SAIVA BHANU KSHATRIYA COLLEGE

(Aruppukottai Nadargal Uravinmurai Pothu Abiviruthi Trustukku Pathiyapattathu)
(Affiliated to Madurai Kamaraj university)
(Re-accredited with B+ Grade (3rd Cycle) by NAAC)

ARUPPUKOTTAI - 626 101
VIRUDHUNAGAR DISTRICT, TAMIL NADU
DEPARTMENT OF CHEMISTRY

M.Sc., Chemistry
REVISED SYLLABUS
(With effect from the academic year 2018-2019 onwards)

Year	Semester	Paper	Credit	Hr / week	Internal	External	Total	External Duration	External Total
I	II	Stereochemistry and Organic Reactions	4	5	25	75	100	3 Hrs.	75
		Coordination, Organometalic and Bioinorganic Chemistry	5	5	25	75	100	3 Hrs.	75
		Group Theory and Spectroscopy	4	5	25	75	100	3 Hrs.	75
		Major C:	5	5	25	75	100	3 Hrs.	75
		1 Computer Applications in Chemistry							
		2 Industrial Chemistry							
		Inorganic Qualitative and quantitative analyses and preparations-Practical	5	5	40	60	100	6 Hrs.	60
		Organic preparation and Qualitative and Quantitative analyses-Practical	5	5	40	60	100	6 Hrs.	60

Semester II
Paper I - Stereochemistry and Organic Reactions

Unit I : Stereochemistry II : Prochirality and prosteroisomerism, enantiotopic and diasterotopic ligands and faces and their nomenclature pro-R and pro-S and Re and Si faces. Stereospecifi and stereoselective reactions. A symmetric synthesis, Cram and Prolong rules; Optical isomerism due to axial chriality – biphenyls, allenes and spiranes, -molecules with plannar chirality – paracyclophanes, trans cycloctene, ansa compounds.

Unit II : Conformational analysis :

Configuration and confirmation – conformations of ethane and n-butane conformation analysis p stereoelectronic and steric factors – conformation of simple cyclic compounds – confirmations of monosubstituted and disubstitutedcyclohexanes correlation of the conformation of acyclic and cyclic systems with their physical and chemical properties – conformational free energy – Curtin – Hammett principle – quantitative treatment of mobile system – Eliel – RO Equation – conformations and reactivity of cyclobexanones – conformational analysis of aldohexopyranoses.

Unit III : Addition to multiple bands :

Electrophilic, nucleophilic and free radical additions – addition to conjugated systems – orientation of the addendum – stereochemical factors in reactions like addition of hydrogen, halogens, hydrogen, halides and hypohalous acids, hydroboration and hydroxylation – epoxidation. \

Addition to carbonyls groups – mechanism – Aldolcondenstation – Perkin reaction - Knoevenagel reaction – Manmch reaction – Cannizaro reaction – benzoil condensation – Claisen ester condensation – Darzen's reaction – Reformatsky reaction – Writing reaction – Grignard reaction. Addition to α, β unsaturated carbonyl groups – addition of Grignard reagent to α, β unsaturated carbonyl compounds – Michael addition – Diels – Alder reaction – addition to carbenes and carebenoids to double and triple bonds. Esterification of acids and hydrolysis of esters – decarboxylation of carboxylic acids.

Elimination : α – elimination – β – elimination – E1, E2, and $E1_CB$ mechanisms – stereochemistry of elimination – orientation of the double bond – effect of changes in the substrate, base, leaving group and medium on E1, E2 and E1cB reactions – elimination vs substitution – pyrolyticcis eliminations – Bredt's rule.

Unit IV :Terpenes : Classfication of terpenoids – structure, stereochemistry and synthesis α, pinene, camphor, zingiberene, cadinene, α-santonin, abietic acid and squalene.
Vitamins : Structure and synthesis of Vitamins A, B1, B2, B6, B12 (structural features only) E, H and K.

