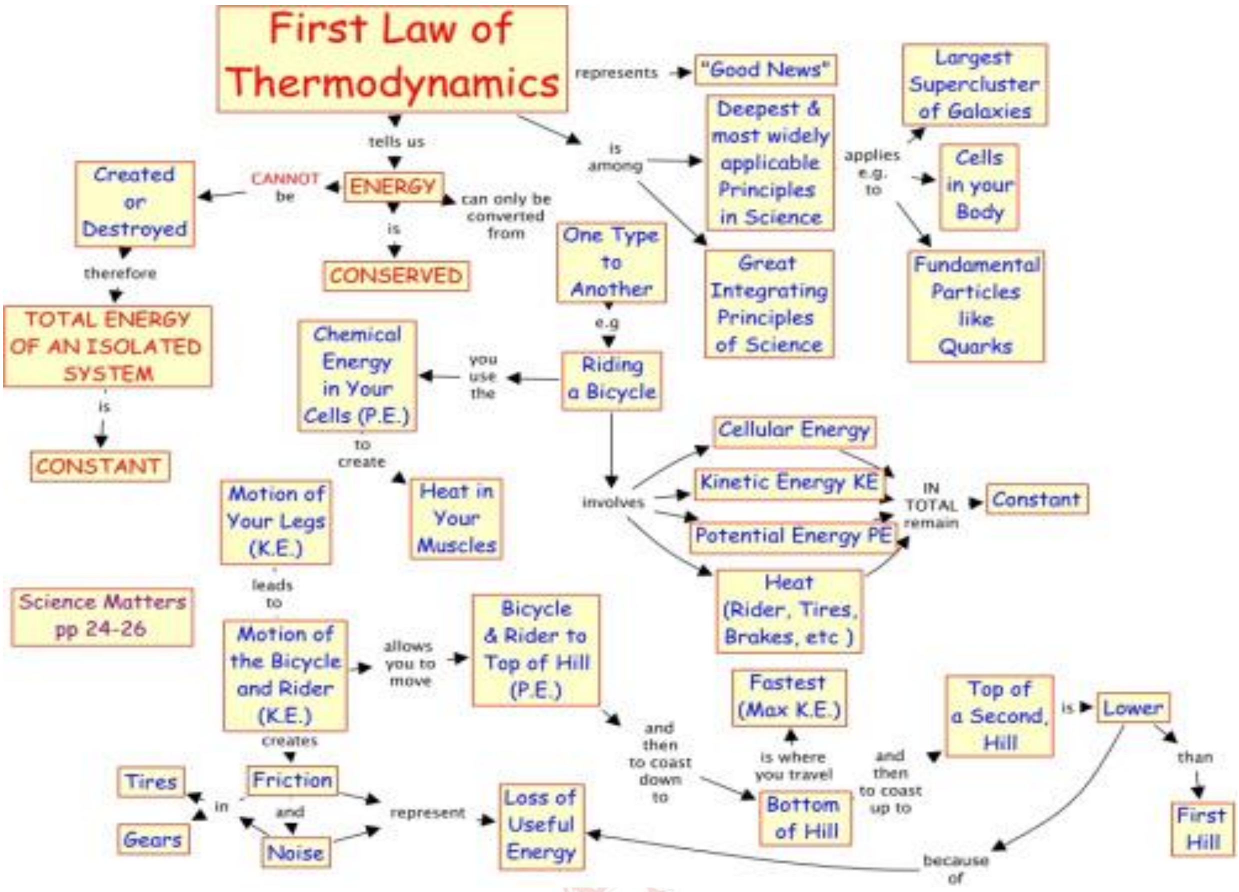


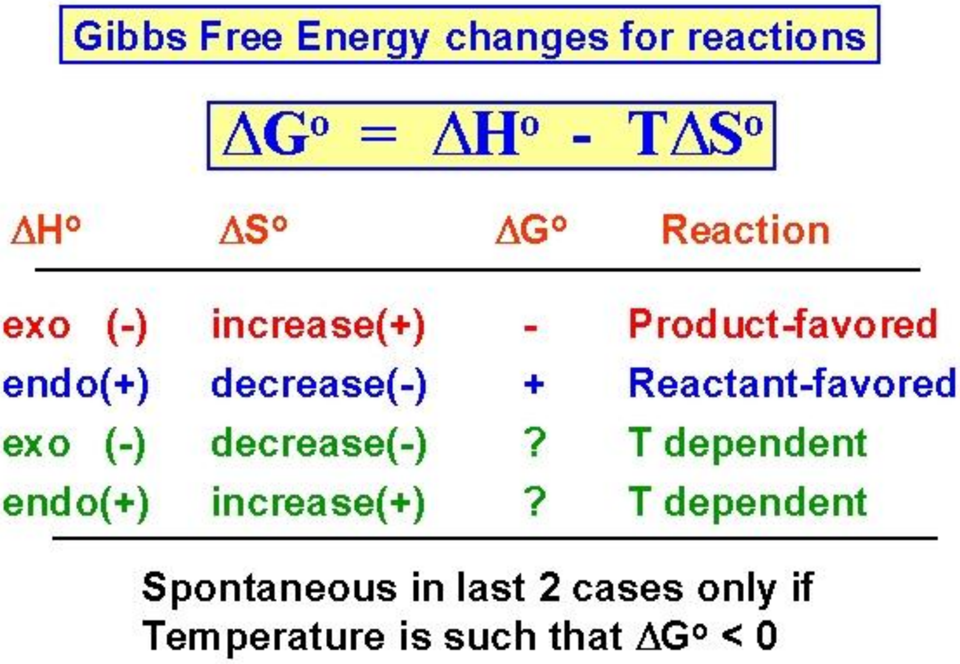
"Isolated" system:
- no exchange of matter
- no exchange of heat

"Closed" system:
- no exchange of matter
- can exchange heat energy

"Open" system:
- can exchange matter
- can exchange heat energy

First Law of Thermodynamics





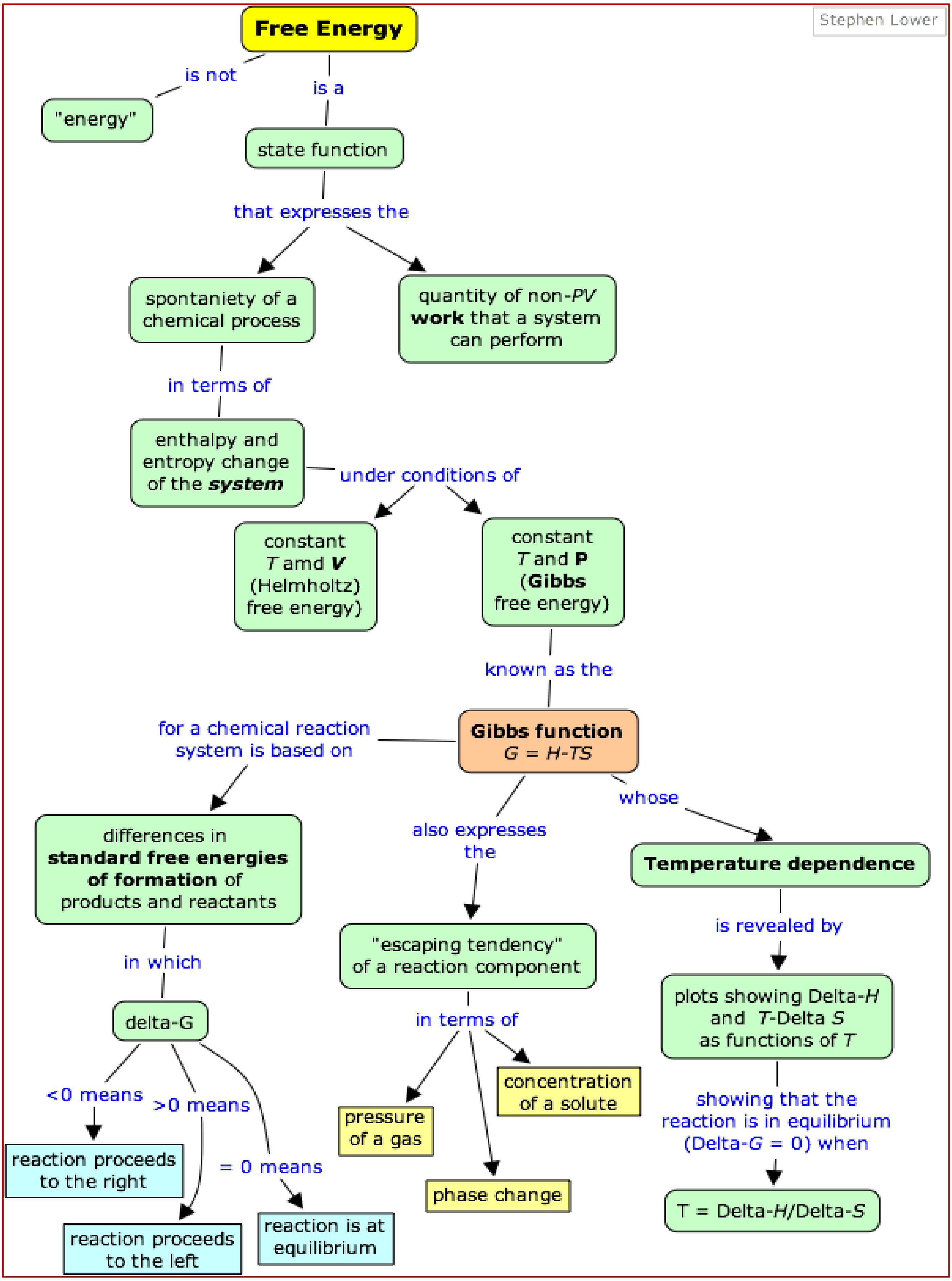
Gibbs Free Energy changes for reactions

$$\Delta G^o = \Delta H^o - T\Delta S^o$$

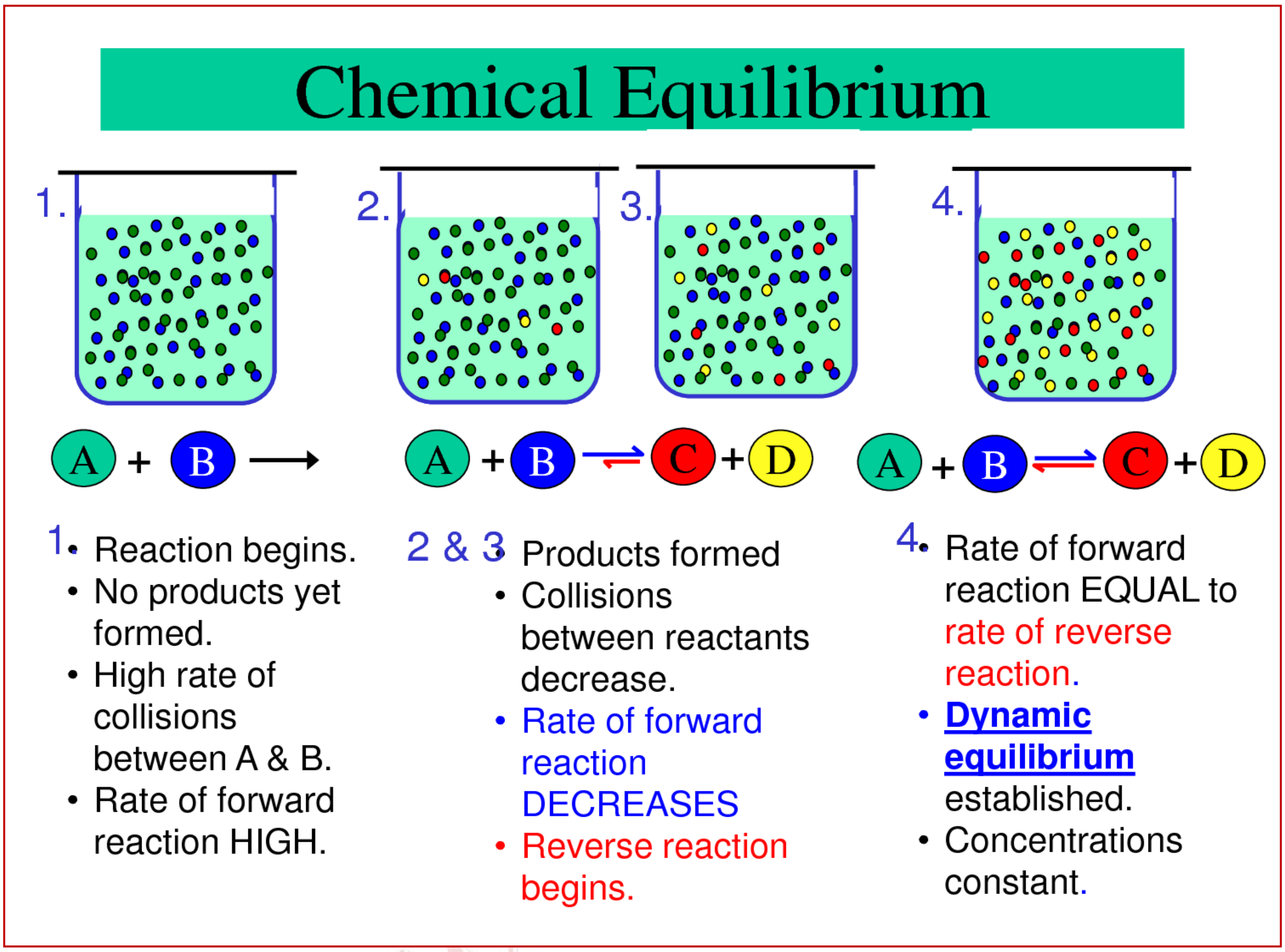
ΔH^o	ΔS^o	ΔG^o	Reaction
exo (-)	increase(+)	-	Product-favored
endo(+)	decrease(-)	+	Reactant-favored
exo (-)	decrease(-)	?	T dependent
endo(+)	increase(+)	?	T dependent

Spontaneous in last 2 cases only if Temperature is such that $\Delta G^o < 0$

Free Energy


Stephen Lower
Free Energy
is not
"energy"
is a
state function
that expresses the
spontaniety of a chemical process
quantity of non-PV work that a system can perform
in terms of
enthalpy and entropy change of the system
under conditions of
constant T amd V (Helmholtz) free energy)
constant T and P (Gibbs free energy)
known as the
Gibbs function G = H-TS
for a chemical reaction system is based on
differences in standard free energies of formation of products and reactants
in which
delta-G
<0 means
reaction proceeds to the right
>0 means
reaction proceeds to the left
= 0 means
reaction is at equilibrium
also expresses the
"escaping tendency" of a reaction component
in terms of
pressure of a gas
concentration of a solute
phase change
whose
Temperature dependence
is revealed by
plots showing Delta-H and T-Delta S as functions of T
showing that the reaction is in equilibrium (Delta-G = 0) when
T = Delta-H/Delta-S

Chemical Equilibrium



Chemical Equilibrium

1. $A + B \longrightarrow$

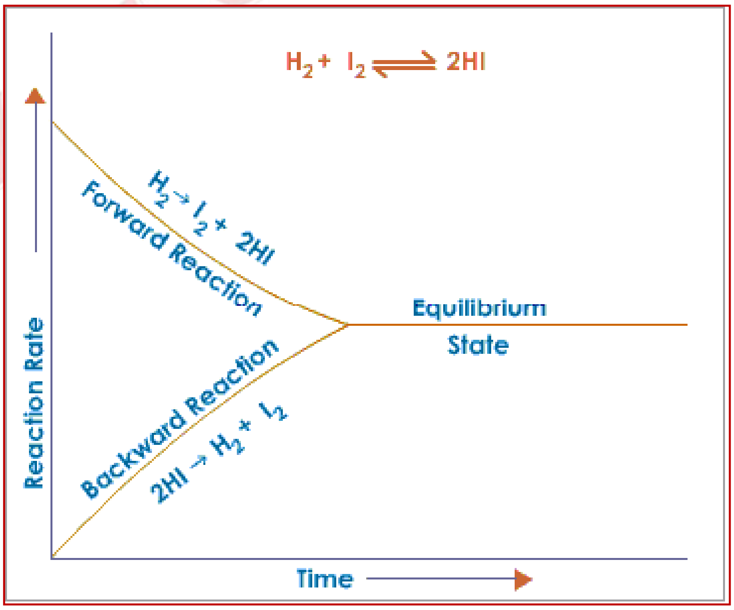
2. 3. $A + B \rightleftharpoons C + D$

4. $A + B \rightleftharpoons C + D$

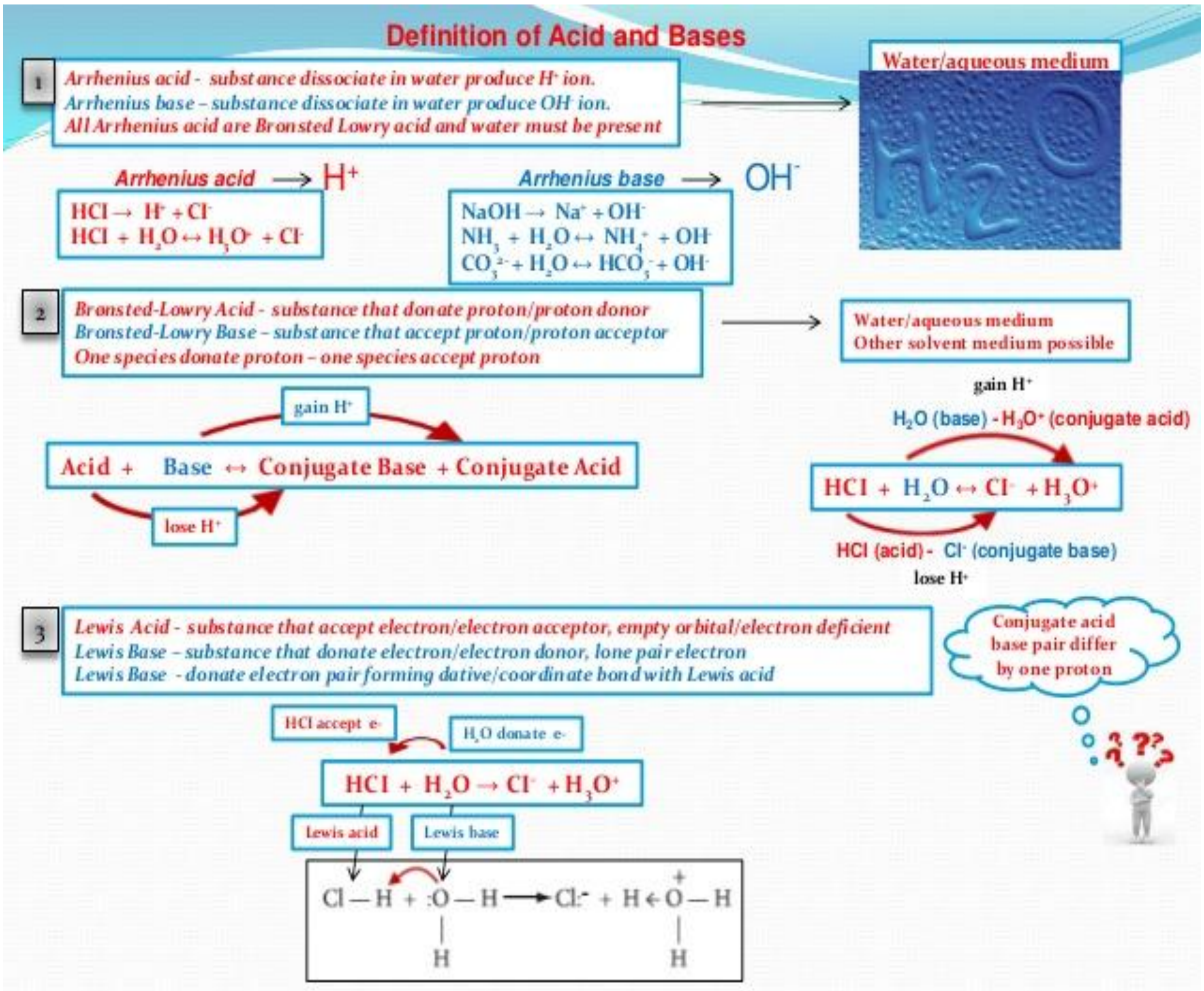
1.
- Reaction begins.
- No products yet formed.
- High rate of collisions between A & B.
- Rate of forward reaction HIGH.

2 & 3
- Products formed
- Collisions between reactants decrease.
- Rate of forward reaction DECREASES
- Reverse reaction begins.

4.
- Rate of forward reaction EQUAL to rate of reverse reaction.
- **Dynamic equilibrium** established.
- Concentrations constant.



Concept of Acids & Bases



Definition of Acid and Bases

1 *Arrhenius acid - substance dissociate in water produce H^+ ion.*
Arrhenius base – substance dissociate in water produce OH^- ion.
All Arrhenius acid are Bronsted Lowry acid and water must be present

→ Water/aqueous medium

Arrhenius acid → H^+

$HCl \rightarrow H^+ + Cl^-$
$HCl + H_2O \leftrightarrow H_3O^+ + Cl^-$

Arrhenius base → OH^-

$NaOH \rightarrow Na^+ + OH^-$
$NH_3 + H_2O \leftrightarrow NH_4^+ + OH^-$
$CO_3^{2-} + H_2O \leftrightarrow HCO_3^- + OH^-$

2 *Bronsted-Lowry Acid - substance that donate proton/proton donor*
Bronsted-Lowry Base – substance that accept proton/proton acceptor
One species donate proton – one species accept proton

→ Water/aqueous medium
Other solvent medium possible

gain H^+

Acid + Base ↔ Conjugate Base + Conjugate Acid

lose H^+

gain H^+

H_2O (base) - H_3O^+ (conjugate acid)

$HCl + H_2O \leftrightarrow Cl^- + H_3O^+$

HCl (acid) - Cl^- (conjugate base)

lose H^+

3 *Lewis Acid - substance that accept electron/electron acceptor, empty orbital/electron deficient*
Lewis Base – substance that donate electron/electron donor, lone pair electron
Lewis Base - donate electron pair forming dative/coordinate bond with Lewis acid

Conjugate acid base pair differ by one proton

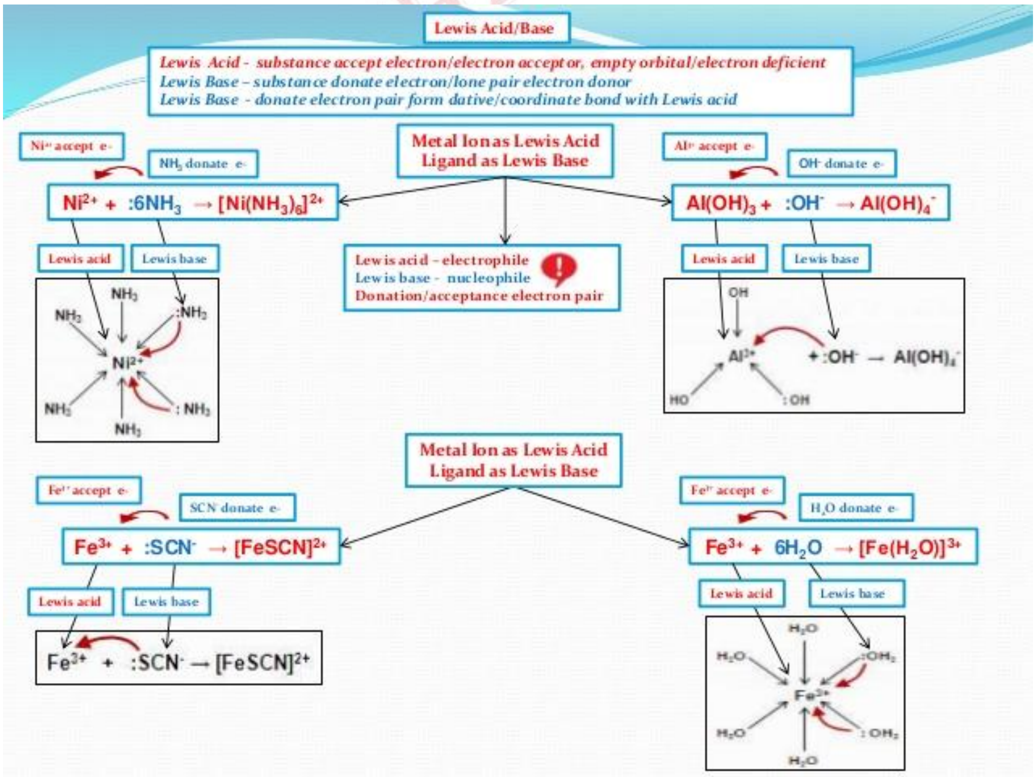
HCl accept e-

H_2O donate e-

$HCl + H_2O \rightarrow Cl^- + H_3O^+$

Lewis acid

Lewis base



Lewis Acid/Base

Lewis Acid - substance accept electron/electron acceptor, empty orbital/electron deficient
Lewis Base – substance donate electron/lone pair electron donor
Lewis Base - donate electron pair form dative/coordinate bond with Lewis acid

Metal Ionas Lewis Acid
Ligand as Lewis Base

Ni^{2+} accept e-

NH_3 donate e-

$Ni^{2+} + :6NH_3 \rightarrow [Ni(NH_3)_6]^{2+}$

Lewis acid

Lewis base

Lewis acid – electrophile
Lewis base - nucleophile
Donation/acceptance electron pair

Al^{3+} accept e-

OH^- donate e-

$Al(OH)_3 + :OH^- \rightarrow Al(OH)_4^-$

Lewis acid

Lewis base

$Al^{3+} + :OH^- \rightarrow Al(OH)_4^-$

Metal Ion as Lewis Acid
Ligand as Lewis Base

Fe^{3+} accept e-

SCN^- donate e-

$Fe^{3+} + :SCN^- \rightarrow [FeSCN]^{2+}$

Lewis acid

Lewis base

$Fe^{3+} + :SCN^- \rightarrow [FeSCN]^{2+}$

Fe^{3+} accept e-

H_2O donate e-

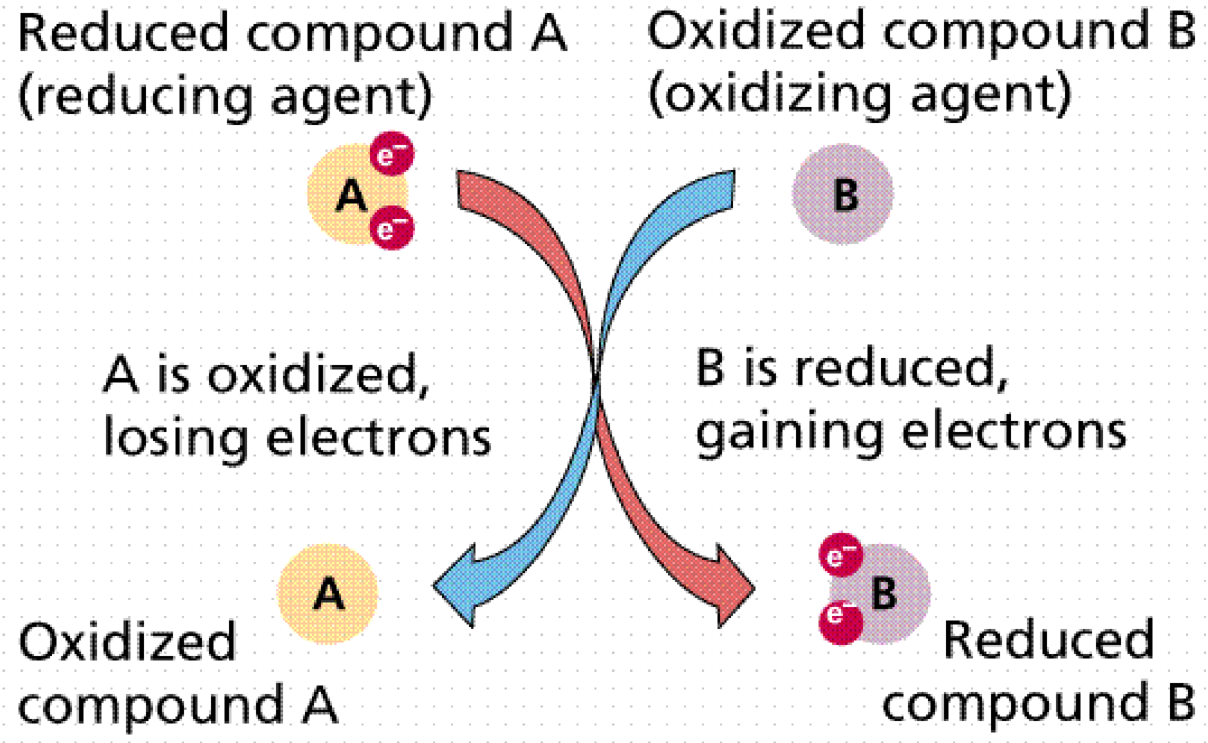
$Fe^{3+} + 6H_2O \rightarrow [Fe(H_2O)]^{3+}$

Lewis acid

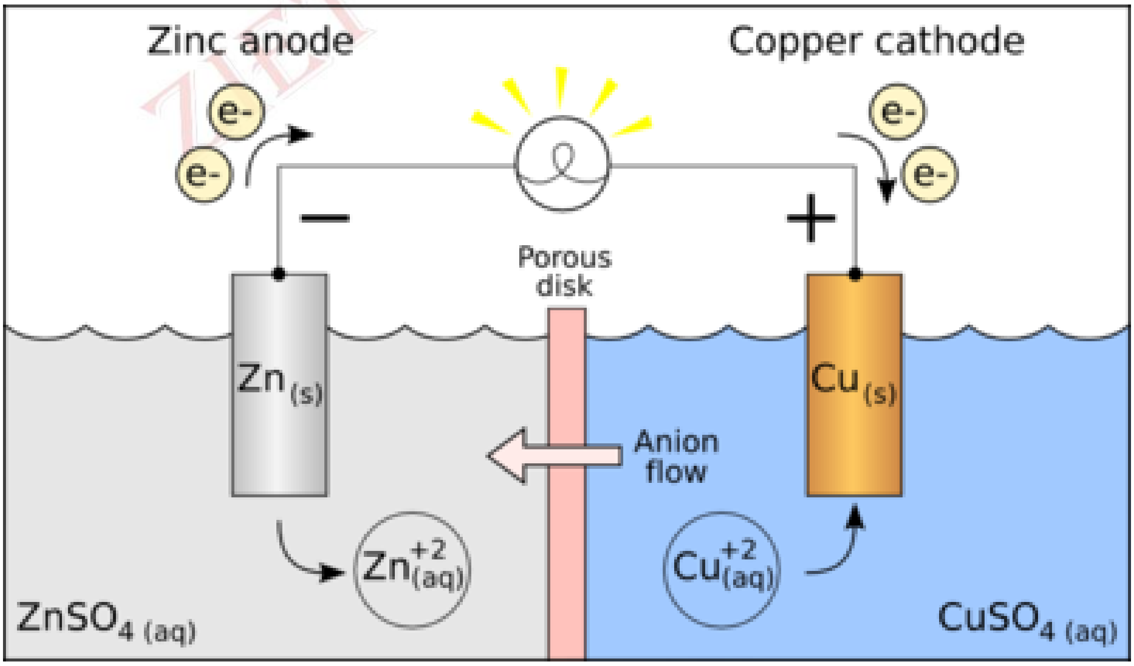
Lewis base

UNIT 8 : Redox Reactions

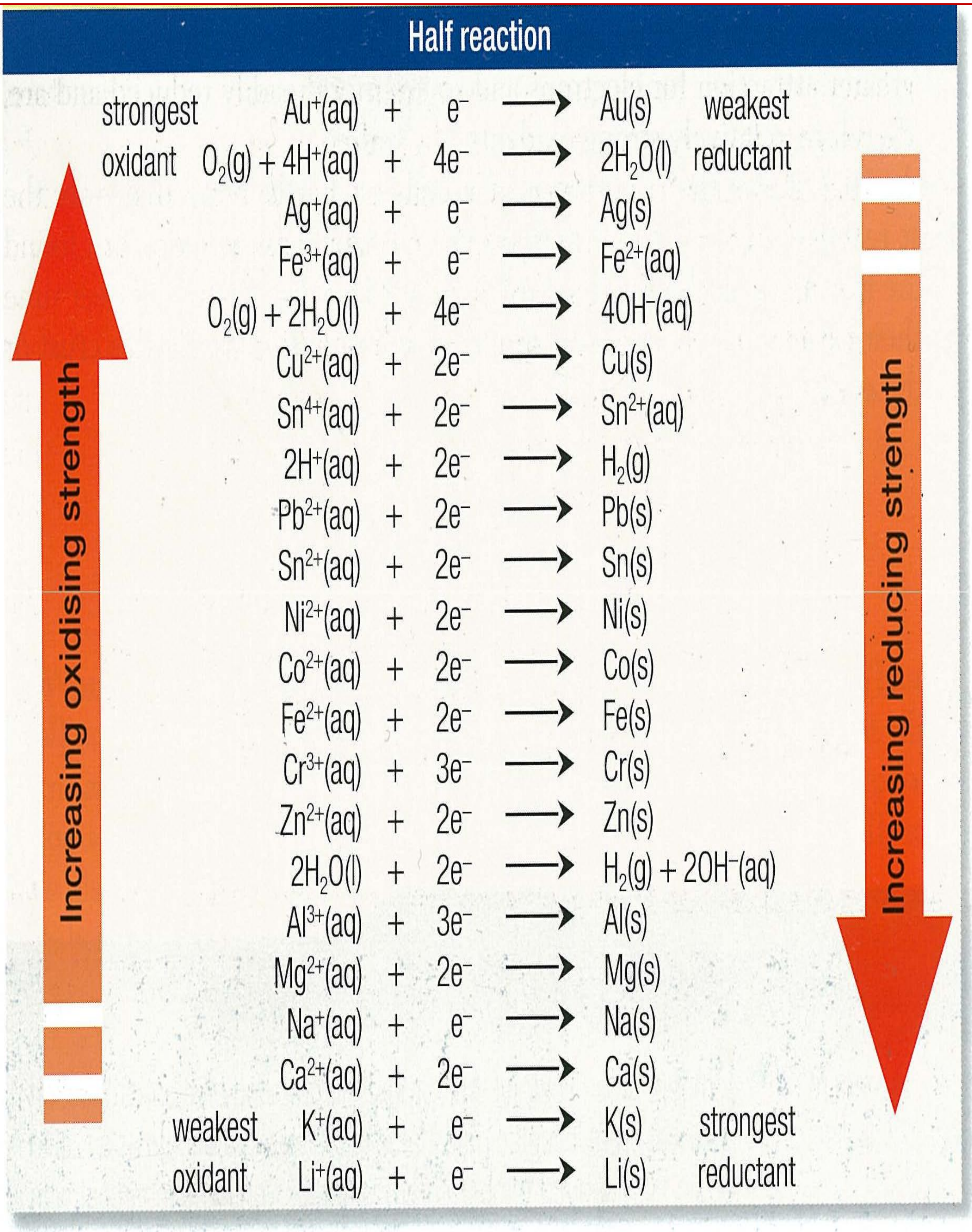
Oxidation & Reduction



Daniel cell



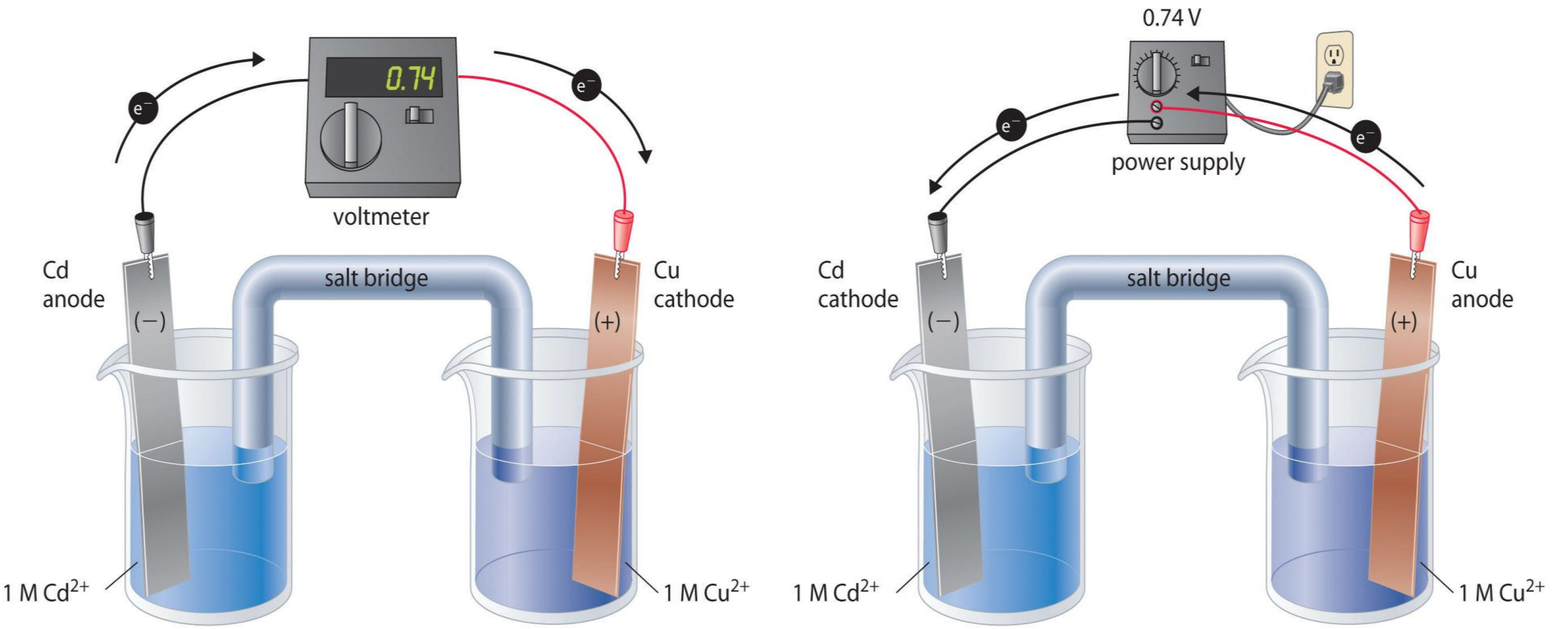
Electrochemical Series



Half reaction

strongest oxidant	$Au^+(aq)$	+	e^-	$\longrightarrow$	$Au(s)$	weakest reductant
	$O_2(g) + 4H^+(aq)$	+	$4e^-$	$\longrightarrow$	$2H_2O(l)$	
	$Ag^+(aq)$	+	e^-	$\longrightarrow$	$Ag(s)$	
	$Fe^{3+}(aq)$	+	e^-	$\longrightarrow$	$Fe^{2+}(aq)$	
	$O_2(g) + 2H_2O(l)$	+	$4e^-$	$\longrightarrow$	$4OH^-(aq)$	
	$Cu^{2+}(aq)$	+	$2e^-$	$\longrightarrow$	$Cu(s)$	
	$Sn^{4+}(aq)$	+	$2e^-$	$\longrightarrow$	$Sn^{2+}(aq)$	
	$2H^+(aq)$	+	$2e^-$	$\longrightarrow$	$H_2(g)$	
	$Pb^{2+}(aq)$	+	$2e^-$	$\longrightarrow$	$Pb(s)$	
	$Sn^{2+}(aq)$	+	$2e^-$	$\longrightarrow$	$Sn(s)$	
	$Ni^{2+}(aq)$	+	$2e^-$	$\longrightarrow$	$Ni(s)$	
	$Co^{2+}(aq)$	+	$2e^-$	$\longrightarrow$	$Co(s)$	
	$Fe^{2+}(aq)$	+	$2e^-$	$\longrightarrow$	$Fe(s)$	
	$Cr^{3+}(aq)$	+	$3e^-$	$\longrightarrow$	$Cr(s)$	
	$Zn^{2+}(aq)$	+	$2e^-$	$\longrightarrow$	$Zn(s)$	
	$2H_2O(l)$	+	$2e^-$	$\longrightarrow$	$H_2(g) + 2OH^-(aq)$	
	$Al^{3+}(aq)$	+	$3e^-$	$\longrightarrow$	$Al(s)$	
	$Mg^{2+}(aq)$	+	$2e^-$	$\longrightarrow$	$Mg(s)$	
	$Na^+(aq)$	+	e^-	$\longrightarrow$	$Na(s)$	
	$Ca^{2+}(aq)$	+	$2e^-$	$\longrightarrow$	$Ca(s)$	
weakest oxidant	$K^+(aq)$	+	e^-	$\longrightarrow$	$K(s)$	strongest reductant
	$Li^+(aq)$	+	e^-	$\longrightarrow$	$Li(s)$	

Electrochemical (Galvanic) VS Electrolytic Cell



anode:
$Cd(s) \rightarrow Cd^{2+}(aq) + 2e^-$

cathode:
$Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)$

Overall reaction: $Cd(s) + Cu^{2+}(aq) \rightarrow Cd^{2+}(aq) + Cu(s)$

(a) Galvanic cell

cathode:
$Cd^{2+}(aq) + 2e^- \rightarrow Cd(s)$

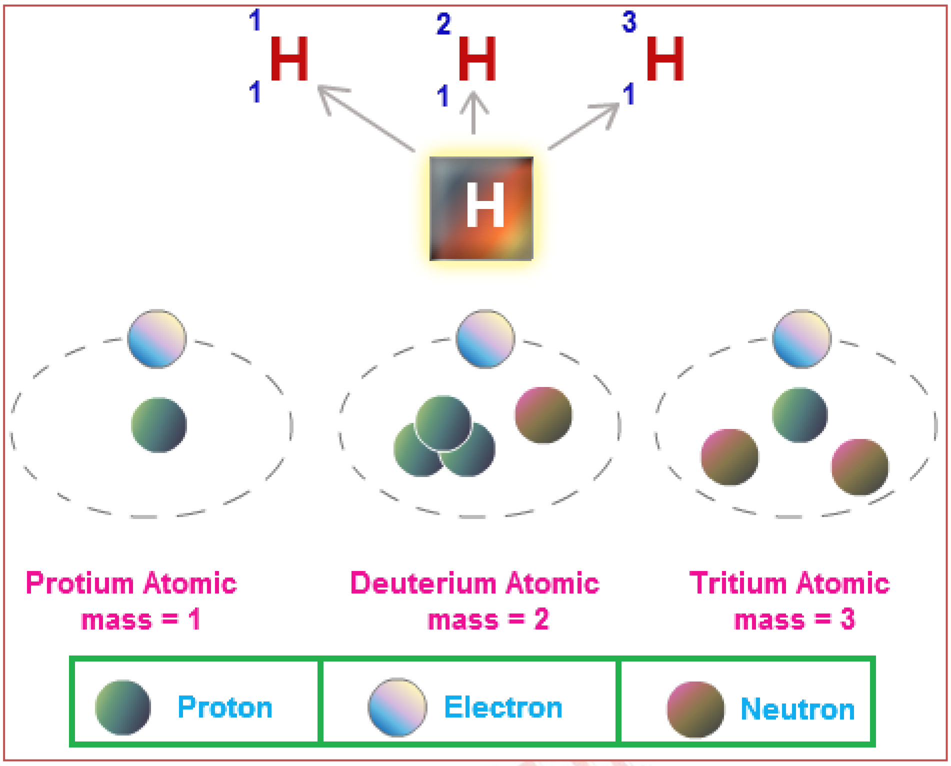
anode:
$Cu(s) \rightarrow Cu^{2+}(aq) + 2e^-$

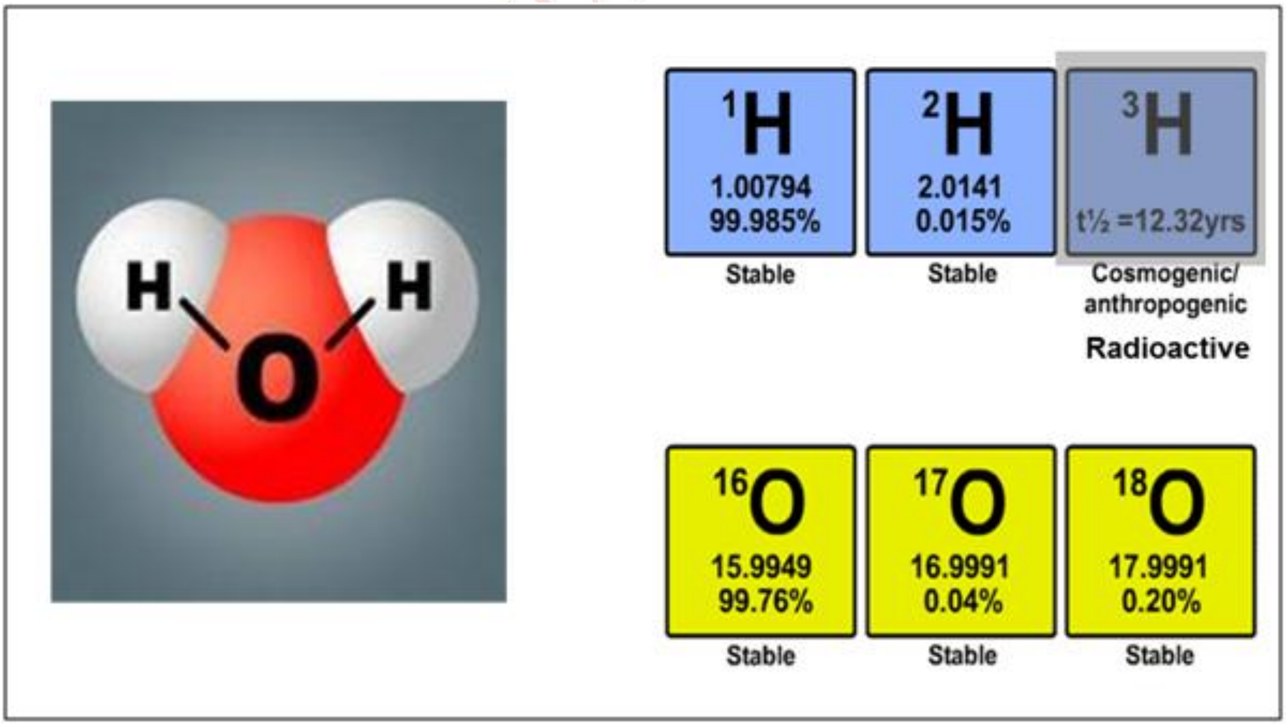
Overall reaction: $Cd^{2+}(aq) + Cu(s) \rightarrow Cd(s) + Cu^{2+}(aq)$

(b) Electrolytic cell

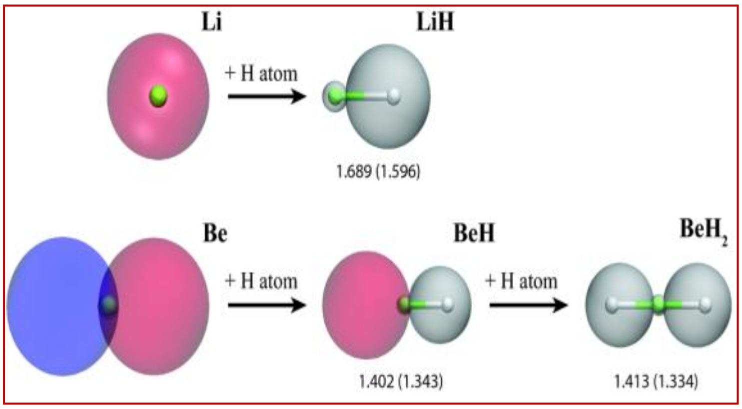
UNIT-9 : Hydrogen

Isotopes of Hydrogen



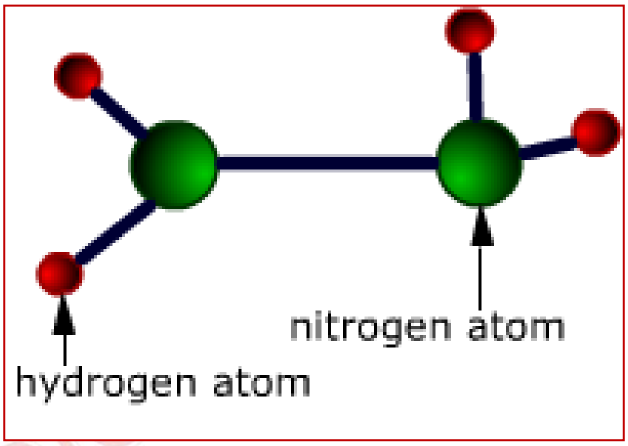


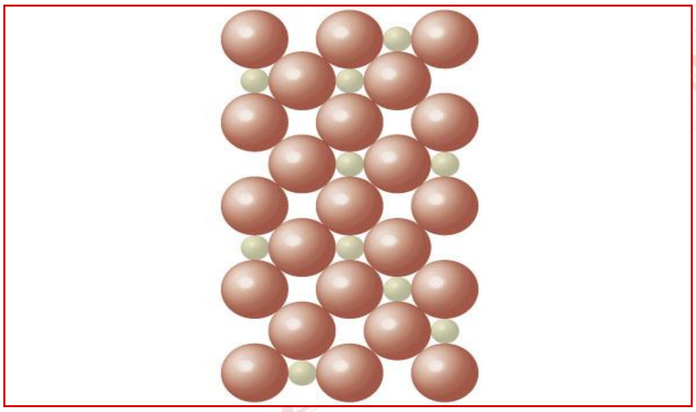
Types of Hydrides



1. Ionic hydrides - formed by alkali metals and heavier alkaline earths like calcium, strontium and barium

2. Covalent hydrides - formed by elements of p-block elements.

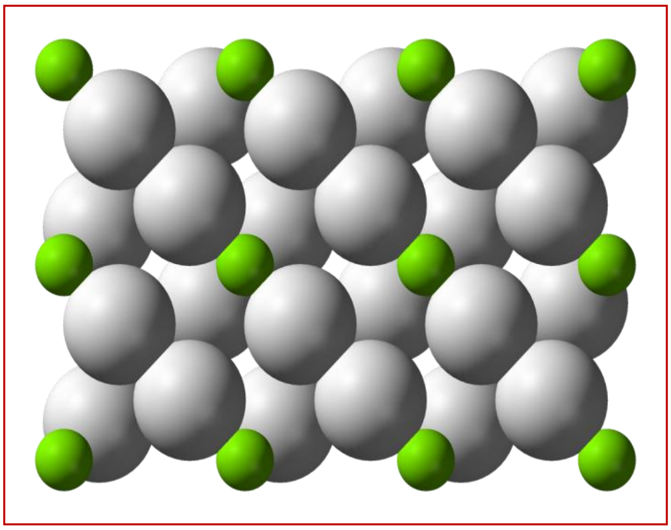




3. Interstitial hydrides -formed by the transition metals, lanthanoids and actinoids

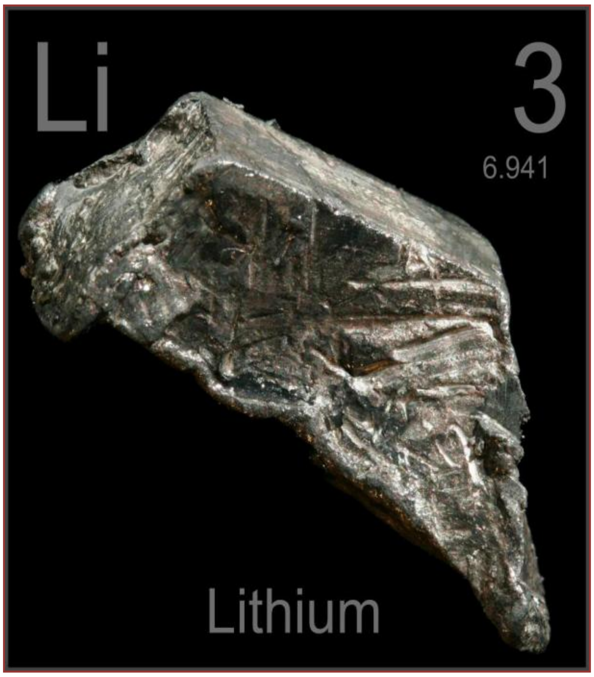
4. Intermediate hydrides

Beryllium, magnesium, copper (in oxidation state I), zinc, cadmium and mercury form intermediate hydrides.



