

CHEMISTRY

Chapter - 1 Some Basic Concepts in Chemistry

1. Metric System



The Great Morning King Henry

Doesn't Usually Drink chocolate Milk

Mixed with Natural Powder

The \rightarrow Tera (×10¹²)

Great \rightarrow Giga (×10⁹)

Morning \rightarrow Mega (×10⁶)

King \rightarrow Kilo ($\times 10^3$)

Henry \rightarrow Hecto ($\times 10^2$)

Doesn't \rightarrow Deca (×10)

Usually \rightarrow Unit (×1)

 $Drink \rightarrow Deci (\times 10^{-1})$

Chocolate \rightarrow Centi (×10⁻²)

Milk → Milli (×10⁻³)

Mixed with \rightarrow Micro (×10⁻⁶)

Natural \rightarrow Nano ($\times 10^{-9}$)

Powder \rightarrow Pico ($\times 10^{-12}$)

Chapter - 2 States of Matter

1. Gas Law's



PTV

(letters that touches are directly proportional & letter don't are indirectly proportional)

$$[P \propto T], [V \propto T], \left[P \propto \frac{1}{V}\right]$$

2. Const terms in Gas Laws



Paid TV Can Be Good

Const terms \rightarrow Pressure (P) Temp (T) Volume (V) Gas Law \rightarrow Boyle's (Gay-Lussac's)

3. Ideal Gas Behavior



PLIGHT

High temp & Low pressure to achieve ideal Gas behavior

PL → Pressure Low

 $IG \rightarrow Inert Gas$

 $\mathrm{HT} \rightarrow \mathrm{High} \ \mathrm{Temp}$

4. Kinetic Theory of Gas



Mother SPEAKS

M → Motion (Gas Particle are in Random Motion)

 $S \rightarrow Size$ (negligible size of particle to total volume)

 $P \rightarrow Pressure$ (Pressure exerted due to Collision with walls of container)

E → Elastic Collision

A → Attractive forces are not present

 $K \rightarrow K.E \propto Temp$

 $S \rightarrow Speed$ (Distribution of speed of particles remain const.)

5. Crystal System



Cu Te MOTHe R 3224

Unit Cell - Cubic, Tetragonal, Monoclinic, Orthorhombic, Triclinic, Hexagonal, Rhombohetral Edge Length - a=b=c, a=b≠c, a≠b≠c, a≠b≠c, a=b=c

Axial Length - $\alpha = \beta = \gamma$, $\alpha = \beta = \gamma$, $\alpha = \beta \neq \gamma$, $\alpha = \beta = \gamma$, $\alpha = \beta \neq \gamma$, $\alpha = \beta \neq \gamma$, $\alpha = \beta \neq \gamma$

No. of Bravias Lattice - 3, 2, 2, 4, 1, 1, 1

6. Edge Length



TOM Handpicked Tag (HT) of Class Representative (CR)

Triclinic, Orthorhombic, Monoclinic ($a \neq b \neq c$) Hexagonal, Tetragonal ($a=b\neq c$) Cubic, Rhombohetral (a=b=c)

7. Axial Angles



TORC Has More (HM) Twists (T)

Tetragonal, Orthorhombic, Rhombohedral, Cubic $(\alpha = \beta = \gamma)$

Hexagonal, Monoclinic ($\infty = \beta \neq \gamma$)

Triclinic ($\infty \neq \beta \neq \gamma$)

Chapter - 3 Atomic Structure

1. Atomic No. & Mass No.



APEMAN

Atomic No. = No. of Protons

= No. of Electrons

Mass No. = Atomic No. + No. of neutrons

2. Isotopes, Isobars & Isotones



Bring Top Talented MAN (BTT MAN)

Atoms having same Isobars → Mass Number Isotopes → Atomic Number Isotones → Neutrons

3. Electromagnetic Spectrum



Roman Men Invented Very Unusual

X-ray Gun

Roman → Radiowaves

Men → Microwaves

Invented \rightarrow IR waves

Very → Visible rays

Unusual → UV waves

X-ray $\rightarrow X$ -rays

Gun $\rightarrow \gamma$ -rays (Gamma rays)

