

Engineering Chemistry



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Engineering Chemistry

Module-I: Electrochemistry and Corrosion

Electro chemical cells: Electrode potential, standard electrode potential, types of electrodes; Calomel, Quinhydrone and glass electrode; Nernst equation; Electrochemical series and its applications; Numerical problems; Batteries: Primary (Dry cell) and secondary batteries (Lead-acid storage battery and Lithium ion battery).

Causes and effects of corrosion: Theories of chemical and electrochemical corrosion, mechanism of electrochemical corrosion; Types of corrosion: Galvanic, water-line and pitting corrosion; Factors affecting rate of corrosion; Corrosion control methods: Cathodic protection, sacrificial anode and impressed current; Surface coatings: Metallic coatings- Methods of coating- Hot dipping, cementation, electroplating and Electroless plating of copper.

Module-II: Water and its Treatment

Introduction: Hardness of water, Causes of hardness; Types of hardness: temporary and permanent, expression and units of hardness; Estimation of hardness of water by complexometric method; Potable water and its specifications, Steps involved in treatment of water, Disinfection of water by chlorination and ozonation; Boiler feed water and its treatment, Calgon conditioning, Phosphate conditioning and Colloidal conditioning; External treatment of water; Ion-exchange process; Desalination of water: Reverse osmosis, numerical problems.

Module-III: Molecular Structure and Theories of Bonding

Shapes of Atomic orbitals, Linear Combination of Atomic orbitals (LCAO), molecular orbitals of diatomic molecules; Molecular orbital energy level diagrams of N_2 , O_2 , F_2 , CO and NO molecules.

Crystal Field Theory (CFT): Salient Features of CFT-Crystal Fields; Splitting of transition metal ion d- orbitals in Tetrahedral, Octahedral and square planar geometries; Band structure of solids and effect of doping on conductance.

**Module-IV: Stereochemistry, Reaction Mechanism and
Synthesis of Drug Molecules**

Introduction to representation of 3-dimensional structures: Structural and stereoisomers, configurations, symmetry and chirality; Enantiomers, diastereomers, optical activity and Absolute configuration; Confirmation analysis of n- butane.

Substitution reactions: Nucleophilic substitution reactions, Mechanism of SN^1 , SN^2 reactions; Electrophilic and nucleophilic addition reactions; Addition of HBr to propene; Markownikoff and anti Markownikoff's additions; Grignard additions on carbonyl compounds; Elimination reactions: Dehydro halogenation of alkylhalides; Saytzeff rule; Oxidation reactions: Oxidation of alcohols using $KMnO_4$ and chromic acid; Reduction reactions: Reduction of carbonyl compounds using $LiAlH_4$ & $NaBH_4$; Hydroboration of olefins; Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

Module-V: Fuels and Combustion

Fuels: Definition, classification of fuels and characteristics of a good fuels; Solid fuels: Coal; Analysis of coal: Proximate and ultimate analysis; Liquid fuels: Petroleum and its refining; Cracking: Fixed bed catalytic cracking; Knocking: Octane and cetane numbers; Gaseous fuels: Composition, characteristics and applications of natural gas, LPG and CNG; Combustion: Calorific value: Gross Calorific Value(GCV) and Net Calorific Value(NCV), calculation of air quantity required for complete combustion of fuel, numerical problems.

Engineering Chemistry

Module-I: Electrochemistry and Corrosion

| | | |
|--------|--|----|
| 1.0 | Aims and Objectives | 2 |
| 1.1 | Introduction | 2 |
| 1.2 | Concept of Electrochemistry | 3 |
| 1.3 | Electrical Conduction | 4 |
| 1.3.1 | Differences between Electronic and Electrolytic Conduction | 7 |
| 1.3.2 | Differences between Metallic and Electrolytic Conductors | 7 |
| 1.3.3 | Differences between Weak and Strong Electrolytes | 8 |
| 1.4 | Conductance in Electrolytic Solution | 8 |
| 1.5 | Specific Conductance | 9 |
| 1.6 | Equivalent Conductance | 10 |
| 1.7 | Molar Conductance | 11 |
| 1.8 | Variation of Conductance with Concentration | 11 |
| 1.9 | Measurement of Conductance | 12 |
| 1.10 | Cell Constant | 13 |
| 1.11 | Electrode Potential (E) | 14 |
| 1.11.1 | Standard Electrode Potential | 15 |
| 1.12 | Galvanic Cell | 17 |
| 1.12.1 | E.M.F of a Cell | 19 |
| 1.13 | Solved Problems | 21 |
| 1.14 | Differences between Galvanic and Electrolytic Cell | 26 |
| 1.15 | Types of Electrodes | 27 |
| 1.15.1 | Standard Calomel Electrodes (SCE) | 28 |
| 1.15.2 | Quinhydrone Electrode | 29 |
| 1.16 | Nernst Equation | 34 |
| 1.16.1 | Solved Problems | 36 |
| 1.17 | Electrochemical Series and its Applications | 42 |
| 1.18 | Batteries | 46 |
| 1.19 | Types of Batteries | 46 |
| 1.19.1 | Primary Batteries | 46 |
| 1.19.2 | Secondary Batteries | 48 |
| 1.20 | Fuel Cell | 52 |
| 1.20.1 | Hydrogen -Oxygen Fuel Cell | 53 |
| 1.20.2 | Distinguish between Primary, Secondary and Fuel Cell | 54 |
| 1.21 | Corrosion | 55 |