Unit V : Aromatic electrophilic substitution – orientation – reactivity – mechanism of nitration, halogenations, Friedal-Craft's reaction and sulphonation – partial rate factors – ortho / para ratio – Quantitative treatment of reactivity of the electrophile (the selectivity relationship) – Aromatic nucleophilic substitution reactions – S_NAr, S_N1 and benzyne mechanisms.

Quantative treatment of the effect of structure on reactivity – The Hammett relationship – significance of reaction and substituents constants – application of the Hammett equation in reaction mechanism – limitations and deviations.

Suggested readings :

1. E.L. Eliel. S.H. Wilen& L.N. mander, Stereochemistry of Carbon Compounds,
    a. John Wiley & Sons, 2003.
2. V.M. Potapoy, Stereochemistry, MIR Publishers, Moscow, 1979
3. L.L. Finar, Organic Chemistry, Vol.II, 5th edn.ELBS,1975.
4. D. Nasipuri, Stereochemistry of Organic Compounds, principals and Applications, New Age International (P) Limited, 2ndedn., 1994.
5. P.S. Kalsi, Stereochemistry, Conformation and Mechanism, New Aged International (P)Limited, 4th edn.1997.
6. T.H.Lowry and K.S. Richardson, Mechanism and Theory in Organic Chemistry.
7. Jerry March, Advanced Organic Chemisty, John Wiley & Sons, 4thedn., 2000.
8. E.S. Gould, Mechanism and Structure in Organic Chemistry, Henry Holt & Company, New York, 1959.
9. Reinhard Bruckner, Advanced Organic Chemistry, Reaction Mechanisms, Academic Press, 2002.
10. F.A. Carey and R.J. Sundberg, Advanced Organic Chemistry, Part B – 4thedn., Plenum Publishers, 2001.

11. Paul de Mayo, Chemistry of Terpenoids, Vol. I & II, academic press.
12. L. Fieser and Mary Fieser, Steroids, Rerinhold 1953
13. W.Klyne, The Chemistry of Steroids, Methuen & Co – New York, 1965.
14. S.F. Dyke, Chemistry of Vitamins, Interscience Publisher 1965.

Paper II - Coordination, organometallic and Bio-inorganic chemistry

Unit I: Coordination Compounds

IUPAC Nomenclature of coordination compounds – isomerism in coordination compounds – Types of ligands – monodendate, ambidentate and macro cyclic ligands – Chelate and Chelate effect - Stability constant – Factors affecting stability of complex compounds – Determination of stability constant spectrophotometry, Jobs method and polarographic methods.

Theories of bonding – VB – CFT — Splitting of d-orbitals in Oh, Td, square planar and trigonalbipyramidal geometries – CFSE calculation in terms of Dq – Factors affecting crystal field splitting – Spectrochemical series –Jahn-Teller Theorem- MO theory of octahedral complex- Magnetic properties of transition metal complexes – calculation of spin-only and orbital quenching magnetic moments.

Unit II: Reaction mechanism of coordination compounds:

Substitution reactions of octahedral complexes – labile – inert complexes – mechanism of acid hydrolysis – and anation reactions. Substitution reactions of square planar complexes – Factors affecting reactivity of square planar complexes – Trans – effect and its applications – Electron transfer reactions – complementary and non-complementary reactions – outer sphere and inner sphere electron transfer mechanisms – Synthesis of coordination compounds using electron transfer and substitution reactions, Macrocyclic ligand and Template effect.

Unit III: Bio-inorganic Chemistry-I

Porphyrin ring system – metalloporphyrins – hemoglobin and myoglobin – structures and work functions – synthetic oxygen carries – cytochromes – structure and work function in respiration – chlorophyll – structure – photosynthetic sequence – iron-sulphur proteins (non-heme iron protein) – Copper containing proteins – classification – blue copper proteins – structure of blue copper electron transferases – copper proteins as oxidases – cytochrome C oxidase – mechanistic studies of Cytochrome C oxidase – Hemocyanin.