4. Visible Region of EMR



VIBGYOR

Visible

- (a) Violet
- (b) Indigo
- (c) Blue
- (d) Green
- (e) Yellow
- (f) Orange
- (g) Red

5. Planck's Quantum theory



Employee's Provident Fund (EPF)

Energy = Planck's constant × Frequency
[E = hr]

6. H-atom spectral lines



Myan Mer Pasta Bread Fund

Lyman (n₁=1)

Balmer $(n_1=2)$

Paschen (n₁=3)

Brackett (n₁=4)

Pfund $(n_1=5)$

7. Bohr Model of an atom



Electronic video Recording (EVR)

Energy (E) $\propto \frac{Z^2}{n^2}$

Velocity $\propto \frac{z}{n}$

Radius $\propto \frac{n^2}{r^2}$

8. Quantum Numbers



SPAM

 $S \rightarrow Spin Quantum no. (m_s)$

 $P \rightarrow Principal Quantum no. (n)$

 $A \rightarrow Azimuthal Quantum no. (l)$

 $M \rightarrow Magnetic Quantum no. (m₂)$

9. Sequence of orbitals



Sober Physicists Don't Find Giraffes Hiding In Kitchen

s,p,d,f,g,h,i,k

Chapter - 4 Chemical Bonding & Molecular Structure

1. Formal Charge



For Very Lovely Son!

[Formal Charge (F.C) = Valence e^- in free state (V.E) – Lone pair (l.p) –1/2 × Shared e^- (S.E)]

2. H-bonding



H-bonding is FON (Fun)!

Fluorine, Oxygen, Nitrogen

3. Diatomic Molecules



Have No Fear of Ice Cold Beer





I can't Handle Dirty Vans

Ionic > Covalent > H–bonds > Dipole > Vanderwaal

5. Bond Polarity



SNAP

Symmetrical \rightarrow Non Polar Asymmetrical \rightarrow Polar

6. Hybridisation



(VMCA)

Steric No. = 1/2 [V+M-C+A]

 $V \rightarrow Valence e^- of central atom$

 $M \rightarrow Monovalent atoms (H/X)$

C → Cationic Charge

A → Anionic Charge

Chapter - 5 Chemical Thermodynamics

1. Process Boring ACT



Peer's Hard Verified Test

Process ISO Bar Adiabatic ISO Choric ISO Therm Const → Pressure (P) Heat (q) Volume (V) Temp (T)

2. State Function



PVT HUGS

Pressure, Volume, Temp, Enthalpy (H), Internal Energy (U), Gibbs free energy (G) Entropy (S)

3. First law of Thermodynamics



I Work Hard

Change in internal energy (U) = Work (w)+Heat (q)

4. Heat Capacity



PVR Cinemas

 $C_p - C_v = R$

5. Criteria of Spontaneity



Good Physicists Have Studied Under Very Ambitious Teachers

 $(dH)_{S,P} < 0$

 $(dU)_{sv} < 0$

 $(dG)_{PT} < 0$

 $(dA)_{VT} < 0$

 $(dS)_{H,P} > 0$



6. Gibb's Free Energy



Get High Test Scores

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

Chapter - 6 Solutions

Ideal & Non ideal Solutions



HIV

	Ideal	Non-Ideal
Enthalpy (ΔH)	$\Delta H=0$	ΔH≠0
Intermolecular	A–A & B–B is	A-A & B-B is not
Forces	same as A-B	same as A–B
Volume (ΔV)	$\Delta V=0$	ΔV≠0

Chapter - 7 Equilibrium

Bronsted Acid-Base Concept



Strong Army, Lost to Carelessly
Weak Bandits

Strong Acid gives Weak Conjugate Base

Chapter - 8 Redox Reactions and Electrochemistry

1. Redox Reaction



Leo Say Ger!