| | | |
|---|--|----|
| 1.21.1 | Cause of Corrosion | 56 |
| 1.21.2 | Effects of Corrosion | 57 |
| 1.21.3 | Units of Corrosion | 57 |
| 1.22 | Theories of Corrosion | 57 |
| 1.22.1 | Acid Theory of Corrosion | 58 |
| 1.22.2 | Dry or Chemical Theory of Corrosion | 58 |
| 1.23 | Mechanism of Wet or Electrochemical Theory of Corrosion | 58 |
| 1.23.1 | Differences between Dry or Wet Corrosions | 60 |
| 1.24 | Types of Corrosion | 61 |
| 1.25 | Factors Influencing Corrosion | 64 |
| 1.26 | Rusting of Iron and its Mechanism | 66 |
| 1.26.1 | Conditions of Rusting of Iron | 68 |
| 1.27 | Corrosion Control Methods | 69 |
| 1.28 | Surface Coatings | 70 |
| 1.29 | Cathodic Protection | 70 |
| 1.29.1 | Sacrificial Anode Process | 71 |
| 1.29.2 | Impressed Current Cathodic Protection | 71 |
| 1.29.3 | Differences between Sacrificial and Impressed Current Method | 73 |
| 1.29.4 | Differences between Anodic and Cathodic Coating | 73 |
| 1.30 | Methods of Application of Metal Coatings | 73 |
| 1.31 | Electroplating | 76 |
| 1.32 | Electroless Plating | 77 |
| 1.33 | Summary | 78 |
| 1.34 | Review Questions | 79 |
| 1.35 | Objective Type Questions | 81 |
| Module-II: Water and its Treatment | | |
| 2.0 | Aims and objectives | 86 |
| 2.1 | Introduction | 86 |
| 2.2 | Water | 87 |
| 2.2.1 | Properties of Pure Water | 87 |
| 2.2.2 | Sources of Water | 87 |
| 2.2.3 | Impurities of Water | 88 |
| 2.2.4 | Sources of Impurities in Water | 88 |
| 2.2.5 | Different Uses of Water | 89 |
| 2.3 | Drinking Water (or) Potable Water | 89 |
| 2.4 | Soft and Hard Water | 91 |
| 2.4.1 | Reasons for Water being Hard or Soft | 91 |
| 2.4.2 | Soap and its Action on Hard Water | 92 |
| 2.4.3 | Causes of Hardness | 92 |
| 2.4.4 | Differences between Hard and Soft Water | 93 |