Unit IV: Bio-inorganic Chemistry-II

Carboxypeptidase A: structure, function – carbonic anhydrase – inhibition and poisoning – corin ring system – vitamin B_{12} and B_{12} coenzymes – *in-vivo* and *in-vitro* nitrogen fixation – essential and trace elements in biological systems – metal ion toxicity and detoxification – molecular mechanism of ion transport across the membrane – sodium and potassium ions pumps – chelate therapy – *cis*platin.

Unit V: Organometallic Chemistry

Synthesis, structure and bonding in metal carbonyls, nitrosyls, dioxygen complexes and dinitrogen complexes – Application of EAN and 18 electron rules- Synthesis, properties, structure and bonding in Ferrocene, Arene, olefin, acetylene and allyl complexes.

Oxidative addition – reductive elimination – insertion reaction – catalytic mechanism in the following reactions: hydrogenation of olefins (Wilkinson catalyst) – Tolman catalytic loops – hydroformylation (oxo process) – acetic acid from ethanol – oxidation of alkenes to aldehydes and ketones (Wacker process) – catalysis in the formation of synthesis of gas-olefin polymerisation (Ziegler – Natta) – Cyclooligomerisation of acetylenes (Reppe's or Wilke's catalysts) – olefin isomerisation using Ni catalyst.

Suggested Readings:

1. W.E. Addison, Structural Principles of Inorganic Chemistry, Wiley, 1961.
2. B.D. Gupta and A.J. Elias, Basic organometallic chemistry, 2nd Edition, University Press, 2017.
3. Asim K das, Fundamental concepts of Inorganic Chemistry, Vol 4-6, 2nd edition, CBS publisher and Distribution Pvt. Ltd, 2016.
4. A.F. Wells, Structural Inorganic chemistry, 4th edition, Oxford, New York, 1975.
5. F.A. Cotton and G. Wilkinson, Advanced Inorganic Chemistry, 6thEdn., John Wiley & Sons, Singapore, 2017.
6. K.P. Purcell and J.C. Koltz, An introduciton to Inorganic Chemistry, W.B. Saunders Company, Philadelphia, 1980.
7. James E.Huheey, Ellen A.Keitler and Richard L.Keitler, Inorganic Chemistry, 4h Edn, Harper Collins College Publishers, New York, 1993.
8. F. Basalo and R.G. Pearson, Mechanism of Inorganic reaction, 2ndEdn., Wiley, New York, 1967.
9. I.Bertini et al. Bioinorganic Chemistry, Viva Books Private Ltd., Chennai, 1998.

Paper III - GROUP THEORY AND SPECTROSCOPY

Unit I: Molecular Spectroscopy I: Characterization of Electromagnetic radiation - Types of molecular energies- Adsorption and emission spectra - signal to noise ratio- the width and intensity of spectral transition – microwave spectra of rigid and non rigid di atomic molecules and simple polyatomic molecules- Einstein's coefficient- induced emission and absorption- Rotational spectra of rigid diatomic molecules- effect of isotopic substitution relative intensity of rotational spectral lines – stark effect in microwave spectra – microwave spectrometer – Application of microwave spectra.

Infrared spectroscopy – energy of a diatomic molecule based on harmonic and anharmonic oscillator model – selection rule – diatomic vibrating rotator – P.Q.R branches – Break down

of oppenheimer approximation – Influence of rotation on the spectra of polyatomic molecules – overtones , combination and difference bands – concept of group frequencies – coupling interaction – Fermiresanance – Fourier transform infrared spectroscopy . Application of IR spectra

Unit II: Molecular spectroscopy II: Raman spectroscopy – qualitative quantum theory of Raman scattering, pure rotational, vibrational and vibrational – rotational Raman spectra – selection rules – Mutual exclusion principle – laser Raman spectra – Electronic spectra of diatomic and polyatomic molecules – Born – opperheimer approximation – vibrational coarse structure – Frank – condon principle – dissociation energy – rotational fire structure of electronic – vibration transitions – fortrat diagram- predissociation. Photoelectron spectroscopy – theory – XPS – UV –PES – Instrumentation – evaluation of ionization potential – ESCA – chemical information from ESCA – Auger electron spectroscopy – basic idea

