CHEMISTRY CURRICULUM

Unit-1

SOLID STATE

1. Introduction

1.1 Classificaton Of Compounds On The basis of bonding forces. (Molecular, Ionic, Covalent Metallic) and examples.

1.2 Crystalline and amorphous solids, Structure and characteristics.

1.3 Two dimensional and three dimensional unit cell lattices with figures (diagrams).

1.4 Calculation of volume used by an atom in unit cell.

1.5 Closed pack structure and their types. (One dimensional, Two dimensional, Three dimensional)

1.6 Tetrahedral and octahedral voids and numbers.

1.7 Calculation of number of atoms in unit cell.

1.8 Point defects and their types.
Band theory in metals with figures.

1.9 Electrical and Magnetic effects of defect.
Band theory in metals.

Unit-2

SOLUTIONS

2.1 Introduction

2.2 Types of Solutions

2.3 Units of Concentrations (N,M,F,x,%w/W,%W/v, %v/V and ppm) and calulation

2.4 Solubility of gases (solubility of gasious solute in liquid solvent)

2.5 Solubility of solid solute in liquid solvent

2.6 Colligative properties of solutions.

2.7 Vapour pressure of solution.

2.8 Raoult's law (for non volatile solute)

2.9 Raoult's law (for volatile solute in volatile solvent) and Ideal-Nonideal Solution

2.10 Elevation in boiling point

2.11 Depression in freezing point

2.12 Osmosis and its uses and examples

2.13 Laws of Osmotic pressure and calculations

2.14 Iso Osmotic solution

2.15 Methods of determining Molecular mass association, dissociation and examples.

2.16 Abnormal Molecular mass and van't Hoff's factor.

Unit-3

ELECTROCHEMISTRY

3.1 Introduction

3.2 Electrochemical Cell

3.3 Types of Electrodes

3.4 Cell Potential

3.5 E.M.F. Series and usefullness

3.6 Nernst Equation and its calculations

3.7 Some application of cell protential

3.8 Eletrolysis

3.9 Products obtained by Electrolysis Faraday's laws & examples.

3.10 Electrolysis of NaCI, Dilute Solution of NaCI, and concentrated solution at NaCI

3.11 Electrolysis of aq. Na_2SO_4

3.12 Electorlysis of aq. $CuSO_4$

3.13 Gibb's free energy and cell protential and examples

3.14 Difference between Electrochemical and Electrolytic Cell

3.15 Electrolysis for Industrial Product

3.16 Electrical Conduction

3.17 Resistivity (Specific Resistance)

3.18 Ionic Mobility

3.19 Kohlrausch's law of independent migration of ions and calculations.

3.20 Batteries (Primary Cell and Secondary Cells : Dry Cell, Mercury Cell, lead storage cell, Ni-Cd Storage Cell, Fuel Cell, Hydrogen Fuel Cell)

3.21 Corrosion

Unit-4

GENRAL PRINCIPLES AND PROCESSES OF ISOLATION OF ELEMENTS

4.1 Introduction

4.2 Occurrence of Metals

4.3 Concentration of Ores their names and formula

4.4 Extraction of Crude metal from the Concentrated Ore

4.5 Thermodynamic Principles of Metallurgy

4.6 Electrochemical Principles of Metallurgy

4.7 Oxidation - Reduction.

4.8 Refining of Impure Metals

4.9 Extraction of AI,Cu,Fe,Zn Metals, alloys and uses

Unit-5

P-BLOCK ELEMENTS-II

5.1 Introduction

5.2 Elements of Group-15

(Occurence,Electronic Configuration, Oxidation State, Periodicity in Physical and Chemical Property)

5.3 Nitrogen (preparation, properties, uses of N2 anamolous behaviour, compounds of nitrogen element-

i)NH_3 [preparation, physical properties, chemical properties and uses]

ii)HNO_3 [preparation, physical property, chemical property, uses]

iii)Oxides of nitrogen [preparation, structures and properties]

5.4 Phosphorous - Allotropes, Compounds of Phosphorous

I)PH_3 [preparation, physical and chemical properties and uses]

ii)PCI_3 [preparation, chemical and physical properties]

iii)PCI_5 [preparation, physical and chemical properties]

iv) oxo acids of phosphorous

5.5 Elementsof Group-16 (Electronic configuration, Occurrence, Oxidation State, periodicity in physical and chemical properties)

5.6 Oxygen

I)Preparation, properties and uses of O_2

ii)Anamalous behaviour of oxygen

iii) Compounds of Oxygen - Simple Oxides and Ozone [Preparation and Properties and uses]

5.7 Sulphur - Allotropes of Sulphur [α - Sulphur, β - Sulphur, Compounds of Sulphur

I)Sulphur dioxide [preparation, chemical and physical properties and uses]

ii) Sulphuric acid [Industrial production, physical and chemical properties and uses]

iii)Oxoacids of Sulphur [Structures and Names]

5.8 Elements of Group-17

Electronics Configuration, Occurrence,Oxidation State, Periodicity in Physical and Chemical Properties, Anamalous behaviour of Fluorine

5.9 Chlorine [Preparation, properties and uses of $C_{12,}$ preparation of HCI; its properties and uses.

5.10 Interhalogen Compounds : preparation, properties and uses.

5.11 Oxoacids Compound of halogen element.

5.12 Elements of Group - 18.

- Electronic configuration, occurrence and oxidation state, periodicity in physical and chemical properties.
- Xenon - Fluorine Compounds
- Xenon - Oxygen Compounds