| | | |
|--|--|-----|
| 2.5 | Types of Hardness | 93 |
| 2.5.1 | Differences between Temporary and Permanent Hardness | 94 |
| 2.6 | Advantages AND Disadvantages of Hard Water | 95 |
| 2.6.1 | Degree of Hardness (ppm) | 95 |
| 2.6.2 | Units of Hardness | 97 |
| 2.6.3 | Solved Problems | 98 |
| 2.7 | Estimation of Hardness of Water by Complexometric Method | 105 |
| 2.7.1 | Solved Problems | 109 |
| 2.8 | Steps Involved in Treatment of Water | 116 |
| 2.9 | Disinfection of Water by Chlorination | 120 |
| 2.9.1 | Break Point Chlorination | 122 |
| 2.10 | Disinfection of Water by Ozonization | 124 |
| 2.11 | Boiler feed Water and its Treatment | 126 |
| 2.11.1 | Requirements of Boiler Feed Water | 126 |
| 2.11.2 | Boiler Troubles | 127 |
| 2.11.2.1 | Scale Formation | 127 |
| 2.11.2.2 | Sludge Formation | 129 |
| 2.11.2.3 | Differences between Scale and Sludge Formation | 130 |
| 2.11.3 | Priming and Forming | 131 |
| 2.11.4 | Boiler Corrosion | 132 |
| 2.11.5 | Caustic Embrittlement | 133 |
| 2.12 | Softening Methods | 134 |
| 2.12.1 | Internal Treatment | 134 |
| 2.12.2 | External Treatment | 136 |
| 2.12.2.1 | Permutit Process | 136 |
| 2.12.2.2 | Ion-exchange Process | 139 |
| 2.12.3 | Comparison of Internal and External Treatment | 141 |
| 2.12.4 | Comparison of Zeolite and Ion-exchange Process | 141 |
| 2.13 | Desalination of Water | 142 |
| 2.13.1 | Electrodialysis | 143 |
| 2.13.2 | Reverse Osmosis | 144 |
| 2.14 | Summary | 149 |
| 2.15 | Review Questions | 150 |
| 2.16 | Objective Type Questions | 152 |
| Module-III: Molecular Structure and Theories of Bonding | | |
| 3.0 | Aims and Objectives | 160 |
| 3.1 | Introduction | 160 |
| 3.2 | Fundamental Particles of an Atom | 161 |
| 3.3 | Shapes of Atomic Orbitals | 162 |
| 3.3.1 | Concept of Orbital | 162 |
| 3.3.2 | Shape of Orbitals-Shapes of s, p and d Orbitals | 163 |

| | | |
|---|--|-----|
| 3.3.3 | Differences between Orbit and Orbital | 164 |
| 3.4 | Quantum Numbers | 165 |
| 3.5 | Aufbau Principle | 168 |
| 3.6 | Structure of the Atom | 169 |
| 3.7 | Atomic and Molecular Orbitals | 172 |
| 3.8 | Molecular Orbital Theory | 173 |
| 3.9 | Bond Order | 176 |
| 3.10 | Differences between Atomic and Molecular Orbital | 178 |
| 3.11 | Linear Combination of Atomic Orbitals (LCAO) | 178 |
| 3.11.1 | Bonding and Anti-bonding Materials | 179 |
| 3.12 | Relative Energies of BMO and ABMO | 180 |
| 3.13 | Differences between Bonding and Antibonding Molecular Orbital | 182 |
| 3.14 | Molecular Orbitals of Homonuclear Diatomic Molecules | 182 |
| 3.15 | Valence Bond Theory | 185 |
| 3.16 | Types of Hybridization | 189 |
| 3.17 | Molecular Orbital Energy Level Diagrams | 192 |
| 3.18 | Crystal Field Theory (CFT) | 199 |
| 3.19 | Crystal Field Splitting of d-orbitals in Octahedral Complexes | 200 |
| 3.20 | Crystal Field Splitting in Tetrahedral Complexes | 202 |
| 3.21 | Crystal Field Splitting in Square Planar Complexes | 204 |
| 3.22 | Applications of CFT | 205 |
| 3.23 | Limitations of CFT | 206 |
| 3.24 | Band Structure of Solids | 207 |
| 3.25 | Distinguish between a Sigma and a pi bond | 209 |
| 3.26 | Formation of BeCl_2 and BF_3 | 209 |
| 3.27 | Summary | 211 |
| 3.28 | Review Questions | 212 |
| 3.29 | Objective Type Questions | 213 |
| Module-IV: Stereochemistry, Reaction Mechanism and Synthesis of Drug Molecules | | |
| 4.0 | Aims and Objectives | 218 |
| 4.1 | Introduction | 218 |
| 4.2 | Representation of 3-dimensional Structures | 219 |
| 4.3 | Stereochemistry | 225 |
| 4.4 | Isomerism and Classification of Isomers | 226 |
| 4.4.1 | Structural Isomerism | 227 |
| 4.4.2 | Stereoisomers | 229 |
| 4.5 | Configurations of Isomerism | 230 |
| 4.6 | Determination of Configuration of Geometrical Isomers Having ($\text{C} = \text{C}$) | 233 |
| 4.7 | Symmetry and Chirality | 234 |
| 4.7.1 | Asymmetric and Diastereomeric Molecules | 237 |

