Chemistry
Unit 1

Periodic Table and subshell Electronic Configuration

1. Increasing order of sub shell energy ?
   Ans : 1s<2s<2p<3s<3p<4s<3d
2. find the block, group and period of the following atomic number?

Atomic No:	Electronic Configuration	Block	Group	Period
11	$1s^2\ 2s^2\ 2p^6\ \mathbf{3}s^1$	s	1	3
12	$1s^2\ 2s^2\ 2p^6\ \mathbf{3}s^2$	s	2	3
19	$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ \mathbf{4}s^1$	s	1	4
20	$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ \mathbf{4}s^2$	s	2	4
21	$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^1\ \mathbf{4}s^2$	d	3 (1+2)	4
24	$1s^2\ 2s^2\ 2s^6\ 3s^2\ 3p^6\ 3d^5\ \mathbf{4}s^1$	d	6	4
29	$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ \mathbf{4}s^1$	d	11	4
30	$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ \mathbf{4}s^2$	d	12	4
13	$1s^2\ 2s^2\ 2p^6\ 3s^2\ \mathbf{3}p^1$	P	13	3
17	$1s^2\ 2s^2\ 2p^6\ 3s^2\ \mathbf{3}p^5$	P	17(5+12)	3
18	$1s^2\ 2s^2\ 2p^6\ 3s^2\ \mathbf{3}p^6$	P	11	3

Shells

1	2	3	4
K(s)	L(s,p)	M(s,p,d)	N(s,p,d,f)
2	8	18	32

Sub shells

S	P	d	f
2	6	10	14

Characteristics

s block	P block	d block	f block
Metallic nature	Solid, liquid and gases	Metallic nature	Radio active
Low ionisation energy	Metal, non metal and Metalloid	Coloured compounds	catalyst
Low electro negativity	**High** ionisation energy	Different oxidation state	Different oxidation state
	High electro negativity		

Unite **2**

Gas laws and mole concept

1. mole = 6.022 * 10^{23} particals = avagadro number - 22.4 litre (STP) , STP = 273 K, 1 atm
   - force exerted per unit area is called preasure.
   - Temperature is the averge unite of the molecules in a substance

Charles low	Boyle's low	Avagadro low
At constant pressure the volume is proportional to	At constant temperature volume is inversely proportional	At constant temperature and pressure the volume of

temperature $\frac{v}{T}$ = constant	to pressure Pv = constant	a gas is directly proportional to the number of molecules
eg: size of air bubble rising from the bottom of an aquarium in creases	eg: inflated balloon kept in sunlight will burst	eg: a ballon is being inflated

- **Find the number of molecules :**
  a) 360 g glucose(molecular mass = 180)
  ans: number of moles = $\frac{\text{given mass}}{\text{GMM}}$

  $= \frac{360}{180} = 2 * NA$

  b) 90 g water (molecular mass = 18)
  number of moles = $\frac{\text{given mass}}{\text{GAM}}$

  $\frac{90}{18} = 5 * NA$

- **Find the number of atom :**

  a) 42 g nitrogen (N = 14)
  number of moles = $\frac{\text{given mass}}{\text{GAM}}$

  $= \frac{42}{14} = \underline{3 * NA}$

  b) 80g oxygen
  number of moles = $\frac{\text{given mass}}{\text{GAM}}$

  $= \frac{80}{16} = 5 * NA$

Chapter 3
Reactivity series and electro Chemistry

potasium	K	Anode (oxidation)
sodium	Na	
calcium	Ca	
magnisum	Mg	
aluminium	Al	
zinc	zn	
iron	Fe	
nickel	Ni	
Tin	Sn	
lead	Pb	
hydrogen	H	
coper	cu	
silver	Ag	Cathode (Reduction)
gold	Au	

Observation	Before the experiment	After the experiment
Colour of Zinc rod	Grey	Covered with copper
Colour of $CuSO_4$ solution	Blue	**Colourless**

Substitution reaction 1

$Zn + CuSO_4 \longrightarrow Zn\,sO_4 + Cu$.

oxidation

$Zn \longrightarrow Zn^2 + 2e^-$

Reduction

$Cu^2 + 2e^- \longrightarrow Cu$

oxidation and reduction takes place at the same time. So it is a Redox Reaction.