UNIT 10 : s - BLOCK ELEMENTS

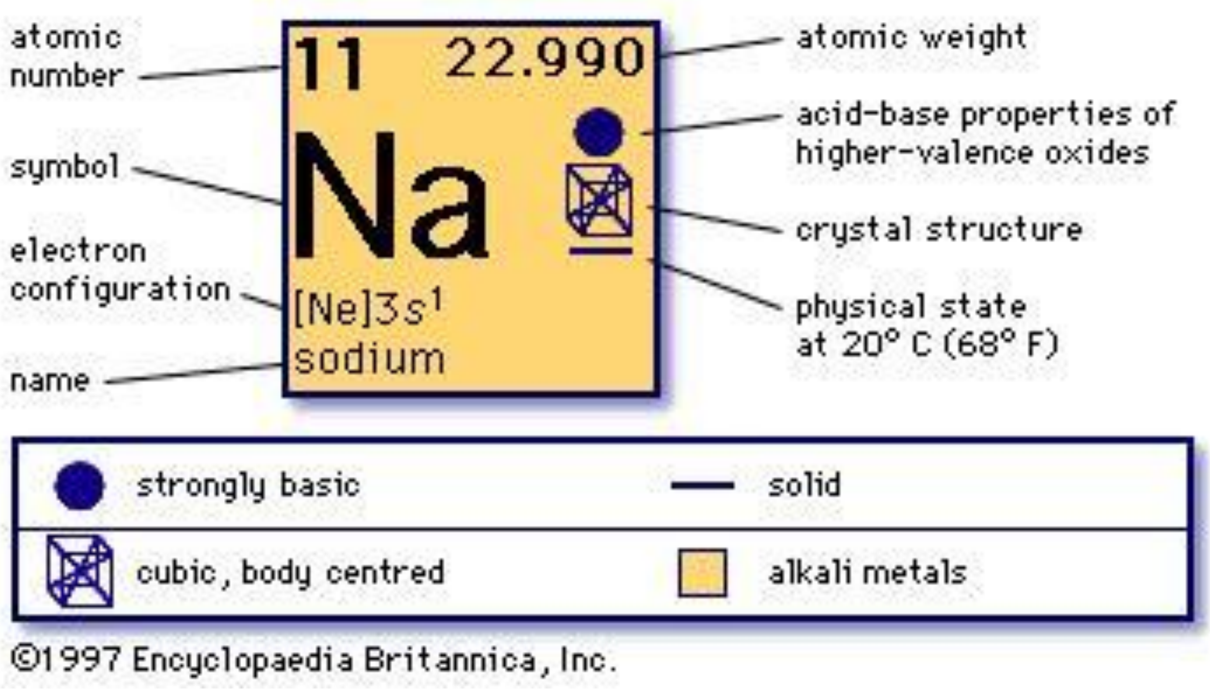
Element Card Sample 1



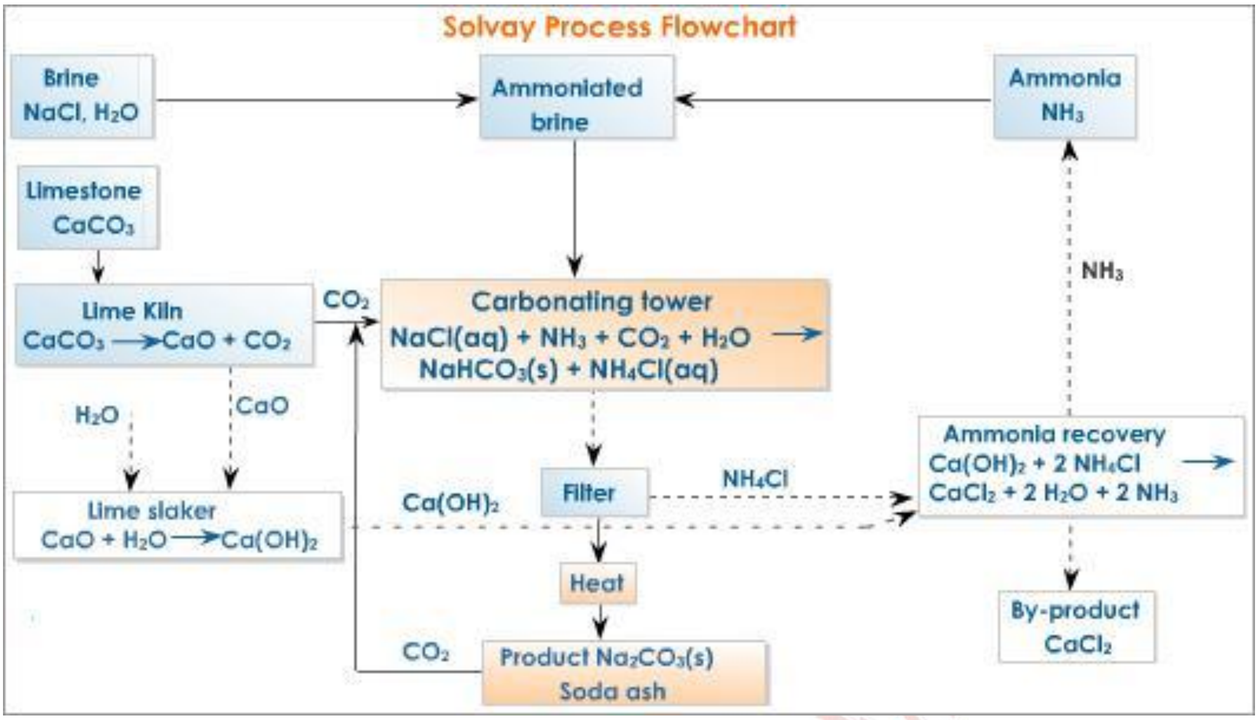
Lithium – Fact File

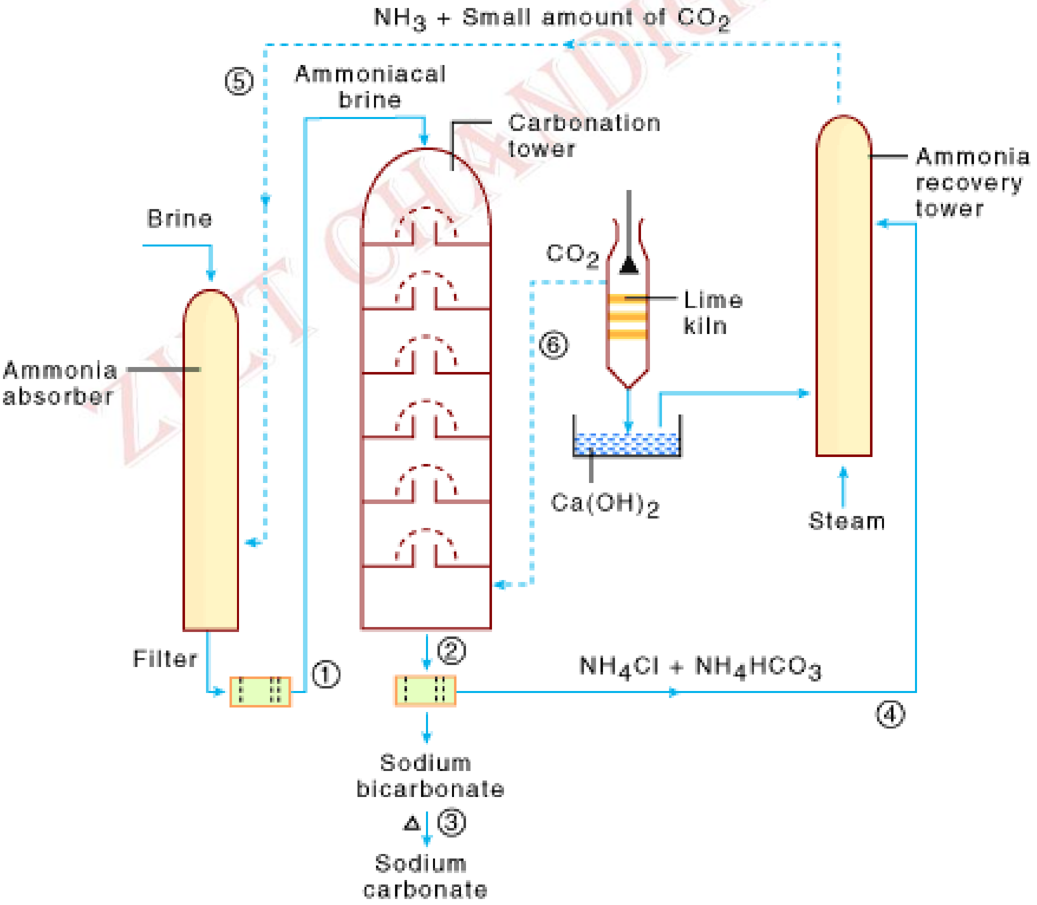
1. *Named after the Greek word for stone (lithos)*
2. *Discovered in Sweden in 1817*
3. *Atomic number: 3*
4. *Atomic weight: 6.941*
5. *The lightest and least dense of all alkali metals*
6. *Highly reactive*
7. *Soft metal*
8. *Low ionization energy*
9. *Electron configuration: [He]2s*^{1}
10. *Often used in rechargeable batteries. Including those used in cell phones, camcorders, laptop computers & pacemakers.*

Element Card Sample 2

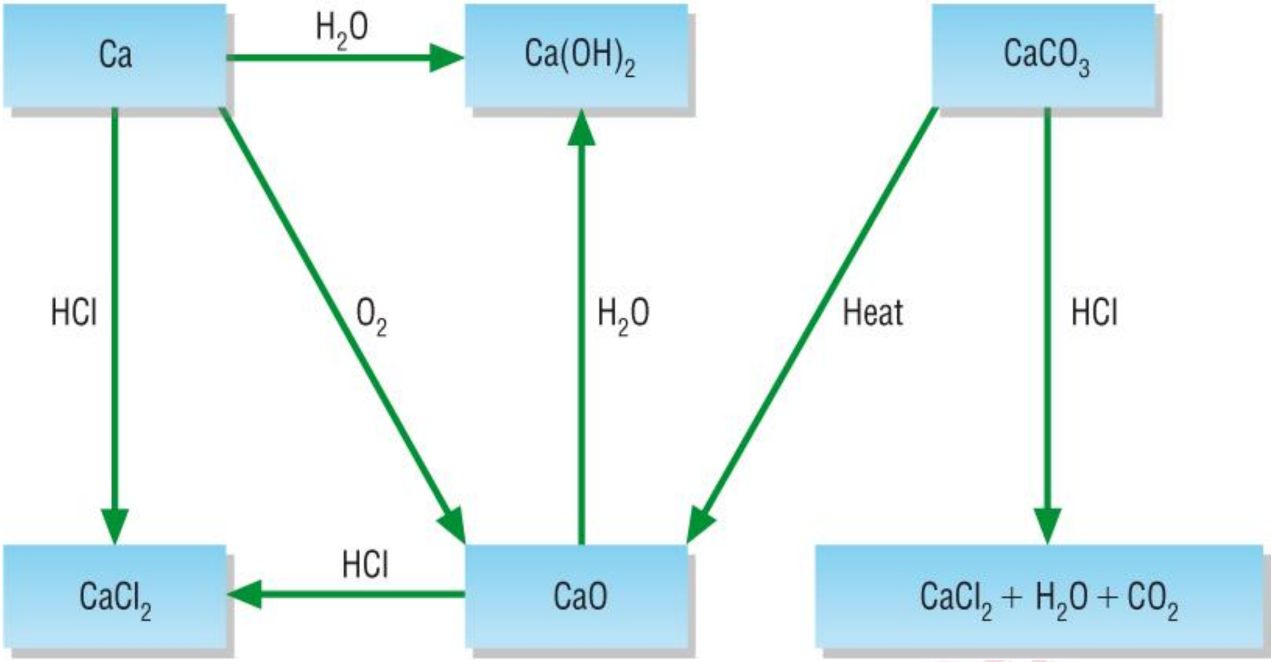


Solvay Process

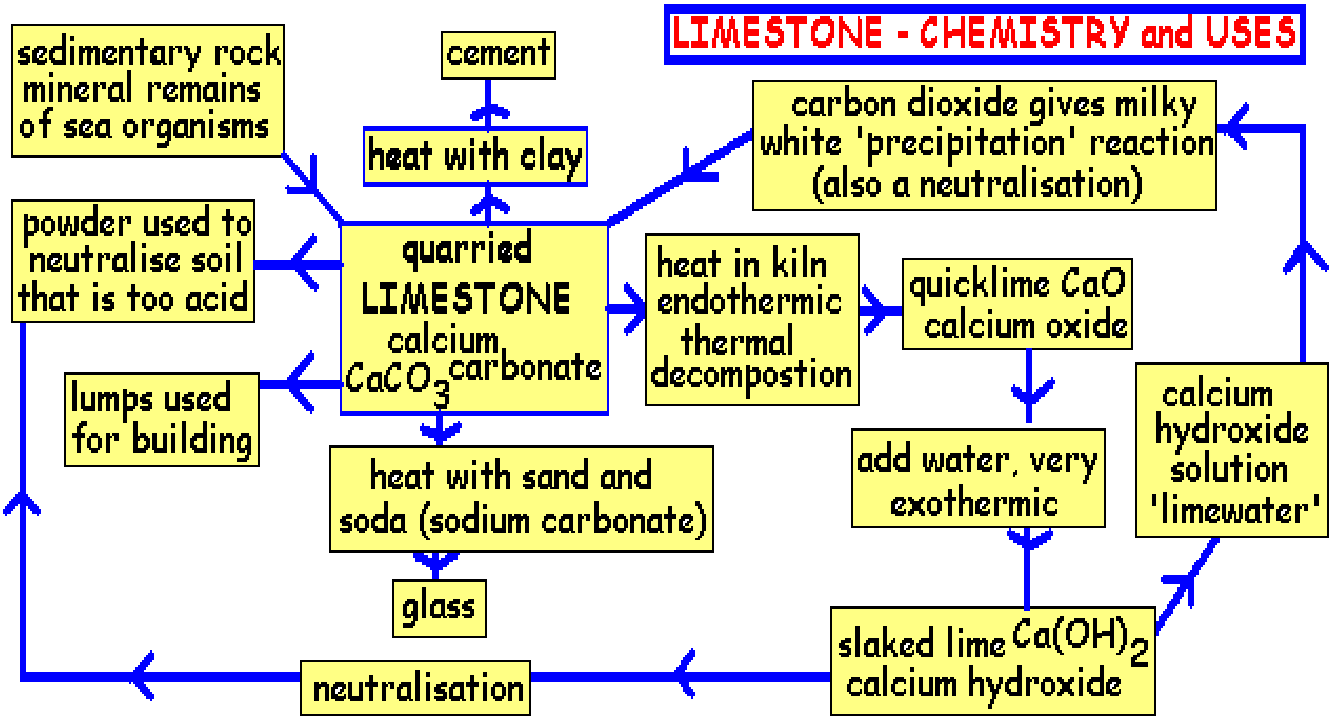




Reactions of calcium

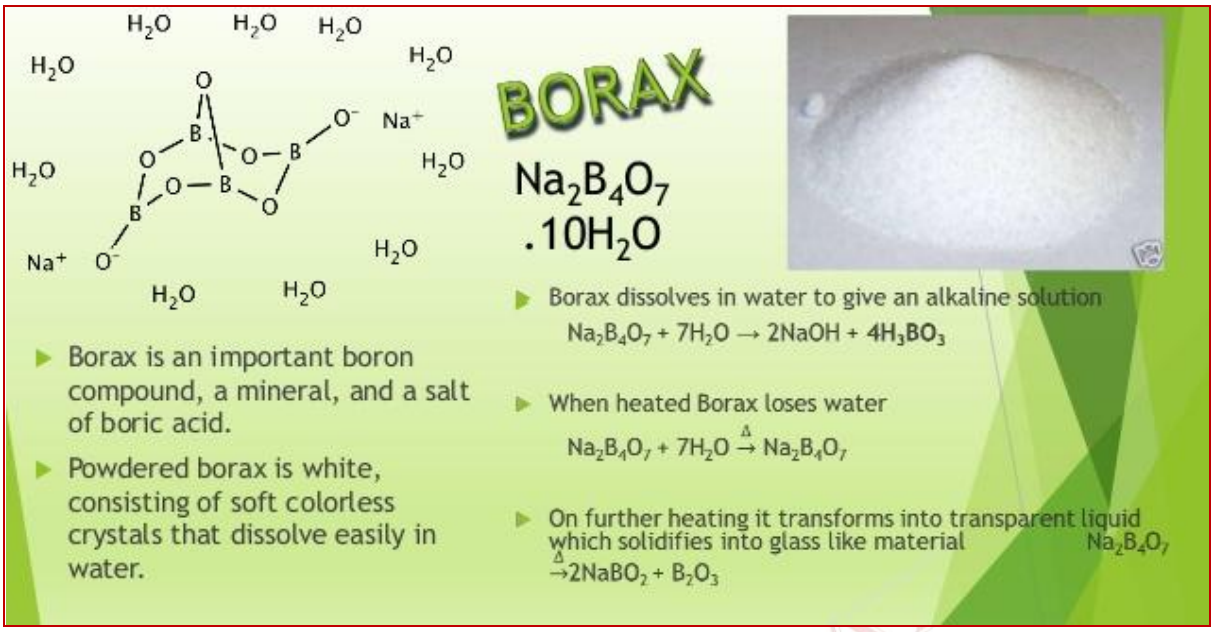


Uses of Lime Stone



Handout –COMPOUNDS OF BORON

BORAX



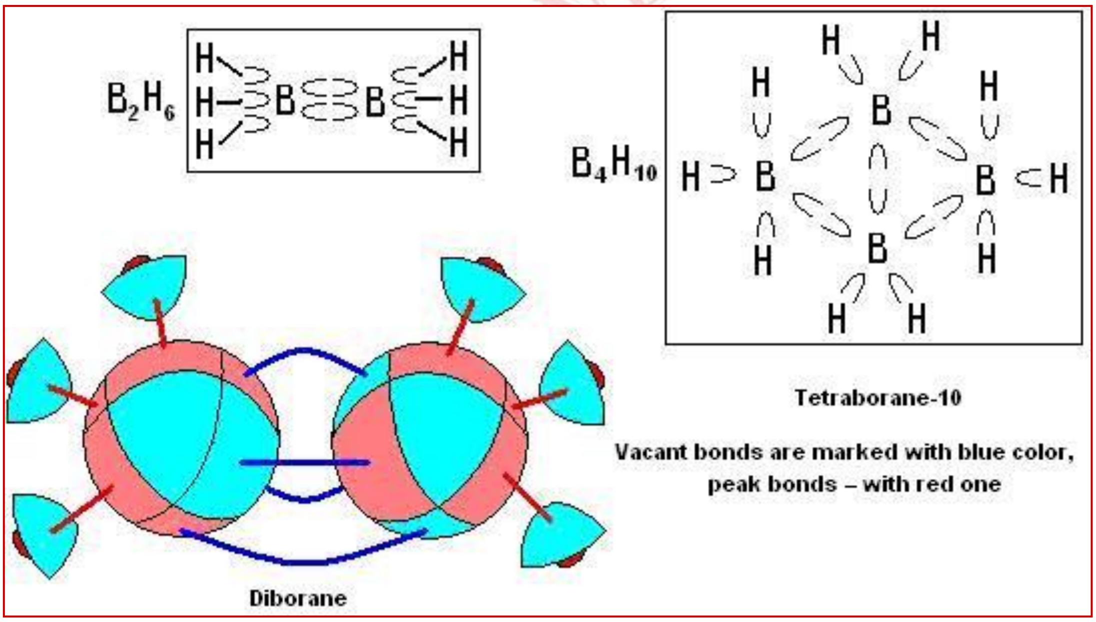
- Borax is an important boron compound, a mineral, and a salt of boric acid.
- Powdered borax is white, consisting of soft colorless crystals that dissolve easily in water.

BORAX

$Na_2B_4O_7$ $.10H_2O$

- Borax dissolves in water to give an alkaline solution
  $Na_2B_4O_7 + 7H_2O \rightarrow 2NaOH + 4H_3BO_3$
- When heated Borax loses water
  $Na_2B_4O_7 + 7H_2O \xrightarrow{\Delta} Na_2B_4O_7$
- On further heating it transforms into transparent liquid which solidifies into glass like material $Na_2B_4O_7 \xrightarrow{\Delta} 2NaBO_2 + B_2O_3$

DIBORANE

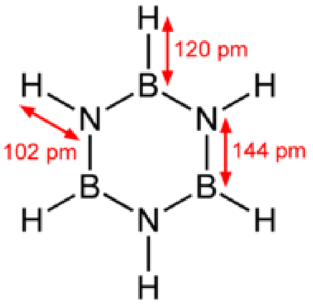
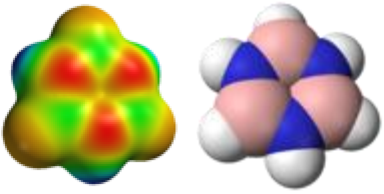


Tetraborane-10

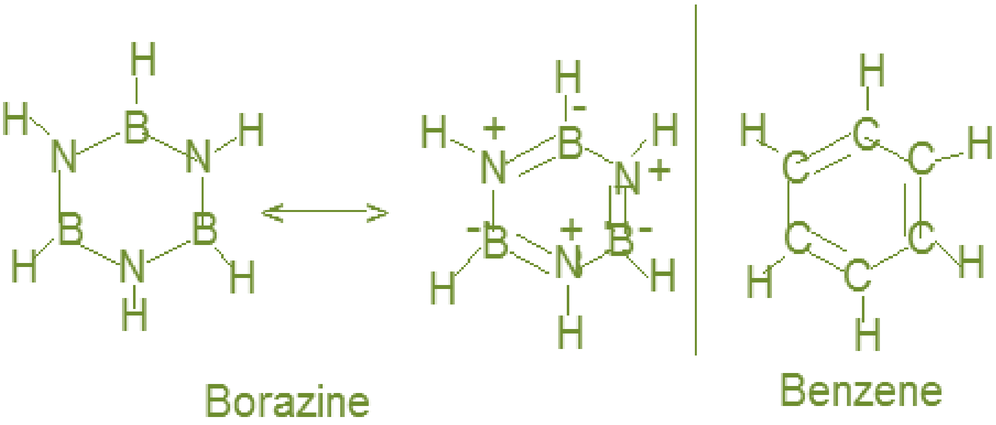
Vacant bonds are marked with blue color, peak bonds – with red one

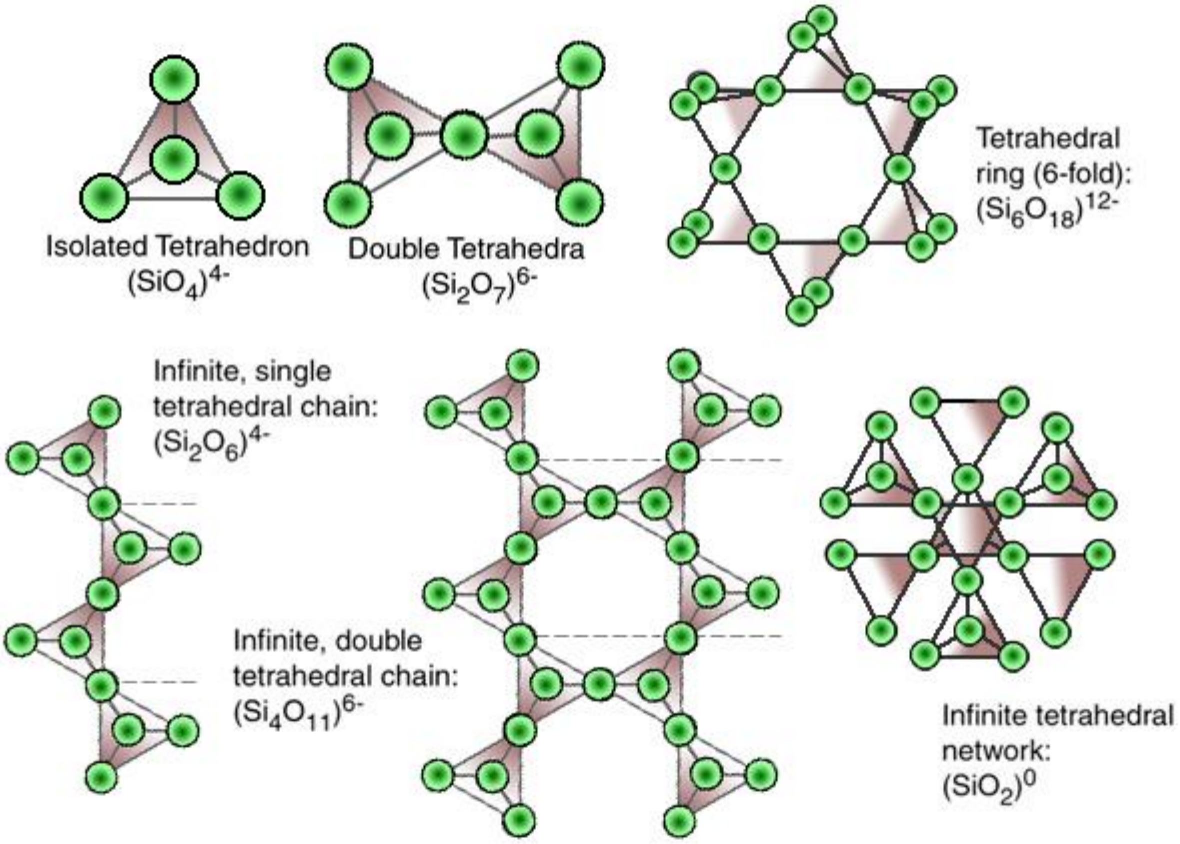
Diborane

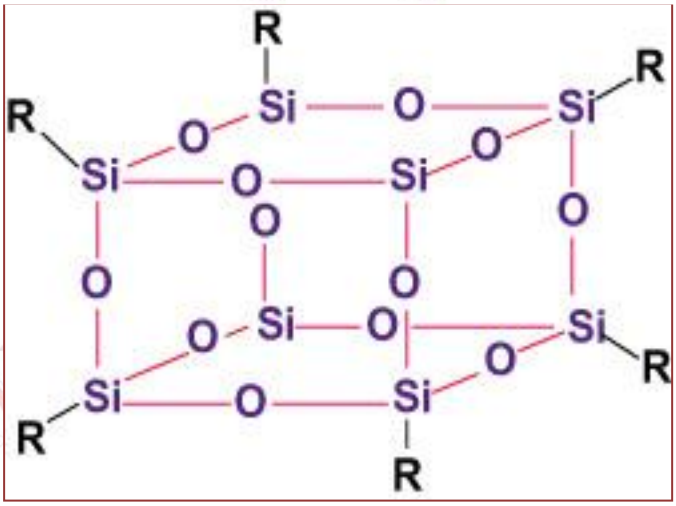
BORAZINE

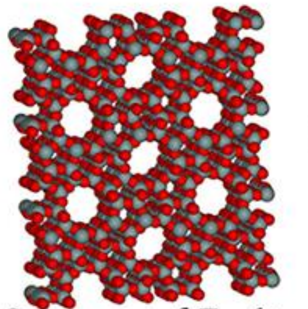
BORAZINE	PROPERTIES
IUPAC NAME	BORAZINE /1,3,5,2,4,6-Triazatriborinane
OTHER NAMES	BORAZOL , INORGANIC BENZENE
	**MOLECULAR FORMULA** $B_3H_6N_3$ **MOLAR MASS** 80.50 g/mol
	**APPEARANCE** Colourless liquid **DENSITY** 0.81 g/cm^3 **MELTING POINT** −58 °C **BOILING POINT** 161 °C; 55 °C at 105 Pa
ISOELECTRONIC AND ISOSTRUCTURAL WITH BENZENE.	

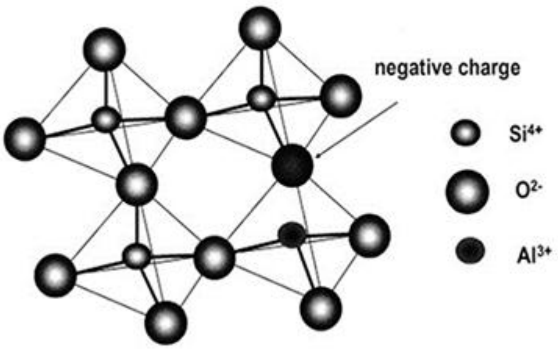
Borazine materials have been demonstrated to be a new class of multifunctional and thermally stable materials with high electron and moderate motilities for applications in electroluminescent devices.



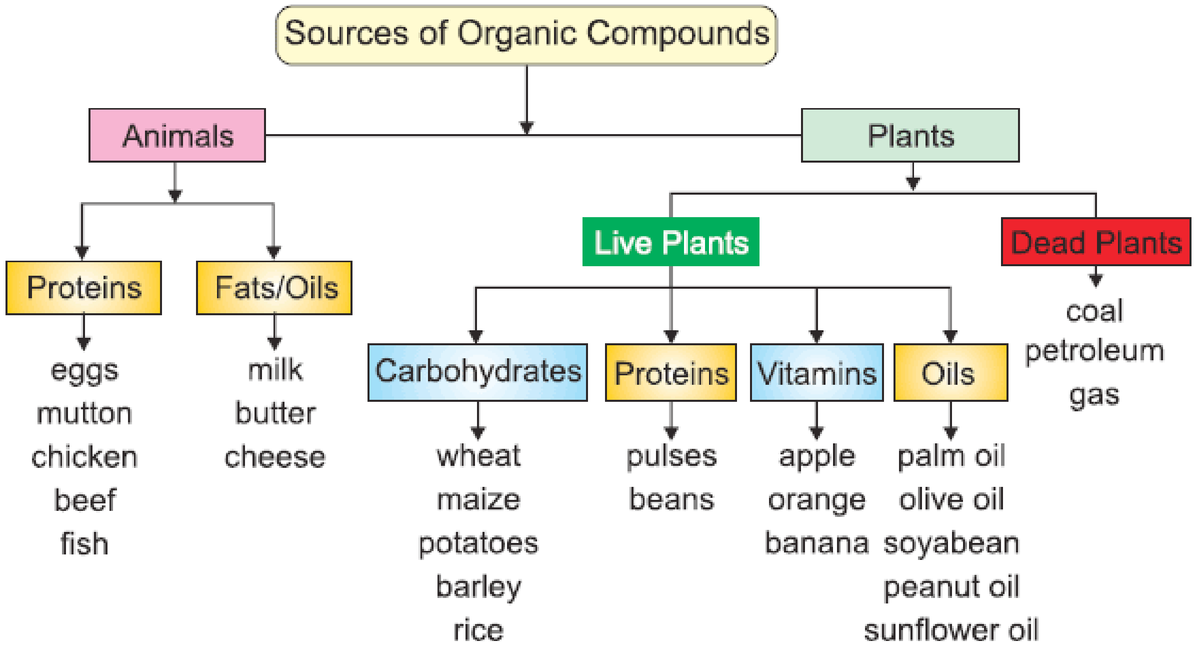




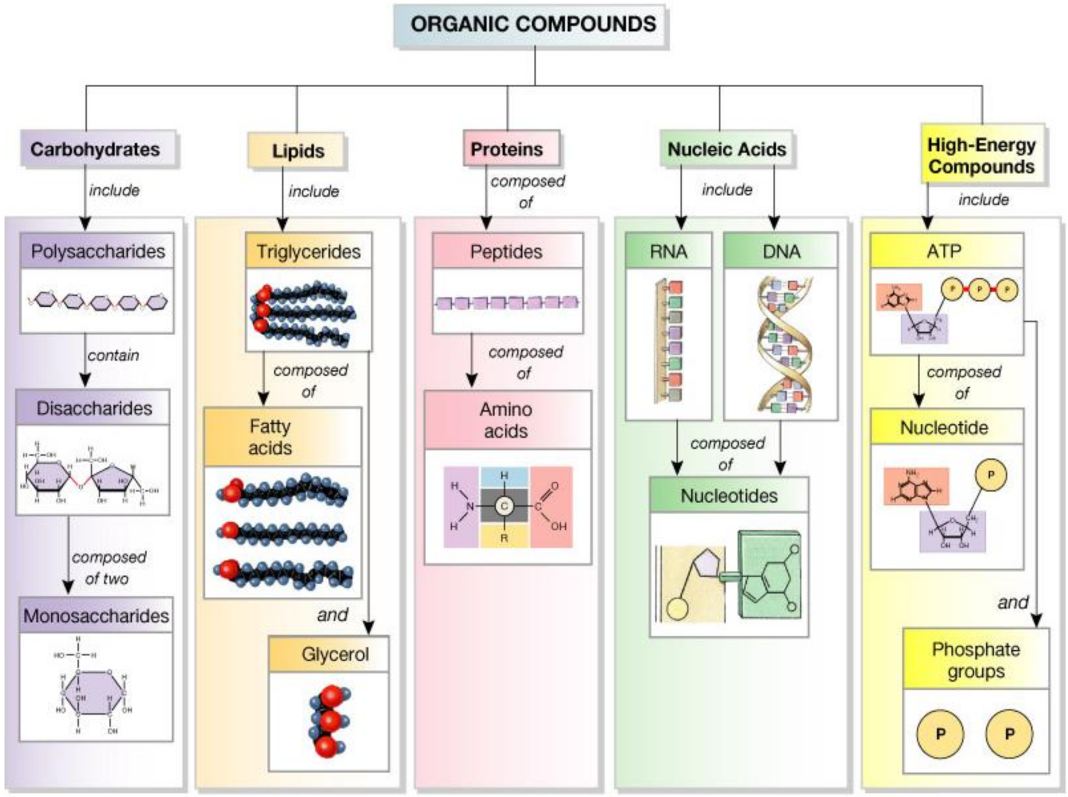

Structure of Zeolite



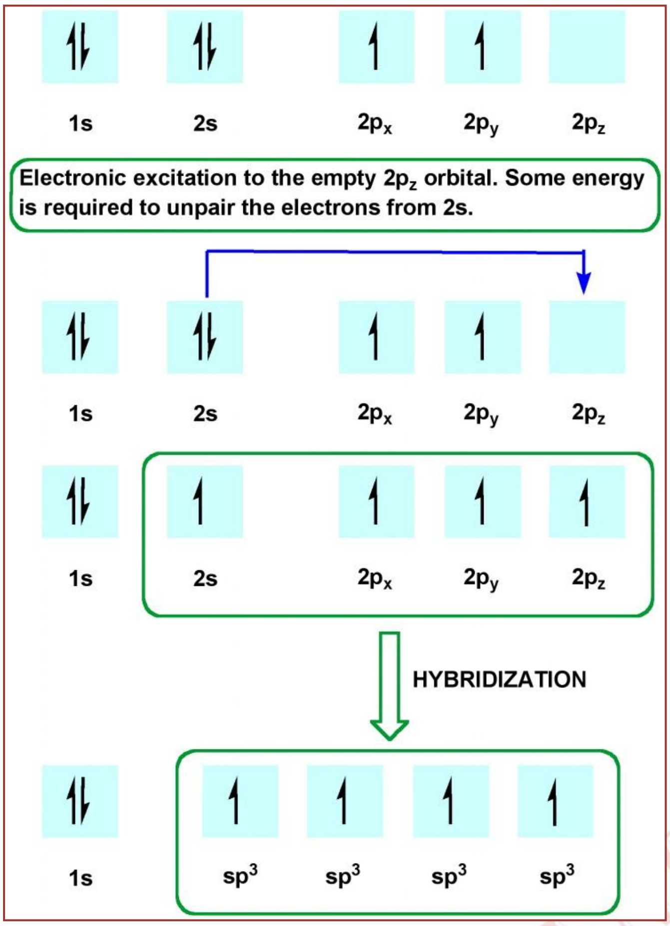
UNIT : 12 Organic chemistry some basic principles & techniques



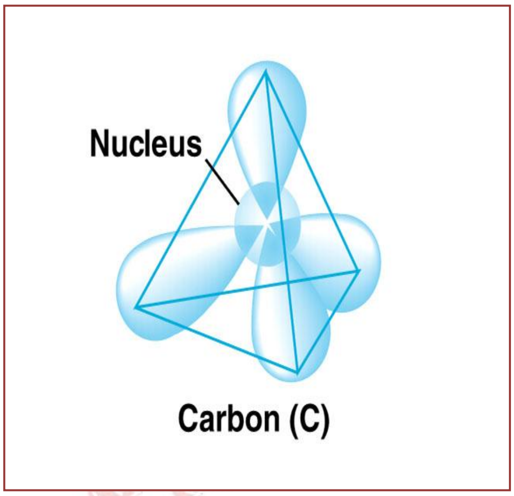
Sources of Organic compounds

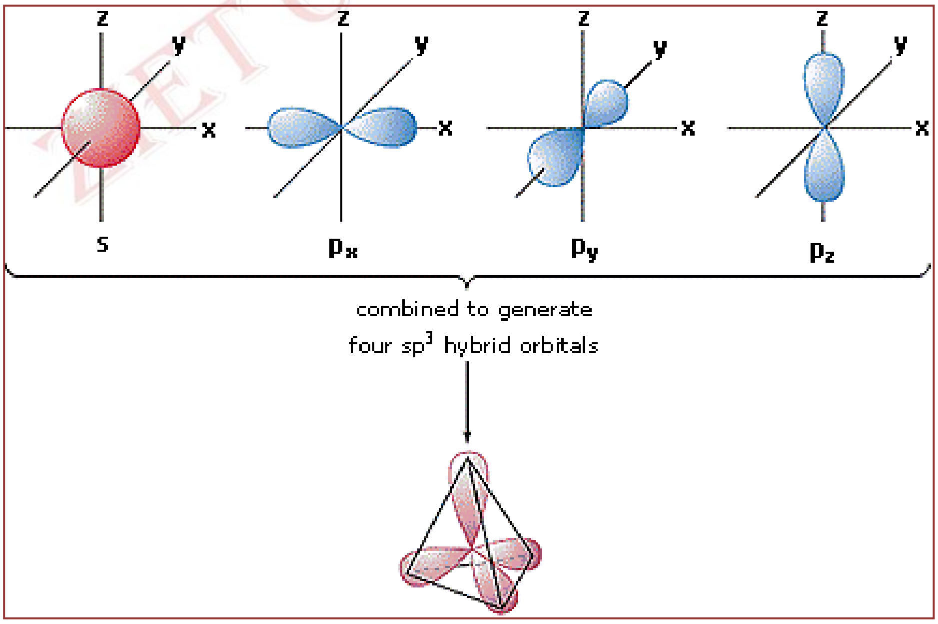


Tetravalent Carbon & Hybridization



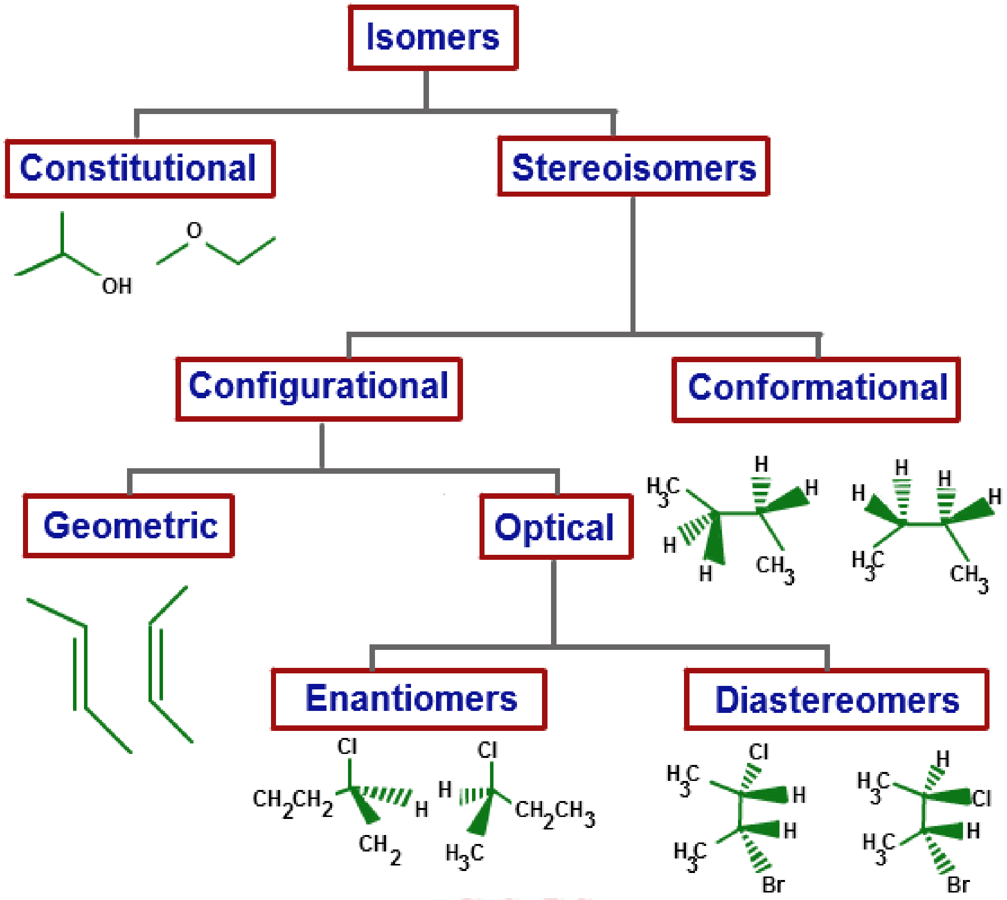
Electronic excitation to the empty 2p_z orbital. Some energy is required to unpair the electrons from 2s.