Loss of e⁻ is oxidation Gain of e⁻ is reduction

2. Redox Reaction



Red Cat

Reduction at Cathode

3. Redox Reaction



An Ox

Anode for Oxidation

4. Metal Activity Series



Please Stop Calling Me A Zebra Crab. I Like Calling Her Smart Goat

Potassium > Sodium > Calcium > Magnesium > Aluminium > Zinc > Chromium > Iron > Lead > Copper > Mercury (Hg) > Silver > Gold

5. Metal activity series



FAT CAT

Flow of e- from anode to cathode

6. Metal activity series



Amount of Hundred Ceins

Balancing Half Cell Steps: (1) Atoms (2) Oxygen

- (2) Oxygen
- (3) Hydrogen
- (4) Charge

7. Electro Chemical Series



Priyanka Chopra Sees Movie About Zebra In The Libya Hiring Cobra Studying Algebra

Potassium < Calcium < Sodium < Magnesium < Aluminium < Zinc < Iron < Tin < Lead < Hydrogen < Copper < Silver < Gold (Au)

8. For Galvanic Cell



LOAN

Loss of e⁻ Oxidation Anode Negative

9. Electrolytic Cell



LOAP

Loss of e⁻ Oxidation Anode Positive

Chapter - 9 Chemical Kinetics and Surface Chemistry

1. Mechanism of Heterogeneous Catalysis



RAID Program

- (a) Reactant diffusion on surface
- (b) Adsorption of Reactant
- (c) Intermediate formation
- (d) Desorption of product
- (e) Product leaves the surface

2. Types of Colloids



Soft SAGE And Shredded Face (SSAGEASF)

Dispersed Phase	Dispersion Medium	Type of Colloids Solid Sol
Solid	Solid	Solid Sol
Solid	Liquid	Sol
Solid	Gas	Aerosol
Liquid	Solid	Gel
Liquid	Liquid	Emulsion
Liquid	Gas	Aerosol
Gas	Solid	Solid Sol
Gas	Liquid	Foam

Chapter - 10 Classification of Elements and Periodicity in Properties

1. Elements of Atomic No (1-18)



Happy Harry Listen BBC Network
Over French Network. Native
Magpies Always Sit Peacefully
Searching Clear Areas

H, He, Li, Be, B, C, N, O, F, Ne, Na, Al, Si, P, S, Cl, Ar

2. Group I Elements



Little Nasty Kids Rub Cats Fur

Lithium (Li), Sodium (Na), Potassium (K), Rubidium (Rb) Caesium (Cs), Francium (Fr)

3. Group II Elements



Beer Mugs Can Snap Bar's

Reputation

Beryllium (Be), Magnesium (Mg), Calcium (Ca), Strontium (Sr), Barium (Ba), Radium (Ra)

4. Group III Elements



BAGIT

Boron (B), Aluminium (Al), Gallium (Ga), Indium (In), Thallium (Tl)

5. Group IV B Elements



Can Simple Germans Surprise Public

Carbon (C), Silicon (Si), Germanium (Ge), Tin (Sn), Lead (Pb)

6. Group V B Elements



New Police Assign Subordinate Bikram on Duty

Nitrogen (N), Phosphorus (P), Arsenic (As), Antimony (Sb), Bismuth (Bi)

7. Group VI B Elements



Oxygen (O), Sulphur (S), Selenium (Se), Tellurium (Te), Polonium (Po)

8. Group VII B Elements



Fluorine (F), Chlorine (Cl), Bromine (Br), Iodine (I), Astatine (Al)

9. Group VIII B/18 Elements

He never Arrived; Karan exited with Rohan

Helium (He), Neon (Ne), Argon (Ar), Krypton (Kr), Xenon (Ex), Radon (Rn)

10. 3d-Series

Scary Tiny Vicious Creatures are
Mean females come to Night Club
Zen

Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn,

11. 4d-Series

Yes S(z)sir Nob. Most Technicians Rub Rod's Pale Silver Cadillac Y, Zr, Nb>Mo, Tc, Ru, Rh, Pd, Ag, Cd

12. 5d-Series

Late Harry Took Walk, Reached
Office In Pajamas After an Hour

La....., Hf, Ta, W, Re, OS, Ir, Pt, Au, Hg

13. Lanthanides

Ladies Can't Put Needles Properly in Slot-machnies. Every Girl Tries Daily However, Every Time You'd be lose

