FCYC -----703	**Inorganic Chemistry-VI**		

Module-I

Role of metal ions in biological systems, Toxic metal ions and their detoxification, Chelation therapy or chelating agents in medicine. Recent advances in cancer chemotherapy using chelates. Biological nitrogen fixation, Natural and synthetic oxygen carriers. Na-K, ATPase or sodium pump. Transport Mechanism Na^+/K^+ transport (Ion pump); O_2 transport by haemoglobin. CO_2 transport by carbonic anhydrase Futuristic aspects of organo-transition metal complexes as catalysts and in bio-inorganic chemistry.

Module –II

Spectral techniques in Inorganic Chemistry

Vibrational Spectroscopy: Vibration motion and energies, number of vibrational modes, an harmonicity, absorption in infrared, FT spectrometers, Cell systems. Effects of phase on spectra, Vibrational spectra and symmetry, selection rules, symmetry of an entire set of normal vibrations, F and G matrix, Raman spectra and selection rules, Polarised and depolarised Raman lines, Resonance Raman Spectroscopy, Use of symmetry to determine the number of active infrared and Raman lines, Rotational fine structure in gas phase IR. Non-resonance overtones and different bands. Application of Raman and IR selection rules for determination of inorganic structures. Bond strength frequency shift relations, changes in spectra of donor molecules on co-ordination, change in symmetry on co-ordination.

Mossbauer spectroscopy: Doppler shift and recoil energy, isomer shift and its interpretation, qudrapole interactions, effect of magnetic field on Mossbauer spectra., applications to metal complexes, metal carbonyls, Fe-S cluster and tin compounds, etc. Partial quadrupole spilltings and geometry of the complexes.

Mass spectroscopy: Experimental arrangements and presentations of spectra, molecular ions, appearance and ionisation potential, fragmentation, ion reactions and their interpretation, effect of isotopes on the appearance of a mass spectrum, molecular weight determination, thermodynamic data. Applications of mass spectroscopy to inorganic compounds

Module-III

Nuclear magnetic resonance Spectroscopy (NMR)

Nuclear spin quantum number, I, its calculations using the nuclear shell model, spin parity rules. Types of nuclei based on values of I, Nuclear spin angular momentum and its relation to classical magnetic moment. Behaviour of a bar magnet in a magnetic field. The NMR transition and NMR experiment. Measuring chemical shift, signal intensities and splitting. Applications of chemical shifts, signal intensities, spin-spin coupling to structure determination of inorganic compounds carrying NMR active nuclei like 1H, 11B, 15N, 19F, 29 Bi, 31P, 183W, 195 Pt etc. Effect of first chemical reactions, coupling to quadrupole nuclei, NMR of paramagnetic substances in solution, nuclear and electron relaxation time, contact shift, pseudocontact shift, factoring contact and pseudo contact shift for transition metal ions. Contact shift and spin

density, pai delocalisation, simplified MO diagram for Co(II), Ni(II). Application to planar tetrahedral equilibrium, contrast agents

Nuclear quadrapolar resonance Spectroscopy (NQR)

Quadrapolar moment, energy lends of a quadrapolar nuclease and effct of asymmetry parameters and energy lends. Effect of an external magnetic field, selected examples of an

external magnetic field, selected examples of elucidation of structural aspects of inorganic compounds using NQR spectroscopy.

Recommended books

1. Ebsworth, E.A.O. Structural methods in Inorganic chemistry. Blackwell scientific publications (1991).
2. Drago, R.S. Physical methods in chemistry, W.B Sounders Co U.K. (1977)
3. Carrington, A.Mc Lachlan, A.D. Introduction to magnetic resonance, Chapman & Hall, NY(1983).
4. Mabbs, F.E. & Machin D.J. Magnetism and Transition metal complexes, Chapmann and Hall: UK(1973).