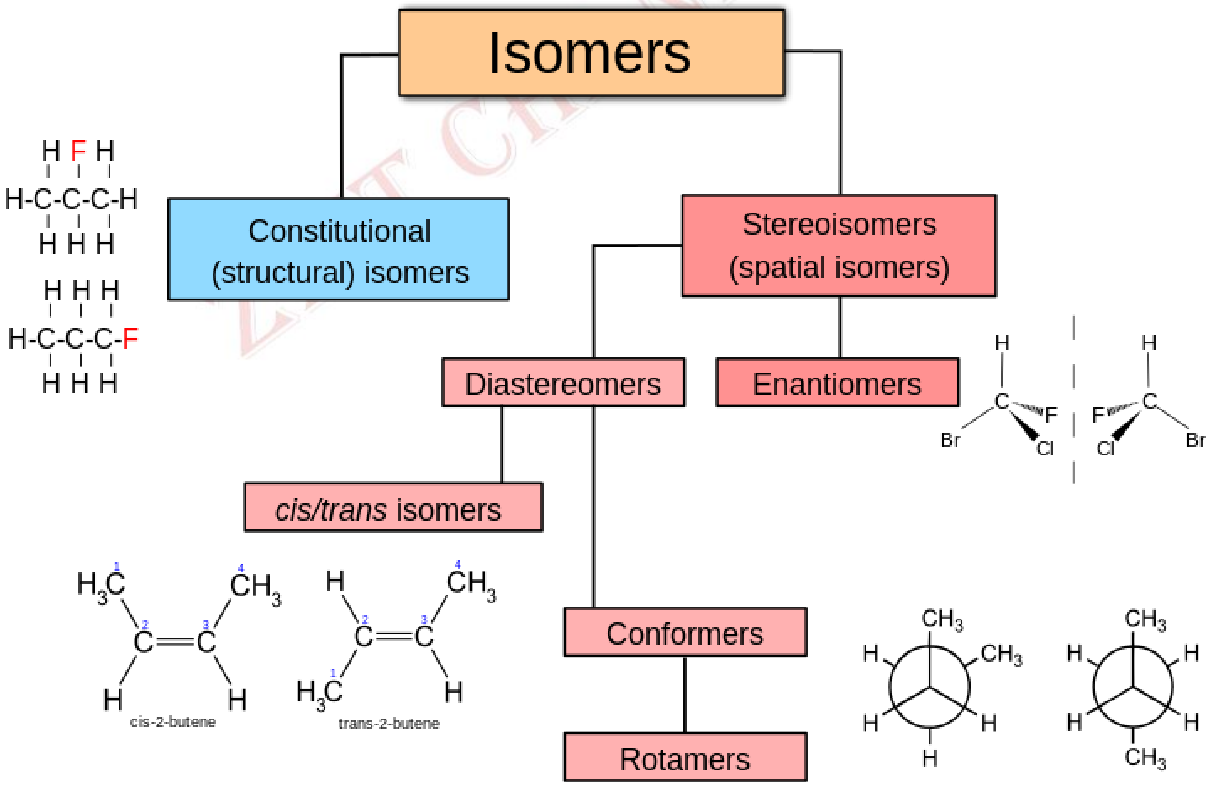




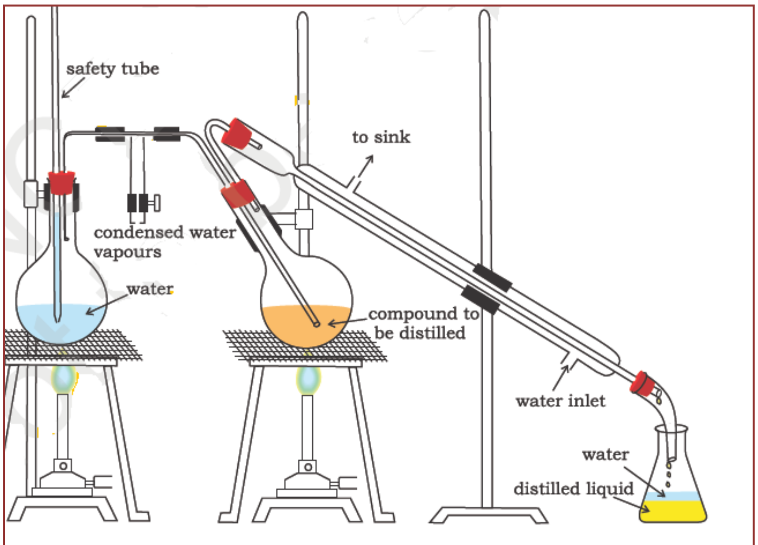
combined to generate
four sp^3 hybrid orbitals

Types of Isomerism





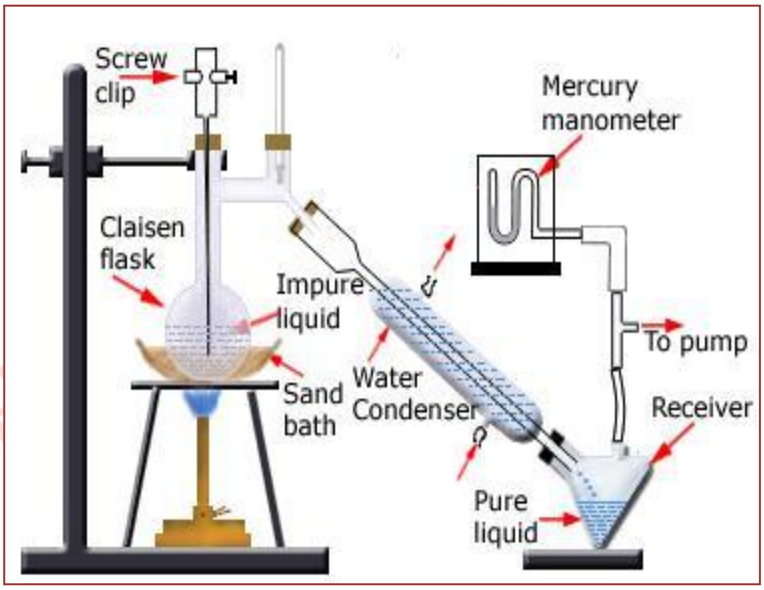
Types of distillations



Steam distillation. Steam volatile component volatilizes, the vapours condense in the condenser and the liquid collects in conical flask.

1. Steam Distillation

2. Distillation under reduced pressure



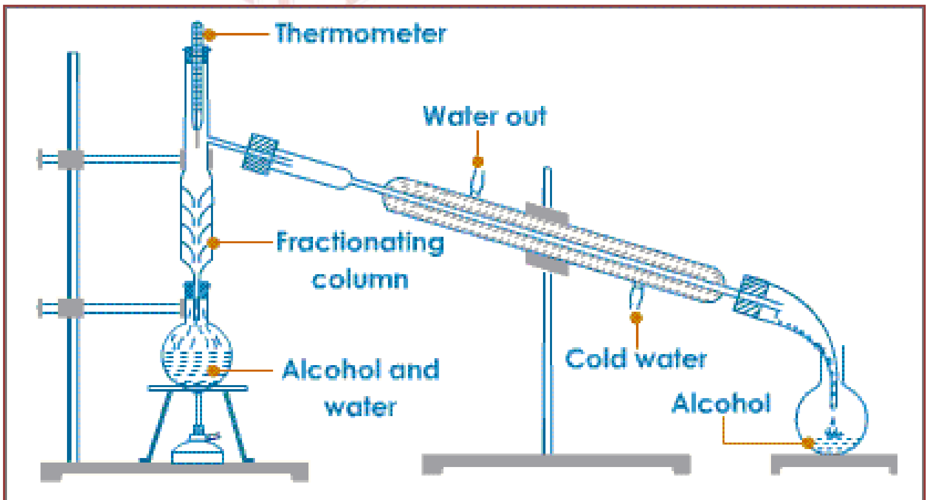
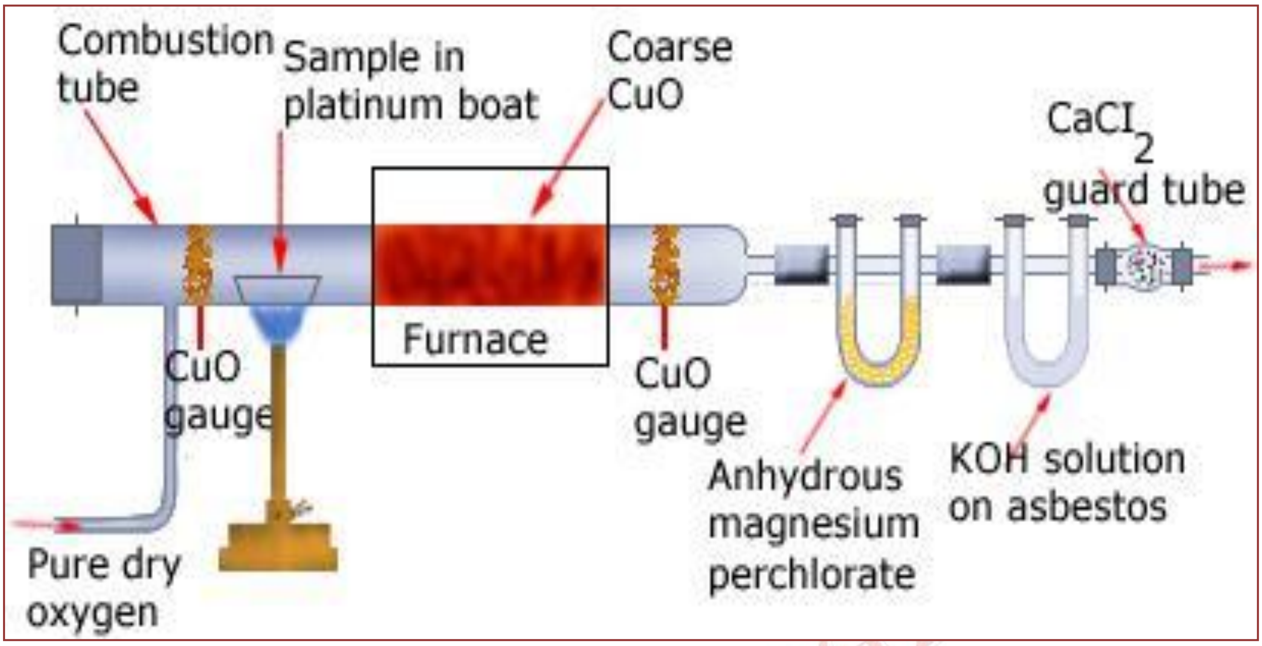


Fig. 4.9 Fractional Distillation

3. Fractional Distillation
]

Detection of Elements

1 . Detection of Carbon & Hydrogen

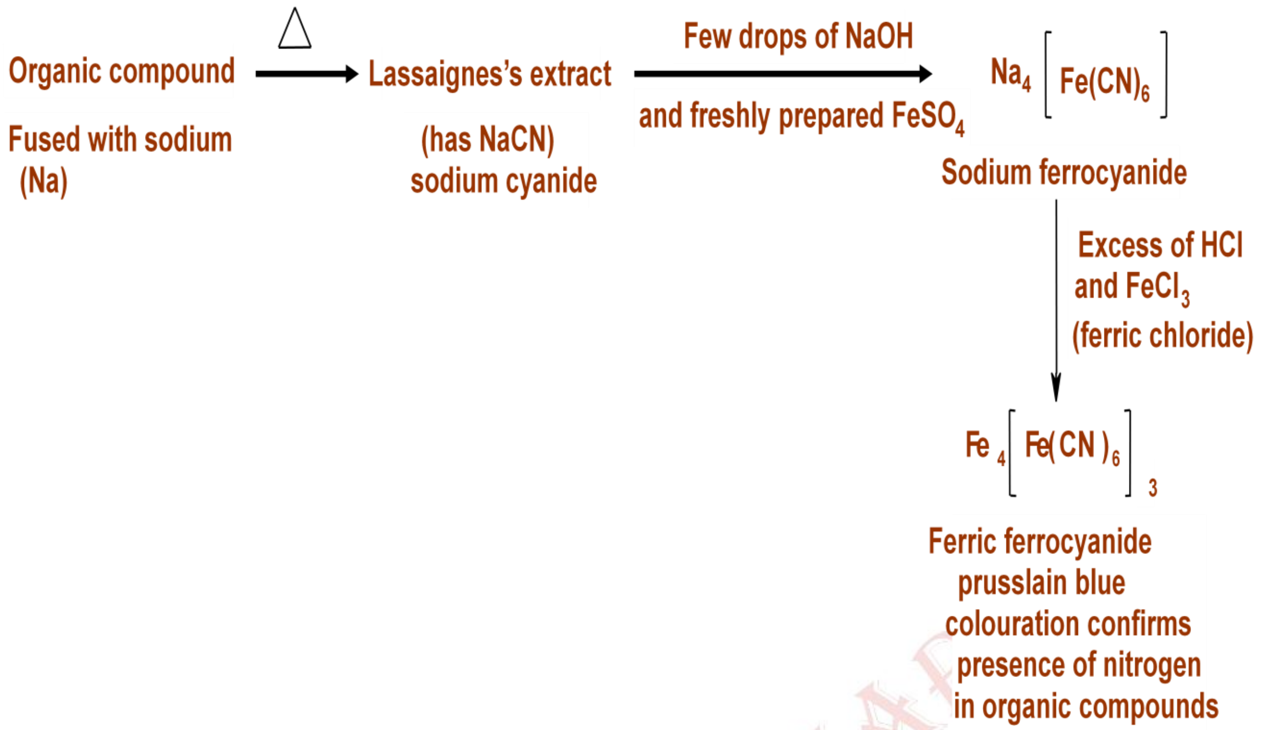


$$\text{Organic compound} + CuO \xrightarrow{\triangle} \underset{\text{Carbon dioxide}}{CO_2} + \underset{\text{Water}}{H_2O} + \underset{\text{Copper}}{Cu}$$

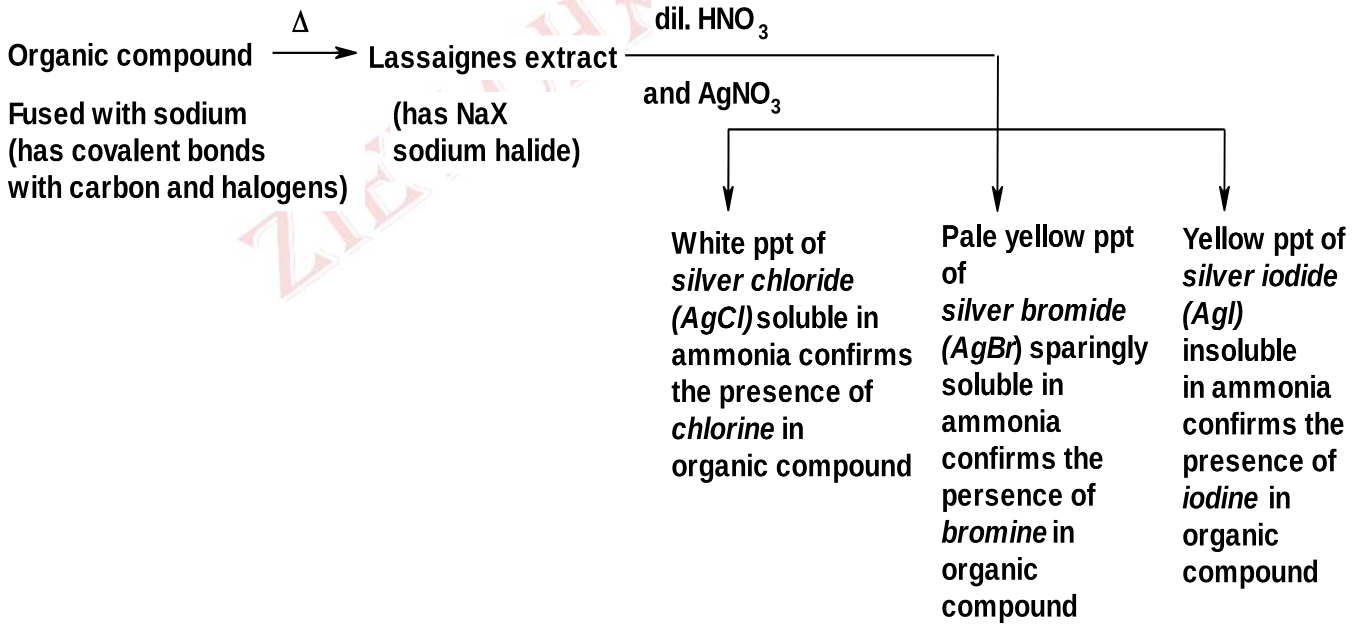
Passed into lime water $Ca(OH)_2$ → **lime water turns milky** → **Carbon (C) present in organic compound**

Passed into anhydrous $CuSO_4$ → **Copper sulphate turns blue** → **Hydrogen (H) present in organic compound**

2. Detection of Nitrogen



3. Detection of Halogens



4. Detection of Phosphorous

Organic compound $\xrightarrow[\text{With Na}_2\text{O (sodium peroxide)}]{\Delta}$ Phosphorus present in organic compound change to phosphate (Na_3PO_4)

↓ boiled with nitric acid (HNO_3) and added ammonium molybdate $[(NH_4)_2MoO_4]$

Yellow ppt of ammonium phosphomolybdate $[(NH_4)_3PO_4.12MoO_3]$ confirms the presence of phosphorus in organic compound

5. Detection of Sulphur

Organic compound Fused with sodium $\xrightarrow{\Delta}$ Lassaignes's extract (has Na_2S sodium shulphide) → Divide the extract in two parts

To one portion add acetic acid (CH_3COOH) and lead acetate $[Pb(CH_3COO)_2]$

↓

Black ppt. of lead sulphide (PbS) confirms the presence of sulphur in organic compound

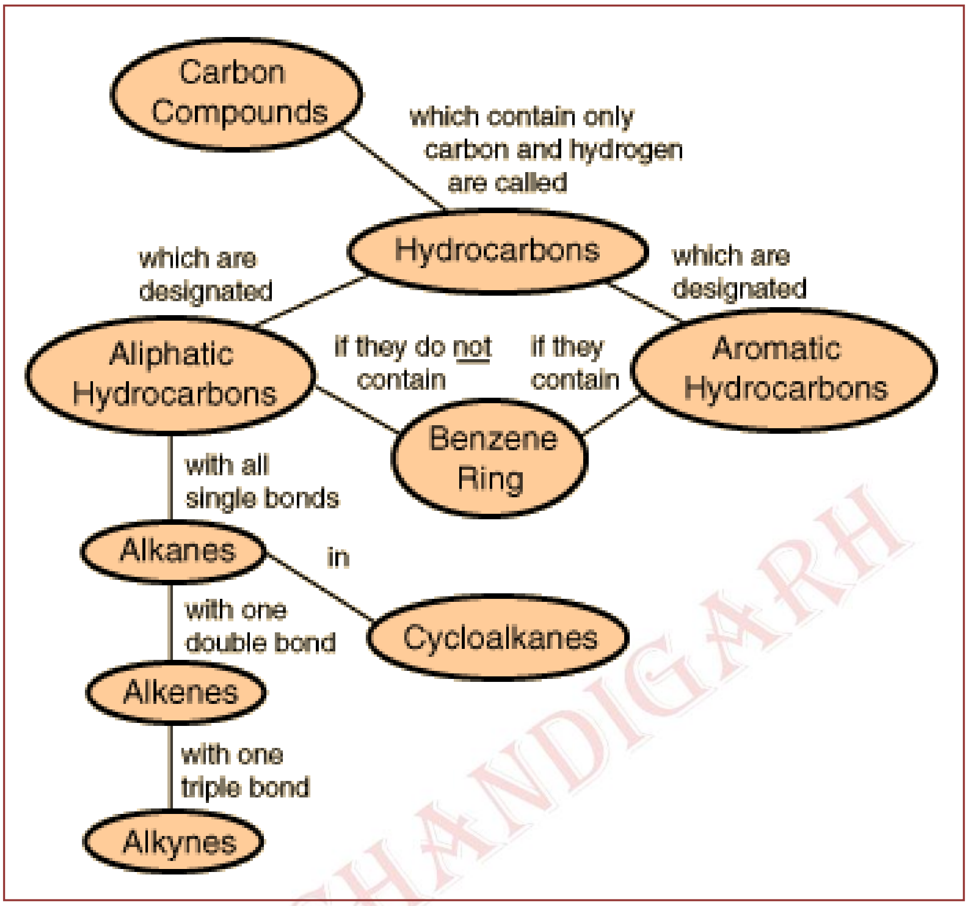
To other portion add freshly prepared sodium nitroprusside $Na_2[Fe(CN)_5(NO)]$

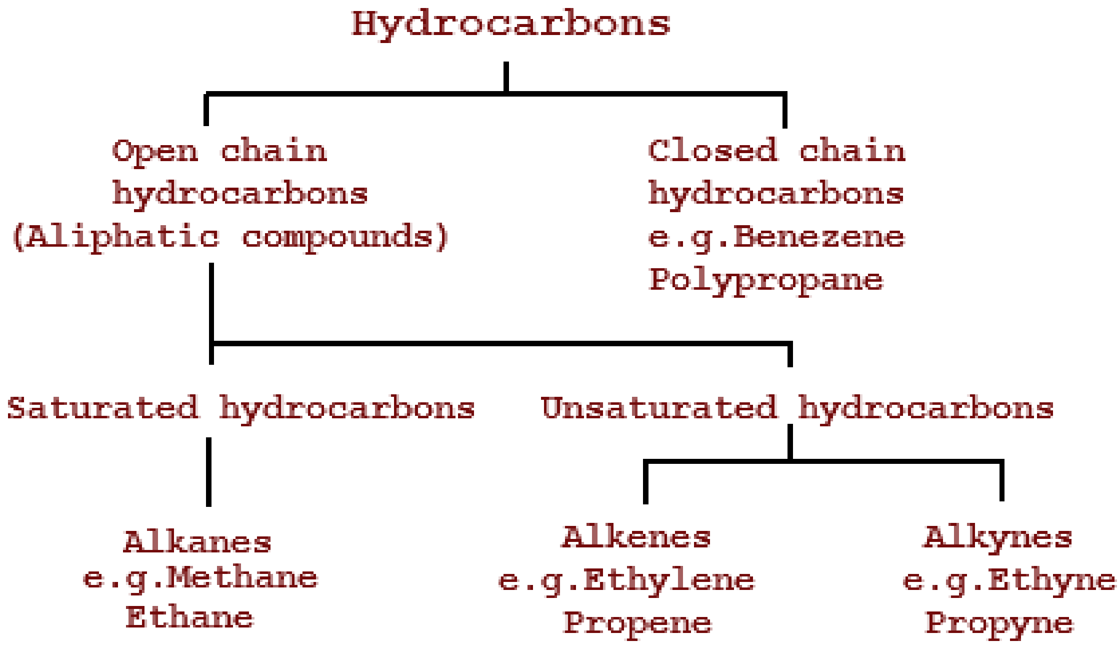
↓

Violet colouration of $Na_4[Fe(CN)_5NOS]$ confirms the presence of sulphur in organic compound

UNIT :13 Hydrocarbons

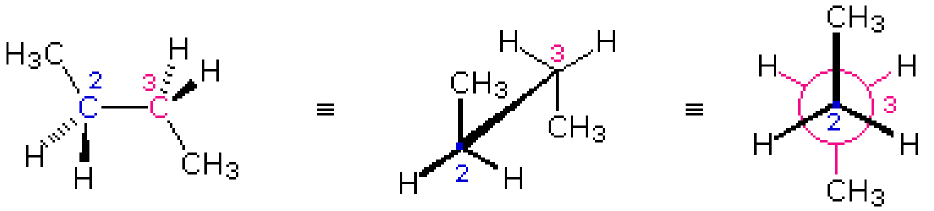
Hydrocarbons





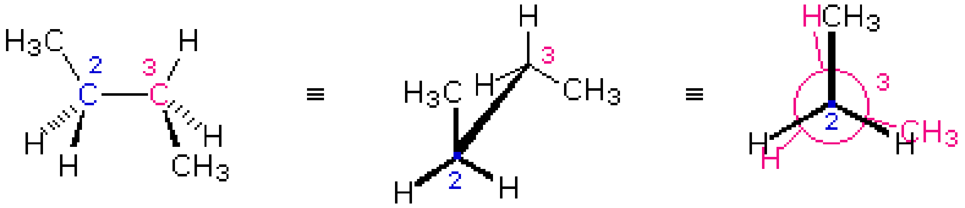
Conformations of Butane

A



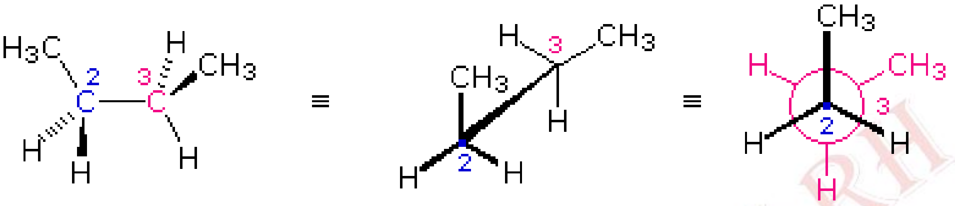
Anti Conformation

B



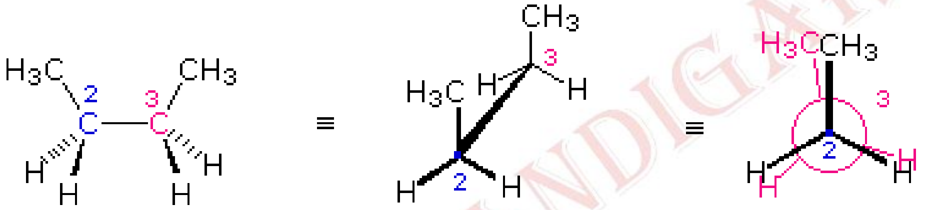
Eclipsed Conformation

C



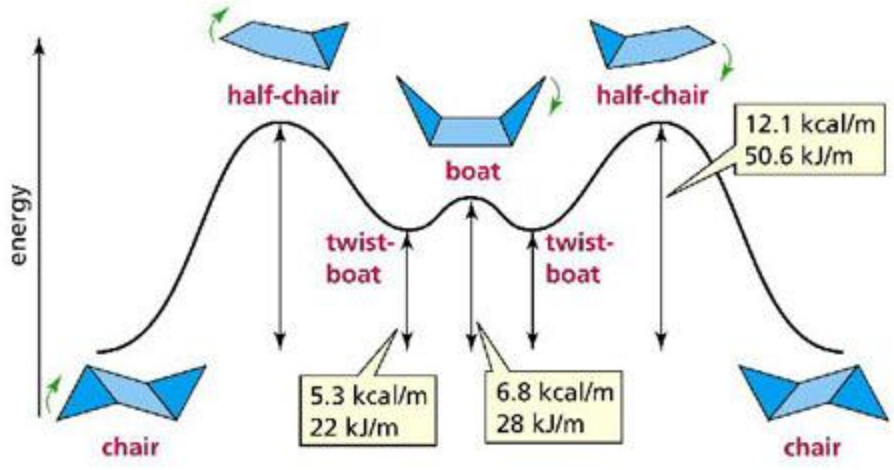
Gauche Conformation

D

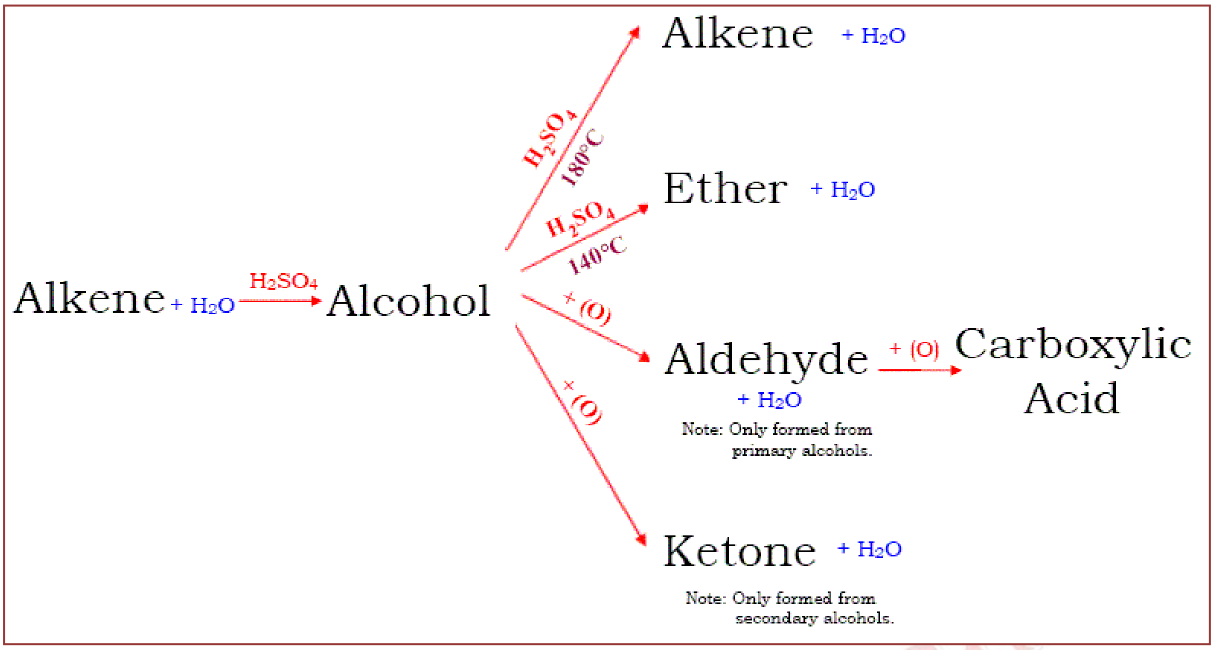


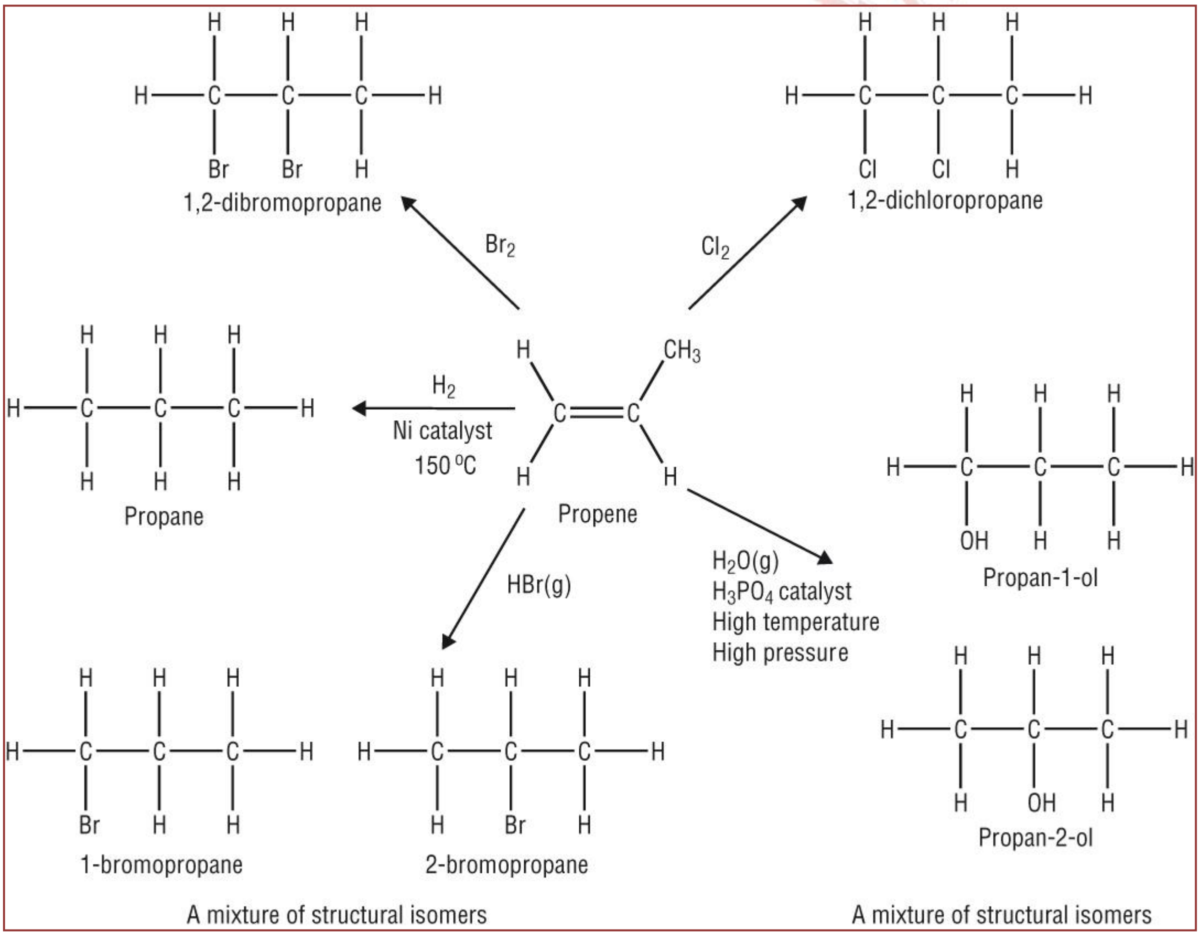
Eclipsed Conformation

Conformations of Cyclohexane

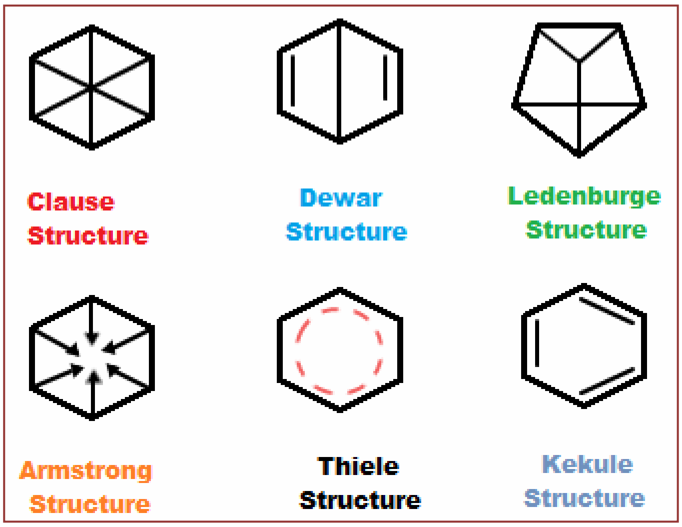


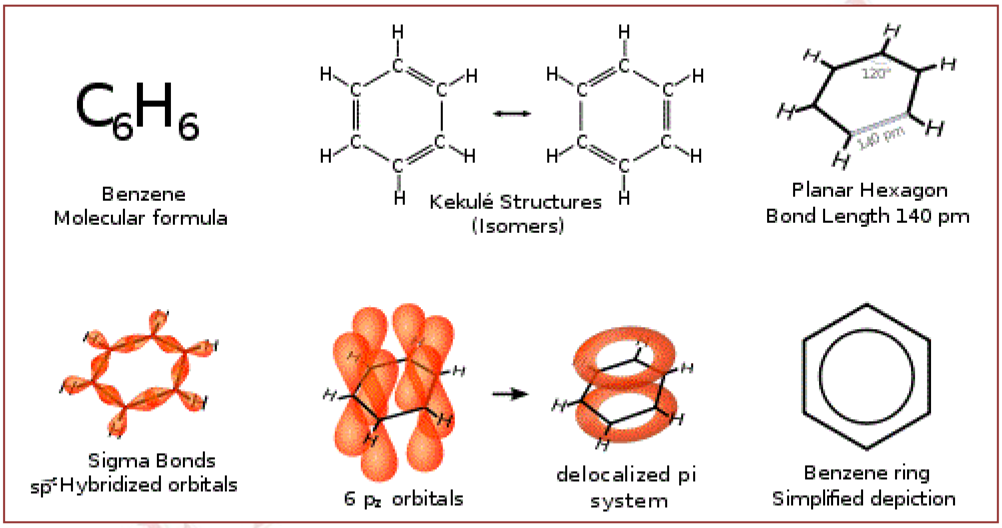
Reactions of Alkenes

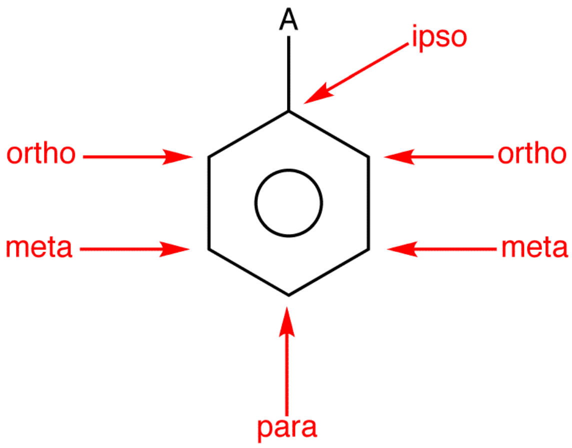




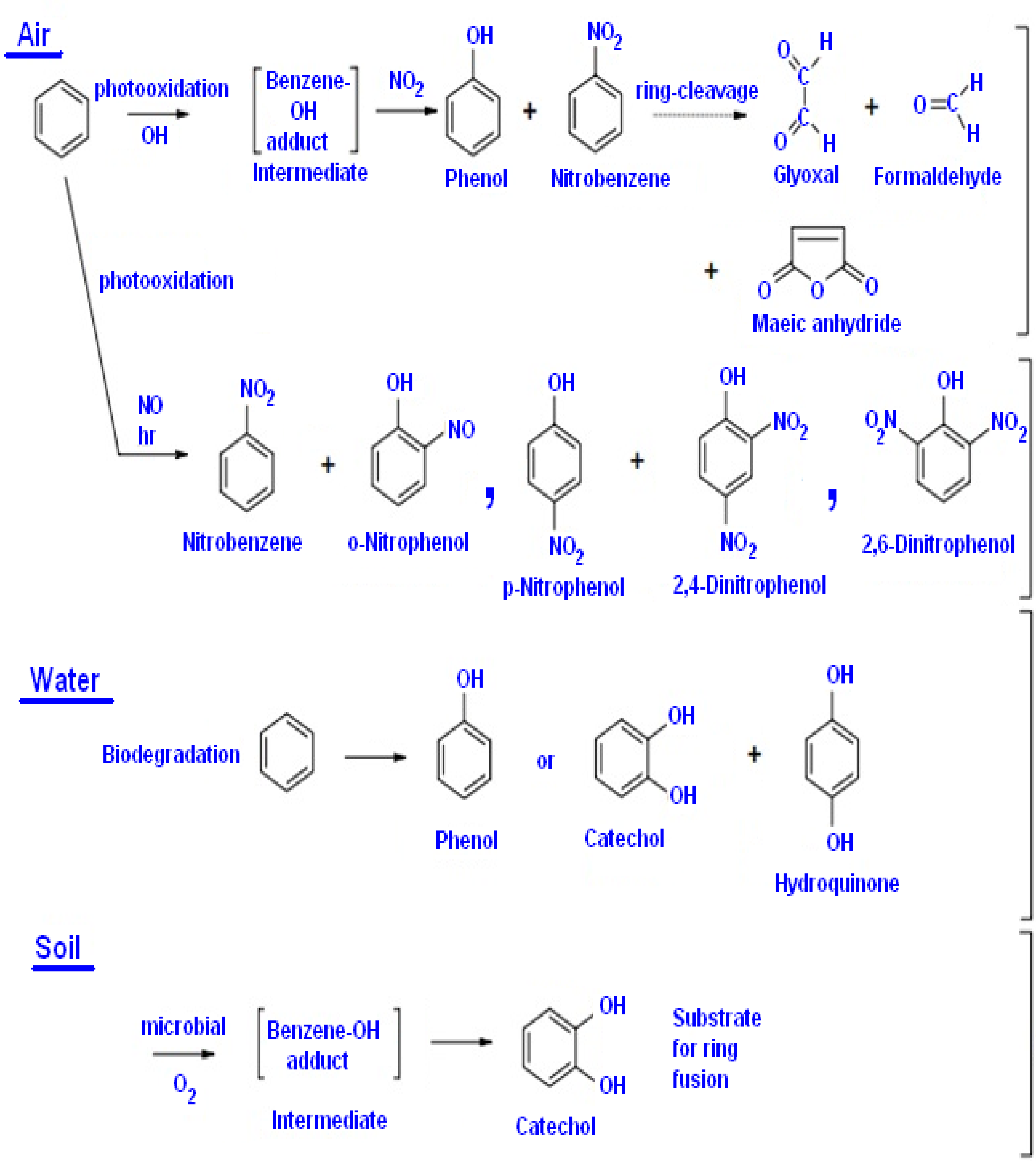
Hand out - Structure of Benzene



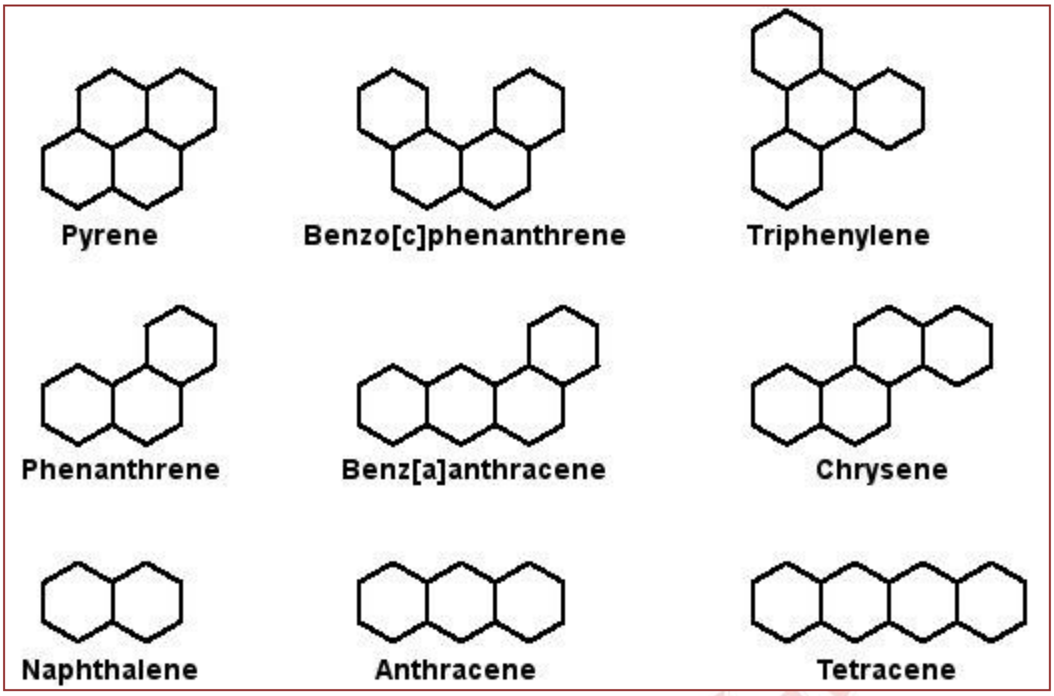


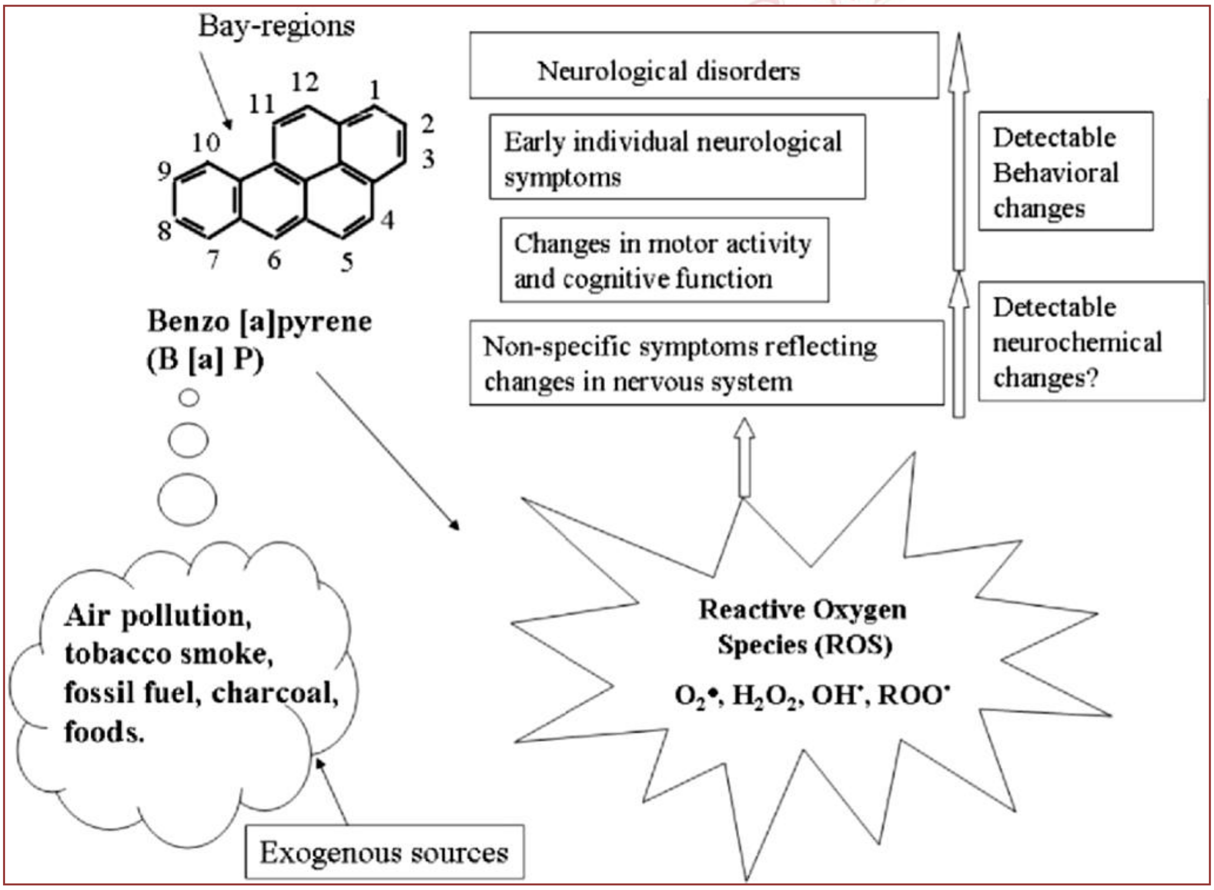


Reactions of Benzene



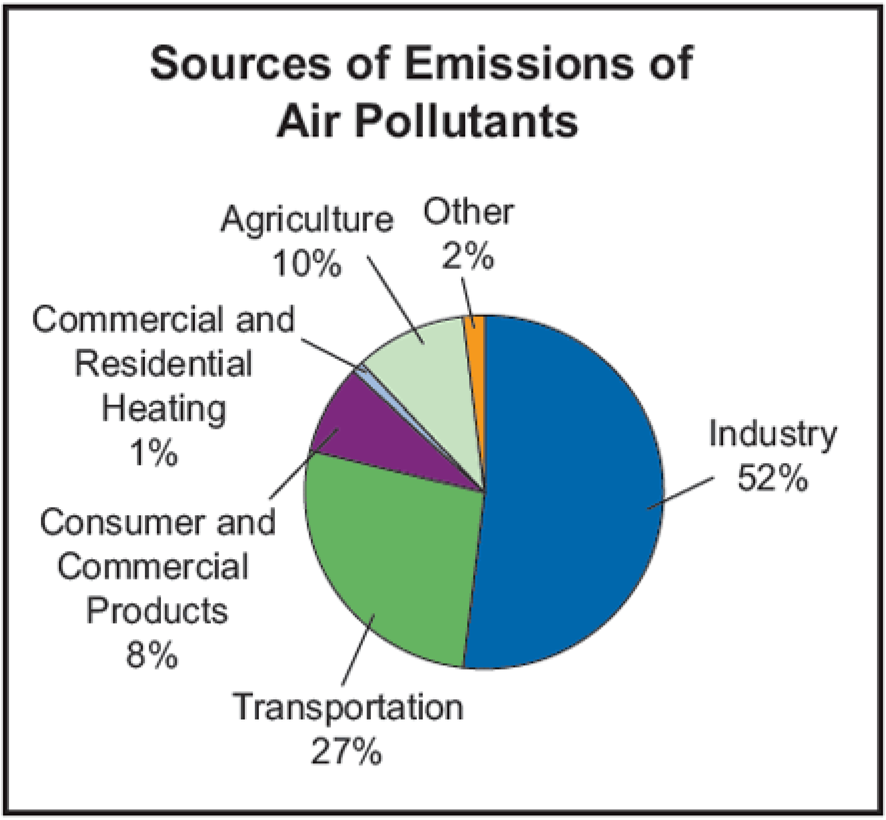
Carcinogenic Polycyclic Aromatic Hydrocarbons

