

Characterization of simple organic compounds on the basis of given xerox copies of spectra (UV, IR, PMR and Mass)

Books Recommended :

1. Systematic Identification of Organic Compounds, R.I. Shriner, R.C. Fusen and D.Y. Curtin.
2. Spectrometric Identification of Organic Compounds, R.M. Silverstein, C.G. Bassler and T.C. Merruill.
3. Spectral and Chemical Characterisation of Organic Compounds, W.J. Criddle and G.P. Ellis.
4. Experimental Organic Chemistry, M.P. Doyle and W.S. Mungall.
5. Experimental and Techniques in Organic Chemistry, D. Pasto, C. Johnson and M. Miller.
6. Elementary Practical Organic Chemistry, Arthur I. Vogel.
7. Comprehensive Practical Organic Chemistry, V.K. Ahluwalia and R. Aggrawal.
8. Advanced Practical Organic Chemistry, N.K. Vishnoi.
9. A Hand-book of Organic Analysis, Hans T. Clarke
10. An Introduction to Chromatography, David Abbott and R.B. Andrews.
11. Systematic Qualitative Organic Analysis, H. Middleton

**PAPER-III (C)
CHEMICAL KINETICS**

Time: 3 Hrs.

M.M. 100

Note: The paper will be divided into THREE sections.

Section-A : Ten questions (short type answer) two from each Unit will be asked. Each question will be of one mark and the candidates are required to attempt all questions. **Total 10 marks**

Section-B : Five questions (answer not exceeding 250 words) one from each Unit with internal choice will be asked and the candidates are required to attempt all questions. Each question will be of 10 marks.

Total 50 marks

Section-C : Four questions may be in parts covering all the five Units (answer not exceeding 500 words) will be asked. The candidates are required to attempt any TWO questions. Each question will be of 20 marks.

Total 40 marks

UNIT-I

Techniques for rate determination - Slow reactions (solution and gas phase), fast reactions - stopped flow, relaxation, shock - tube method, flash photolysis, NMR, optical and laser methods

Methods for determining reaction mechanism and rate law.

UNIT-II

Principles of reactivity - Significance of entropy, enthalpy and Gibb's free energy, Arrhenius equation, uses of activation parameters, potential energy diagrams and models, curve-crossing model, nature of activation barrier in chemical reaction

Structure effect on rate - Linear free energy constants relationship, Hammett equation, substitution constants, theories of substituent effect, interpretation of σ values and reaction constant ρ , deviation from Hammett equation, the Taft model, σ_1 and σ_R scales, steric acceleration, molecular measurements of steric effect upon rates.

UNIT-III

Kinetic isotope effect - Theory of isotope effects, primary and secondary kinetic effect, heavy atom isotope effect, tunneling effect, solvent isotope effect.

Solvation and solvent effect on rate - Factors affecting reaction rate in solution, quantitative understanding of solvent solute effects on reactivity - thermodynamic measures of solvation, effect of solvation, effect of solvation on reaction rate, solvent effect on ion - ion, ion - dipole and dipole - dipole reactions, preliminary idea about diffusion - controlled reactions.

UNIT-IV

Homogeneous catalysis - Acid-base catalysis, specific and general catalysis, Bronsted catalysis, nucleophilic

and electrophilic catalysis, acidity function and their applications,

Electron transfer processes in solution - Inner-sphere, outersphere, bridged transition states, Marcus theory and its modifications, one equivalents and two equivalent exchange reaction, reactions of solvated electron with metal ions.

UNIT-V

Reaction on surfaces - Adsorption isotherm, structure of solid surface and adsorbed layers, mechanism of surface reactions, unimolecular and bimolecular surface reactions, transition state theory of surface reactions, surface chemistry in industrial processes.

Gas phase reaction - Hydrogen-oxygen reaction, combustion of hydrocarbons, decomposition of N_2O_5 and acetaldehyde, Gold, Finger- Lettort - Niclaus rule and inhibition mechanism.

Books Recommended :

1. Surface activity and Detergency, K. Durham, Ed. McMillan.
2. Emulsion and Foams, S. Berkman and G. Egloff, Reinhold.
3. Surface Chemistry, J.B. Bikeman, Academic
4. Chemical Kinetics, K.J. Laidler
5. Chemical Kinetics and Mechanism, A.A Frost and R.G. Pearson