CH 502: INORGANIC CHEMISTRY III (3-1-0: 4)

Organometallic Chemistry

18 electron rule, synthesis, structure and bonding in polynuclear carbonyl, nitrosyl and dinitrogen complexes. Structure and bonding in metal alkyls, carbenes, carbynes, alkenes, alkynes and allyl complexes.

Synthesis and bonding in cyclobutadiene and pentadienyl complexes, metallocenes, preparation, properties and bonding in ferrocene – MO theory, metal-arene complexes (cycloheptatriene and tropylium complexes, cyclooctatetraene complexes), fluxional molecules.

Reactions of Organometallic Compounds

Oxidative addition and reductive elimination reactions, insertion and eliminations, β-elimination reaction, nucleophilic and electrophilic attack of co-ordinated ligands, transmetallation.

Catalysis by Organometallic Complexes

Alkene hydrogenation, hydroformylation, Monsanto acetic acid process, synthesis gas, synthetic gasoline, Wacker process isomerisation, metathesis and Ziegler- Natta polymerization.

Chemistry of Lanthanides and Actinides

Principal Characteristics of the rare Earth Elements, Oxidation state, periodic properties, lanthanide and actinide contraction, separation of lanthanides and actinides, magnetic and spectral properties of lanthanides, reactions, lanthanide shift reagents and its application.
Radioactivity

Text Books and References:

1. J. E. Huheey, E. A. Keiter and R. L. Keiter, “Inorganic Chemistry: Principles of structure and reactivity”, Pearson Education.
2. F. A. Cotton, G. Wilkinson, C. A. Murillo and M. Bochmann, “Advanced Inorganic Chemistry”, Wiley.
3. B. D. Gupta and A. J. Elias, “Basic Organometallic Chemistry: Concepts, Syntheses and Applications”, Universities Press.
4. N. N. Greenwood and A. Earnshaw, “The Chemistry of Elements”, Butterworth-Heinemann Ltd.