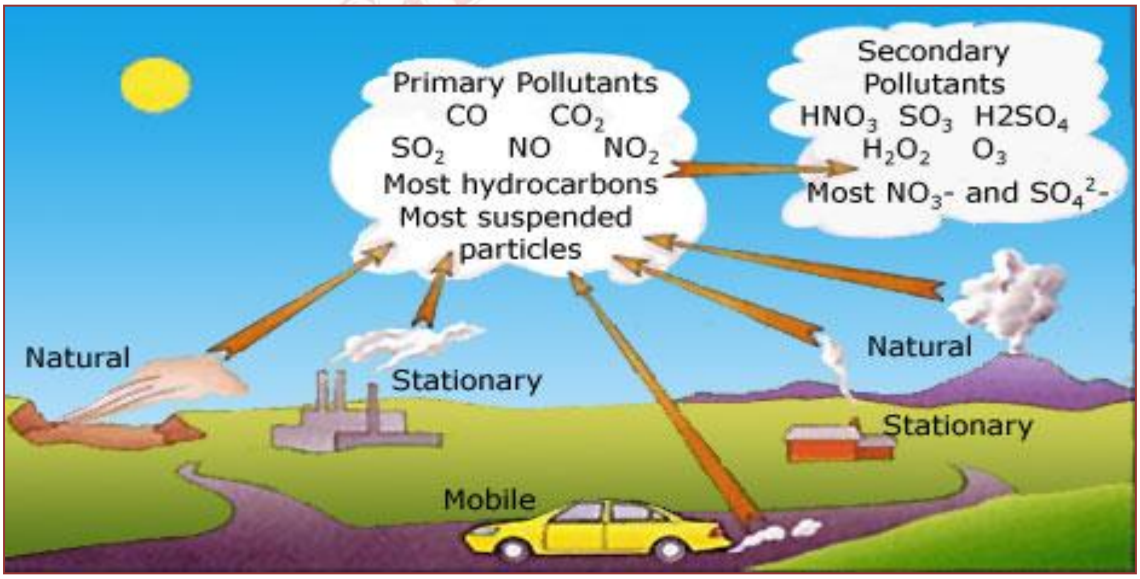




UNIT 14 . Environmental Chemistry

Sources and types of air pollutants





Health effects of Air Pollutants

Pollutant	Sources	Effects
OZONE *Near the ground (the troposphere), it is a major part of smog* *In the upper atmosphere (stratosphere), which screens out harmful ultraviolet rays.*	*Formed when nitrogen oxides and volatile organic compounds mix in sunlight.* *Nitrogen oxides come from burning gasoline, coal, or other fossil fuels.*	*Frequent asthma attacks in people who have asthma and can cause sore throats, coughs, and breathing difficulty. It may even lead to premature death. Ozone can also hurt plants and crops.*
CARBON MONOXIDE *A gas that comes from the burning of fossil fuels, mostly in cars. It cannot be seen or smelled.*	*Released when engines burn fossil fuels.* *Furnaces and heaters in the home can emit high concentrations of carbon monoxide, too, if they are not properly maintained.*	*Makes people feel dizzy and tired and gives them headaches. In high concentrations causes heart disease .*
NITROGEN DIOXIDE *A reddish-brown gas that comes from the burning of fossil fuels. It has a strong smell at high levels.*	*From power plants and cars. Nitrogen dioxide is formed in two ways—when nitrogen in the fuel is burned, or when nitrogen in the air reacts with oxygen at very high temperatures.*	*Give people coughs and can make them feel short of breath and respiratory infections.* *Nitrogen dioxide reacts in the atmosphere to form acid rain, which can harm plants and animals.*
PARTICULATE MATTER *Solid or liquid matter that is suspended in the air. To remain in the air, particles usually must be less than 0.1-mm wide and can be as small as 0.00005 mm.*	*Coarse particles are formed from sources like road dust, sea spray, and construction.* *Fine particles are formed when fuel is burned in automobiles and power plants.*	*Enter the lungs and cause health problems.* *Frequent asthma attacks, respiratory problems, and premature death.*
SULFUR DIOXIDE *A corrosive gas that cannot be seen or smelled at low levels but can have a "rotten egg" smell at high levels.*	*From the burning of coal or oil in power plants.* *From factories that make chemicals, paper, or fuel.*	*Exposure affects people who have asthma* *Irritate people's eyes, noses, and throats. Sulfur dioxide can harm trees and crops, damage buildings, and make it harder for people to see long distances*
LEAD *A blue-gray metal that is very toxic and is found in a number of forms and locations.*	*From cars in areas where unleaded gasoline is not used.* *From power plants and other industrial sources.* *Pealed paints*	*Can lead to lower IQs and kidney problems.* *Increases the chance of having heart attacks or strokes.*

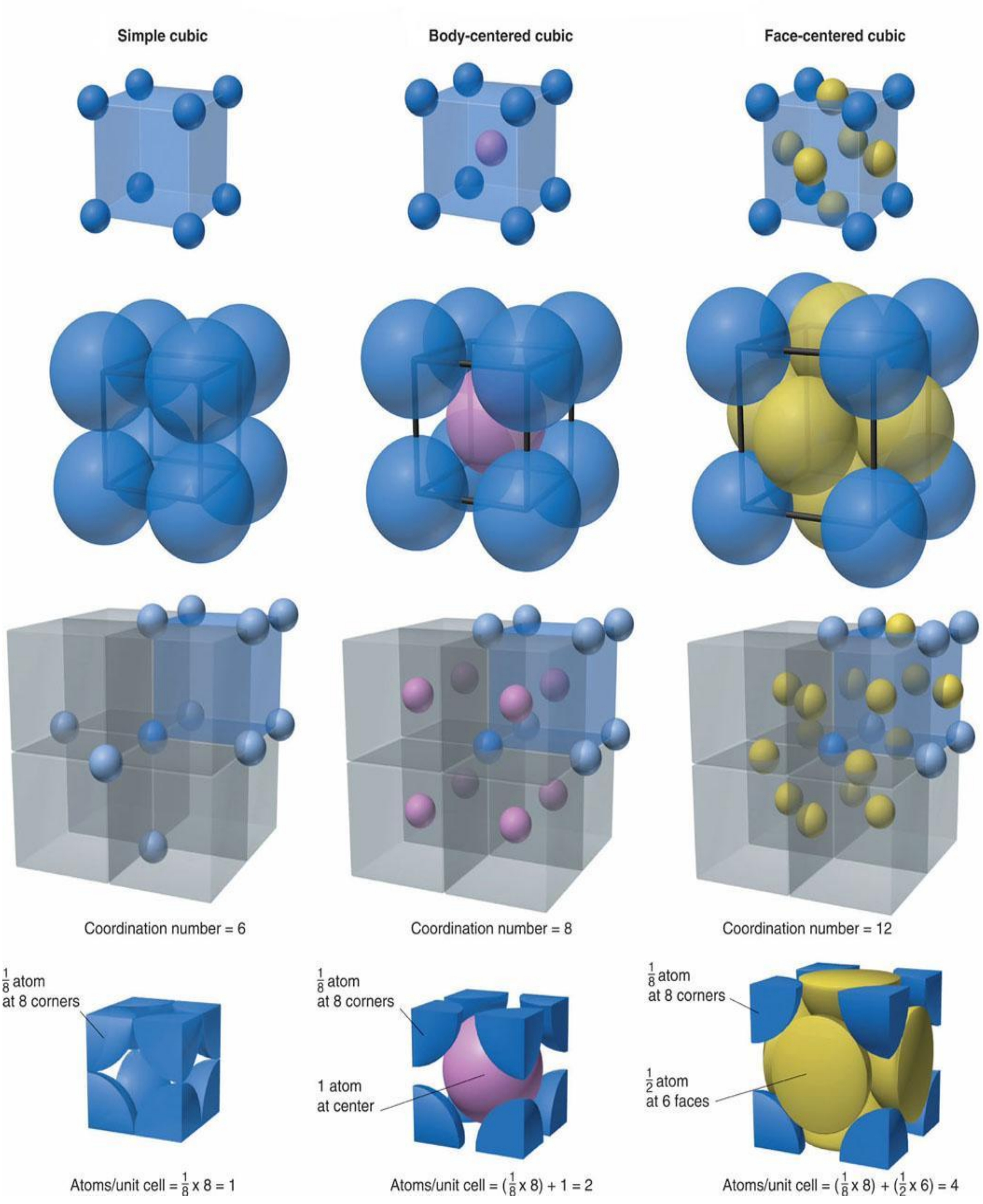
Pollutant	Sources	Effects
TOXIC AIR POLLUTANTS *A large number of chemicals that are known or suspected to cause cancer. Some important pollutants in this category include arsenic, asbestos, benzene, and dioxin.*	*Created in chemical plants or are emitted when fossil fuels are burned. Some toxic air pollutants, like asbestos and formaldehyde, can be found in building materials and can lead to indoor air problems.*	*Can cause cancer. Some toxic air pollutants can also cause birth defects.* *Skin and eye irritation and breathing problems.*
STRATOSPHERIC OZONE DEPLETERS *Chemicals that can destroy the ozone in the stratosphere. These chemicals include chlorofluorocarbons (CFCs), halons, and other compounds that include chlorine or bromine.*	*CFCs are used in air conditioners and refrigerators, since they work well as coolants. They can also be found in aerosol cans and fire extinguishers. Other stratospheric ozone depleters are used as solvents in industry.*	*If the ozone in the stratosphere is destroyed, people are exposed to more radiation from the sun (ultraviolet radiation). This can lead to skin cancer and eye problems. Higher ultraviolet radiation can also harm plants and animals.*
GREENHOUSE GASES *Gases that stay in the air for a long time and warm up the planet by trapping sunlight. This is called the "greenhouse effect" because the gases act like the glass in a greenhouse. Some of the important greenhouse gases are carbon dioxide, methane, and nitrous oxide.*	*Carbon dioxide is the most important greenhouse gas. It comes from the burning of fossil fuels in cars, power plants, houses, and industry. Methane is released during the processing of fossil fuels, and also comes from natural sources like cows and rice paddies. Nitrous oxide comes from industrial sources and decaying plants.*	*The greenhouse effect can lead to changes in the climate of the planet. Some of these changes might include more temperature extremes, higher sea levels, changes in forest composition, and damage to land near the coast. Human health might be affected by diseases that are related to temperature or by damage to land and water*

****

Sample Hand Outs – Class XII

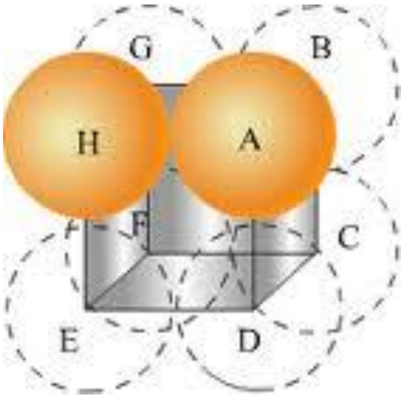
UNIT 1 : Solid State

Types of UNIT CELLS



Packing Efficiency of simple cubic & face centered cube

1] Packing Efficiency of simple cubic



$$\text{Packing efficiency} = \frac{\text{Volume of one atom}}{\text{Volume of cubic unit cell}} \times 100\%$$

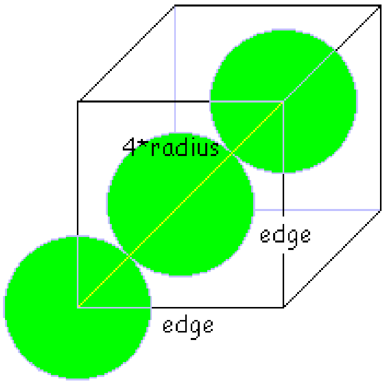
$$= \frac{\frac{4}{3}\pi r^3}{8r^3} \times 100$$

$$= \frac{\pi}{6} \times 100$$

$$= 52.36\%$$

$$= 52.4\ \%$$

2] Packing Efficiency of face centered cube

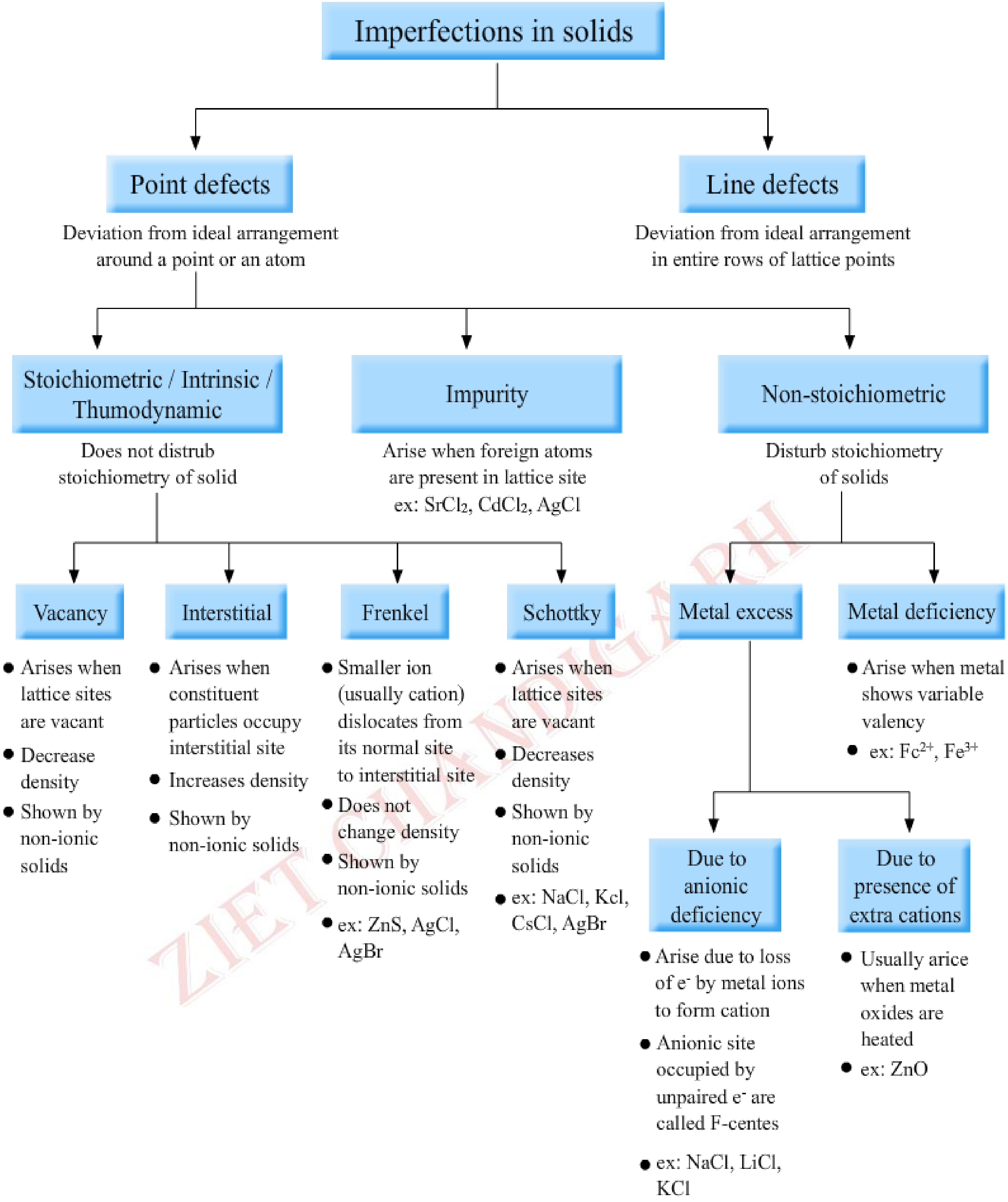


edge = $2\sqrt{2} * \text{radius}$

Packing Efficiency

$$\frac{\text{4 atoms * volume per atom}}{\text{volume of unit cell}} \times 100$$

$$\frac{4 * \frac{4}{3}\pi r^3}{\left(2\sqrt{2} * r\right)^3} \times 100 = 74\%$$



Imperfections in solids

Point defects

Deviation from ideal arrangement around a point or an atom

Stoichiometric / Intrinsic / Thumodynamic

Does not distrub stoichiometry of solid

Vacancy

- Arises when lattice sites are vacant
- Decrease density
- Shown by non-ionic solids

Interstitial

- Arises when constituent particles occupy interstitial site
- Increases density
- Shown by non-ionic solids

Frenkel

- Smaller ion (usually cation) dislocates from its normal site to interstitial site
- Does not change density
- Shown by non-ionic solids
- ex: ZnS, AgCl, AgBr

Schottky

- Arises when lattice sites are vacant
- Decreases density
- Shown by non-ionic solids
- ex: NaCl, Kcl, CsCl, AgBr

Impurity

Arise when foreign atoms are present in lattice site ex: $SrCl_2$, $CdCl_2$, AgCl

Non-stoichiometric

Disturb stoichiometry of solids

Metal excess

Due to anionic deficiency

- Arise due to loss of e^- by metal ions to form cation
- Anionic site occupied by unpaired e^- are called F-centes
- ex: NaCl, LiCl, KCl

Due to presence of extra cations

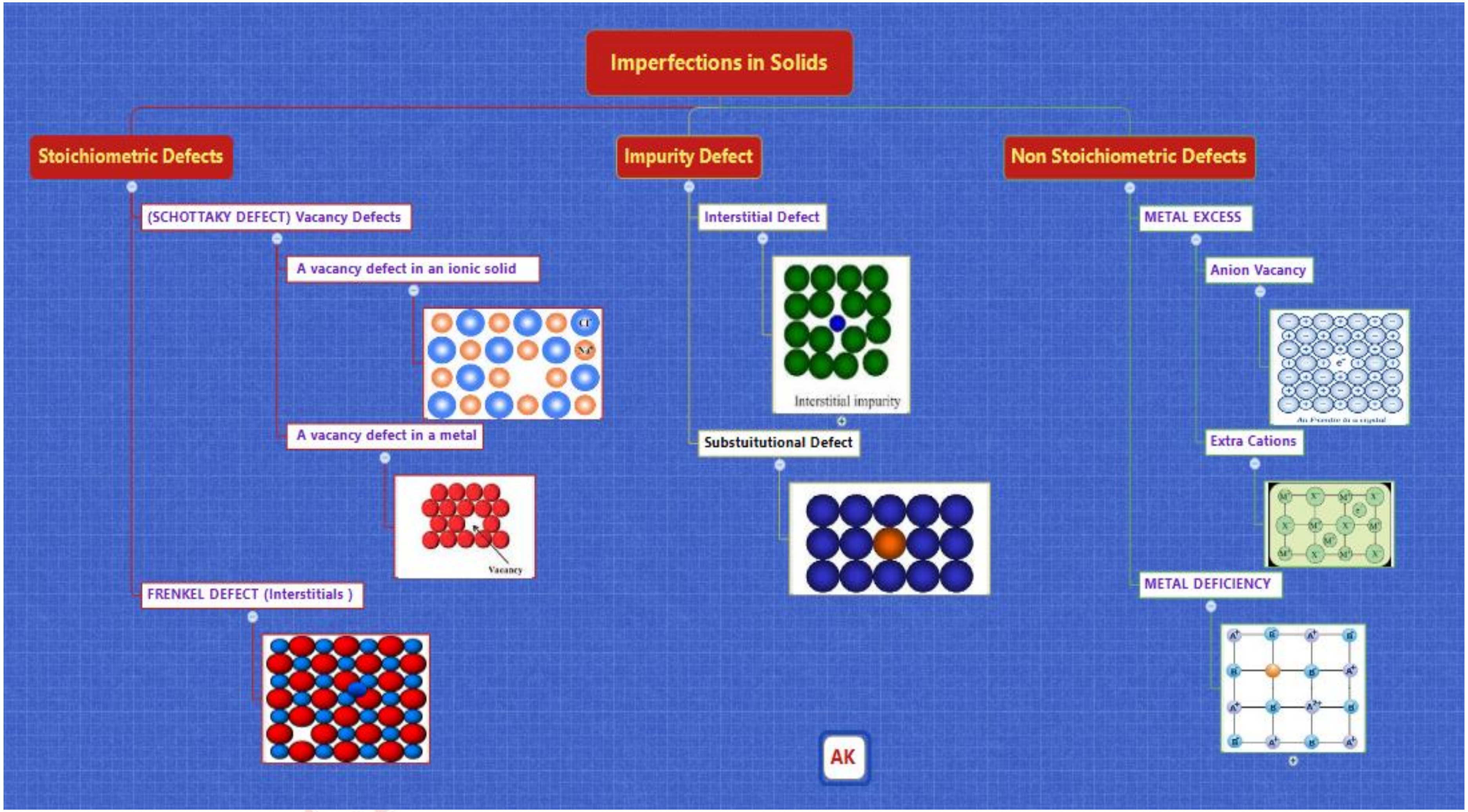
- Usually arice when metal oxides are heated
- ex: ZnO

Metal deficiency

- Arise when metal shows variable valency
- ex: Fc^{2+}, Fe^{3+}

Line defects

Deviation from ideal arrangement in entire rows of lattice points

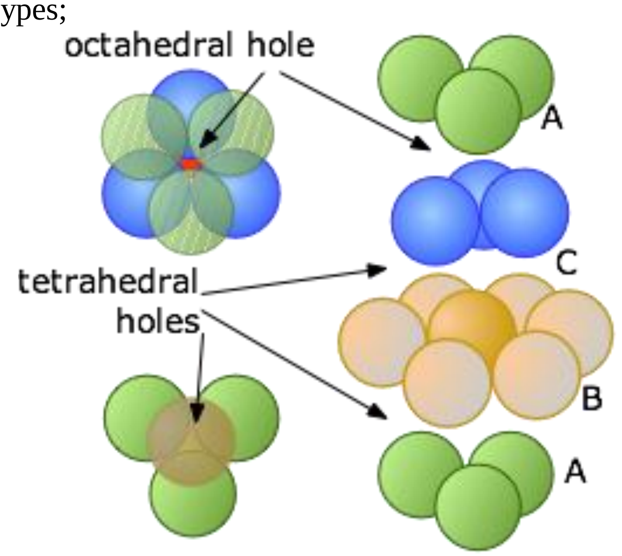


Imperfections in Solids

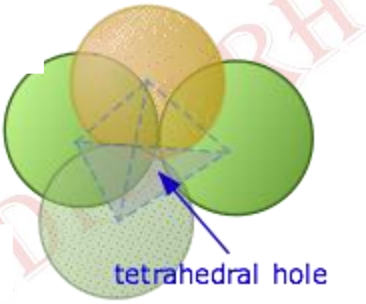
- Stoichiometric Defects
  - (SCHOTTAKY DEFECT) Vacancy Defects
    - A vacancy defect in an ionic solid
    - A vacancy defect in a metal
  - FRENKEL DEFECT (Interstitials)
- Impurity Defect
  - Interstitial Defect
  - Substuitutional Defect
- Non Stoichiometric Defects
  - METAL EXCESS
    - Anion Vacancy
    - Extra Cations
  - METAL DEFICIENCY

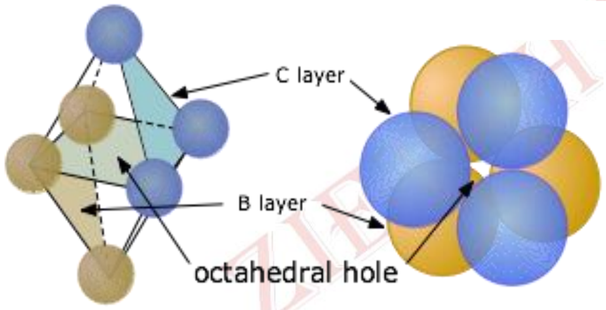
Voids / Interstitial Sites

Unoccupied spaces in solids are called interstitial voids or interstitial sites.
Voids can be two types;



Tetrahedral voids surrounded by four particles

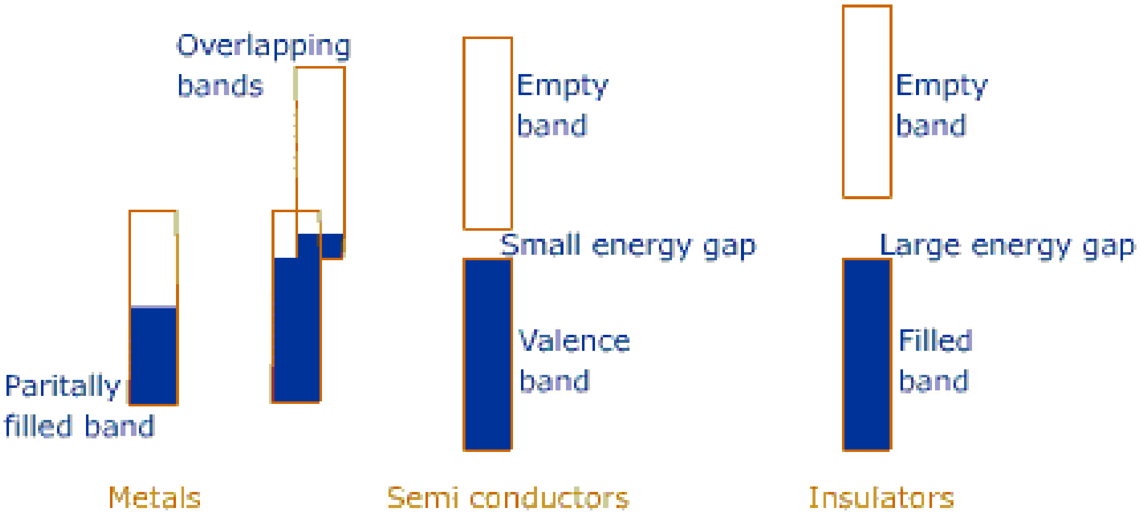


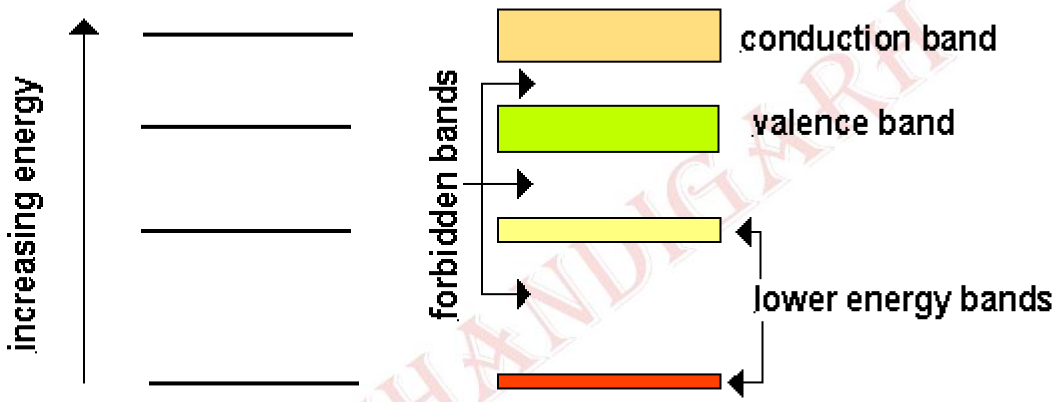


O**ctahedral voids** surrounded by six particles.

Sizes of tetrahedral and octahedral voids		
Radius ratio r+/r-	**Structural Arrangement**	**Coordination number**
0.225 – 0.414	**Tetrahedral**	**4**
0.414 – 0.732	**Octahedron**	**6**
0.732 – 1	**Cubic**	**8**

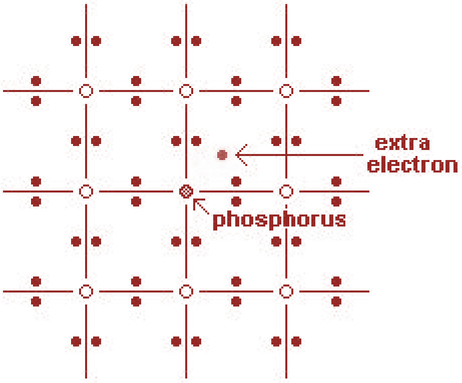
Band theory of conductivity

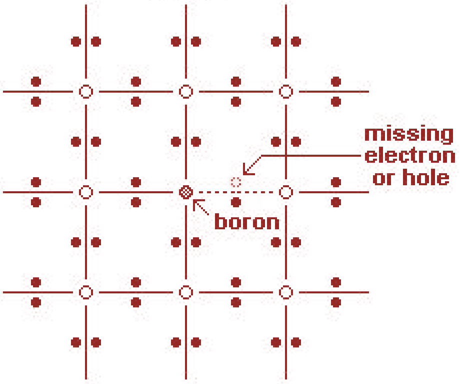




(a) energy levels in a free atom

(b) energy bands in a solid


Silicon doped with phosphorus


Silicon doped with boron

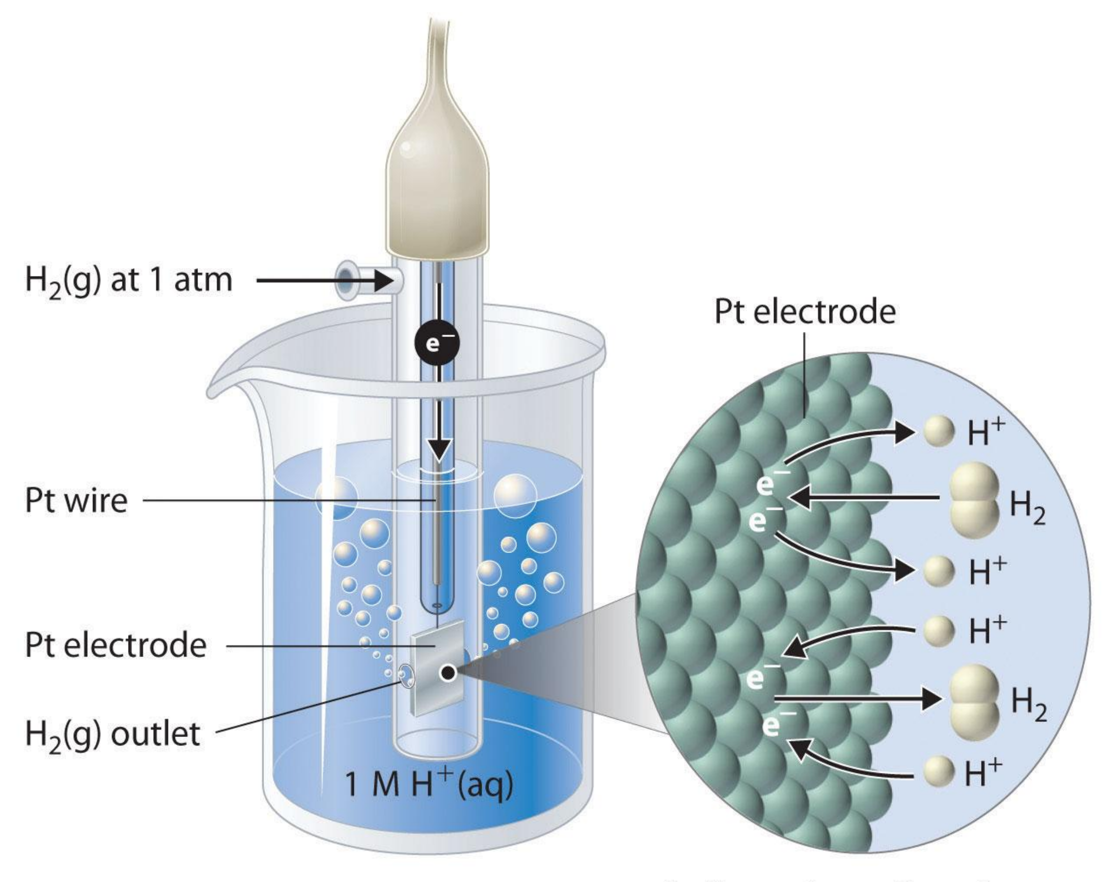
UNIT 2 : Solutions

Types of Solution

S.N.	Solute	Solvent	Type of Sol.	Examples
SOLID SOLUTIONS (Solid Solvent)				
1.	Solid	Solid	Solid in solid	Alloys (brass, German silver, bronze, 22 carat gold etc.)
2.	Liquid	Solid	Liquid in solid	Hydrated salts, Amalgam of Hg with Gold
3.	Gas	Solid	Gas in solid	Dissolved gases in minerals of H_2 in Pd.
LIQUID SOLUTIONS (Liquid solvent)				
4.	Solid	Liquid	Solid in Liquid	Salt or glucose or sugar or urea solution in water
5.	Liquid	Liquid	Liquid in Liquid	Methanol or ethanol in water
6.	Gas	Liquid	Gas in Liquid	Aerated drinks, O_2 in water
GASEOUS SOLUTIONS (Gases solvent)				
7.	Solid	Gas	Solid in Gas	Iodine vapours in air, camphor in N_2 gas
8	Liquid	Gas	Liquid in Gas	Humidity in air, chloroform mixed with N_2 gas
9	Gas	Gas	Gas in Gas	Air (O_2 + N_2)

UNIT 3 : Electrochemistry

Standard Hydrogen Electrode



half-reaction at Pt surface:
$2H^+(aq) + 2e^- \rightleftharpoons H_2(g)$

Acting as anode - oxidation takes place

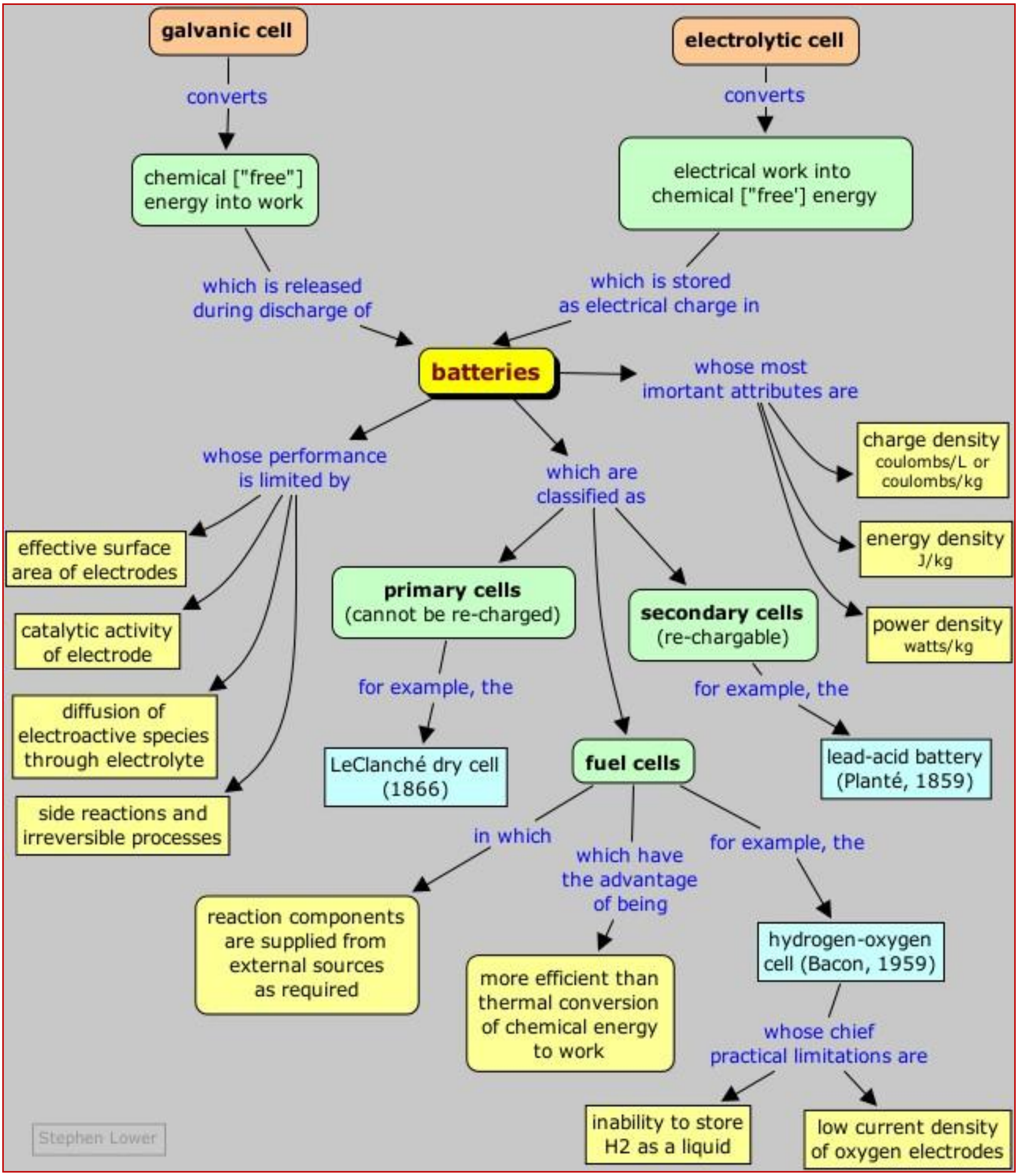
$$H_2(g) \longrightarrow 2H^+(aq) + 2e^-$$

Acting as cathode - reduction takes place

$$2H^+(aq) + 2e^- \longrightarrow H_2(g)$$

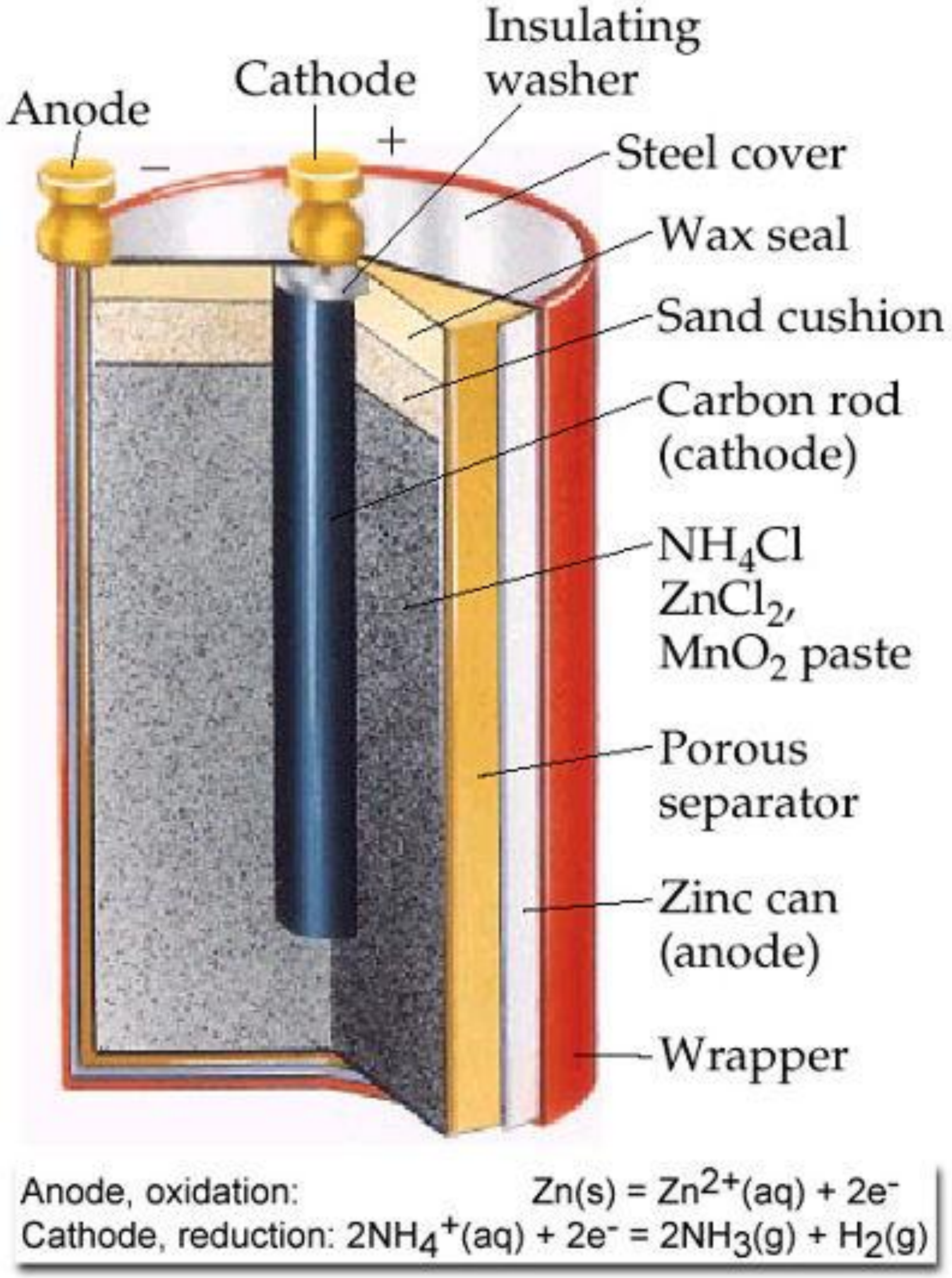
Electrolysis

Batteries


galvanic cell
converts
chemical ["free"] energy into work
electrolytic cell
converts
electrical work into chemical ["free'] energy
which is released during discharge of
which is stored as electrical charge in
batteries
whose most imortant attributes are
charge density coulombs/L or coulombs/kg
energy density J/kg
power density watts/kg
whose performance is limited by
effective surface area of electrodes
catalytic activity of electrode
diffusion of electroactive species through electrolyte
side reactions and irreversible processes
which are classified as
primary cells (cannot be re-charged)
for example, the
LeClanché dry cell (1866)
secondary cells (re-chargable)
for example, the
lead-acid battery (Planté, 1859)
fuel cells
in which
reaction components are supplied from external sources as required
which have the advantage of being
more efficient than thermal conversion of chemical energy to work
for example, the
hydrogen-oxygen cell (Bacon, 1959)
whose chief practical limitations are
inability to store H2 as a liquid
low current density of oxygen electrodes
Stephen Lower