Unit-6

HALO ALKANES AND HALO ARENES

6.1 Introduction

6.2 Classification

6.3 IUPAC and Common nomenclature of halo alkanes and haloarene compound

6.4 Nature of C - X bond

6.5 Preparation of haloalkane and haloarene compounds

6.6 Physical properties

6.7 D, L and R, S nomenclature

6.8 Chemical Properties

- Reaction of haloalkane
- Nucleophilic reaction : SN^1 and SN^2 reaction mechanism
- Elimination reaction
- Reaction with metal (Grignard and Wuatz reaction)
- Reaction of haloarenes (nucleophilic, electrophilic and reaction with metal)

6.9 Polyhalogen Compounds

[Preparation, Properties and uses]

Unit-7

ALCOHOLS, PHENOLS AND ELHERS

7.1 Introduction

7.2 Classification of Alcohols

7.3 Nomenclature of Alcohols

7.4 Electronic Structure of Alcohol

7.5 Physical properties of Alcohols

7.6 Preparation of Alcohols

7.7 Chemical Reactions of Alcohol

7.8 Nomenclature of Phenols

7.9 Electronic Structure of Phenol

7.10 Physical Properties of Phenol

7.11 Preparation of Phenol

7.12 Chemical Reaction of Phenol

7.13 Nomenclature of Ether Compound

7.14 Electronic Structure of Ether

7.15 Physical properties of Ether

7.16 Preparation of Ethers

7.17 Chemical reactions of Ether

Unit-8

CHEMICAL KINETICS

8.1 Introduction

8.2 Factors affecting the rate of Chemical reaction

8.3 Rate of Chemical Reaction

8.4 Rate constant and order of reaction

8.5 Molecularity and order of reaction

8.6 Integrated rate law

8.7 Zero order reaction and Hetrogeneous reaction

8.8 Rate equation for first order reaction and calculations

8.9 Pseudo first order reaction and calculations

8.10 Determination of order of reaction

8.11 Effect of temperature on rate constant

8.12 Theory of collision and mechanism

8.13 Mechanism of Chemical reaction

Unit-9

SURFACE CHEMISTRY

9.1 Introduction

9.2 Adsorption :

(Mechanism of adsorption, types of adsorption, factors affecting adsorption).

9.3 Freundlich adsorption isotherm, formula, graph and limitations

9.4 Langmuir adsorption isotherm and mathematical formula

9.5 Adsorption from solution and uses of adsorption

9.6 Catalysis

9.7 Nature of solid catalyst

9.8 Shape selective catalysis by zeolite

9.9 Enzyme catalysis :
(Mechanism, Characteristics)
- Catalysis in industries.

9.10 Colloids and their types

9.11 Methods of preparing colloid - sol

9.12 Purification of colloidal solution - sol

9.13 Important properties of colloidal solution - sol

9.14 Coagulation of Colloids

9.15 Emulsion :
Test, preparation and Demulsification

9.16 Uses of colloids

Unit-10

d AND f BLOCK ELEMENTS

10.1 Introduction

10.2 Transition elements - Elements of d-block
Electron configuration, Oxidation States, general characteristics.

10.3 Periodic trends in properties of elements of first transition series.

10.4 Characteristic properties of elements of first transition series.

10.5 Interstitial compounds, examples, properties and uses.

10.6 Alloys, Hume and Rothery's rules.

10.7 Some important compounds of 3d-transition elements

10.8 Application of d-block elements.

10.9 Inner transition elements [Elements of f-block]

10.10 Lanthanide Series;
-Electronic Configuration, Oxidation States, atomic volume and chemical reactivity.

10.11 Actinide Series
-Electronic Configuration and oxidation states

10.12 Comparision of Actinoids with Lanthanoids

10.13 Application of f-block elements

Unit-11

COMPLEX SALTS OR CO-ORDINATION COMPOUND

11.1 Introduction

11.2 Double salts, complex salts.

Unit-12

ALDEHYDES, KETONES AND CARBOXYLIC ACIDS

Unit-13

ORGANIC COMPOUNDS CONTAINING NITROGEN

13.7 Chemical reactions of amines

13.8 Diazonium salt and its uses

13.9 Cynide and nitrile compounds, structures, properties and chemical reactions

13.10 Isocyanide compounds

13.11 Nitro compounds

Unit-14

BIOMOLECULES

14.1 Introduction

14.2 Carbohydrates :

-Classification

-nomenclature and structures

14.3 Monosaccharides :

-Glucose and fructose

-Preparation and Structure of Glucose

14.4 Disaccharides and their structures :

-Sucrose

-Maltose

-Lactose

14.5 Polysaccharides : Starch and Cellulose

14.6 Importance of Carbohydrates

14.7 Proteins :

- aminocacids
- peptides
- structures of proteins
- Denaturation of proteins

14.8 Enzymes

14.9 Vitamins

14.10 Nucleic acids and Hormones

Unit-15

POLYMERS

15.1 Introduction

15.2 Classification of polymenrs in different forms

15.3 Industrial manufacturing, properties and uses of :

Polythene, teflon, PAN, PVC, Polystyrene, butyl rubber, SBR, Nylon-66,Nylon-6, Dacron, (Terelyne) Bakelite, Melamine, Glyptal, Urea formaldehyde resin.

15.4 Rubber :

- Nature rubber
- Vulcanised rubber
- Synthetic rubbers : Neoprene, BuNa - N, BuNa-S

15.5 Molecular mass of polymers and PDI

15.6 Biopolymers

- Biodegradble polymers
- Non biodegradable polymers and their examples and properties
- PHBV, Nylon-2-Nylon-6, PGA, PLA, Dextran

Unit-16

CHEMISTRY IN EVERDAY LIFE

16.1 Introduction

16.2 Drugs

16.3 Classification of Drugs

16.4 Working mechanism of Drugs

16.5 Therapentic action of different classes of Drugs

16.6 Chemicals in Food

16.7 Cleansing agents