

FCYE408	Chemistry -IV	3-0-0	3
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Carbohydrates

[08 Hrs]

Classification and nomenclature: Monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and shortening of aldoses. Configuration of monosaccharides. Erythro and threo-diastereomers. Conversion of glucose into mannose. Formation of glycosides, ethers and esters. Determination of ring size of monosaccharides. Cyclic structure of D(+)-glucose. Mechanism of mutarotation.

Structure of ribose and deoxyribose.

An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination.

Coordination compounds

[05Hrs]

Warner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes.

Electrochemistry

[10 Hrs]

Types of reversible electrodes – gas-metal ion, metal-metal ion, metal-insoluble salt-anion and redox electrodes. Electrode reactions, Nernst equation, derivation of cell EMF and single electrode potential, standard hydrogen electrode- reference electrodes- standard electrode potential, sign conventions, electrochemical series and its significance.

Electrolytic and Galvanic cells – reversible and irreversible cells, conventional representation of electrochemical cells.

EMF of a cell and its measurements. Computation of cell EMF. Calculation of thermodynamic quantities of cell reactions (ΔG , ΔH and K), polarization, over potential and hydrogen overvoltage.

Concentration cell with and without transport, liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient, potentiometric titrations.

Definition of pH and pKa, determination of pH using hydrogen, quinhydrone and glass electrodes by potentiometric methods.

Buffers – mechanism of buffer action, Henderson – Hazel equation. Hydrolysis of salts. Corrosion types, theories and methods of combating it.

Solutions, Dilute Solutions and Colligative Properties

[07 Hrs]

Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient.

Dilute solution, colligative properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis, law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point.

Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods for determining various colligative properties.

Abnormal molar mass, degree of dissociation and association of solutes.

Essential readings:

- J.D. Lee, Concise Inorganic Chemistry, 5th edition, Blackwell Publishing, 2008
- Huheey, Keiter and Keiter, Inorganic chemistry Principle, structure and reactivity. 4thedn
- Inorganic Chemistry R.D.Madan, S.Chand Publication
- Basic Inorganic Chemistry Cotton & Willkinson
- P.W. Atkins and Julio de Paula, Elements of Physical Chemistry, Oxford University Press, 1992
- Principles of Physical Chemistry by Puri, Sharma and Pathania, Vishal Publication Co
- Principles of Bio-Chemistry – Lehinger, Nelson and Cox
- Fundamentals of Bio-Chemistry – Voet & Voet
- Bio-Chemistry by Zubay
- Bio-Chemistry, Rastogi, Tata McGraw Hill