Types of Cells

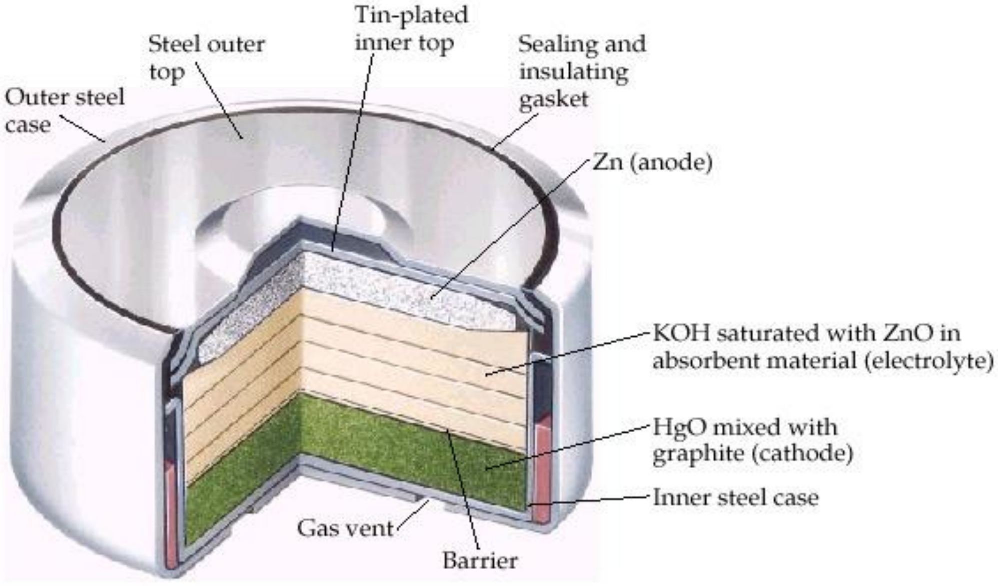
A COMMERCIAL DRY CELL



Anode, oxidation: $Zn(s) = Zn^{2+}(aq) + 2e^-$

Cathode, reduction: $2NH_4^+(aq) + 2e^- = 2NH_3(g) + H_2(g)$

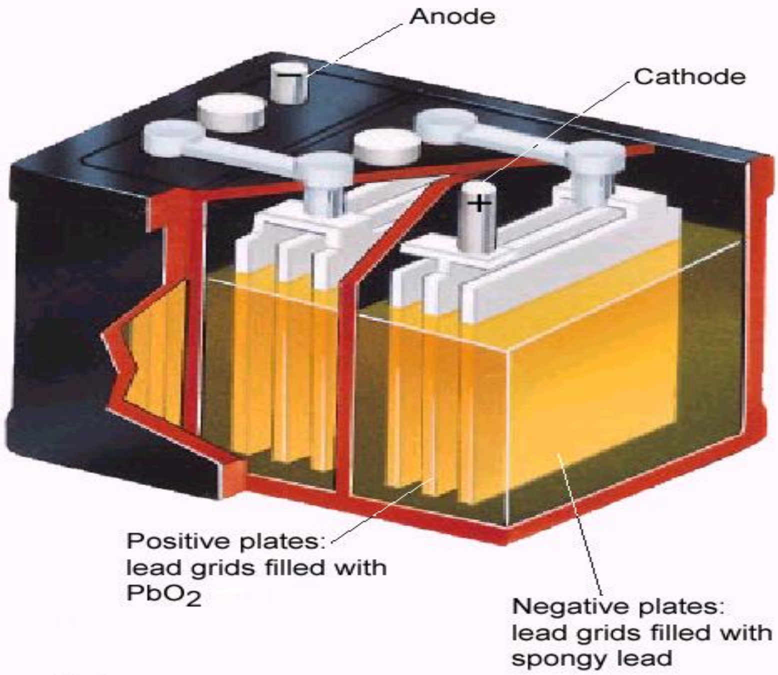
COMMONLY USED MERCURY CELL



Anode, oxidation: $Zn(s) + 2OH^-(aq) = ZnO(s) + H_2O(l) + 2e^-$

Cathode, reduction: $HgO(s) + H_2O(l) + 2e^- = Hg(l) + 2OH^-(aq)$

THE LEAD STORAGE BATTERY CELL



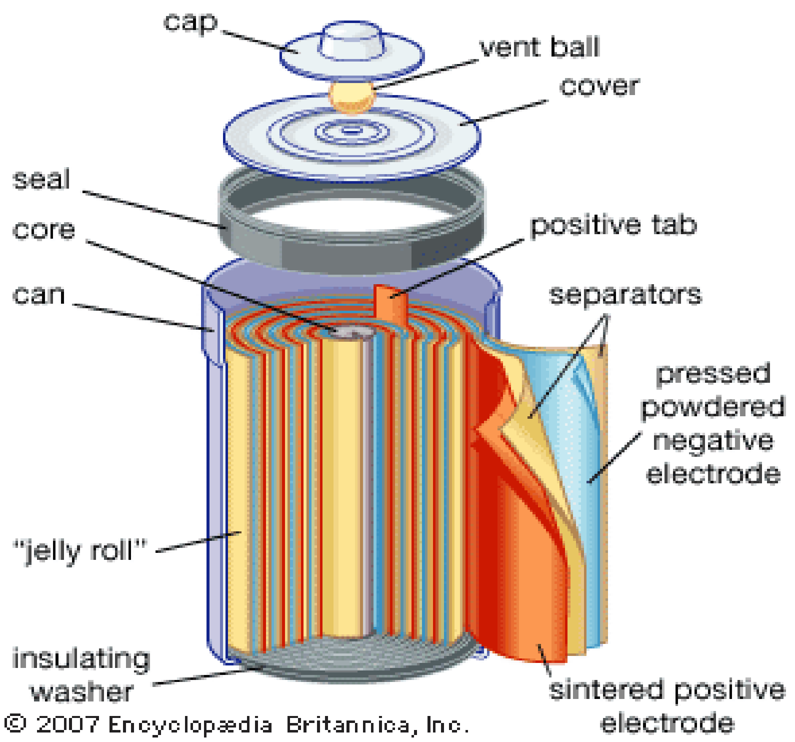
Anode, oxidation:

$Pb(s) + SO_4^{2-}(aq) = PbSO_4(s) + 2e^-$

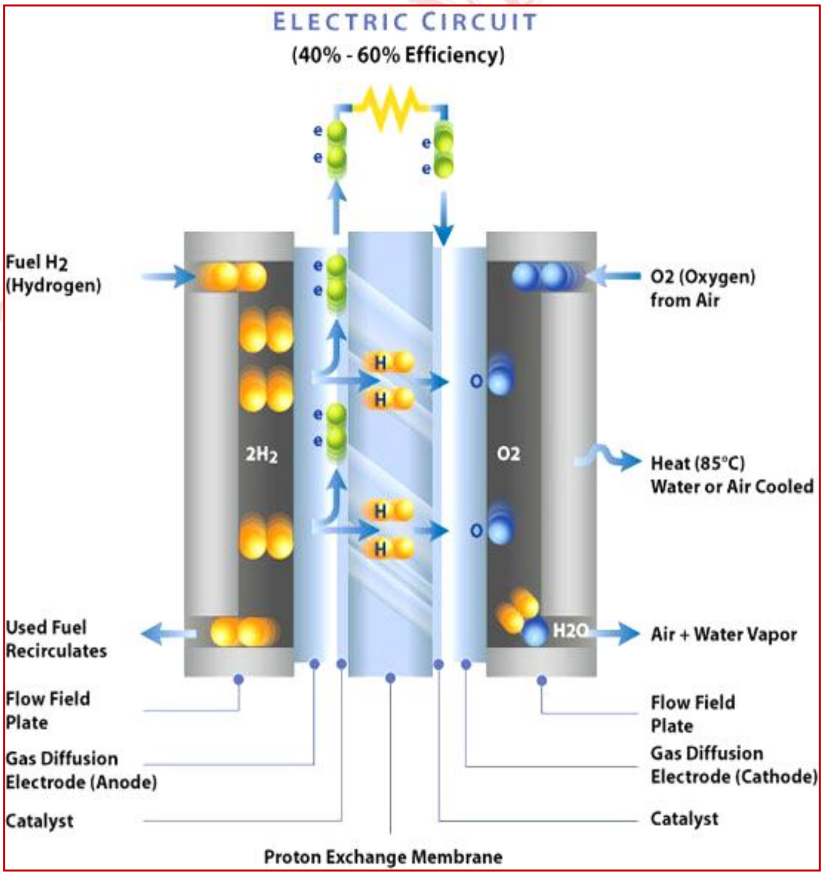
Cathode, reduction:

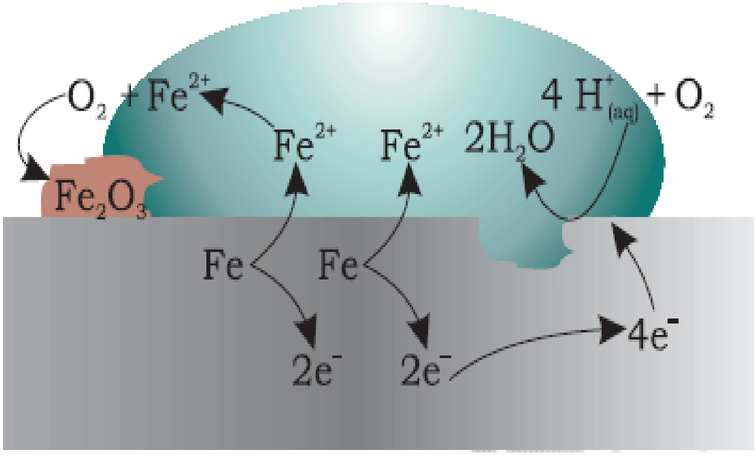
$PbO_2(s) + 4H_3O^+(aq) + SO_4^{2-}(aq) + 2e^- = PbSO_4(s) + 6H_2O(l)$

Nickel-CADMIUM CELL



FUEL CELL





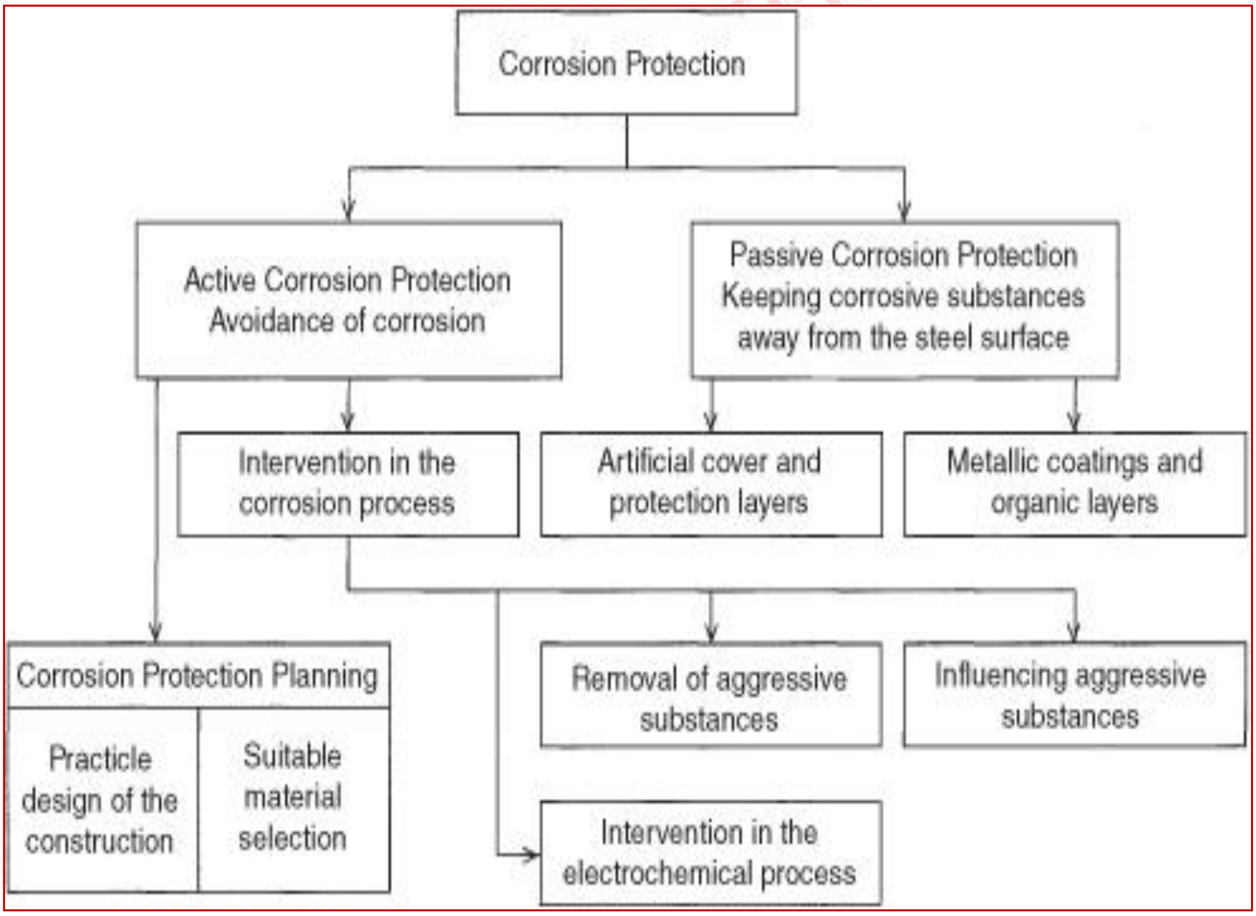
Oxidation: $Fe\ (s) \rightarrow\ Fe^{2+}\ (aq)\ +2e^-$

Reduction: $O_2\ (g)\ +\ 4H^+(aq)\ +4e^-\ \rightarrow\ 2H_2O(l)$

Atomospheric

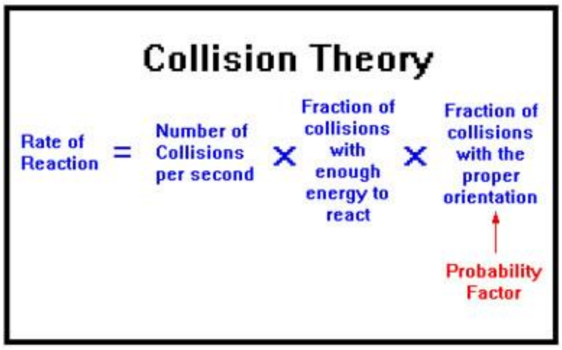
oxidation : $2Fe^{2+}(aq) + 2H_2O(l) + \frac{1}{2}O_2(g) \rightarrow Fe_2O_3(s) + 4H^+(aq)$

Corrosion & its Protection



UNIT 4 : Chemical Kinetics

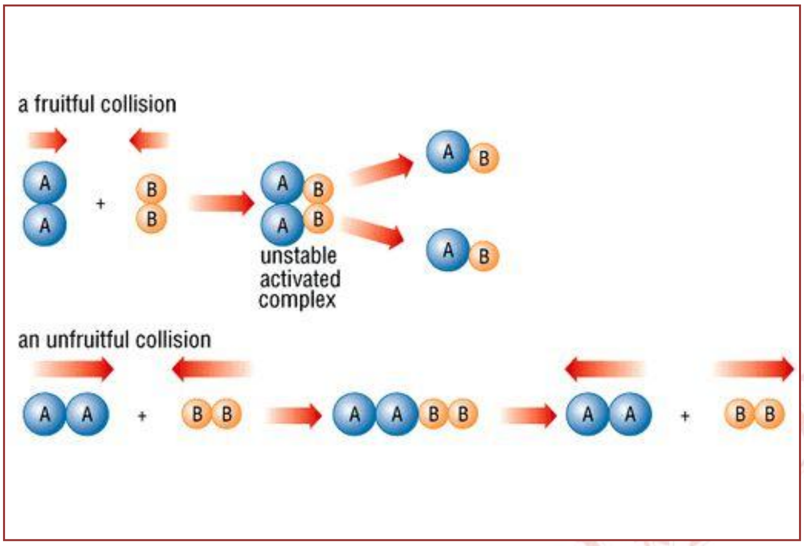
Collision Theory

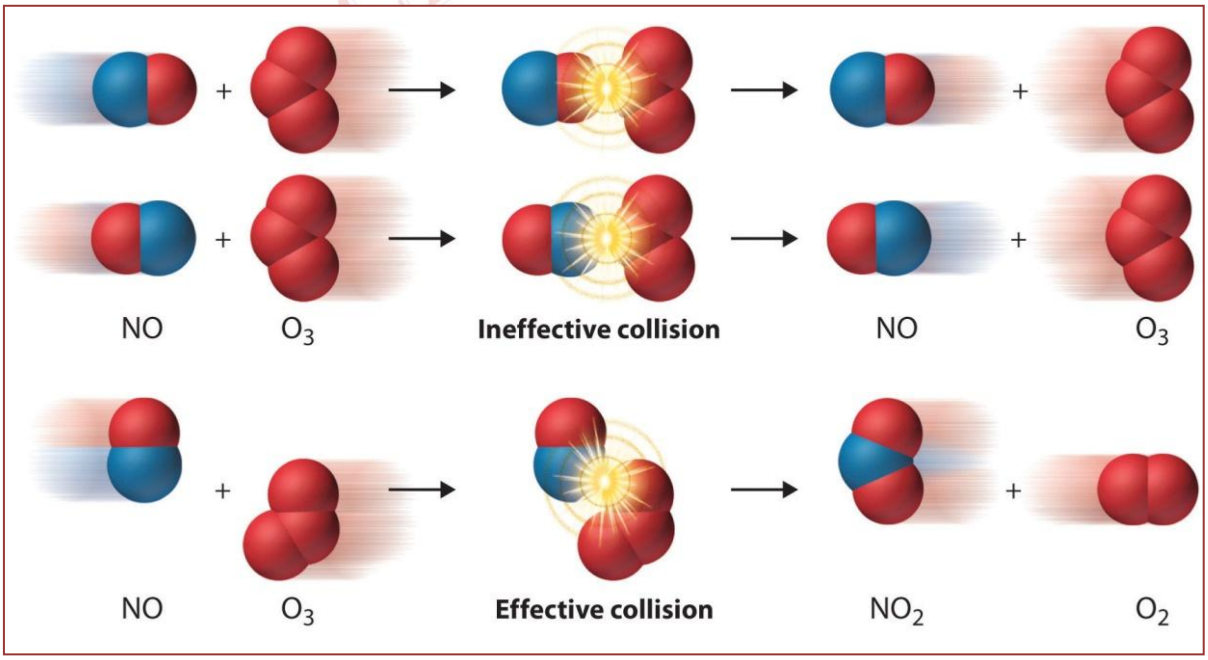


Collision Theory

Rate of Reaction = Number of Collisions per second × Fraction of collisions with enough energy to react × Fraction of collisions with the proper orientation

Probability Factor

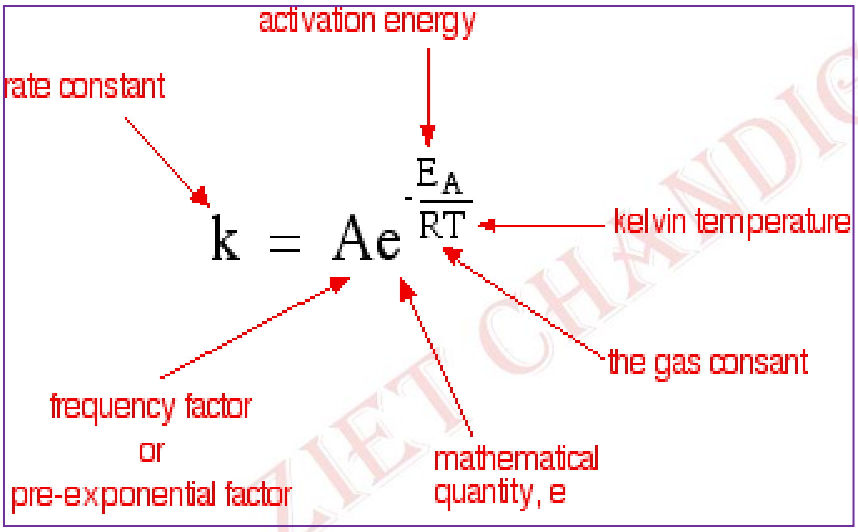


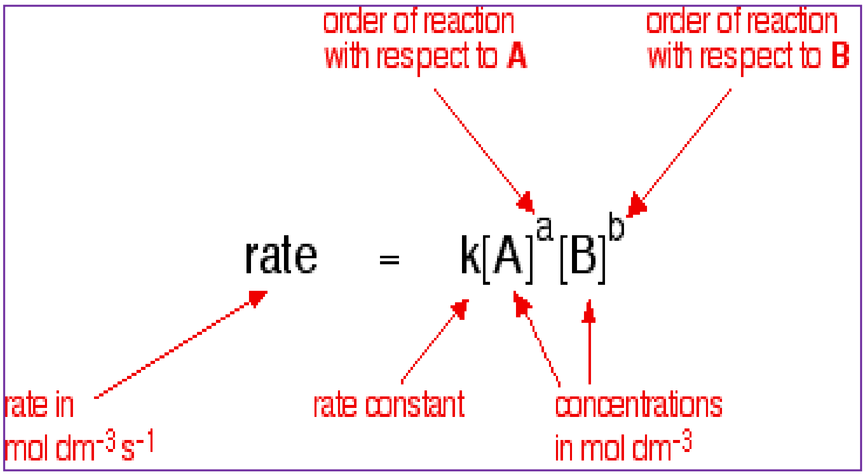


Rate Law & Rate Constants

SUMMARY

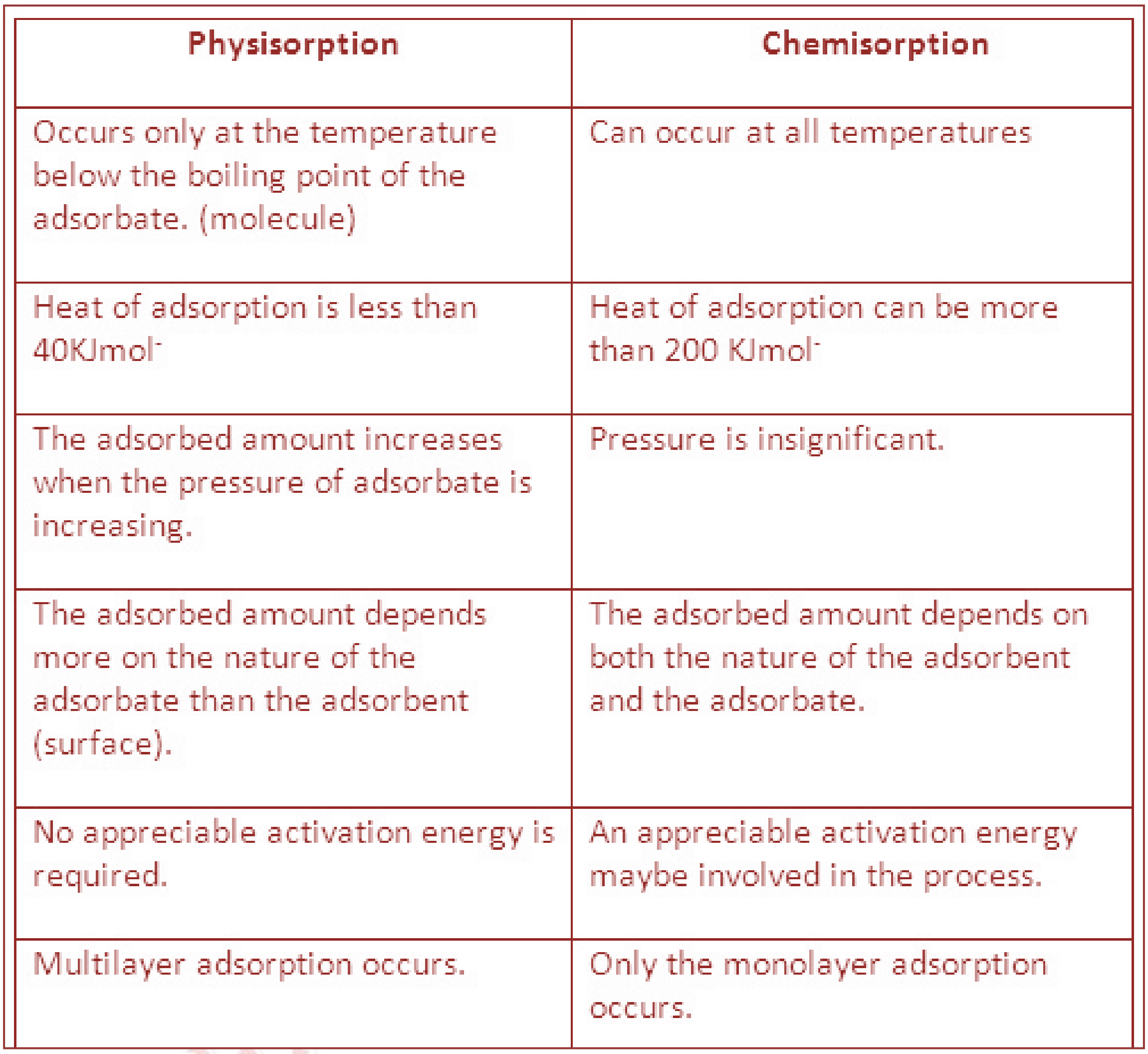
Order of reaction	Zero	First	Second
Rate law	Rate = k	Rate = k[A]	Rate = $k[A]^2$
Integrated rate law	$[A]_t =$ $[A]_0$ - kt	$\ln[A]_t - \ln[A]_0 = -kt$	$1/[A]_t - 1/[A]_0 = kt$
Units of k	M/s	1/s	1/(M•s)
Linear plot	[A] vs. t	ln[A] vs. t	1/[A] vs. t
slope	-k	-k	k
Half life	$t_{1/2}=$ $1/2[A]_0k$	$t_{1/2} = 0.693/k$	$t_{1/2}= 1/(k[A]_0)$



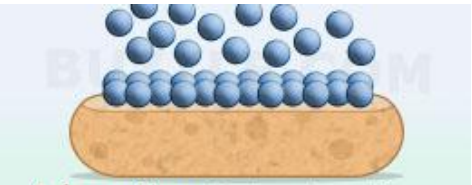


UNIT 5 : Surface Chemistry

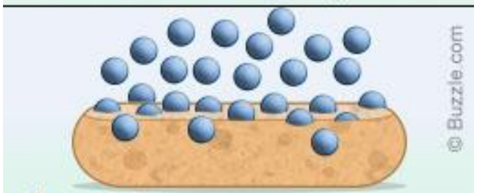
Physical & Chemical adsorption



Physisorption	Chemisorption
Occurs only at the temperature below the boiling point of the adsorbate. (molecule)	Can occur at all temperatures
Heat of adsorption is less than 40KJmol^{-}	Heat of adsorption can be more than 200 KJmol^{-}
The adsorbed amount increases when the pressure of adsorbate is increasing.	Pressure is insignificant.
The adsorbed amount depends more on the nature of the adsorbate than the adsorbent (surface).	The adsorbed amount depends on both the nature of the adsorbent and the adsorbate.
No appreciable activation energy is required.	An appreciable activation energy maybe involved in the process.
Multilayer adsorption occurs.	Only the monolayer adsorption occurs.

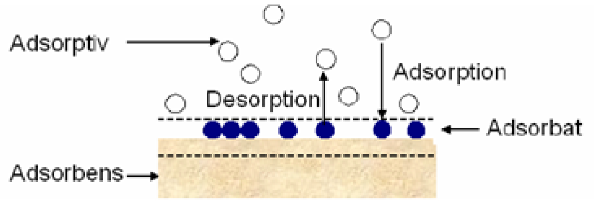


Adsorption: Molecules adhere to the surface of the phase.

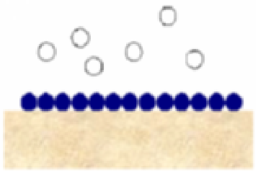


Absorption: Molecules are drawn into the bulk of the phase.

Mechanism of adsorption & isotherms

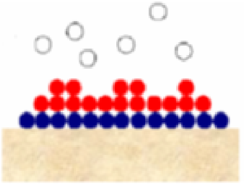


Monolayer adsorption

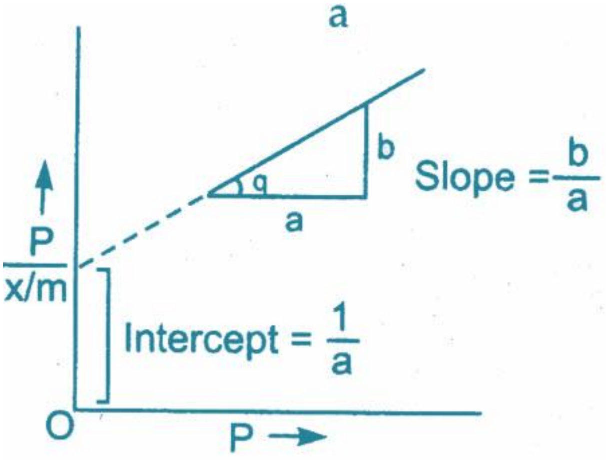


The heat of adsorption of the first monolayer is much stronger than the heat of adsorption of the second and all following layers. Typical for Chemisorption case

Multilayer adsorption

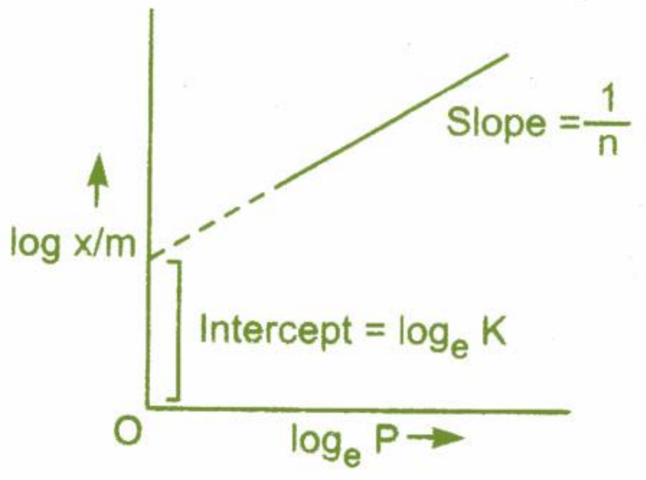


The heat of adsorption of the first layer is comparable to the heat of condensation of the subsequent layers. Often observed during Physisorption



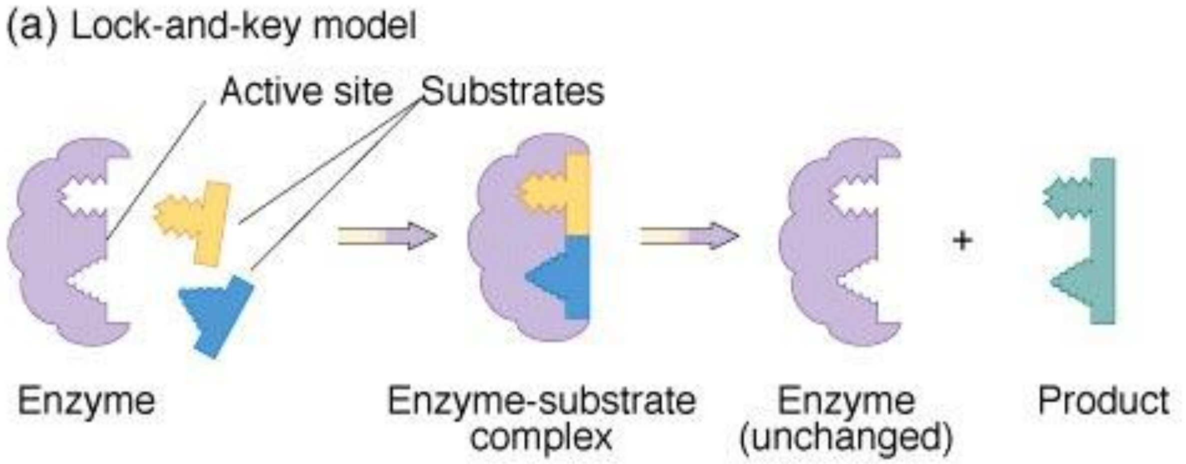
LANGMUIR ADSORPTION ISOTHERM

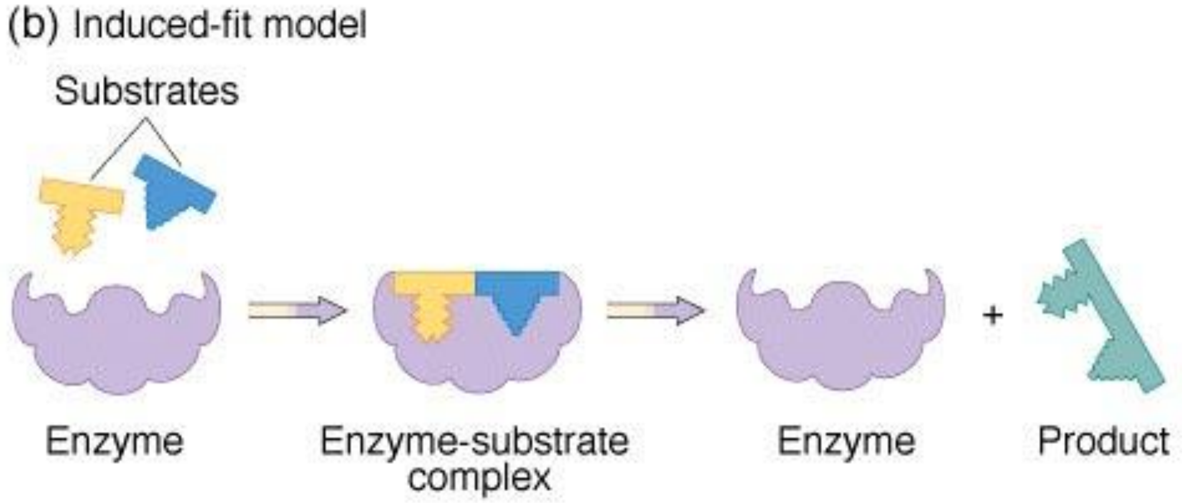
FREUNDLICH ADSORPTION ISOTHERM



Dispersion of Colloids

Enzyme Catalysis





Enzymes are highly specific and each enzyme catalyzes a particular reaction.

Example:

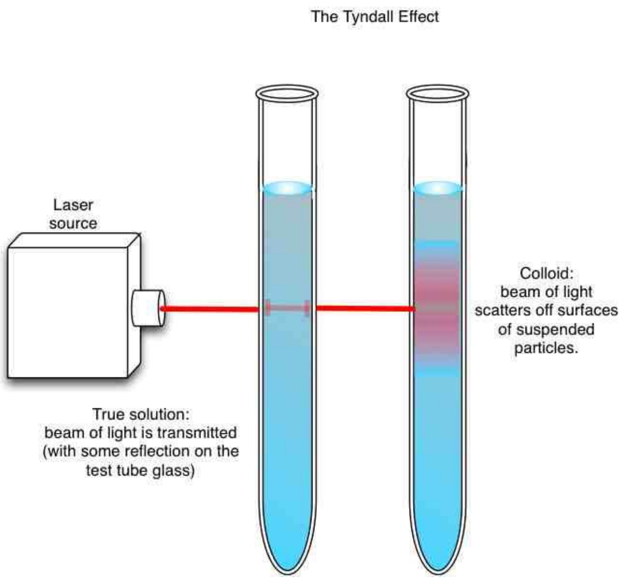
An enzyme called unease catalyzes the hydrolysis of urea and no other reactions.

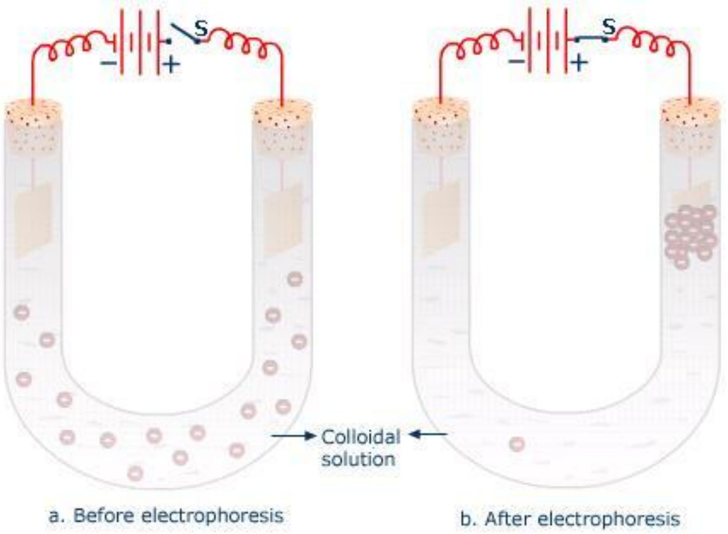
$$NH_2CONH_2 + H_2O \rightarrow 2NH_3 + CO_2$$

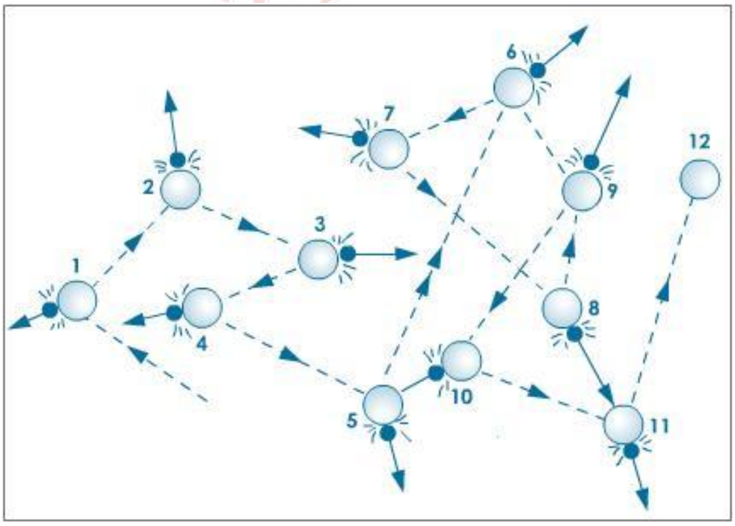
Enzyme zymase converts glucose into ethyl alcohol.

$$C_6H_{12}O_6 \rightarrow 2C_2H_2OH + 2CO_2$$

Tyndall Effect ; Electrophoresis ; Brownian Movement

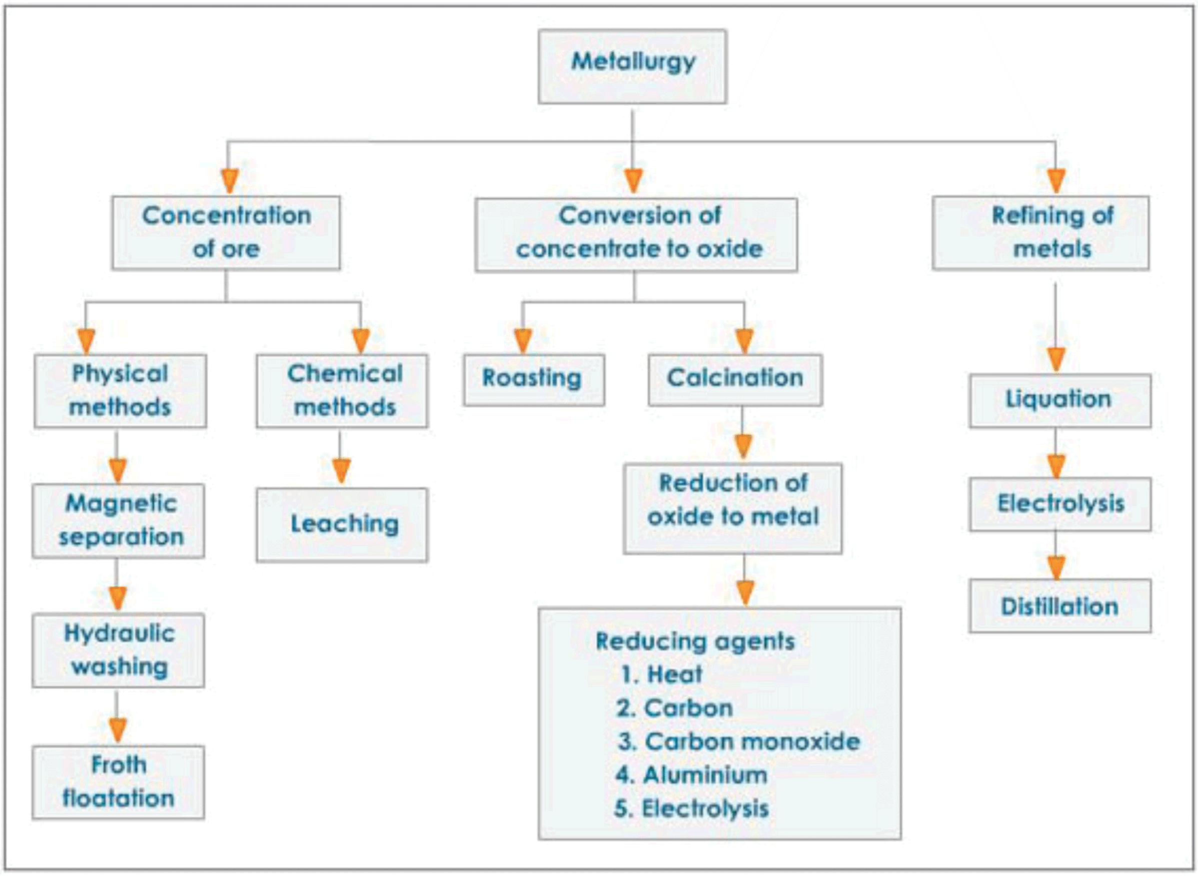






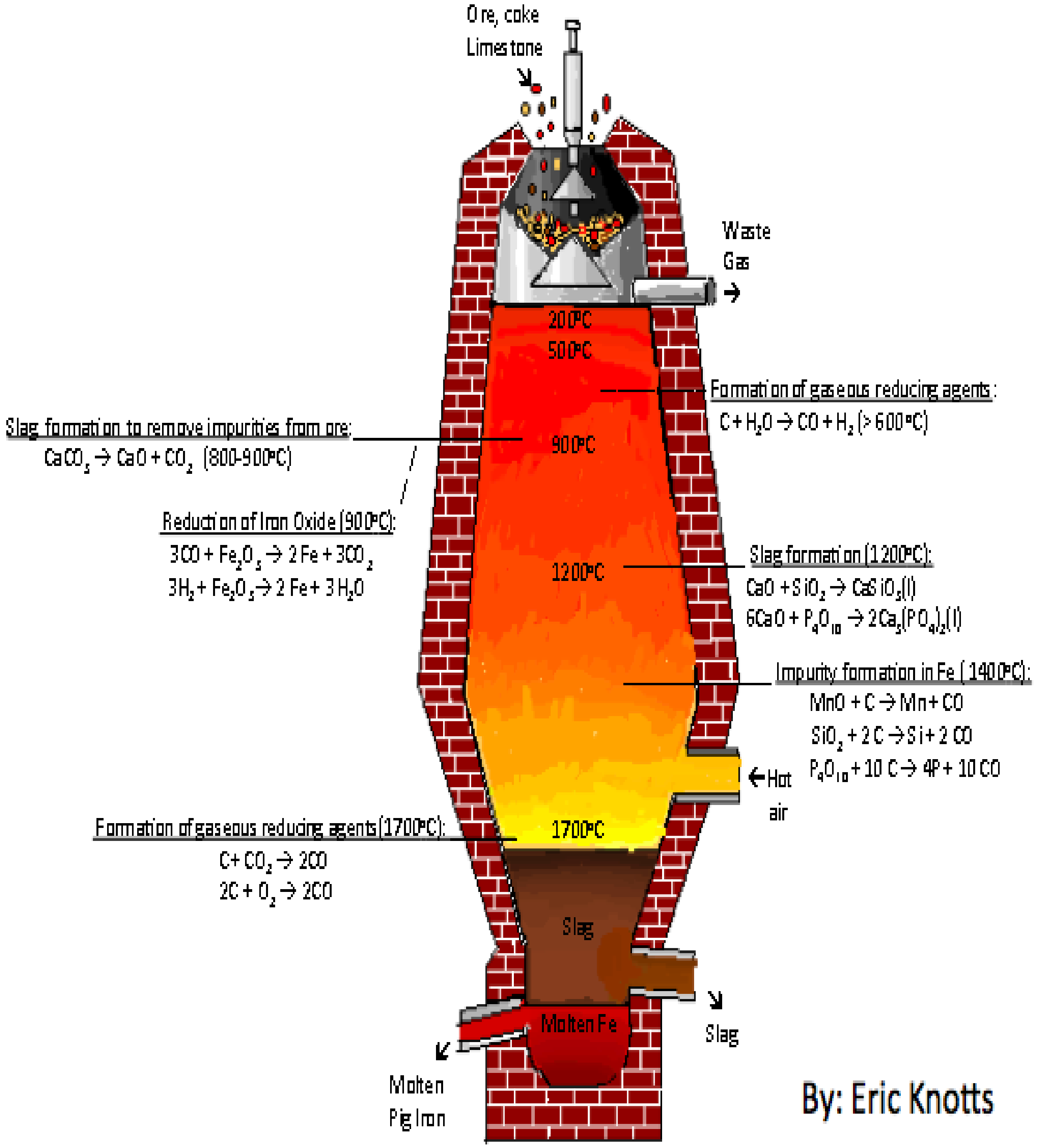
UNIT 6 –General Principles & Processes of Isolation Of Elements

Ores & Metallurgy



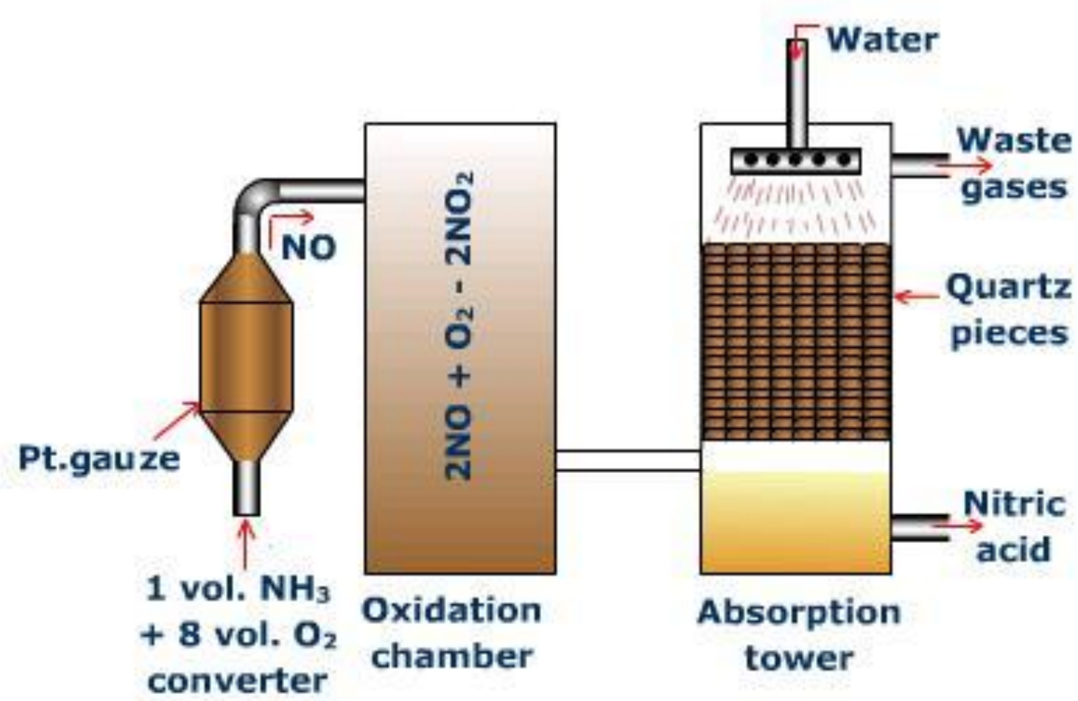
	Chemical formula	Metal	Type of ore
Haematite	Fe_2O_3	Iron	Oxide
Iron Pyrite	FeS_2	Iron	Sulphide
Copper Pyrite	$CuFeS_2$	Copper	Sulphide
Copper glance	Cus / Cu_2S	Copper	Sulphide
Bauxite	$Al_2O_3 . 2H_2O$	Aluminium	Oxide
Galena	PbS	Lead	Sulphide
Litharge	PbO	Lead	Oxide
Pyrolusite	MnO	Manganese	Oxide