La, Ce, Pr, Nd, Pm, Sm, Eu Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu

Chapter - 11 General Principles and Process of Isolation of Metal

1. Process of Metallurgy



- (a) Concentration of Ore
- (b) Isolation
- (c) Purification

2. Concentration of Ore



Honest Man Feeling Low (HMFL)

- (a) Hydraulic Washing
- (b) Magnetic Separation
- (c) Froath Floatation Method
- (d) Leaching

3. Conversion to Oxide



CRAP

Calcination \rightarrow Absence of O₂ Roasting \rightarrow Presence of O₂

4. Ores



MISH

Prime Minister Going China

Iron ores → Magnetite, Iron pyrites, Siderite, Haematite Copper ores → Copper pyrites, Malachite, Copper Glance, Cuprite

Chapter - 12 Hydrogen, s & p-Block Elements Hydrogen

1. Isotopes of Hydrogen



Pro-Diabetic Treatment PDT)

Protium
$$\begin{pmatrix} 1\\1 \end{pmatrix}$$
Deuterium $\begin{pmatrix} 2\\1 \end{pmatrix}$
Tritium $\begin{pmatrix} 3\\1 \end{pmatrix}$

2. H-Bonding



iso FON! (Say Fun)

Fluorine, Oxygen, Nitrogen

3. Hardness of Water



CM is temporarily hard with Head Clerks (HC) but permanently

Temporary hardness due to $Mg(HCO_3)_{2'}$, $Ca(HCO_3)_2$ Permanent hardness due to MgCl2, $CaCl_{2'}$, $MgSO_4$, $CaSO_4$ Hard with civil servants (CS) Cl^- , SO^{2^-} hydrogen Carbonate (HCO_3^-)

s-block elements

4. Group I Elements



Little Nasty Kids Ruts Cats Far

Lithium (Li), Sodium (Na), Potassium (K), Rubidium (Rb), Caesium (Cs), Francium (Fr)

5. Group II Elements



Beer Mug Can Snape Bar's Reputation

Beryllium (Be), Magnesium (Mg), Calcium (Ca), Strontium (Sr), Barium (Ba), Radium (Ra)

6. Castner Kellnar Cell



Cement Modified Soil (CMS)

Oxidised

Cathode Mercury (Hg) on which

Sodium ion(Na+) is oxidised

 $ACC \rightarrow reduced \rightarrow Anode of carbon on which Cl^- is reduced$

7. Properties of Birch Reagent



Roman People Can Commute (RPCC)

(Na/Li + liq.NH₃) – (Reducing in nature, Paramagnetic, conducting,

p-block elements

8. Group 13 Elements



BAGIT

Coloured)

Boron (B), Aluminium (Al), Gallium (Ga), Indium (In), Thallium (Tl)

9. Group 14 Elements



Can Simple Germans Surprise Public

Carbon (C), Silicon (Si), Germanium (Ge), Tin (Sn), Lead (Pb),

10. Borax bead Test



Multiple Program Combined (MPC) for Your Growth (FYG). New Boys Get (NBG) Common Boys Room (CBR) for Combining Desktop Drawing (CDD)

Ion Oxidising Flame Reducing Flame					
Mn ₂ +	Pink	Colour less	\rightarrow	MPC	
Fe ₂ +/Fe ₃ +	Yellow	Green	\rightarrow	FYG	
Ni ₂ +	Brown	Grey	\rightarrow	NBG	
Cu ₂ +	Blue	Red	\rightarrow	CBR	
Co ₂ +	Deep Blue	Deep Blue	\rightarrow	CDD	

p-block elements

11. Group 15 Elements



New Police Assigns Subordinate Bikram on duty

Nitrogen (N) Phosphorus (P) Arsenic (As) Antimony (Sb) Bismuth (Bi)

12. Group 16 Elements



Old Sahranpur Seems Terribly

Polluted

Oxygen (O)

Sulphur (S)

Selenium (Se)

Tellurium (Te)

Polonium (Pu)

13. Group 17 Elements



First Class Biryani In Australia

Fluorine (F)

Chlorine (Cl)

Bronine (Br)

Iodine (I)

Astatine (At)