Substitution reaction 2

$Ag\,NO_3 + Cu \longrightarrow Cu\,(NO_3)_2 + 2Ag$

oxidation

$Cu \longrightarrow Cu^2 + 2e^-$

oxidation and reduction takes place at the same time. So it is a Redox Reaction

Reduction

$\mathbf{2}Ag^+ + \mathbf{2}e^- \longrightarrow \mathbf{2}Ag$

Galvanic cell

a) zn – Cu cell

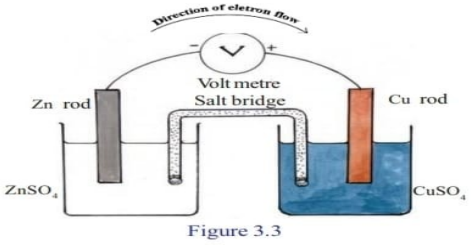


Figure 3.3

Anode (oxidation) reaction

$Zn \longrightarrow Zn^{2+} + 2e^-$.

cathode (reduction) reaction

$Cu^{2+} + 2e^- \longrightarrow Cu$

$Zn + Cu \longrightarrow Zn^{2+} + Cu$ - redox

b). **Ag - Cu cell**

anode(oxidation)

$Cu \longrightarrow Cu^{2+} + 2e^-$

cathode (reduction) reaction

$2Ag^+ + 2e^- \longrightarrow 2Ag$

$Cu + 2Ag^+ \longrightarrow Cu^{2+} + 2Ag$ - redox

Unit 4
Production of Metals

1. characteristic of ores
   - abundance
   - easily and cheaply separatable
   - High metal content
2. stages of metallurgy
   - concetration of ore
   - Extraction of metals
   - Refining of metals

1. concetration of ore

levigation	Froth flotation	Magnetic separation	leaching
Lighter impurities and heavier ore particle eg: gold , oxide	Heavier impurities and lighter ore particle eg: sulphide	Ore or impurity has magnetic nature eg : magnetite , tin stone	Dissolve in sodium hydroxide solution eg: bauxite (aluminium)

2. Extraction of Metals:
   a) Conversion in to oxide

Calcination
Heating in the absence of temperature
eg: carbonates and hydroxide

Roasting
Heating the presence of temperature
eg: sulphide

3.Refining of metals

liquation	Distillation	Electrolytic refining
Low melting metals eg: Tin, lead (ലെഡിനെ ടിന്നിലിട്ടു)	Metals with low boiling point ഉദാ: Cadmium, Zinc,Mercury (കാ സി മെ)	Positive – Impure Metal Negative – Pure Metal Electrolytic – salt solution of pure metal

	Copper plating on iron bangle.	Refining of Copper.
Anode	Copper rode	Impure copper
Cathode	Iron bangle	Pure Copper
Electrolyte	Copper sulphate solution	Copper sulphate + H_2SO_4
Reaction(oxidation)	$Cu \longrightarrow Cu^{2+} + 2e^-$	$Cu \longrightarrow Cu^{2+} + 2e^-$
Cathode Reaction (Reduction)	$Cu^{2+} + 2e^- \longrightarrow Cu$	$Cu^{2+} + 2e^- \longrightarrow Cu$

Both of them are Cu

Iron

Fools gold - Iron pyrites (brazent yellow colour)
ore of iron - Hametitc - Ore of Aluminium – Bauxite

Row material fed into the blast furnare	Coke,lime stone,haematite
The compounds used for reducing haematite	Carbon Monoxide (Co)
Gangue	SiO_2 (Silica)
Flux	CaO
Slag	$CaSiO_3$

Equation of formation of Slag :- $CaO + SiO_2 \longrightarrow CaSiO_3$
Permanent Magnet - Alnico (high resistance)

Heating Coil – Nichrome

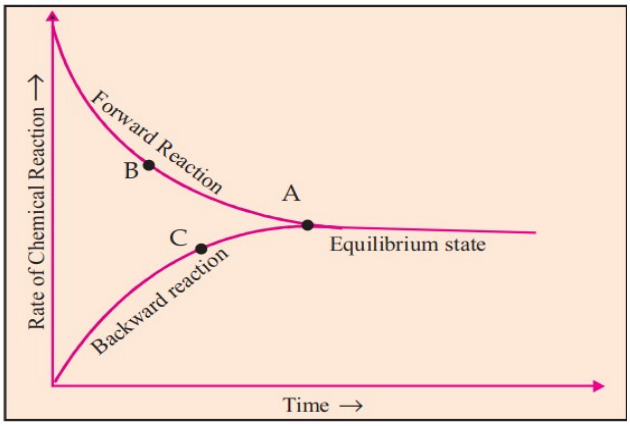
Unit 5
Compound of Non Metals

1. Ammonia (NH_3) – Haber Process
   2. Sulphuric Acid(H2SO4) – Contact proces
   (Catalyst – Vanadium pentoxide (V_2O_5)

2. Why ammonia gas passed through quick lime (Cao)
   To remove moisture
3. Why gas jar kept into inverted position?
   Density of ammonia is less than air.