Extraction of Iron



UNIT 7: The p - Block Elements

1 – Ostwald Process



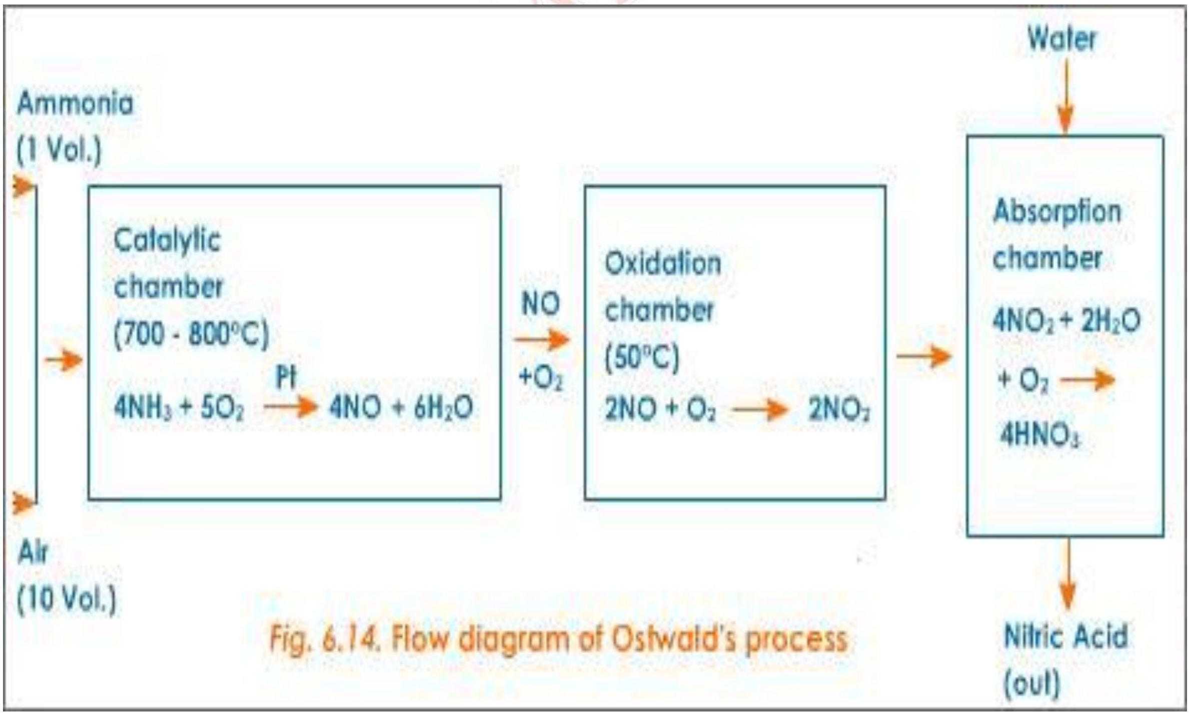
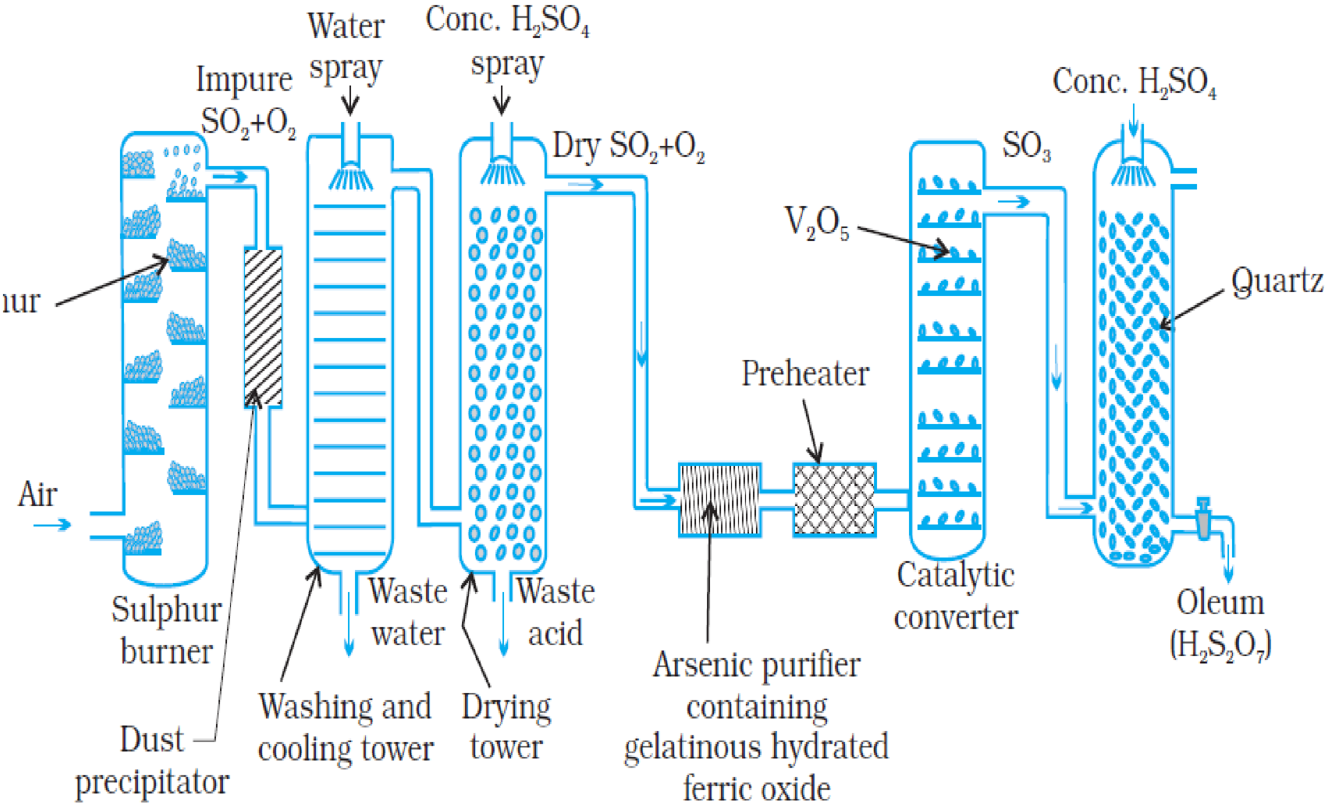
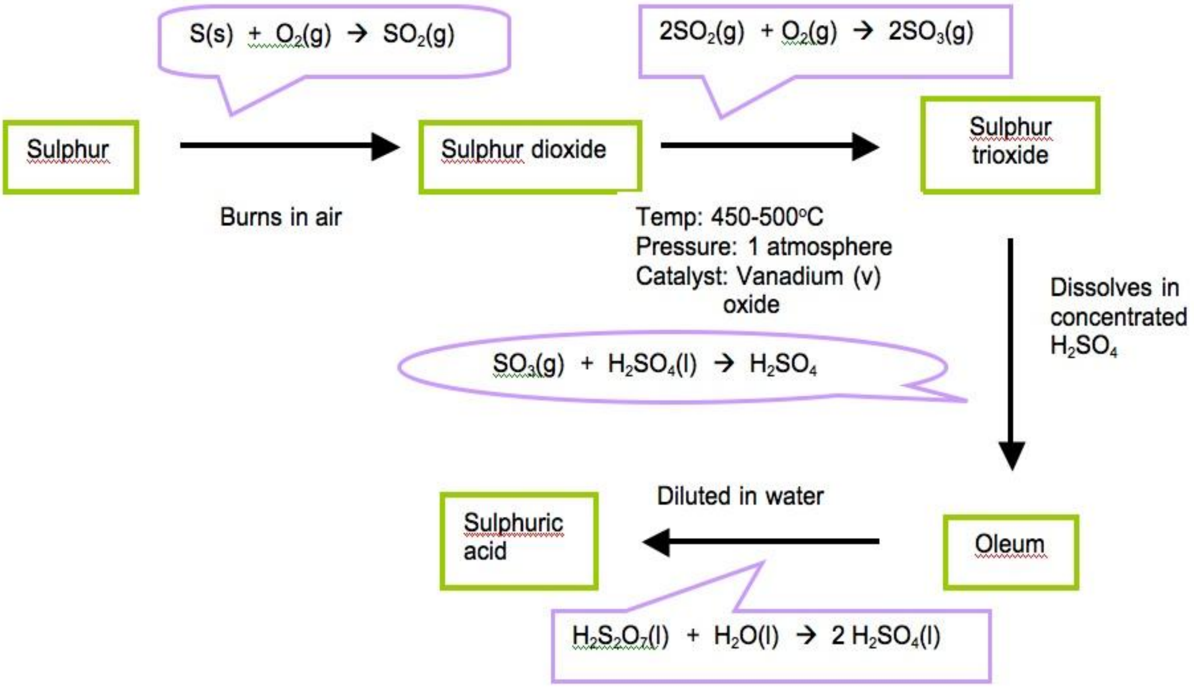


Fig. 6.14. Flow diagram of Ostwald's process

2- Contact Process





3] Properties of Nitric Acid & Sulphuric acid

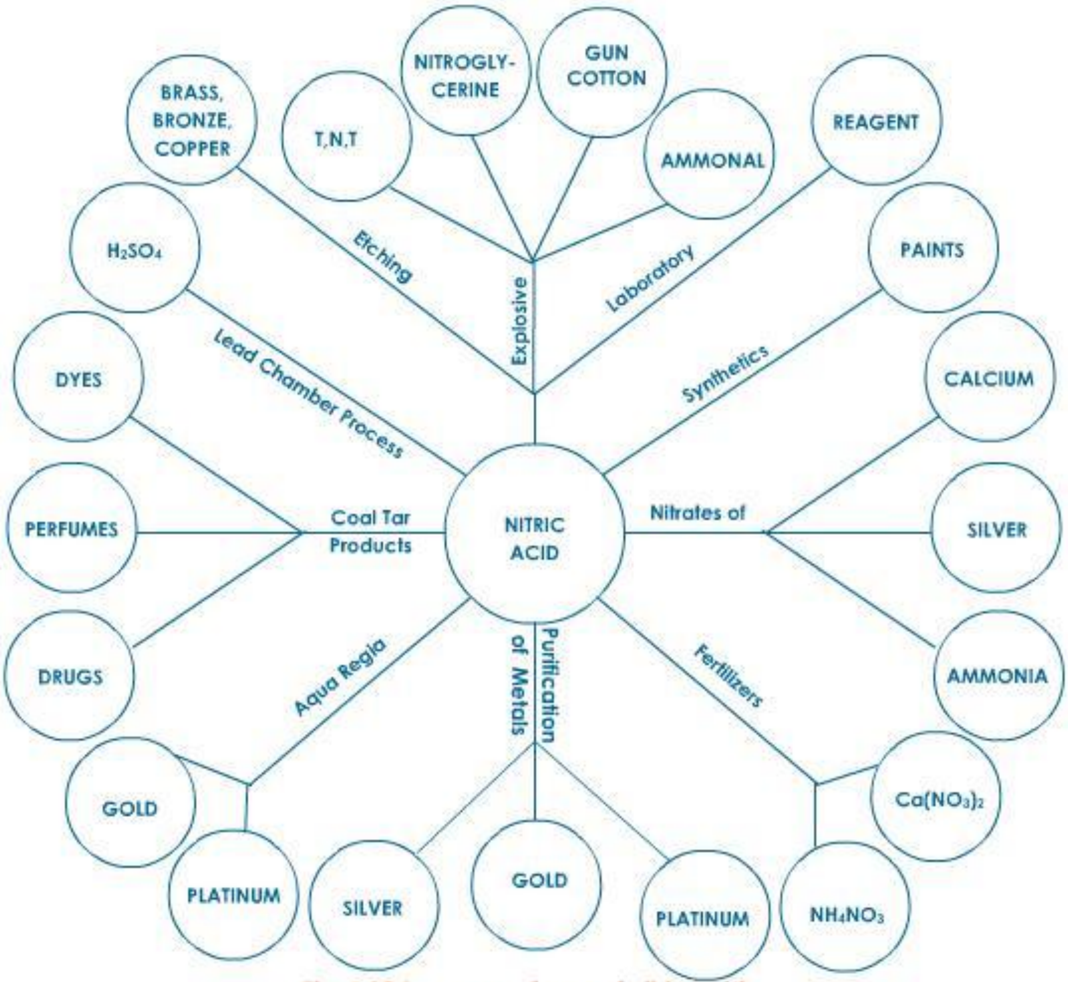


Fig. 6.18 Summary of uses of nitric acid

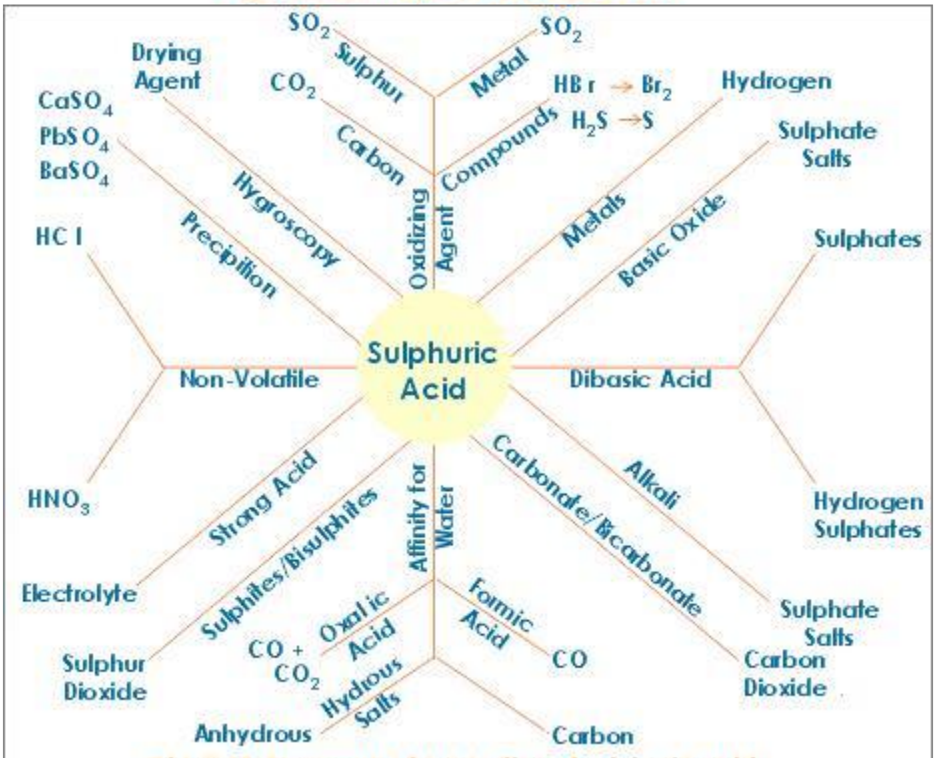
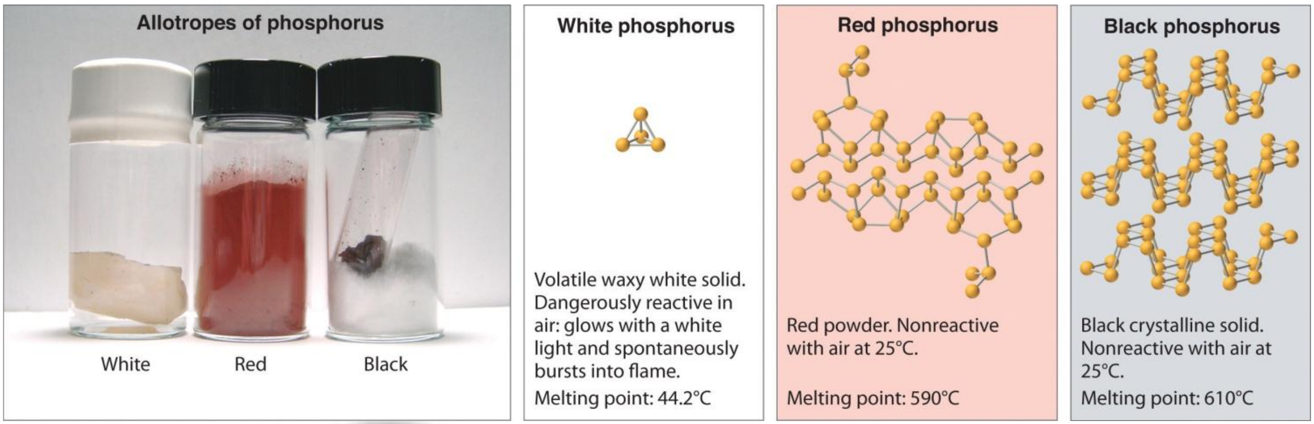


Fig. 7.18. Summary of properties of sulphuric acid

Allotropes of Phosphorous & Sulphur

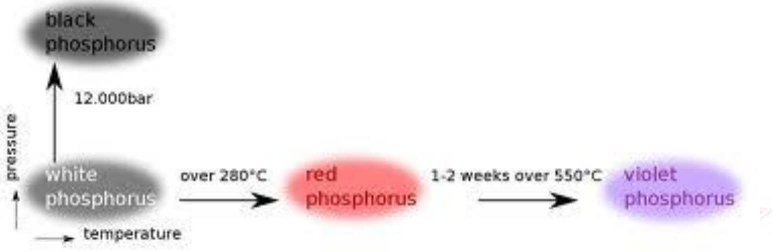
1- Allotropes of Phosphorous



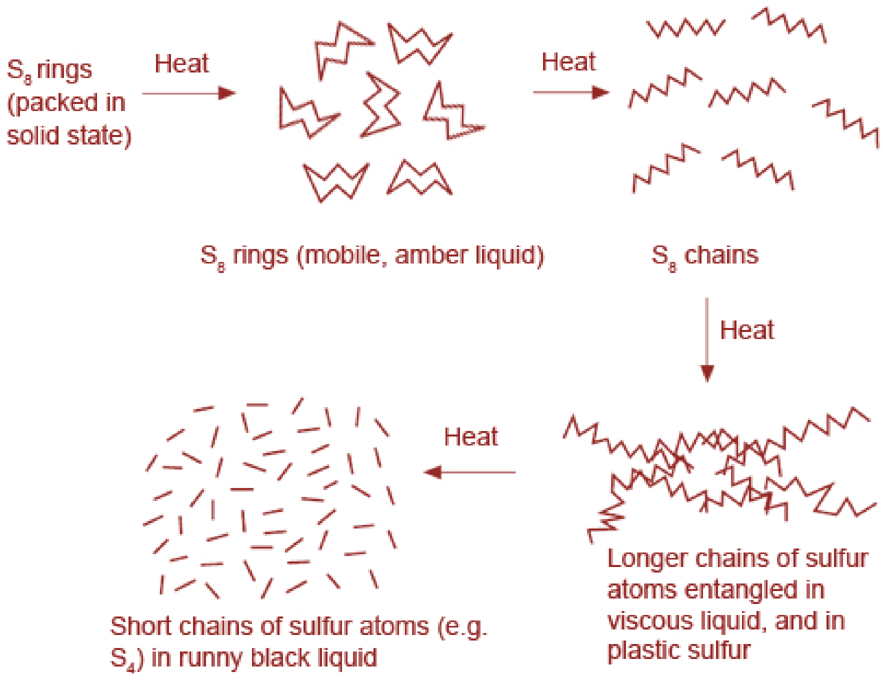
Volatile waxy white solid. Dangerously reactive in air: glows with a white light and spontaneously bursts into flame.
Melting point: 44.2°C

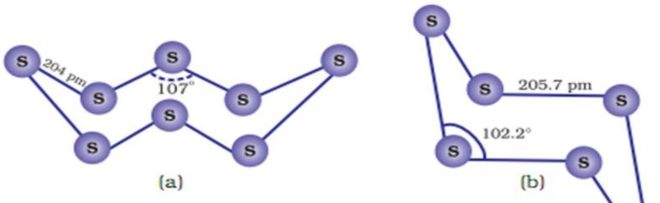
Red powder. Nonreactive with air at 25°C.
Melting point: 590°C

Black crystalline solid. Nonreactive with air at 25°C.
Melting point: 610°C

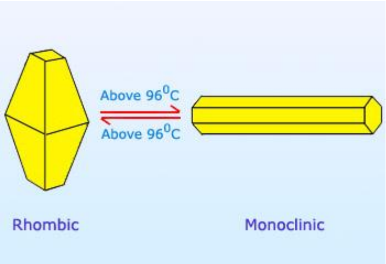


2- Allotropes of Sulphur

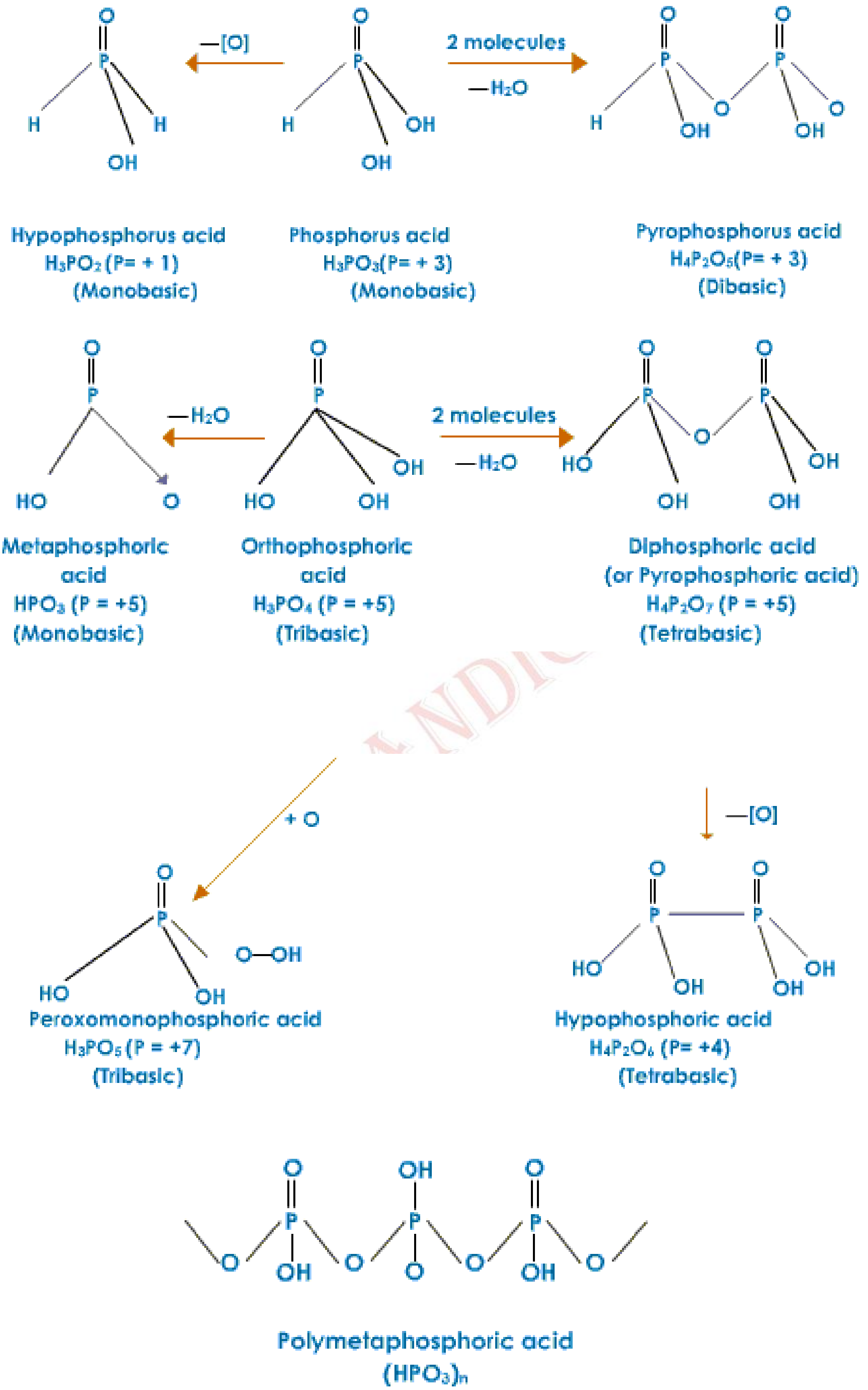




The structures of (a) S_8 ring in rhombic sulphur and (b) S_6 form

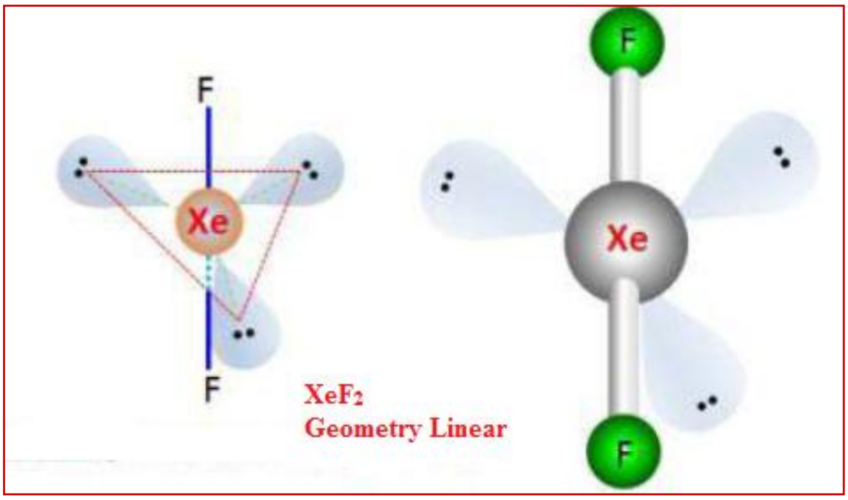


Oxoacids of Phosphorous

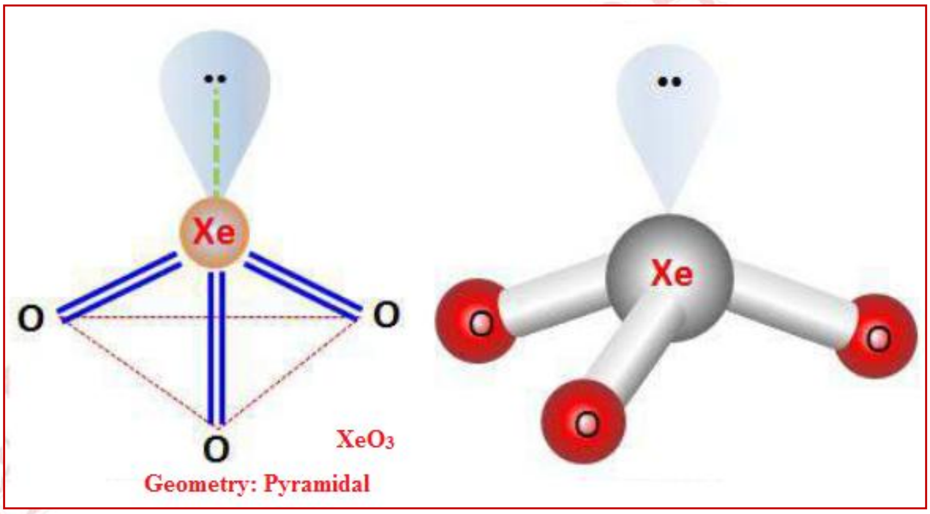


Compounds of Xenon

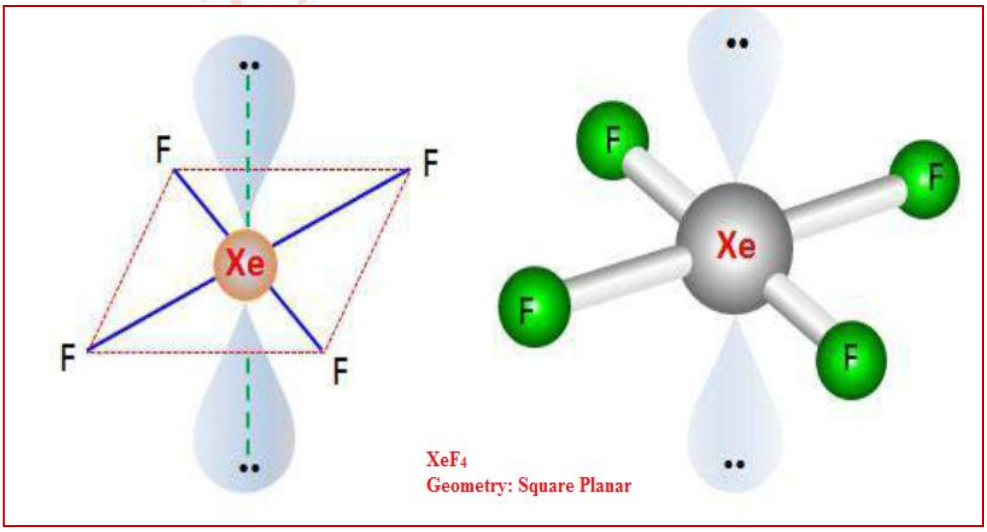
LINK - http://urip.wordpress.com/2013/10/05/bentukgeometri-molekul-dan-hibridisasi-dari-beberapa-senyawa-xenon/



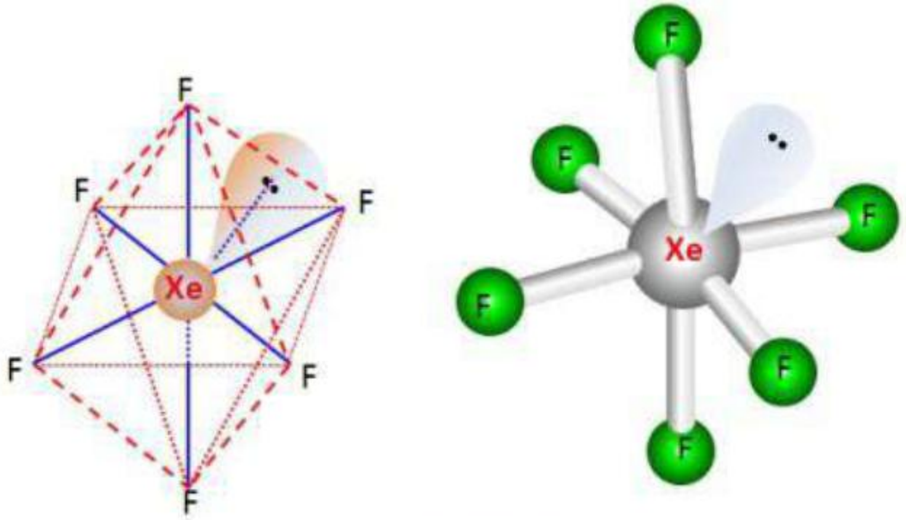
XeF_2
Geometry Linear



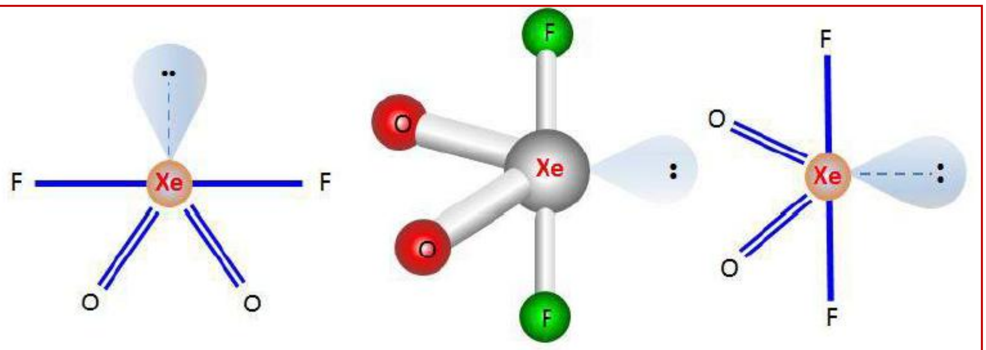
XeO_3
Geometry: Pyramidal



XeF_4
Geometry: Square Planar

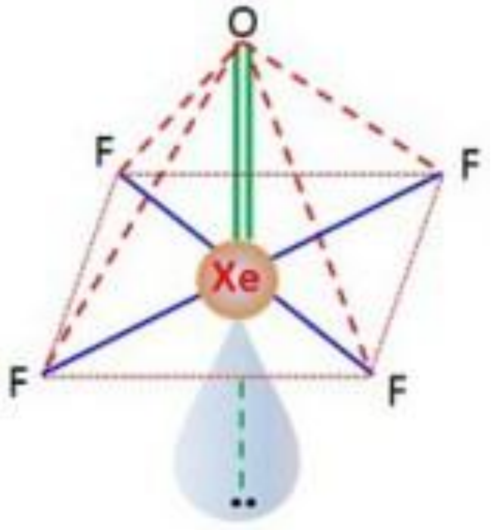


XeF_6
Geometry: Octahedral



XeO_2F_2

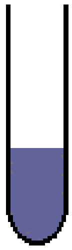
Geometry: See- saw

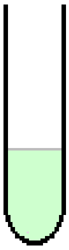


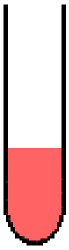
$XeOF_4$ Square Pyramidal

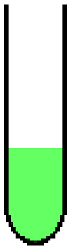
Unit - 8 d & f - Block Elements

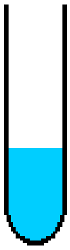
Approximate colours for some common transition metal complex ions

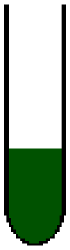

$[Cr(H_2O)_6]^{3+}$

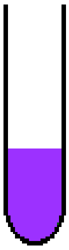

$[Fe(H_2O)_6]^{2+}$

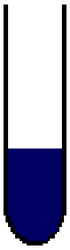

$[Co(H_2O)_6]^{2+}$

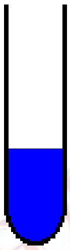

$[Ni(H_2O)_6]^{2+}$


$[Cu(H_2O)_6]^{2+}$


$[Cr(OH)_6]^{3-}$

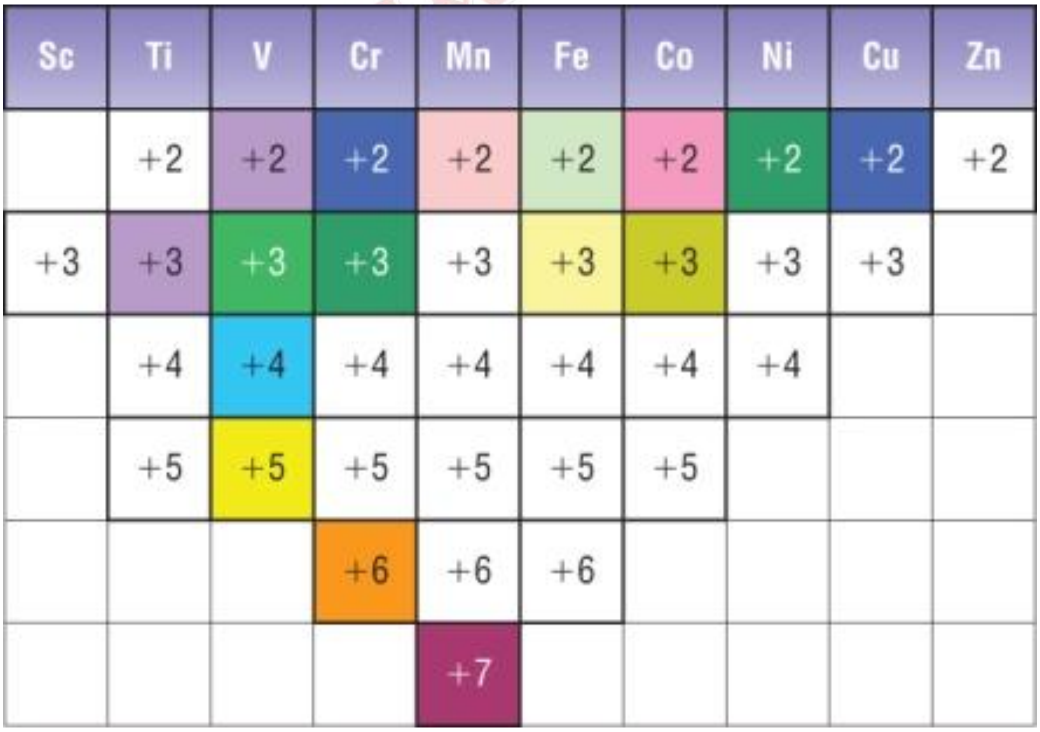

$[Cr(NH_3)_6]^{3+}$


$[Cu(NH_3)_4(H_2O)_2]^{2+}$


$[CoCl_4]^{2-}$


$[Co(NH_3)_6]^{2+}$

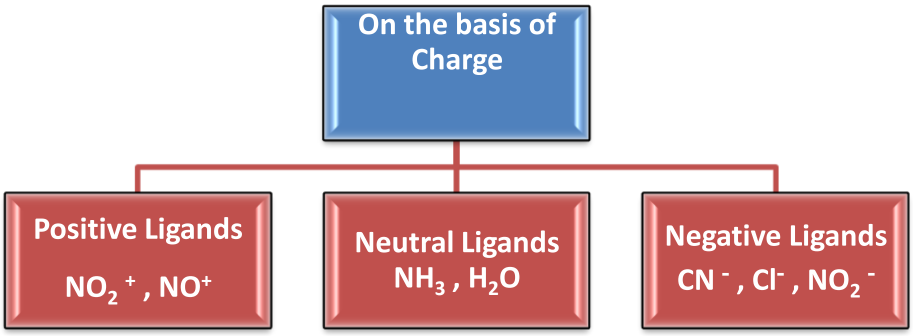
Oxidation Numbers



Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn
	+2	+2	+2	+2	+2	+2	+2	+2	+2
+3	+3	+3	+3	+3	+3	+3	+3	+3	
	+4	+4	+4	+4	+4	+4	+4		
	+5	+5	+5	+5	+5	+5			
			+6	+6	+6				
				+7					

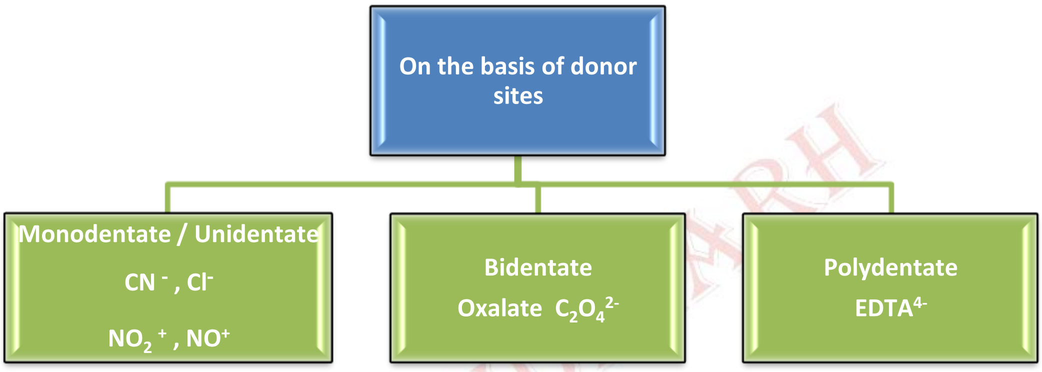
UNIT - 9 Co Ordination Compounds

Classification of Ligands



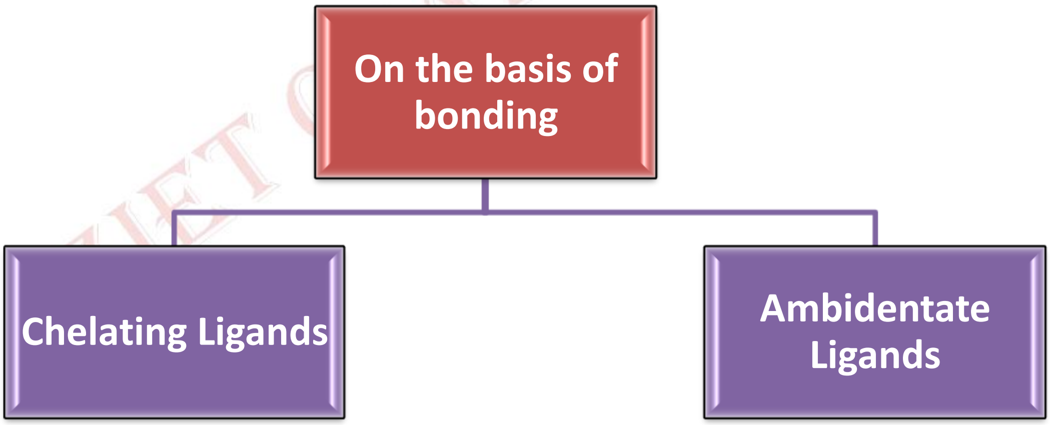
On the basis of Charge

- Positive Ligands NO_2^+ , NO^+
- Neutral Ligands NH_3 , H_2O
- Negative Ligands CN^- , Cl^- , NO_2^-



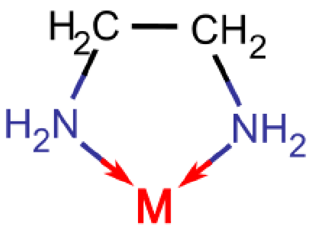
On the basis of donor sites

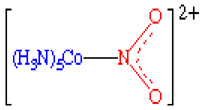
- Monodentate / Unidentate CN^- , Cl^- NO_2^+ , NO^+
- Bidentate Oxalate $C_2O_4^{2-}$
- Polydentate $EDTA^{4-}$



On the basis of bonding

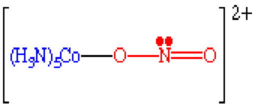
- Chelating Ligands
- Ambidentate Ligands





Nitro

pentamminenitrocobalte (III)

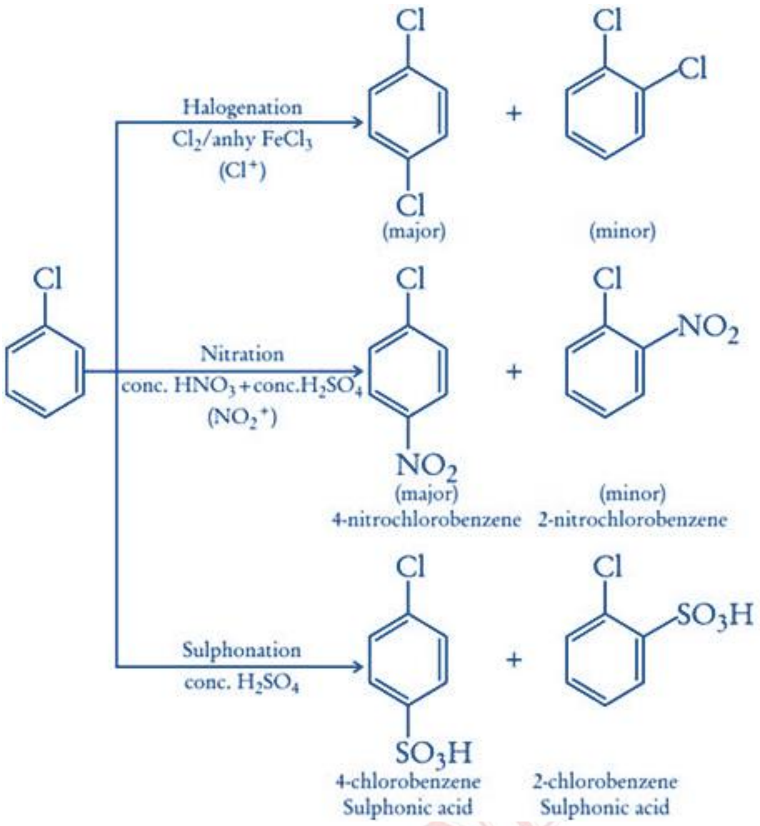


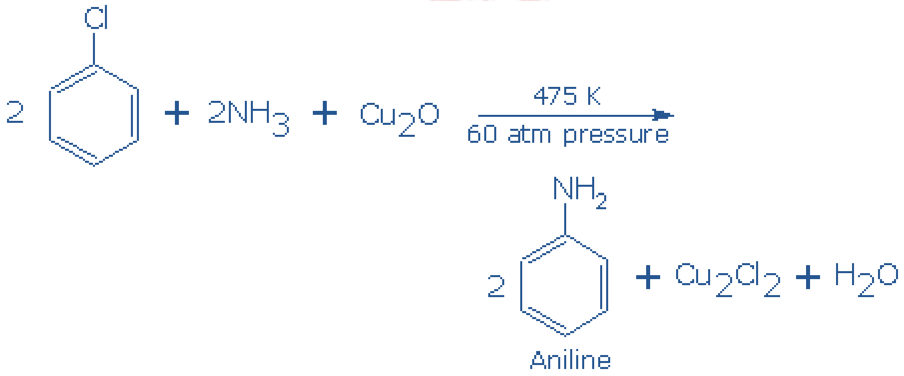
Nitrito

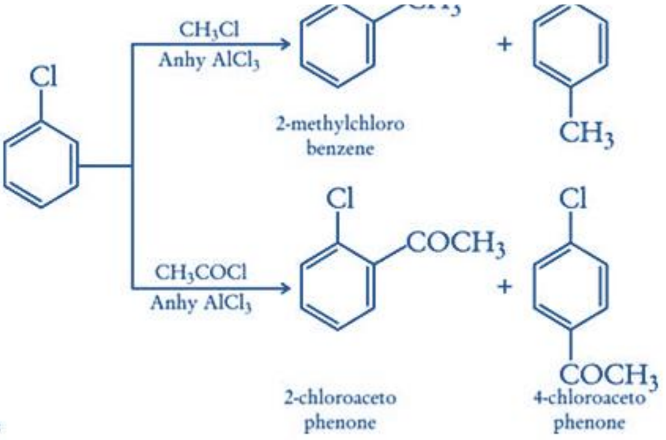
pentamminenitritocobalte(III)