14. Group 18 Elements



He Never Arrived; Karan exited with Rohan

Helium (He)

Neon (Ne)

Argon (Ar)

Krypton (Kr)

Xenon (Xe)

Chapter - 13 d & f block elements and Coordination Compounds

1. 3d-Series



Scary Tiny Vicious Creatures are Mean; Females Come to Night Club Zen

Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn

2. 4d-Series



Yes **S**(z)ir, **N**ob **M**ost **T**echnicians **R**ub **R**od's **P**ale **S**ilver **C**adillac

Y, Zr, Nb, Mo,Tc, Ru, Rh, Pd, Ag, Cd

3. 5d-Series



Late Harry Took Walk, Reached
Office In Pajamas After an Hour

La...... Hf, Ta, W, Re, Os, Ir, Pt, Au, Hg

4. Lanthanides



Ladies Can't Put Needles Properly is Slot-machines. Every Girl Tries Daily, However, Every Time You'd be Lose

La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu

5. Spectrochemical Series



I Bought Some Copies to Study Fundamental of Chemistry. He Nurtured Excellence in Necessary Coordination Compound

 $I < Br^{-} < SCN^{-} < Cl^{-} < S^{2-} < OH^{-} < C_{2}O_{4}^{2-} < H_{2}O < NC5^{-} < EDTA^{+-} < NH_{3} < CN^{-} < CO$

6. Pairing of e- Octahedral Complexes



Common League People win Hearts

CFSE (Δ_0) < Pairing Energy Ligand → Weak field Type of complex → High spin Pairing of e⁻ in t₂g orbital

7. Werner's theory



Plcturesque SNow

Primary valency \rightarrow Ionisable (Charge on Ionisation sphere) Secondary valency \rightarrow Non Ionisable (Coordination

Secondary valency \rightarrow Non Ionisable (Coordination Number)

8. Spectrochemical series



I Bought Some Copies to Study
Fundamental of Chemistry
He Nutured Excellence in Necessary
Coordination Compounds

 $I^- < Br^- < SCN^- < Cl^- < S^{2-} < OH^- < C_2O_4^{2-} < H_2O < NCS^- < EDTA^{4-} < NH_3 < CN^- < CO$ $I^- = I$

 $Br^- = Brought$

SCN⁻ = Some

Cl⁻ = Copies to

 S^{2-} = Study

F = Fundamental

 $OH^- = Of$

 $C_2O_4^{2-}$ = Chemistry

 $H_2O = He$

NCS- = Nutured

EDTA4- = Excellence in

NH₂ = Necessary

CN- = Coordination

CO = Compounds

9. Pairing of e- Octahedral Complexes



Common League People win Hearts

Vice-**V**ersa

(i) CFSE (Δ_0) < Pairing Energy (P.E)

Ligand → Weak field ligand

Type of complex → High spin Complex

Pairing of e⁻ in t2g orbital

(ii) CFSE (Δ_0) < Pairing Energy (P.E)

10. Werner's theory



Plcturesque SNow

Primary valency → Ionisable i.e., Charge on

Ionisation sphere (PIcturesque)

Secondary valency → Non Ionisable i.e.,

Coordination number (SNow)

Chapter - 14 Environmental Chemistry

1. Gases air Pollutants



HOSCN

Hydrocarbons, Oxides of Sulphur (SO₂, SO₃), Carbon (CO, CO₂), Nitrogen (NO, NO₂)

2. Components of Photochemical Smog



O FAN PAN

Ozone, Formaldehyde, Acrolein, Nitric oxide, PAN

Chapter - 15 Purification, Basic Principles and Characteristics of Organic Compounds

1. Functional group preference order



ASEHA NAKAA Delhi Training Camp

Carboxylic Acid > Sulphonic Acid > Ester > Acid Halides > Acid Amides > Nitrile > Aldehyde > Ketone > Alcohol > Amnes = > =

2. No Preference Functional Group



NAHE

Nitro, Alkyl / Aryl, Halo, Ethers

3. Carbon Chain



Monkey Eat Peeled Bananas

Meth, Eth, Prop, But

4. 3-D Representation



So towards Do away

Solid → Towards observer (◄)