Liquid - Ammonia	Liquo**r** - Ammonia
Liquified by pressure	Ammonia + wate**r**

Chemical Equlibrium



Industrial production of Ammonia (NH3) - Haber Process

$N_2+3H_2 \longrightarrow 2NH_3$

Methods of increase the production of Ammonia?

1. Increase Pressure - Rate of forward reaction increase, production of Ammonia increases
2. Increases the concentration of reactant or Decrease the concentration of product - Rate of forward reaction increases. Production of Ammonia increases
3. Decrease the temperature - Rate of forward reaction increases. Production of Ammonia increases

What is the function of catalyst in a reversible reaction (Production of Ammonia)
System reaches equilibrium at a faster rate

Catalyst used in preparation of sulphuric acid.- Vanadium pent oxide (V_2O_5)

Chapter 6
Nomenclature of organic compounds and isomerism

1.

C_3H_6, C_4H_{10}, C_4H_8, C_3H_4, C_3H_8, C_4H_6, C_5H_{10}, C_5H_8, C_5H_{12}

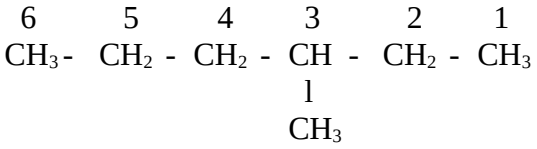
Alkanes	Alkene	Alkyne
C_4H_{10}	C_3H_6	C_3H_4

C_3H_8	C_4H_8	C_4H_6
C_5H_{12}	C_5H_{10}	C_5H_8

2. Write the general formula of Alkanes?
   Ans :CnH_2n+2. (n = Number of carbon atom)
3. General formula of alkene ?
   Ans :CnH_2n
4. General formula of Alkynes ?
   Ans :$CnH_2n - 2$.
5. Number of carbon atoms and word root

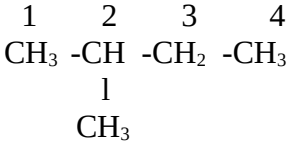
C_1 ---- Meth	C_5 ----- pent	C_9 ------ non
C_2 ---- eth	C_6 ----- hex	C_{10} ------ dec
C_3 ------ prop	C_7 -------hept	
C_4 ------ but	C_8 -------- oct	

6. write the IUPACname of the following .



Ans : 3 - methyl hexane

7.



Ans: 2 - methyl butane

8. $CH_2=CH-CH_2-CH_3$
   Ans: but - 1 -ene

9. $CH_3-C=C-CH_3$
   Ans : but - 2- ene

Functional group	Name of functional group	compound
OH	hydroxyl	alcohol
COOH	carboxylic	acid
C1,Br,I,F	halo	Halogen group
O-R	Alkoxy group	ether

Functional group of alcohol - OH
Functional group of eher - O- R

Unit 7
Chemical reactions of organic compounds

reactants	products	Name of reactions
$CH_4 + Cl_2$	$CH_3 – Cl + HCl$	substitution
$CH_2 = CH_2 + Hcl$	$CH_3 – CH_2 - Cl$	addition
$nCH_2 = CH_2$	$[CH_2 – CH_2]_n$	polymerisation

$C_2H_6 + O_2$	$CO_2 + H_2O$	combustion
$CH_3 – CH_2 – CH_2 – CH_3$ + heat	$CH_3 – CH = CH_2$ + CH_4	Thermal cracking

monomer	polymer	uses
$nCH_2 = CH_2$ ethene	$+ CH_2 - CH_2 +_n$ polythene	Bag, toys
$nCH_2 = CH$ l Cl vinyl chloride	$CH_2 – CH$ l Cl n poly vinyl chloride	Bag , **sandal**
$nCF_2 = CF_2$ tetrafluoro ehene	$[CF_2 - CF_2]_n$ teflon	Non stick
isoprene	Poly isoprene(natural rubber)	**sandals**

Wood spirit	Grape spirit
methanol CH_3OH	ethanol $CH_3CH_2OH(C_2H_5OH)$

8 - 10% ethanol	wash
95.6% ethanol	Rectified spirit
99.5 % ethanol	Absolute alcohol
alcohol + petrol	Power alcohol

How ethanol is prepared?
ethanol is manufactured by fermenting dilute molasses by adding yeast.

Uses :

Ammonia (NH_3)	Sulphuric acid H_2SO_4	methanol CH_3OH	ethanol C_2H_5OH
Chemical fertilizer	**Chemical fertilizer**	Varnish, formalin - reactant	Beverage,fuel
refrigerant	**paint**	**Paint** - solvent	**paint**