UNIT :10 Haloalkanes and Haloarenes

Chemical Properties – Halo Arenes



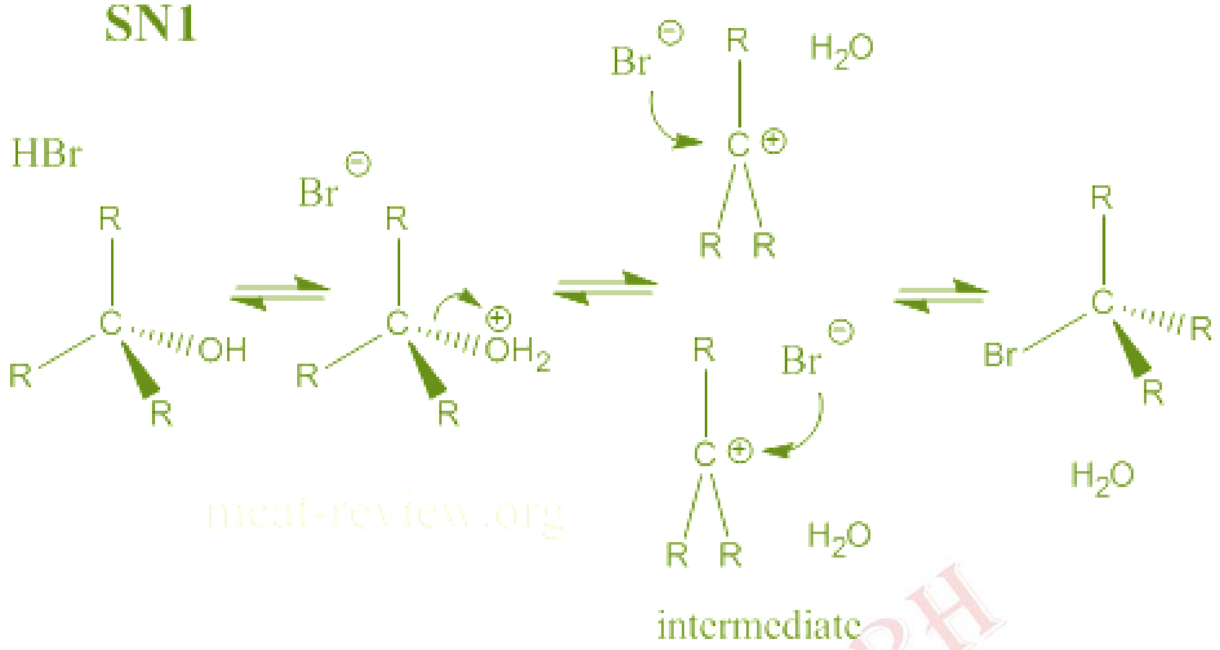




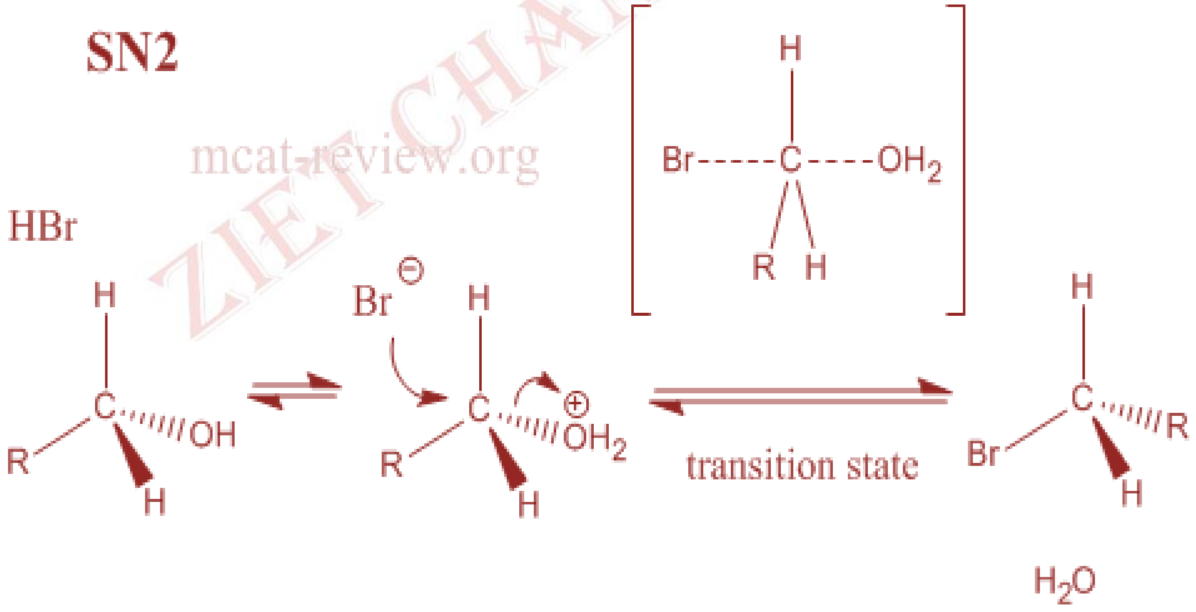
Friedal Craft Reaction

Mechanism – SN1 & SN2

SN1

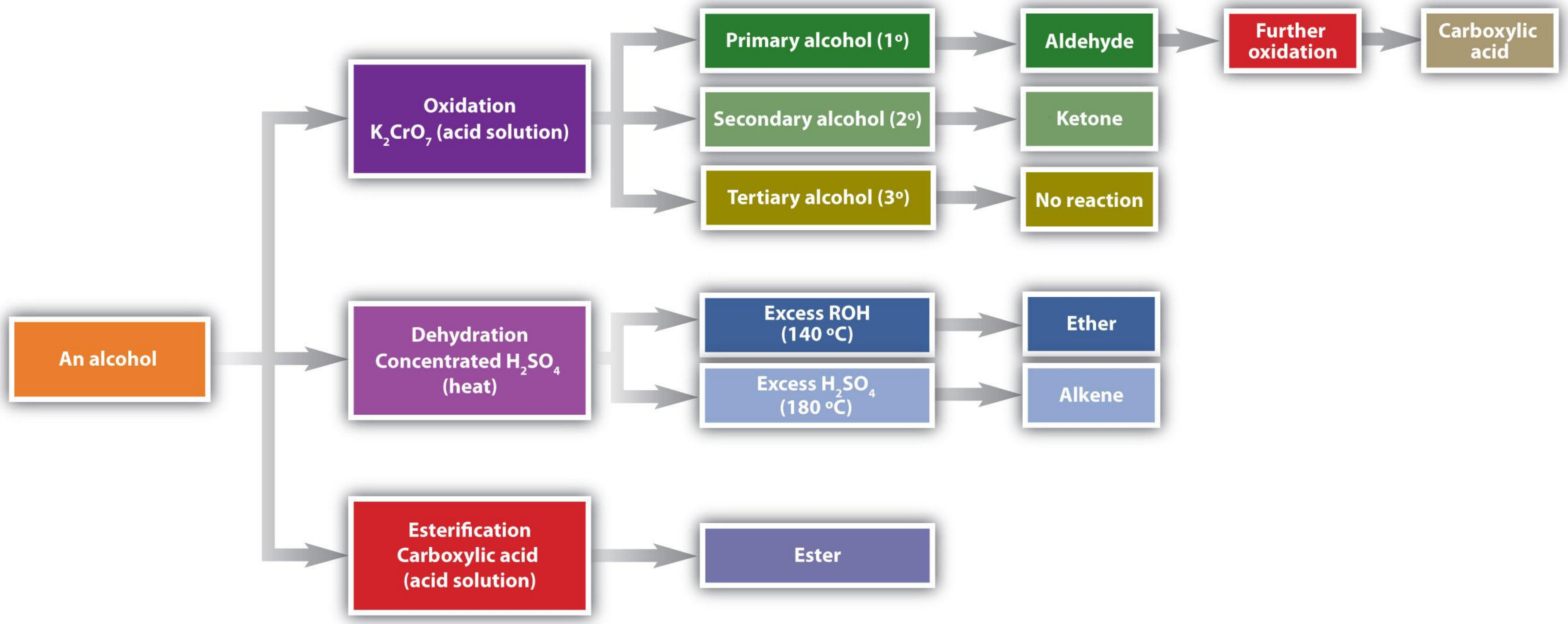


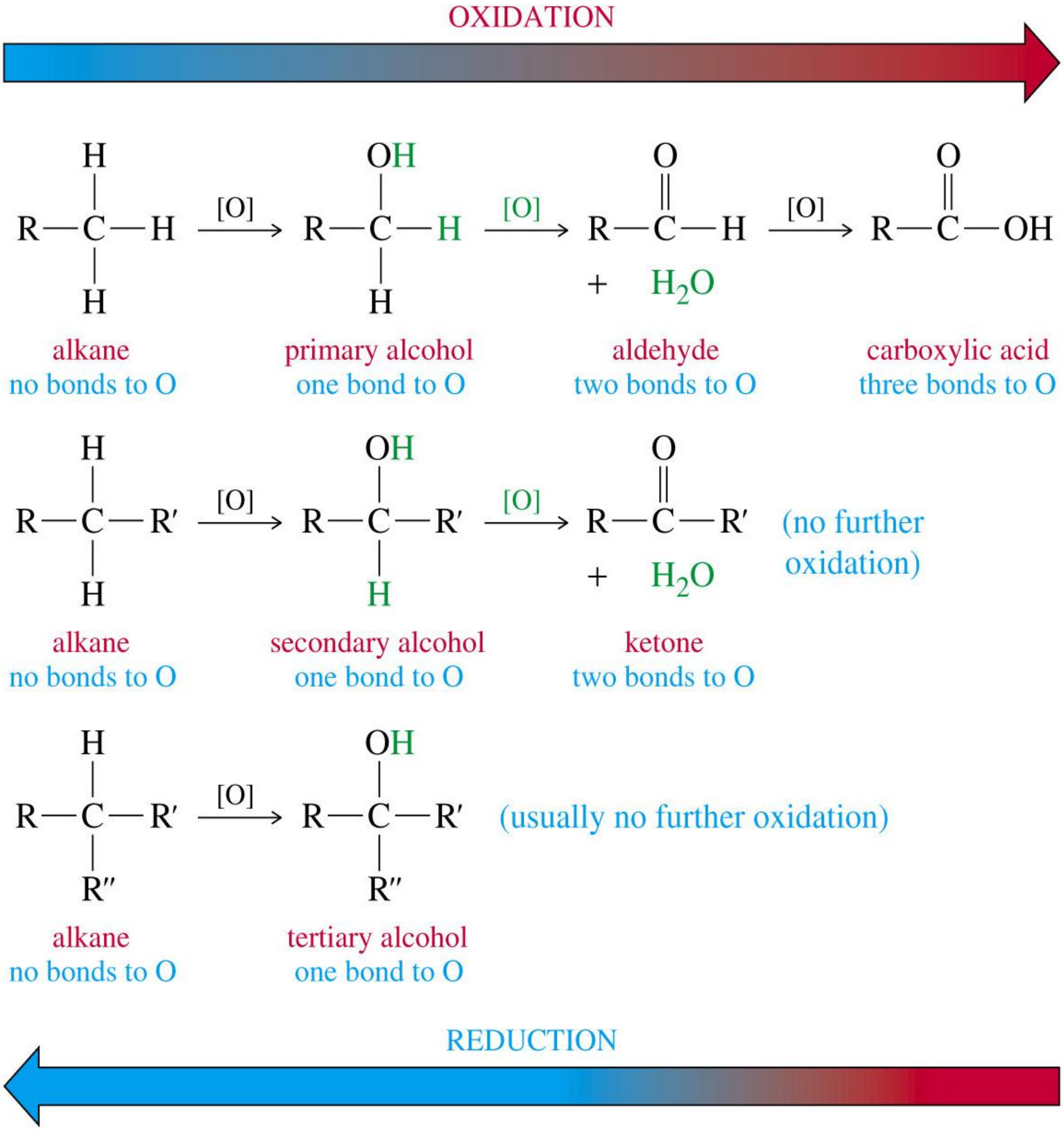
SN2



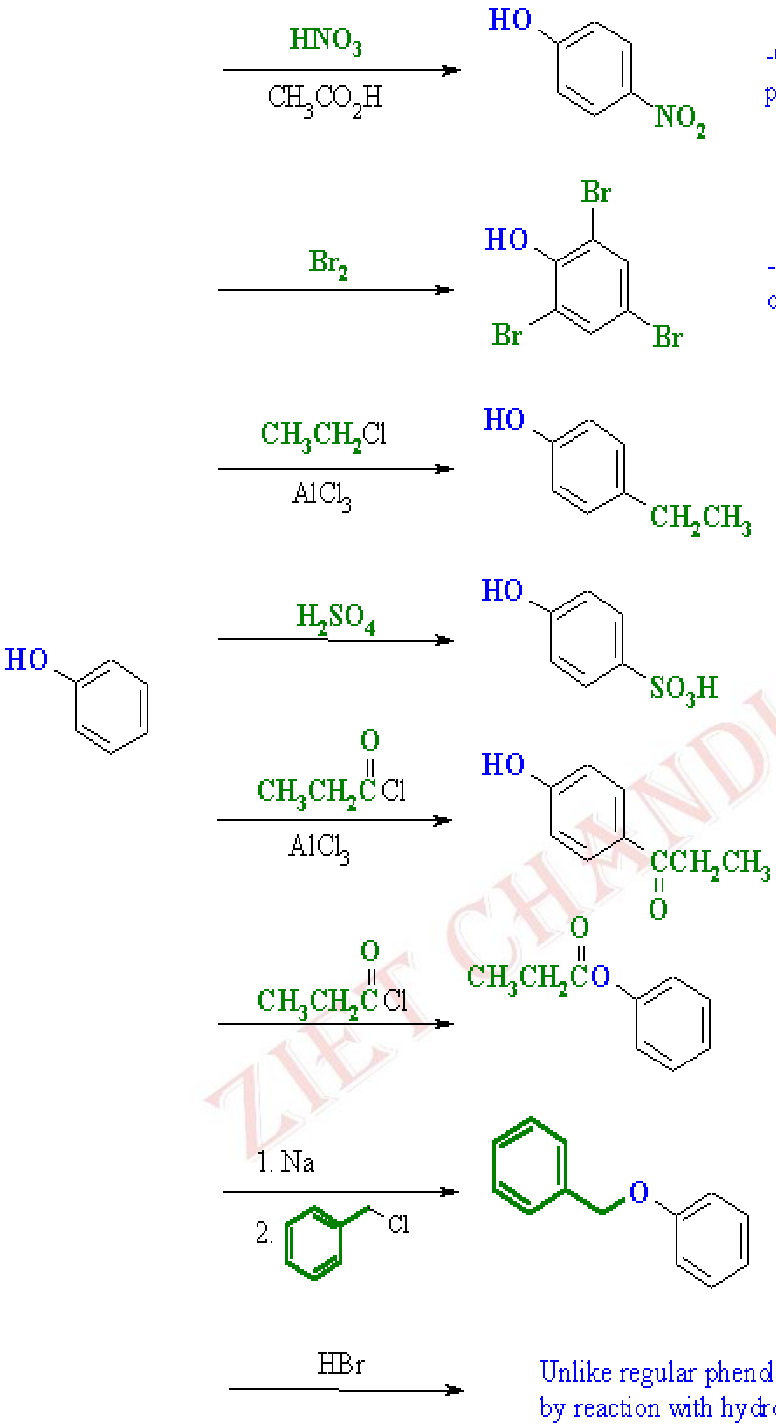
Unit :11 Alcohols, Phenols and Ether

Reactions of Alcohols




OXIDATION
[O]
[O]
[O]
alkane
no bonds to O
primary alcohol
one bond to O
aldehyde
two bonds to O
carboxylic acid
three bonds to O
+ H2O
(no further oxidation)
alkane
no bonds to O
secondary alcohol
one bond to O
ketone
two bonds to O
(usually no further oxidation)
alkane
no bonds to O
tertiary alcohol
one bond to O
REDUCTION

Reactions of Phenol



-OH group directs nitration to the para position

-OH is so activating that bromination occurs at all available o- and p- sites

Friedel-Crafts alkylation is directed to the para-position by the -OH group

-OH group directs sulfonation to the para position

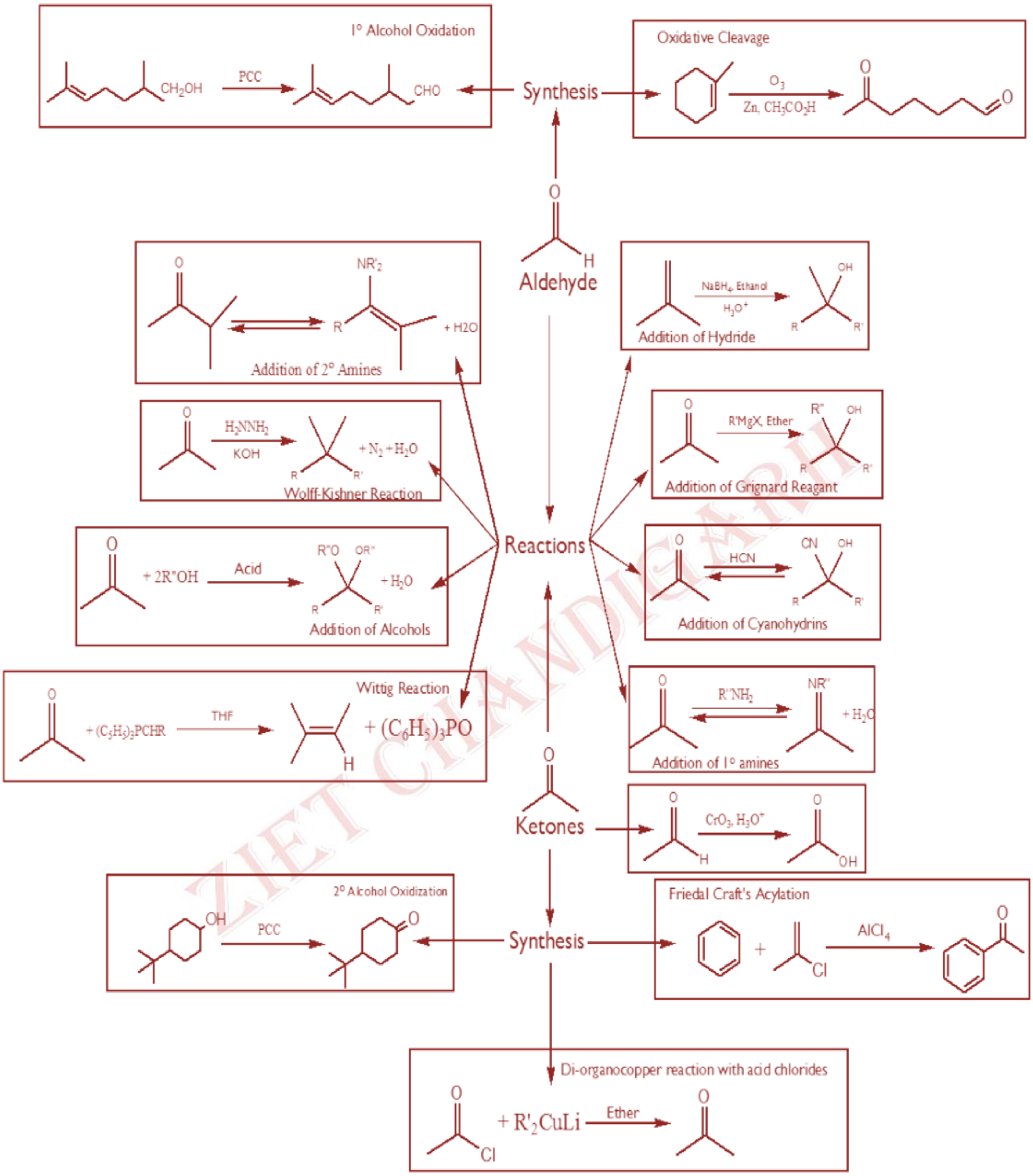
Friedel-Crafts acylation is directed to the para-position by the -OH group

Like other alcohols, phenols react with acyl chlorides to give esters

A typical Williamson ether synthesis

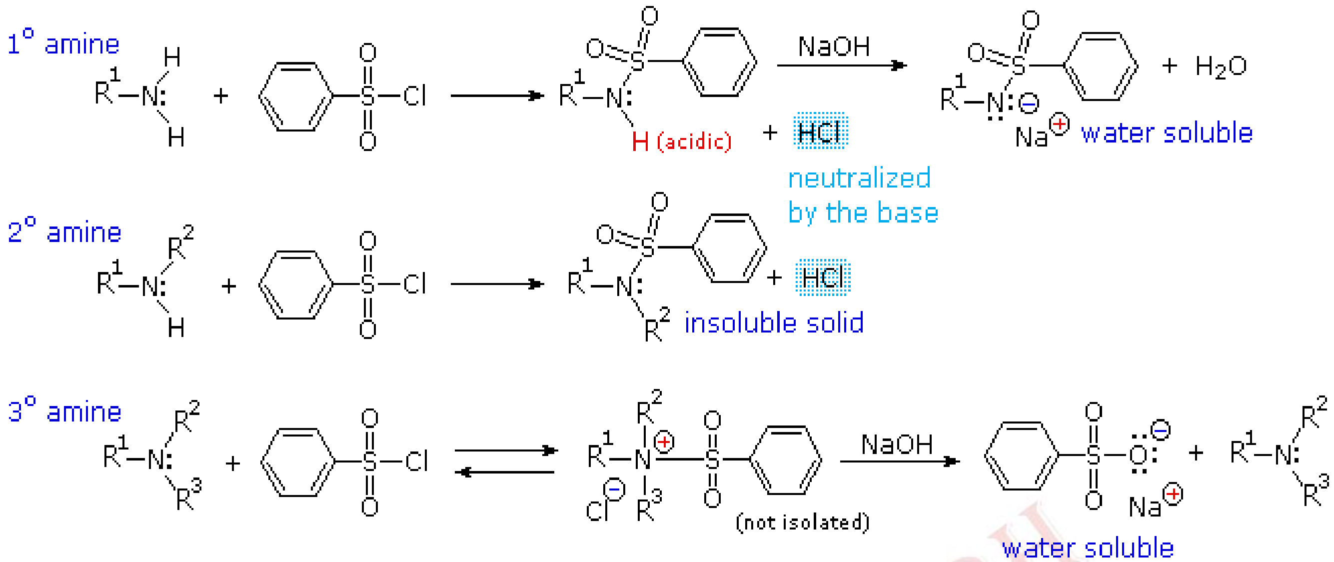
Unlike regular phends are not converted to bromides by reaction with hydrogen bromide

UNIT 12: Aldehydes, Ketones And Carboxylic Acids

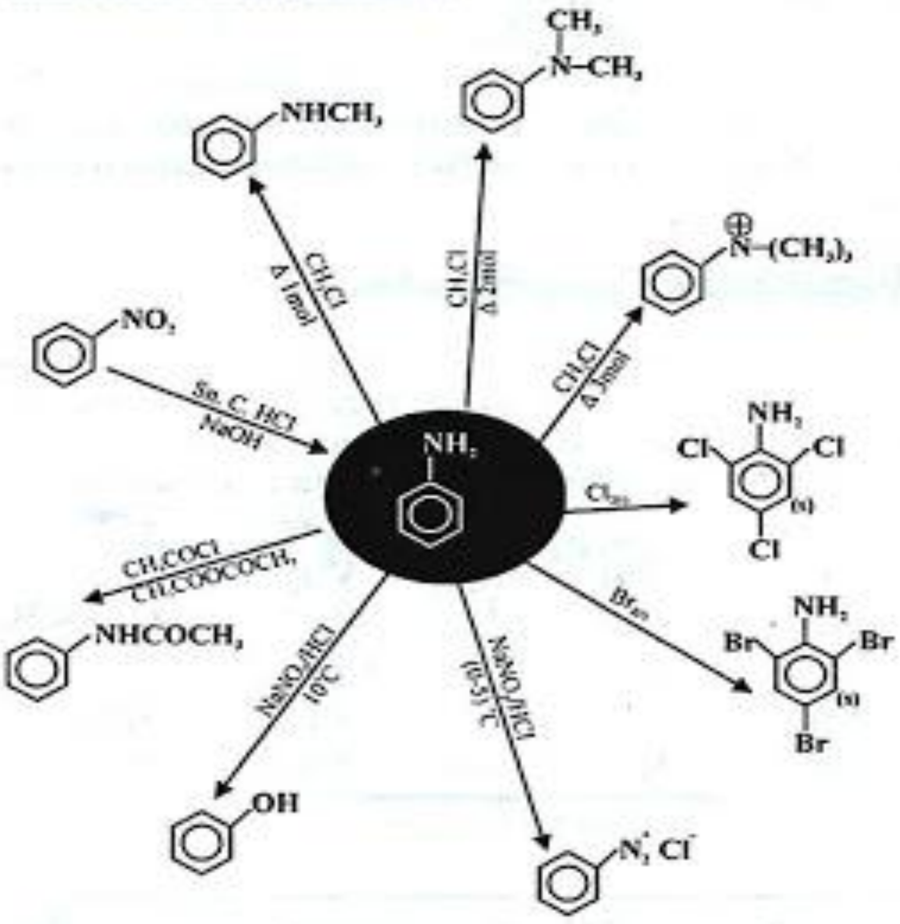


UNIT :13 Organic compound containing Nitrogen

The Hinsberg test



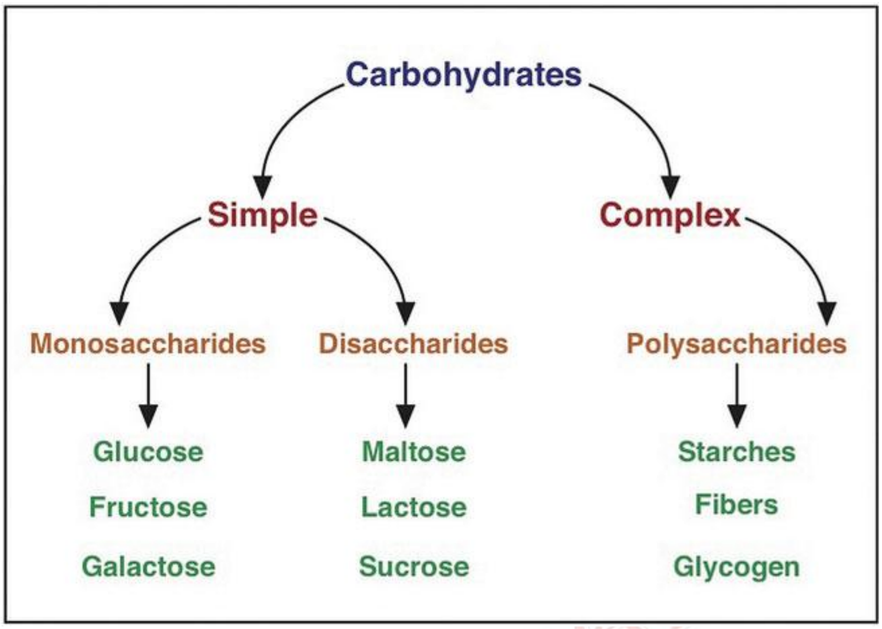
Reaction summery of Aniline

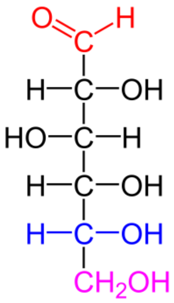


UNIT : 14 Biomolecules

Classification of Carbohydrates

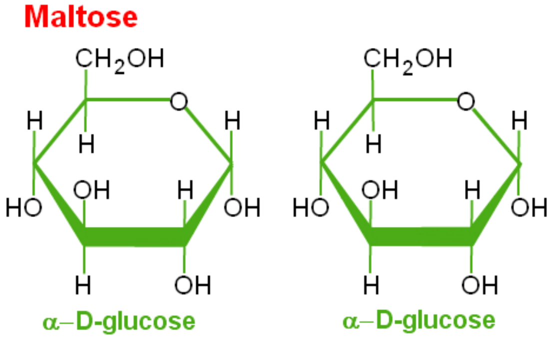
The carbohydrates are divided into three major classes depending upon whether or not they undergo hydrolysis and on the number of products formed.



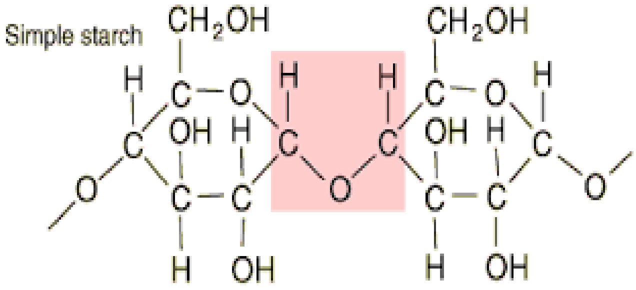


MONOSACCHARIDE

Glucose

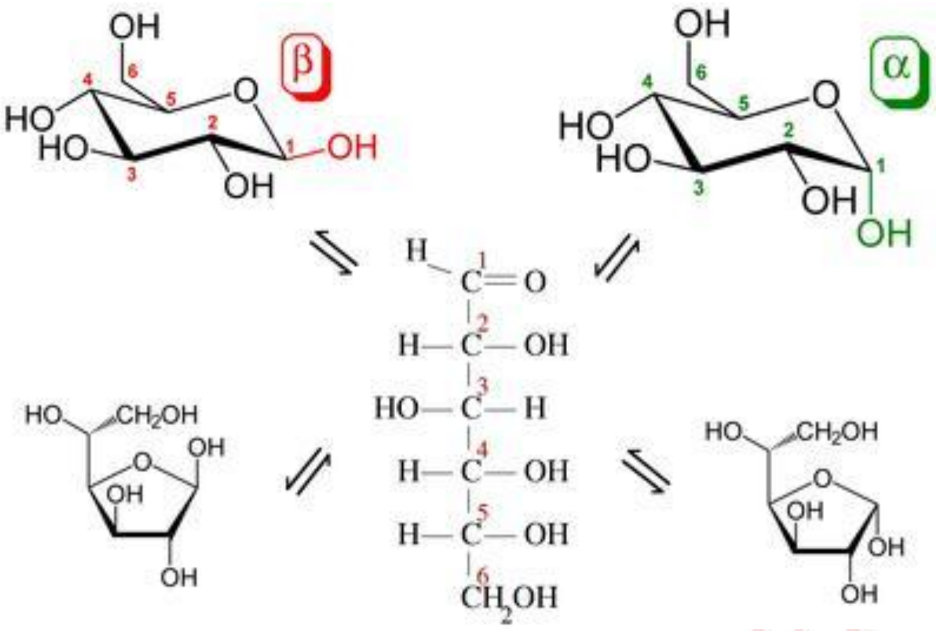


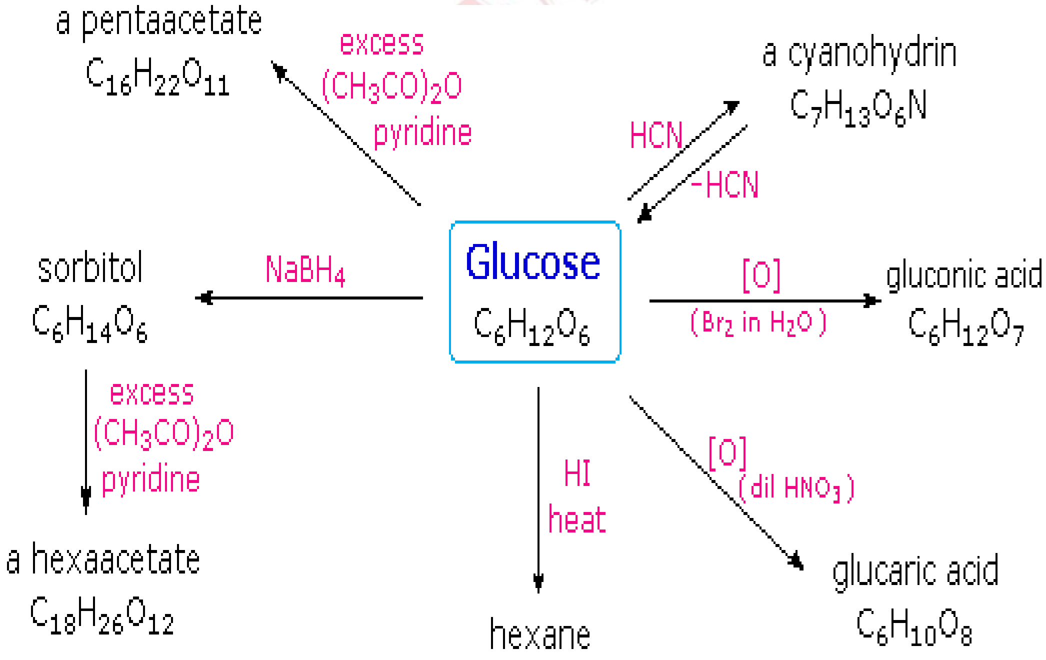
DISACCHARIDE



POLYSACCHARIDE

Forms & Reactions of Glucose

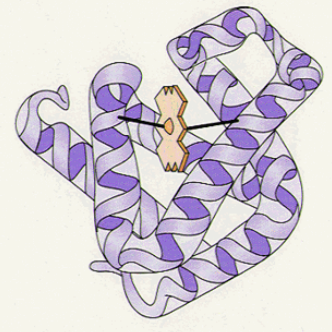




Classification of Proteins

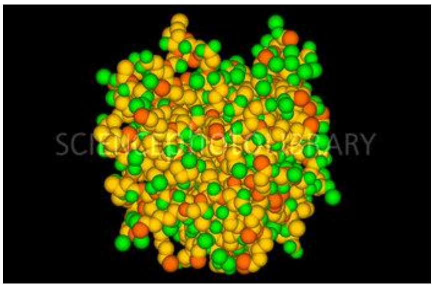
Properties	**Fibrous Protein**	**Globular Protein**
Shape	Long and narrow	Rounded / spherical
Role	Structural (strength and support)	Functional (catalytic, transport, etc.)
Solubility	(Generally) insoluble in water	(Generally) soluble in water
Sequence	Repetitive amino acid sequence	Irregular amino acid sequence
Stability	Less sensitive to changes in heat, pH, etc.	More sensitive to changes in heat, pH, etc.
Examples	Collagen, myosin, fibrin, actin, keratin, elastin	Catalase, haemoglobin, insulin, immunoglobulin

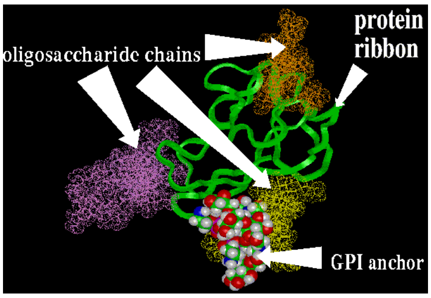
Collagen, a fibrous protein



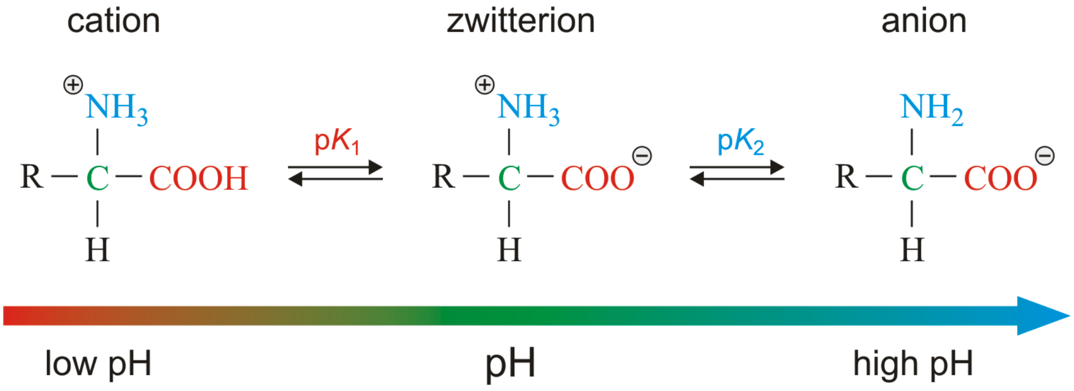
Myoglobin, a globular protein

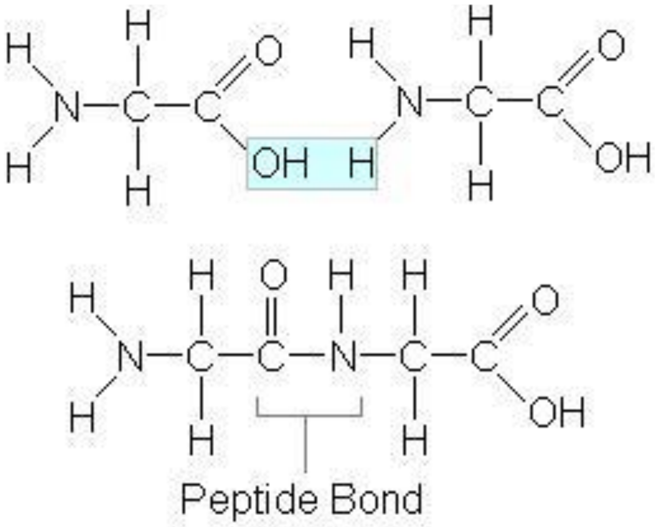
Simple Protein	Conjugated Protein
Simple protein consists of only amino acids or their derivatives. When hydrolysed by acids, alkalies or enzymes, simple proteins yield only amino acids or their derivatives	These consist of simple proteins in combination with some non-protein component. The non-protein groups are called prosthetic groups.
Ex- Albumins Globulins	Ex- Nucleoproteins: Protein + nucleic acid Glycoproteins : Protein+ Carbohydrate



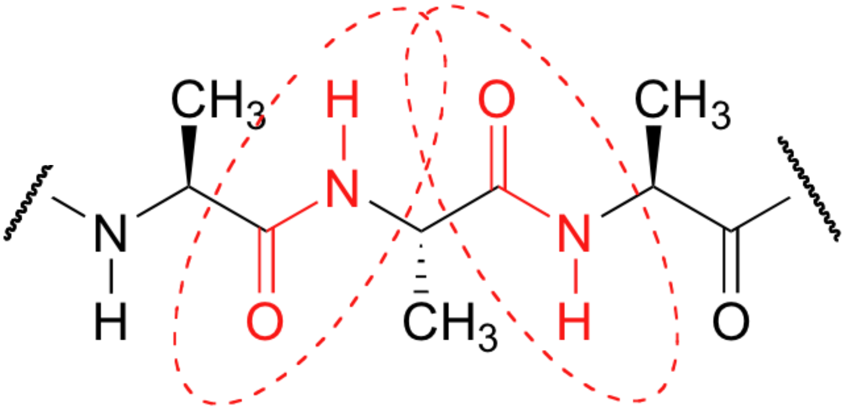


Zwitter ion & Peptide Linkage





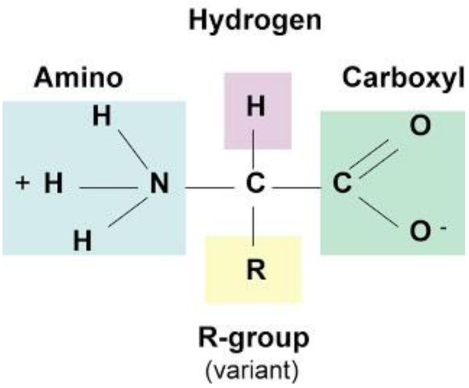
A molecule of water is removed from two glycine amino acids to form a peptide bond.