Dashed → Away from observer (||||||)

5. Types of Organic Reaction



EARS

- (a) Elimination
- (b) Addition
- (c) Rearrangement
- (d) Substitution
- 6. Structural Isomerism



Poor Farmer Managing Crops (PFMC)

- (a) Position
- (b) Functional Group
- (c) Metamerism
- (d) Chair

7. Optical Isomerism



GO

- (a) Geometrical
- (b) Optical

Chapter - 16 Hydrocarbons and their Halogen Derivatives

1. m-directing Group



Queen Elizabeth Second's Navy Commands, Controls

Qiatonary

2. o, p-directing



AHA AHA P

Alkyl (-R)
Halogen (-X)
Alkoxyl (-OR)
Amino (-NH₂, NHR, NR₂)
Hydroxyl (-OH)
Amide (-NHCl)
Phenyl (C₆H₆)

3. SN1 reaction



CURT-I

Carbocation Intermediate Unimolecular Reaction Racemic mixture is obtained Two step process Ist order kinetics

4. Chirality



CANS

Chiral \rightarrow Non-Super imposable mirror Images Achiral \rightarrow Super imposable Mirror Images

Chapter - 17 Organic Compound Containing Oxygen

1. Detection test



TASte FAAR IMLy

TASte \rightarrow Tollen's test, Aldehyde group, Silver Mirror

 $FAAR \rightarrow Fehling$'s test, Aliphatic Aldehyde, Red-Brown ppt

 $\ensuremath{\mathbf{IMLY}} \to \ensuremath{\mathsf{Iodoform}}$ test, Methyl group linked to

O , Yellow ppt

2. Common Names of Carboxylic Acid



Frog Are Polite, Being Very

Courteous

Formic, Acetic, Propionic, Butyric, Valeric, Caproic

3. Dicarboxylic Acid



Oh My, Such Good Apple Pie, Sweet As Sugar

Oxalic, Malonic, Succinic, Glutaric, Adipic, Pimelie, Subric, Azelaic, Sebacic

4. Clemmenson and wolf Reaction



Can Zebra Woo Nightingale

Reaction to convert –C– to alkane (to remember regents of reaction) Clemmen \rightarrow son \rightarrow Zn–Hg/HCl Wolf \rightarrow Reaction \rightarrow NH₂–NH₂/OH⁻

Chapter - 18 Organic Compounds Containing Nitrogen

1. Carbylamine test



PAFSI (Say Pepsi)

Primary amine gives Foul smell of Isocyanicle with CHCl₃+KOH Amine Smell RNH₂+CHCl₃+KOH RNC+KCl+H₂O

2. Coupling Reaction



DSPO DAY (Say, DeSPO DAY)

Diazonium Salt + Phenol \rightarrow Orange dye

Diazonium Salt + Aniline \rightarrow Yellow dye

OH

OH

(orange dye) N_2 Cl + N_2 Cl + N

Chapter - 19 Polymers and Biomolecules

1. Disaccharides



Non-reducing SGF

Sucrose → Glucose + Fructose Non-Reducing Sugar

2. Essential Amino Acids



PVT TIM HALL

(Phenylalanine, Valine, Threonine, Tryptophan, Isoleucine, Methionine, Histidine, Arginine, Leucine, Lysine)

3. Fatsoluble Vitamins → Vitamin K, E, D, A



KEDA

Rest all Vitamins are water Soluble

4. DNA & RNA



G3Cinema AT 2PM

DNA A=T, G≡C

(2 H-bonds b/w Adenine & Thymine 3 H-bonds b/w Guanine & Cytosine)
G=C A=T

Also, GCAT

Chapter - 20 Analytical Chemistry and Chemistry in Everyday life

1. Artificial Sweetening Agents



ASSA

Aspartame, Saccharin, Sucrolose, Alitame Also, Assac Sue Ali

2. Antiseptic & Disinfectants



Bitter Chlor

Bithionol, Terpineol, Chloroxylenol

3. Antacids



His Interaction Presented by lime Ran (Say Simran)

Interaction of Histamine prevented by limetidine, Ranitidine