Unit III: Spin Resonance Spectroscopy: NMR – Principle – Relaxation process – chemical shift- spin – spin splitting, relaxation times – line shape and line width, experimental technique – double resonance technique, ENDOR , Overhauser effect, FT – NMR Spectroscopy, Lanthanide shift reagents – NMR imaging. NQR –Principles – Characteristics of quadrapolar nucleus – effects of field gradient and magnetic field upon quadrapolar energy levels – NQR transitions – application of NQR spectroscopy. ESR – Principles – hyperfine spilliting – factors affecting the magnitude of g value – ESR spectra of free radicals in solutions – Anisotropic systems –Systems in triplet state – Zero field splitting and Krammers degeneracy

Unit IV Group theory: Molecular symmetry elements and symmetry operations – Group postulates and types of groups- point groups – assignment of point groups to molecules – order of a group, sub groups, similarity transformations – conjugate elements and classes- Group multiplication table- cyclic and inverse rule – Matrix representation of symmetry operations, character of the matrix – reducible and irreducible representation - properties of irreducible representation – Mullikans notation- statement and proof of Great orthogonality theorem and its consequences- construction of character tables- C_{2v},C_{3v},C_{4v},C_{2h} and $D_{2\alpha}$ point groups – Determinations of symmetry species for translation and rotations – Direct product concept – Symmetry of hybrid orbitals.

Unit V Application of Group theory: Standard reduction formula relating reducible and irreducible representations – symmetries of normal modes of vibrations in linear and non-linear molecules – physical basis of spectroscopic selection rule – properties of dipole moment, polarizability and definite integrals. Selection rules for vibrational spectra –IR and Raman active mutual exclusion principle with illustrations Symmetries of molecular orbitals and symmetry selection rule for electronic transition in ethylene formaldehyde and benzene. Projection operators- SALC procedure – Hybridization schemes for atoms in CH_4, BF_3, $PtCl_4^-$ and SF_6Wave functions as basis of irreducible representation – HMO theory – HMO Calculation and delocalization energy for cyclopropeny, butadiene and benzene systems.

References:

1) F.A.Cotton, Chemical Applications of Group Theory, 3rd, Edn., John Wiley & Sons, New York (1999).
2) G.Davidson, Introduction to Group Theory for Chemist, Applied Science Publishers Ltd., London (1971).
3) V.Ramakrishnan and Gopinath, Group Theory in Chemistry, 2ndedn., Vishal Publications, 1991.
4) K.V.Raman, Group Theory and its Application in Chemistry, Tata McGrew-Hill, (1990).
5) A.Streitweiser, Molecular Orbital Theory for Organic Chemistry, John Wiley & Sons.
6) C.N.Banwell and E.M.McCash, Molecular Spectroscopy. Tata McGraw Hill, 4th Edn., (1995).
7) G. Aruldhas, "Molecular Structure and Spectroscopy", Prentice-Hall of India Ltd., New Delhi (2001).
8) R.S.Drago, Physical Methods in Chemistry, W.B. Saunders Co., London (1977)
9) D.C.Harris and M.D. Bertolucci, Symmetry and Spectroscopy-An Introduction to Vibrational and Electronic Spectroscopy, Oxford University Press, New York, (1978).
10) G.H.Barrow, Introducation to Molecular Spectroscopy, McGraw Hill.
11) R.Chang, Basic Principles of Spectroscopy, McGraw Hill, London (1976).
12) B.F.Straughan and S. Walker (eds.). Spectroscopy, Vol 1.2 and 3, Chapman & Hall, London (1976).
13) P.W.Atkins, Physical Chemistry, 6thedn., Oxford University Press, Tokyo (1998).
14) E.B.Becker, High Resolution NMR, 2ndedn., ."Academic Press, 1990
15) A.Carrignton and A.D.McLachian, Introduction to Magnetic Resonance, Harper and Row.
16) D.Shaw, Fourier Transform NMR Spectroscopy, Elsevier.