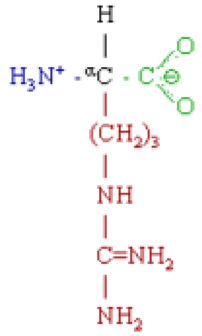


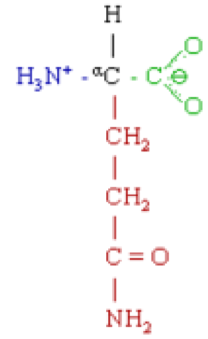
peptide bonds in a polypeptide

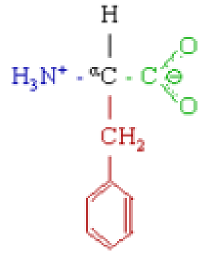
3] Amino Acids

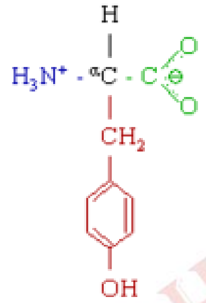
Amino Acid Structure

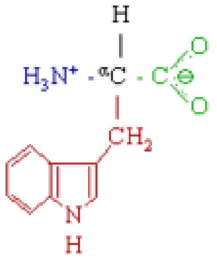


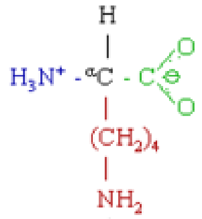

Arginine
(Arg / R)

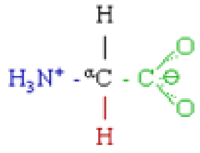

Glutamine
(Gln / Q)

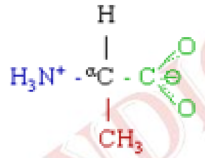

Phenylalanine
(Phe / F)

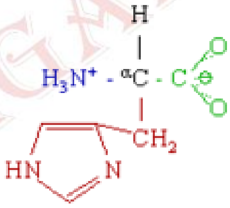

Tyrosine
(Tyr / Y)

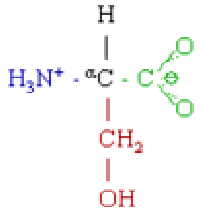

Tryptophan
(Trp, W)

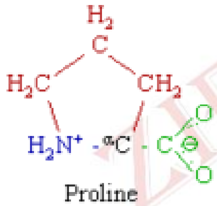

Lysine
(Lys / K)

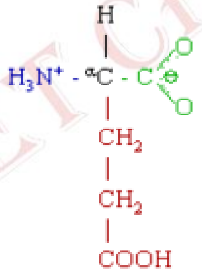

Glycine
(Gly / G)

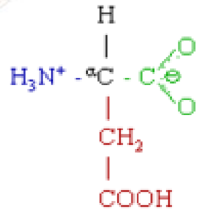

Alanine
(Ala / A)

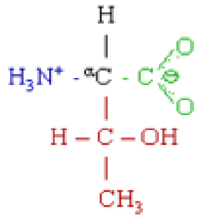

Histidine
(His / H)

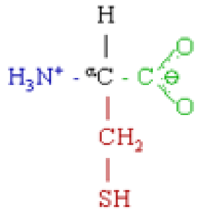

Serine
(Ser / S)

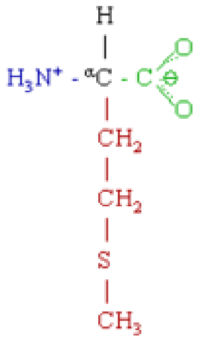

Proline
(Pro / P)

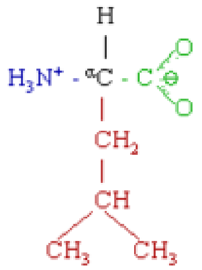

Glutamic Acid
(Glu / E)

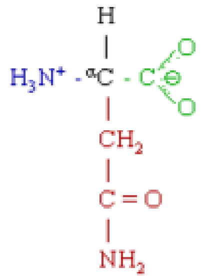

Aspartic Acid
(Asp / D)

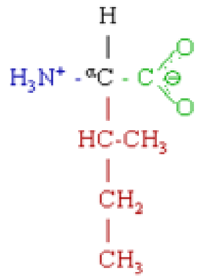

Threonine
(Thr / T)

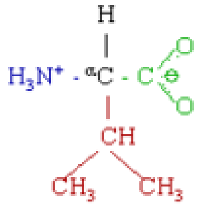

Cysteine
(Cys / C)


Methionine
(Met / M)


Leucine
(Leu / L)


Asparagine
(Asn / N)

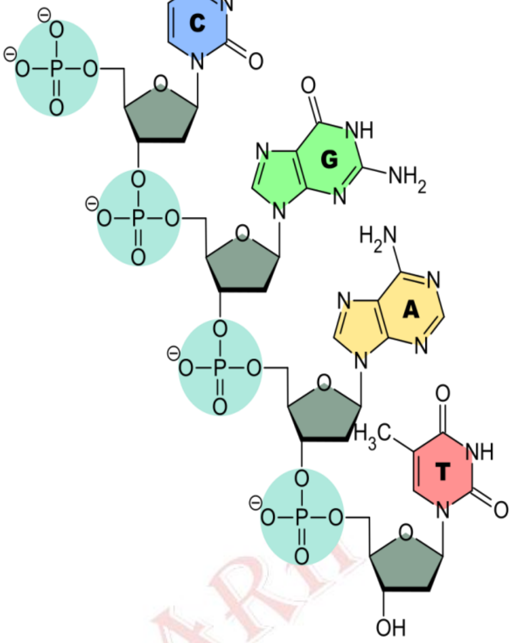

Isoleucine
(Ile / I)

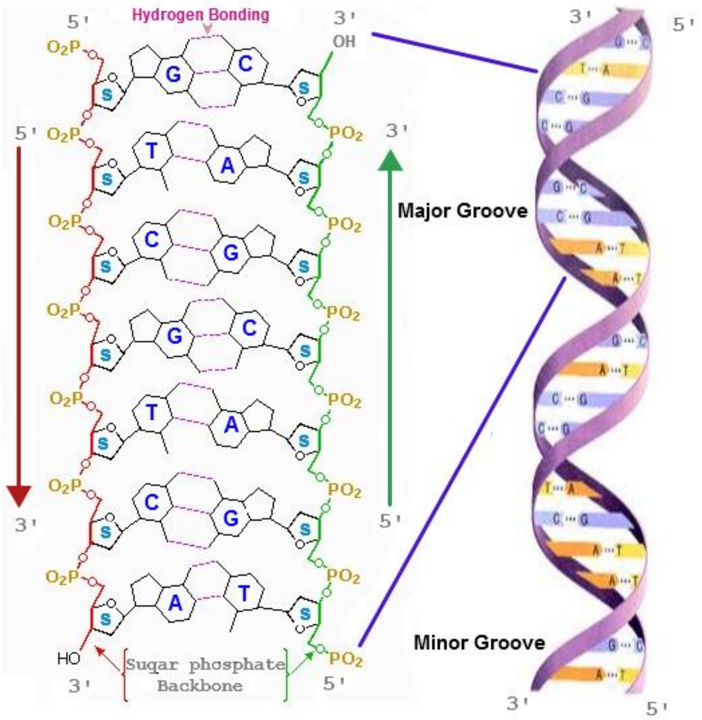

Valine
(Val / V)

Structure of Nucleic Acids

PRIMARY STRUCTURE

consists of a linear sequence of nucleotides that are linked together by phosphodiester bonds. It is this linear sequence of nucleotides that make up the primary structure of ***DNA*** ***or*** ***RNA*****.**



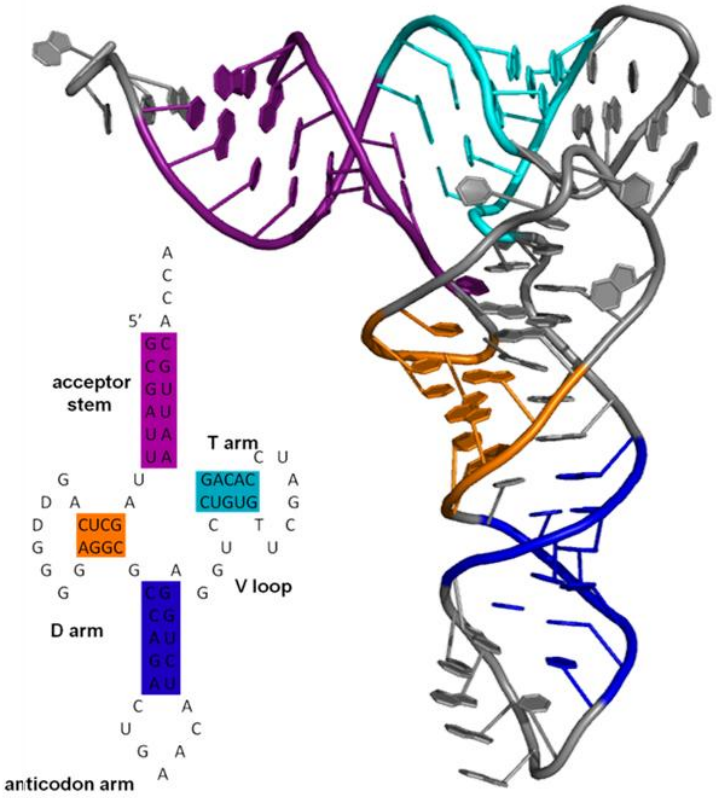


(a) (b)

SECONDARY STRUCTURE *is the set of interactions between bases, i.e., parts of which is strands are bound to each other. In DNA double helix, the two strands of DNA are held together by* ***hydrogen bonds*****.**

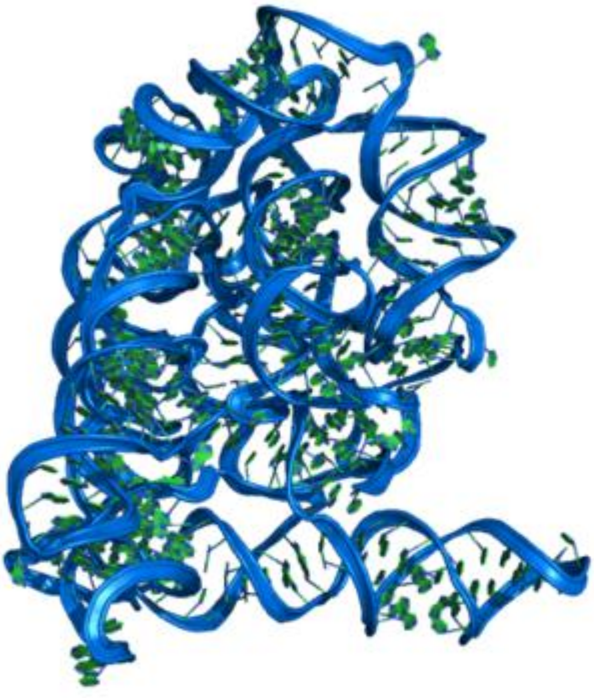
TERTIARY STRUCTURE

*the locations of the atoms in three-dimensional space, taking into consideration geometrical and **<u>stearic</u> constraints.***



QUATERNARY STRUCTURE

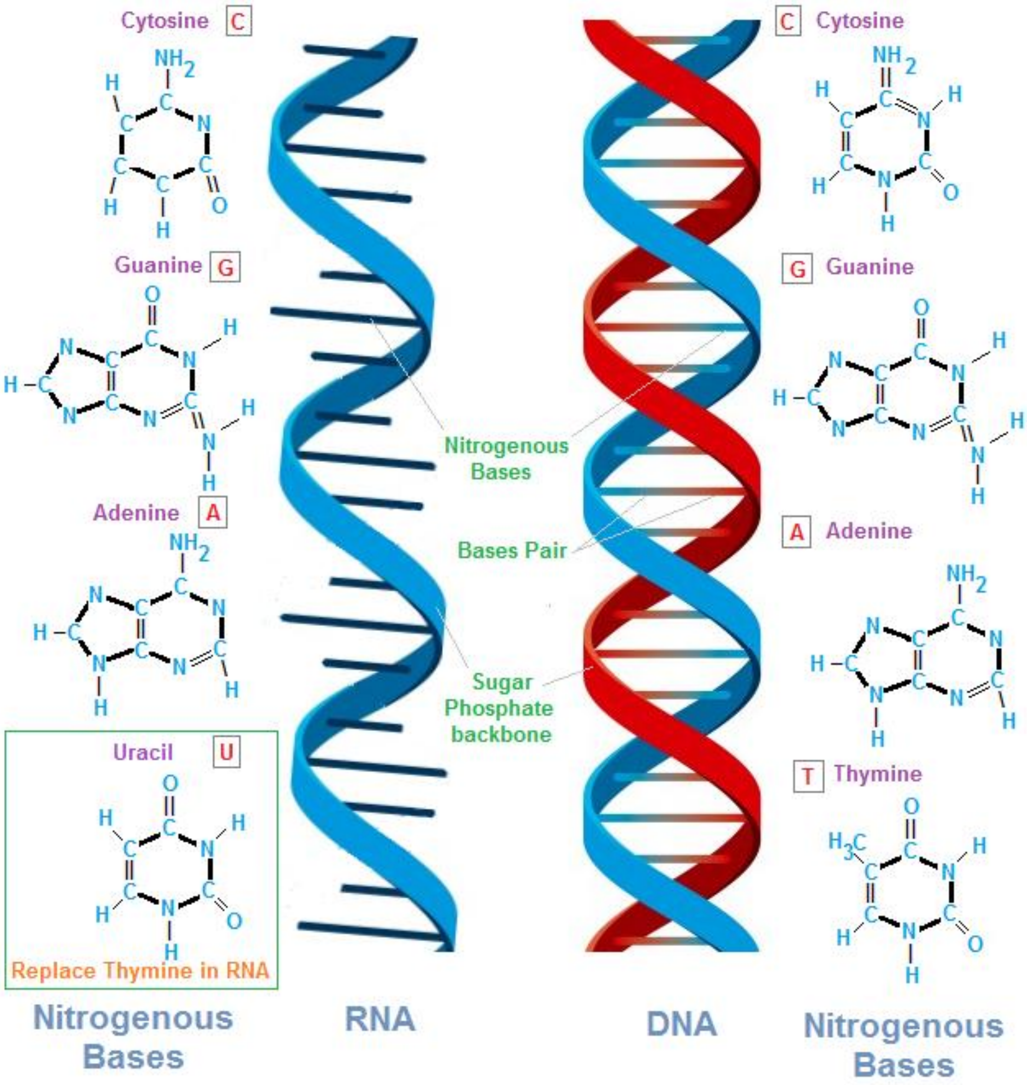
refers to a higher-level of organization of nucleic acids.

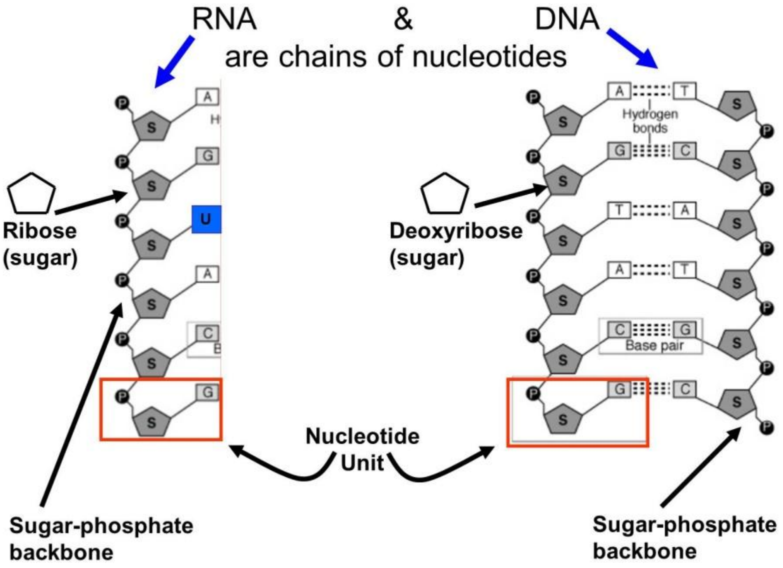


Example of a large catalytic RNA

RNA vs DNA

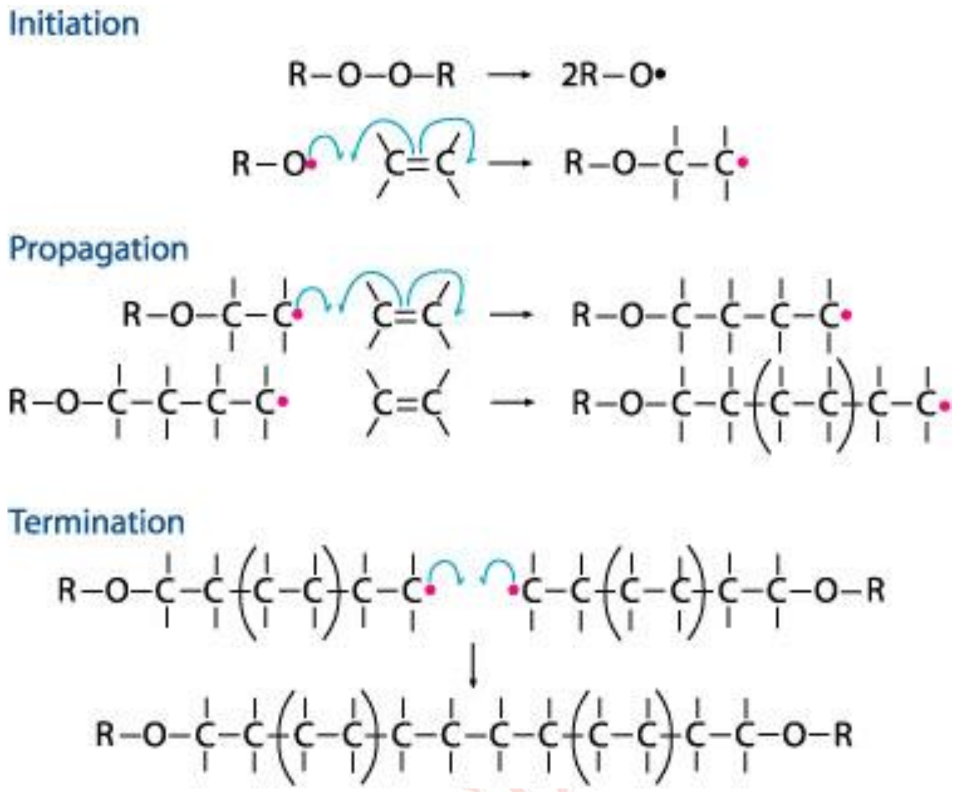
	DNA	RNA
Stands For	**DeoxyriboNucleicAcid.**	**RiboNucleicAcid.**
Definition	A nucleic acid that contains the genetic instructions used in the development and functioning of all modern living organisms. DNA's genes are expressed, or manifested, through the proteins that its nucleotides produce with the help of RNA.	The information found in DNA determines which traits are to be created, activated, or deactivated, while the various forms of RNA do the work.
Function	The blueprint of biological guidelines that a living organism must follow to exist and remain functional. Medium of long-term, stable storage and transmission of genetic information.	Helps carry out DNA's blueprint guidelines. Transfers genetic code needed for the creation of proteins from the nucleus to the ribosome.
Structure	Double-stranded. It has two nucleotide strands which consist of its phosphate group, five-carbon sugar (the stable 2-deoxyribose), and four nitrogen-containing nucleobases: adenine, thymine, cytosine, and guanine.	Single-stranded. Like DNA, RNA is composed of its phosphate group, five-carbon sugar (the less stable ribose), and four nitrogen-containing nucleobases: adenine, uracil (not thymine), guanine, and cytosine.
Base Pairing	Adenine links to thymine (A-T) and cytosine links to guanine (C-G).	Adenine links to uracil (A-U) and cytosine links to guanine (C-G).
Location	DNA is found in the nucleus of a cell and in mitochondria.	Depending on the type of RNA, this molecule is found in a cell's nucleus, its cytoplasm, and its ribosome.
Stability	Deoxyribose sugar in DNA is less reactive because of C-H bonds. Stable in alkaline conditions. DNA has smaller grooves, which makes it harder for enzymes to "attack."	Ribose sugar is more reactive because of C-OH (hydroxyl) bonds. Not stable in alkaline conditions. RNA has larger grooves, which makes it easier to be "attacked" by enzymes.
Propagation	DNA is self-replicating.	RNA is synthesized from DNA when needed.
Unique Features	The helix geometry of DNA is of B-Form. DNA is protected in the nucleus, as it is tightly packed. DNA can be damaged by exposure to ultra-violet rays.	The helix geometry of RNA is of A-Form. RNA strands are continually made, broken down and reused. RNA is more resistant to damage by Ultra-violet rays.


Cytosine C
Guanine G
Adenine A
Uracil U
Replace Thymine in RNA
Nitrogenous Bases
RNA
Nitrogenous Bases
Bases Pair
Sugar Phosphate backbone
DNA
C Cytosine
G Guanine
A Adenine
T Thymine
Nitrogenous Bases

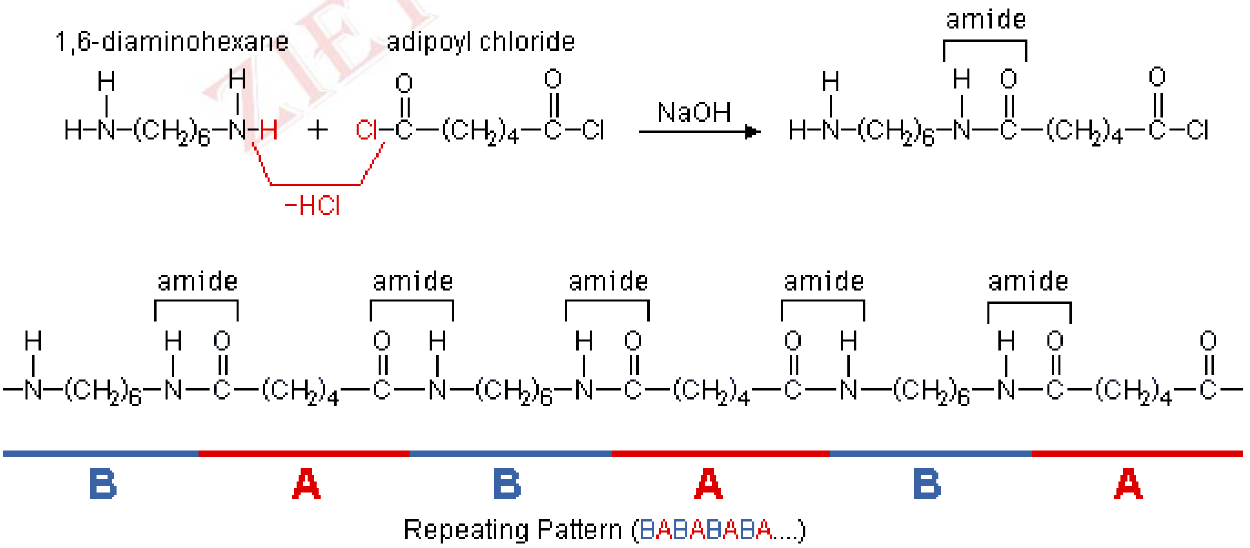

RNA
&
DNA
are chains of nucleotides
Ribose (sugar)
Deoxyribose (sugar)
Hydrogen bonds
Base pair
Nucleotide Unit
Sugar-phosphate backbone
Sugar-phosphate backbone
A
G
U
A
C
G
A T
G C
T A
A T
C G
G C
S
P

UNIT : 15 Polymers

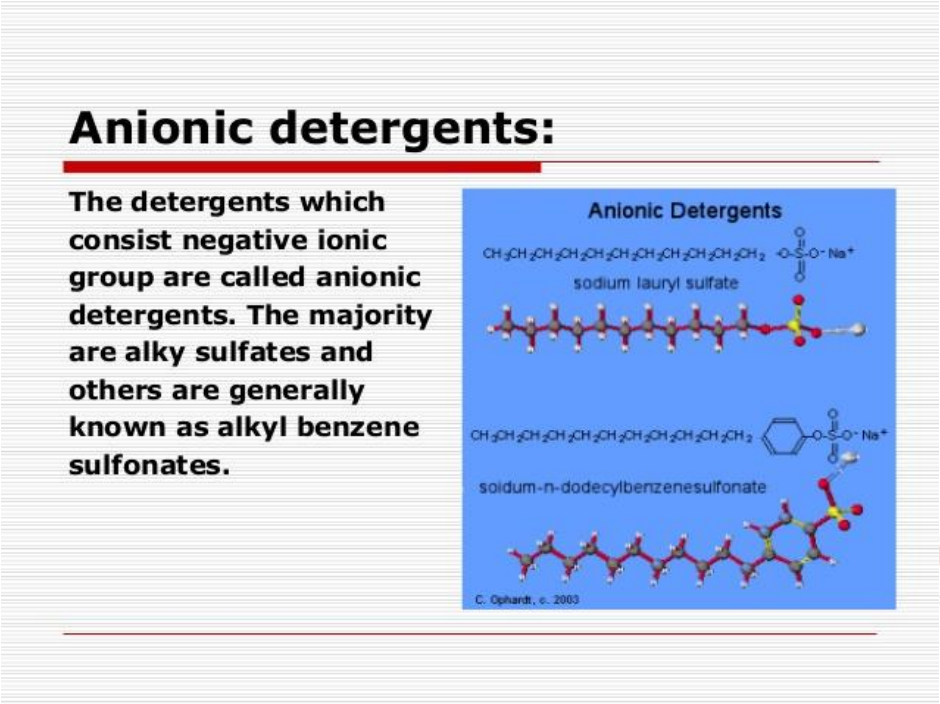
Addition Polymerisation



Condensation Polymerisation

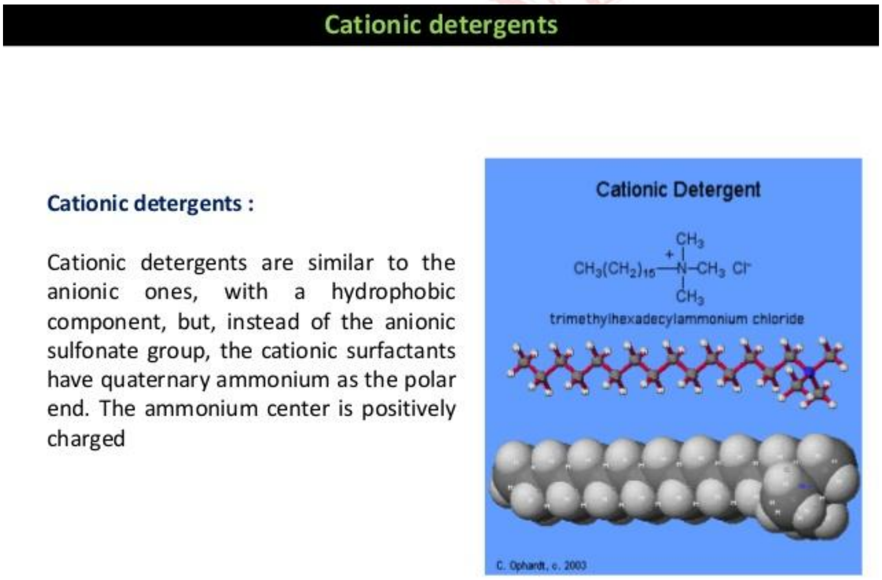


Anionic Detergents



Anionic detergents:

The detergents which consist negative ionic group are called anionic detergents. The majority are alky sulfates and others are generally known as alkyl benzene sulfonates.



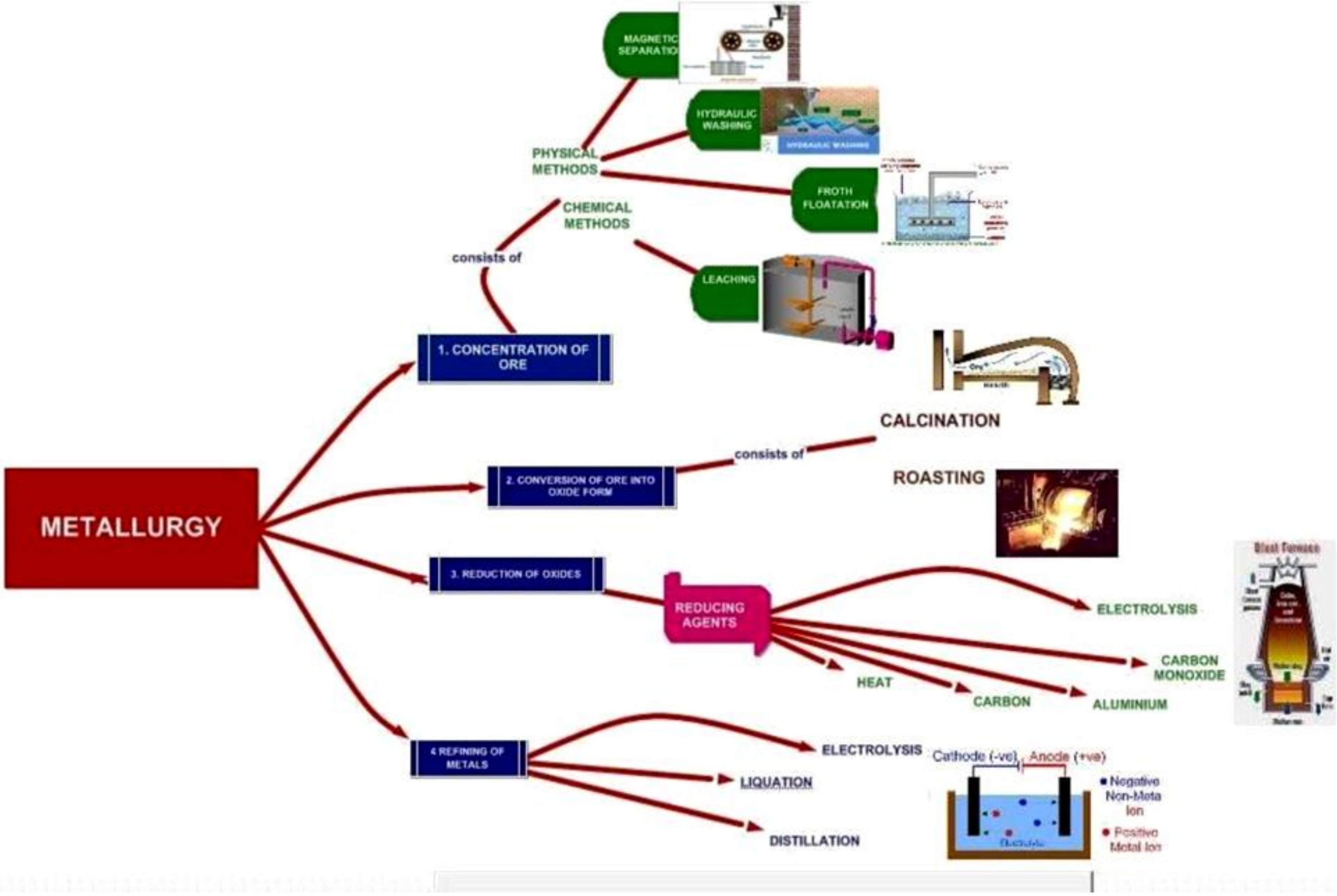
Cationic detergents

Cationic detergents :

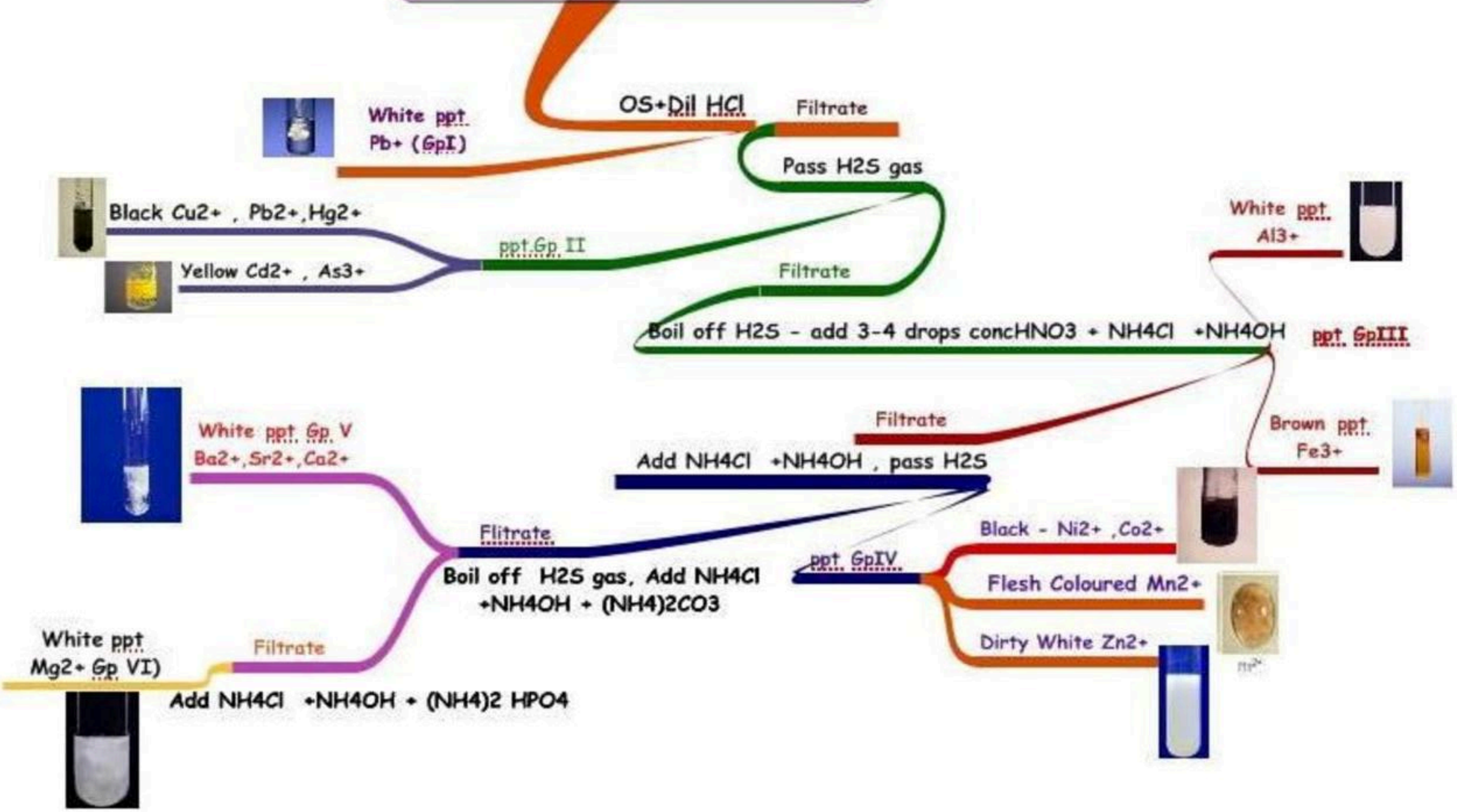
Cationic detergents are similar to the anionic ones, with a hydrophobic component, but, instead of the anionic sulfonate group, the cationic surfactants have quaternary ammonium as the polar end. The ammonium center is positively charged

****

METALLURGY


METALLURGY
1. CONCENTRATION OF ORE
consists of
PHYSICAL METHODS
MAGNETIC SEPARATIO
HYDRAULIC WASHING
FROTH FLOATATION
CHEMICAL METHODS
LEACHING
2. CONVERSION OF ORE INTO OXIDE FORM
consists of
CALCINATION
ROASTING
3. REDUCTION OF OXIDES
REDUCING AGENTS
ELECTROLYSIS
CARBON MONOXIDE
HEAT
CARBON
ALUMINIUM
Blast Furnace
4 REFINING OF METALS
ELECTROLYSIS
LIQUATION
DISTILLATION
Cathode (-ve)
Anode (+ve)
Negative Non-Meta Ion
Positive Metal Ion

ANALYSIS FOR CATIONS



OS+Dil HCl

White ppt
Pb+ (GpI)

Filtrate

Pass H2S gas

ppt.Gp II

Black Cu2+ , Pb2+,Hg2+

Yellow Cd2+ , As3+

Filtrate

Boil off H2S - add 3-4 drops concHNO3 + NH4Cl +NH4OH

ppt. GpIII

White ppt
Al3+

Brown ppt
Fe3+

Filtrate

Add NH4Cl +NH4OH , pass H2S

ppt. GpIV

Black - Ni2+ ,Co2+

Flesh Coloured Mn2+

Dirty White Zn2+

Flitrate

Boil off H2S gas, Add NH4Cl
+NH4OH + (NH4)2CO3

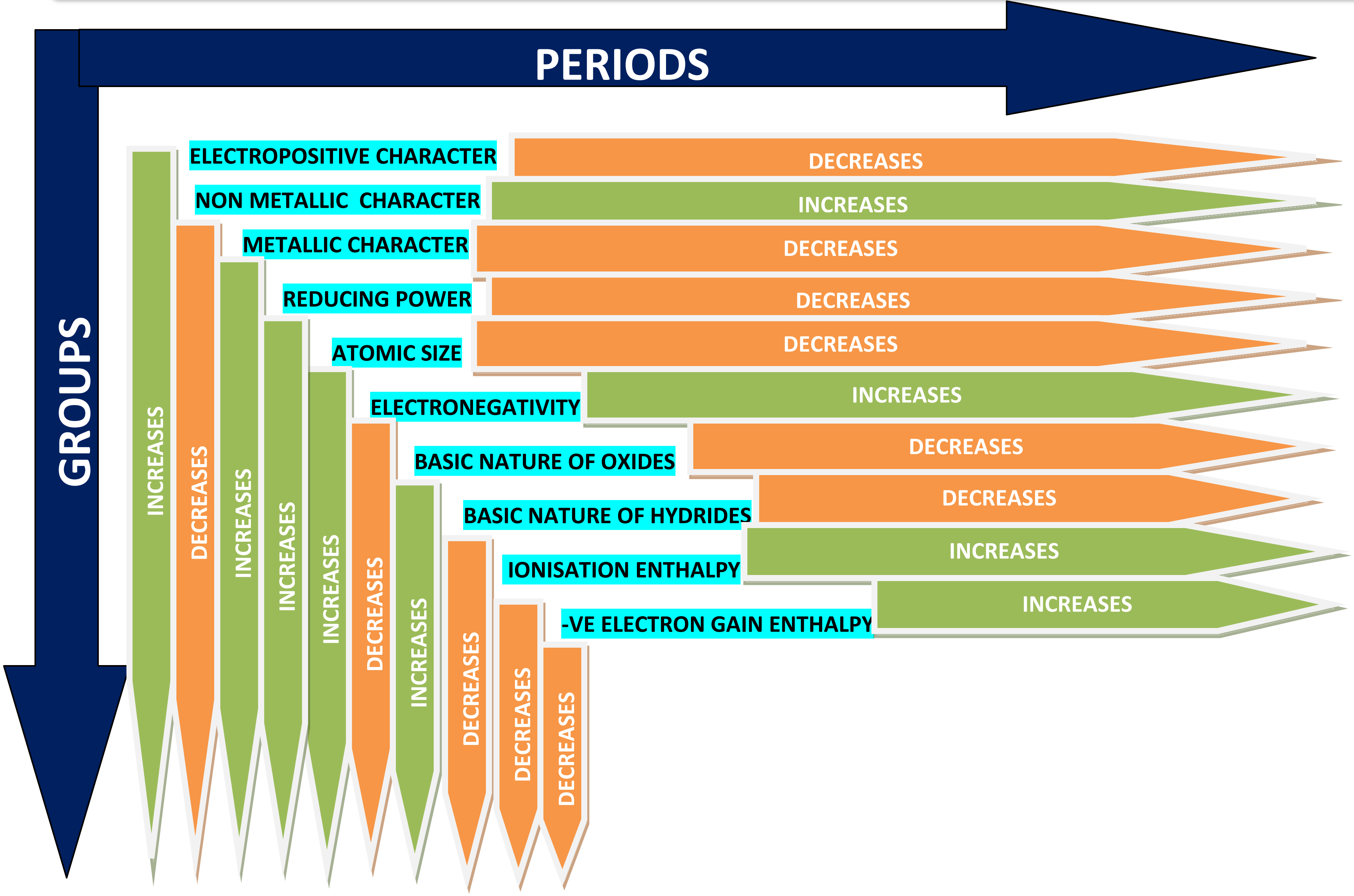
White ppt Gp V
Ba2+,Sr2+,Ca2+

Filtrate

Add NH4Cl +NH4OH + (NH4)2 HPO4

White ppt
Mg2+ Gp VI)

GENERAL TRENDS - PERIODIC TABLE



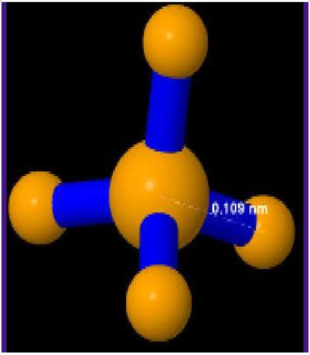
PERIODS

GROUPS

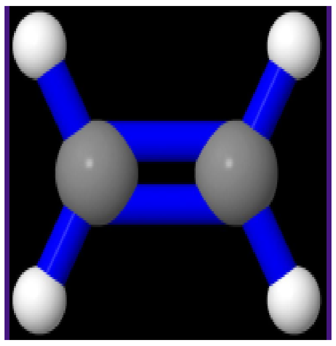
ELECTROPOSITIVE CHARACTER	DECREASES	INCREASES
NON METALLIC CHARACTER	INCREASES	DECREASES
METALLIC CHARACTER	DECREASES	INCREASES
REDUCING POWER	DECREASES	INCREASES
ATOMIC SIZE	DECREASES	INCREASES
ELECTRONEGATIVITY	INCREASES	DECREASES
BASIC NATURE OF OXIDES	DECREASES	INCREASES
BASIC NATURE OF HYDRIDES	DECREASES	DECREASES
IONISATION ENTHALPY	INCREASES	DECREASES
-VE ELECTRON GAIN ENTHALPY	INCREASES	DECREASES

HYDROCARBONS

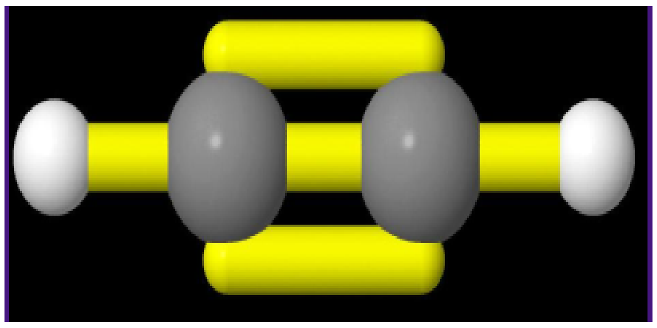
- SATURATED
  - ALKANES
    - General Formula - Cn H2n+2
    - Eg. METHANE

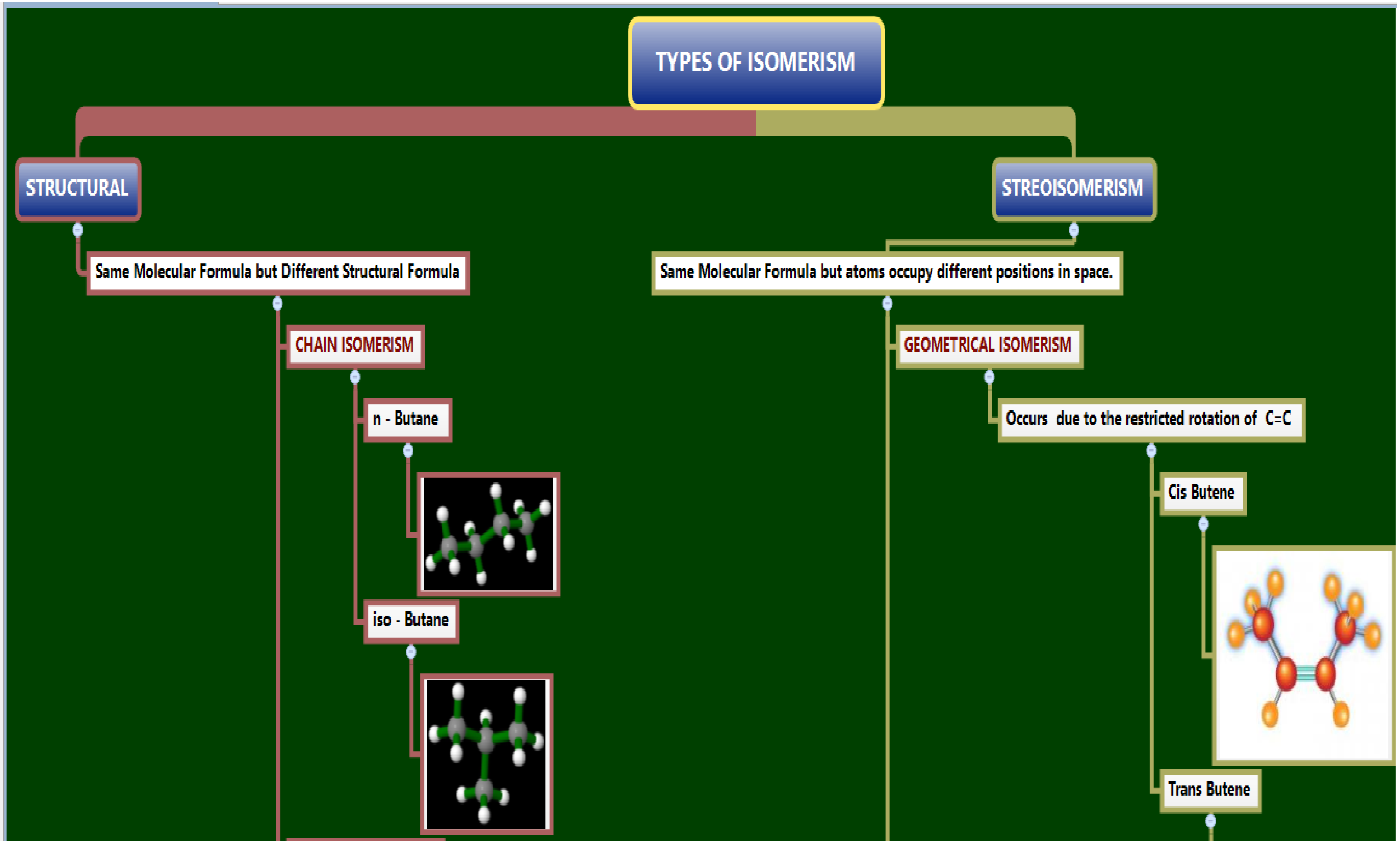


- UNSATURATED
  - ALKENES
    - General Formula - Cn H2n
    - Eg. ETHENE



  - ALKYNES
    - General Formula - Cn H2n-2
    - Eg.ETHYNE





TYPES OF ISOMERISM

STRUCTURAL

Same Molecular Formula but Different Structural Formula

CHAIN ISOMERISM

n - Butane

iso - Butane

STREOISOMERISM

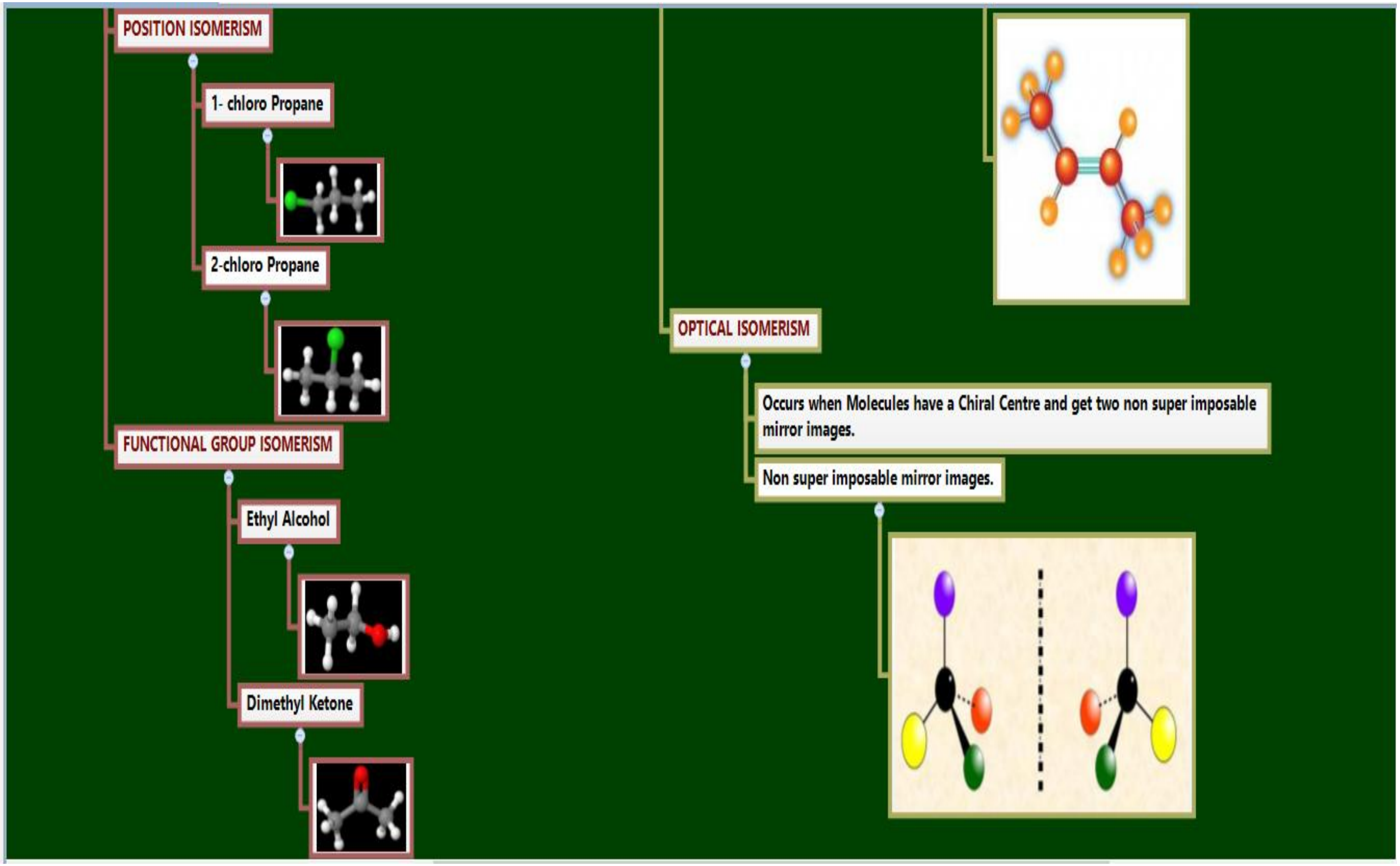
Same Molecular Formula but atoms occupy different positions in space.

GEOMETRICAL ISOMERISM

Occurs due to the restricted rotation of C=C

Cis Butene

Trans Butene



POSITION ISOMERISM

1- chloro Propane

2-chloro Propane

FUNCTIONAL GROUP ISOMERISM

Ethyl Alcohol

Dimethyl Ketone

OPTICAL ISOMERISM

Occurs when Molecules have a Chiral Centre and get two non super imposable mirror images.

Non super imposable mirror images.

REFERENCES & ACKNOWLEDGEMENTS

A] WEBSITES

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- *share my lesson .com*
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B] WEB PAGES

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- http://www.doctoroz.com/article/list-names-artificial-sweeteners

C] BOOKS

- *NCERT text book class XII chemistry*
- *NCERT text book class XI chemistry*
- *Physical Chemistry by Samuel Glasston*
- *Physical Chemistry by Bahal & Tuli*
- *Physical Chemistry by Gurdeep Raj*
- *The Golden Book of Chemistry Experiments*
- *Concise Chemistry by J.D.Lee*
- *Inorganic Chemistry by Cotton & Wilkinson*
- *Organic Chemistry by Morrison and Boyd*
- *The Golden Book of Chemistry Experiments by Robert Brent*
- *A guidebook to Mechanism in Organic Chemistry by Peter Sykes*

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****

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Kendriya Vidyalaya Sangathan
Zonal Institute of Education & Training , Chandigarh

"Education is not the learning of facts, but the training of the mind to think"
– Albert Einstein