| | | |
|---------------------------------------|---|-----|
| 4.8 | Enantiomers | 238 |
| 4.9 | Diastereomers | 240 |
| 4.10 | Comparison of Enantiomers and Diastereomers | 242 |
| 4.11 | Differences Between Configurational and Conformational Isomers | 243 |
| 4.12 | Optical Activity | 244 |
| 4.13 | Absolute Configuration | 248 |
| 4.14 | Conformational Isomerism | 253 |
| 4.15 | Organic Reaction Mechanisms | 257 |
| 4.16 | Types of Organic Reactions | 260 |
| 4.16.1 | Electrophilic and Nucleophilic Addition Reactions | 260 |
| 4.16.2 | Substitution Reactions | 262 |
| 4.16.2.1 | Mechanism of S_N^1 , S_N^2 Reactions | 263 |
| 4.16.2.2 | Comparison of S_N^2 and S_N^1 | 267 |
| 4.16.3 | Addition of HBr to Propene | 267 |
| 4.17 | Markownikoff and anti Markownikoff's Additions | 270 |
| 4.18 | Elimination Reactions | 273 |
| 4.19 | Grignard Additions on Ccarbonyl Ccompounds | 277 |
| 4.20 | Oxidation reactions | 280 |
| 4.20.1 | Oxidation Reactions of $KMnO_4$ | 283 |
| 4.20.2 | Reduction Reactions | 284 |
| 4.20.2.1 | Lithium Aluminium hydride ($Li Al H_4$) | 287 |
| 4.21 | Hydroboration of Olefins | 289 |
| 4.22 | Addition of diborane(hydroboration) | 290 |
| 4.23 | Structure, Synthesis and pharmaceutical Applications of Paracetamol and Aspirin | 291 |
| 4.23.1 | Pharmaceutical Applications of Aspirin and Paracetamol | 293 |
| 4.25 | Review Questions | 295 |
| 4.26 | Objective Type Questions | 297 |
| Module-V: Fuels and Combustion | | |
| 5.0 | Aims and Objectives | 306 |
| 5.1 | Introduction | 306 |
| 5.2 | Fuel | 307 |
| 5.2.1 | Formation of Fossil Fuels | 307 |
| 5.3 | Classification of Fuels | 307 |
| 5.4 | Characteristics of Good Fuel | 308 |
| 5.4.1 | Differences between Solid, Liquid and Gaseous Fuels | 309 |
| 5.4.2 | Primary and Secondary Fuels | 310 |
| 5.5 | Solid Fuels | 311 |
| 5.5.1 | Classification of Coal | 313 |
| 5.5.2 | Selection of Coal | 315 |
| 5.6 | Analysis of Coal | 316 |

| | | |
|---------|--|-----|
| 5.6.1 | Proximate Analysis | 316 |
| 5.6.2 | Ultimate Analysis | 318 |
| 5.6.3 | Solved Problems | 323 |
| 5.7 | Advantages and Disadvantages of Solid Fuels | 327 |
| 5.8 | Composition and Uses of Coal | 328 |
| 5.9 | Liquid Fuels | 331 |
| 5.9.1 | Advantages and Disadvantages of Liquid Fuels | 331 |
| 5.9.2 | Petroleum | 332 |
| 5.9.2.1 | Classification of Petroleum | 333 |
| 5.9.2.2 | Origin of Petroleum | 334 |
| 5.9.3 | Mining of Petroleum | 335 |
| 5.9.4 | Refining of Petroleum | 336 |
| 5.10 | Cracking | 340 |
| 5.10.1 | Types of Cracking | 341 |
| 5.10.2 | Advantages of Catalytic Cracking | 343 |
| 5.11 | Knocking | 344 |
| 5.12 | Octane Number | 345 |
| 5.12.1 | Chemical Structure and Petrol Knock | 346 |
| 5.13 | Cetane Number | 347 |
| 5.13.1 | Chemical Structure and Diesel Knock | 347 |
| 5.13.2 | Differences between Octane and Cetane Number | 348 |
| 5.13.3 | Differences between Petrol and Diesel | 349 |
| 5.14 | Gaseous Fuels | 350 |
| 5.14.1 | Natural Gas | 351 |
| 5.15 | Liquified Petroleum Gas (lpg) | 356 |
| 5.16 | Compressed Natural Gas (cng) | 357 |
| 5.17 | Flue Gas Analysis | 358 |
| 5.18 | Orsat's Apparatus | 358 |
| 5.19 | Combustion | 360 |
| 5.20 | Calorific Value of Fuel | 362 |
| 5.20.1 | Higher or Gross Calorific Values (HCV) | 363 |
| 5.20.2 | Lower or Net Calorific Value (LCV) | 363 |
| 5.20.3 | Differences between HCV and LCV | 363 |
| 5.21 | Calculation of Air Quantity Required for Complete Combustion of Fuel | 364 |
| 5.21.1 | Solved Problems | 363 |
| 5.22 | Determination of Calorific Value | 368 |
| 5.22.1 | Solved Problems | 373 |
| 5.23 | Summary | 382 |
| 5.24 | Review Questions | 382 |
| 5.25 | Objective Type Questions | 385 |