ELECTIVE OPTION 1 - COMPUTER APPLICATIONS IN CHEMISTRY

Unit I: Basic Concepts of Communications systems

Computer networks: An overview – communication processors – protocols – network architecture

Net working – types of network-Net work topology

Communication systems: Satellites – RADAR – optical fibers – advantages and disadvantages – ISDN – distributed systems – advantages and disadvantages.

Telecommunications: Analog and digital signals – types and needs of modulations – MODEMS – Telecommunication software.

Unit II: Basic concepts of Internet and Applications in Chemistry

Internet: History of internet – the working way of internet – getting connected to internet – Internet protocols – Internet addressing – domain names – internet services- Characterization – advantages – drawbacks – need for intranet – extranet.

WWW: Web pages – home pages – web browsers – search engines – internet chat – chatting on web.

Application of Internet in Chemistry: Websites in Literature survey in chemistry – popular websites in chemistry –opening, browsing and searching a website – literature searching online. Desktop chemical software - Structure drawings programs using Chemdraw – Graph drawing and calculation of Linear and Multi regression and correlation coefficient using Ms Excel.

Unit III: Basic Concepts VB

Introduction to Visual Basic – the integrated development environment – the menu bar, the tool bar, the project explorer, the tool box, the properties of window, the form designer, the form lay out, the immediate window, the elements of the interface –customizing the environment. Working with Forms: The appearance of form – the start up form – loading, showing and hiding forms – elementary concepts of drag and drop operations. Elementary concepts of the Text Box control, the List Box and Combo Box controls.Variables – declaring variables – variable types – strings, numeric and data variables – scope and life forms of variables – constants.

Unit IV: The Language Forms and Basic Active Controls

Control flow statements: If ... Then and If ... Then ... Else

Loop statements: DO... Loop, For ... Next and While – Wend-nested control statement – the Exit statement.

Arrays: Declaring arrays – specifying arrays – multi dimensional arrays.

Procedures: Subrouties, functions, calling procedures

Unit V: Applications of VB in Chemistry

Writing Simple VB programs in Chemistry:

1. Calculation of different types of velocity
2. Ionic strength of an electrolyte.
3 Different velocities of a gas.
4. Average rate constant.

5. Unit cell dimensions in solid state
6. Thermodynamic parameters.
7. Reduced mass.
8. Empirical formula of an organic compound containing C, H and O.
9. Normality, molality and molarity of a solution.
10. Half life period of a radioactive material.
11. Temperature in Kelvin scale into Celsius scale and vice-versa.

Practical (Class work Only)

Salient feature of windows and MS Word for typing texts equations in Chemistry
To learn creating, receiving and sending e-mail
Drawing chemical structure and predicting NMR spectrum in ChemDraw

To search a particular topic in chemical literature sources for physical data, reactions, syntheses, techniques or concepts.
To learn the data analysis correlation and curve fitting using MS Excel
Data interpretations of some physical chemistry experiments like CST, Ester hydrolysis, Phase Diagram
To develop a visual basic application for displaying the contents of the selected file using the file list box, directory list box and drive list box.
To learn the integrated development environment – the menu bar, tool bar, the project explorer, the tool box, Different types of window
Form designer, the Message box and Input box
Construction of programs in VB language, compiling, debugging and making executive files, printing the output.
Running VB programs in Chemistry to calculate/determine the problems given in Unit V

References:

1. EvangelosPetroutsos, Mastering "Visual Basic 6", BPB Publication, First Indian Edition, New Delhi, 1998, pp 1-51, 99-174, 177-180, 209-211, 227-262.
2. David Jung, Pierre Boutquin, John D. Conley III, Loren Eidahl, Lowell Mauer and Jack Pudum, "Visual Basic 6 Super Bible", First Indian Edition, Techmedia, New Delhi, 1999.
3. Gary Cornell, "Visual Basic 6", Tata-McGraw Hill, New Delhi, 1998.
4. Barbara Kasser, "Using the Internet", Fourth Edition, EE Edition, New Delhi, 1998.
5. K.V. Raman, "Computers in Chemistry", Tata – McGraw Hill Publishing Company, New Delhi, 1993.
6. Alexis Leon and Mathews Leon, "Fundamentals of Information Technology", (Chapters 17-19 & 21-23), Leon Vikas, Chennai (1999).

ELECTIVE OPTION 2 - INDUSTRIAL CHEMISTRY

Unit : I PRINCIPLES OF CHEMICAL TECHNOLOGY

Introduction – basic principles of chemical technology – importance of chemical technology – classification of technological process – designing and modeling of chemical plants – unit process and unit operations.

Basic requirements of industrial reactors – choice and selectivity of reactor – basic principles of homogeneous and heterogeneous processes and reactors with examples.

Unit : II RAW MATERIALS AND ENERGY FOR CHEMICAL INDUSTRY

Raw materials – Characteristics of raw materials and their resources – methods of raw material concentration – integral utilization of raw materials.

Energy for chemical industry – power and fuels – classification of fuels – coal – fuel gases and liquid fuels – petroleum – cracking – chemical corrosion – types of corrosion and preventive measures.

Unit : III SMALL SCALE CHEMICAL INDUSTRIES

Electro-thermal and electro-chemical industries: electroplating – surface coating industries – oils, fats and waxes – soaps and detergents – cosmetics.

Match industries and Fire Works: Manufacture of some industrially important chemicals like potassium chlorate, potassium nitrate, barium nitrate and red phosphorous – metal powders.

Unit : IV LARGE SCALE CHEMICAL INDUSTRIES

Manufacturing process – raw materials – composition and uses of products in Portland cement – ceramics – plastics, synthetic fibres –synthetic rubber – fertilizers – insecticides and pesticides – photo film industries – commercial aspects of starting an industry

Unit : V INDUSTRIAL SAFETY

Safety signs and colours used in industries – Industrial Hazards and Accidents – Classification of Hazards – Physical, chemical Biological, Ergonomic and stress Hazards – Causes, prevention and control – case study on industrial accidents – Bhopal gas Tragedy – Heat stress – sources and control – Noise pollution in industry – sources and control.

References:

1. Mukhlynov (ed.), Chemical Technology, Vol.1, Mir Publication, Moscow, III edn., 1979.
2. A. K. De, Environmental Chemistry, Wiley Eastern Ltd., II edn., Meerut 1989, Chs, 5 – 7.
3. R.K. Goel, Process know-how and material of construction for Chemical Industries, S.B. Publ., Delhi, 1977.
4. B.N. Chakrabarthy, Industrial Chemistry, Oxford and IBH Publ., Now Delhi, 1984.
5. R. Norris Shreve and J.A. Brink, Jr. Chemical Process Industries, IV edn., McGraw Hill, Tokyo, 1977.
6. Industrial Safety and Environment – A.K. Gupta – University Science press, New delhi.

Practicals

Semester I & II

Practical 1 - Inorganic Qualitative and Quantitative Analysis & Preparations

1. Semimicro Qualitative Analysis:

Analysis of mixture containing two familiar and two less familiar cautions from the following:

Less familiar : W, Mo, Se, Te, Ce, Th, Zr, Ti, V, U, Li

Familiar : Pb, Cu, Bi, Cd, Cr, Mn, Zn, Co, Ni, Ca, Sr and Mg

(Insoluble and Interfering anions may be avoided)

2. Estimation: Estimation of one metal ion (Cu, Mg, Ca) in the presence of impurity (Pb) by complexometric titration.

3. Inorganic Preparations: Preparation of at least six inorganic complexes.

1)	*$VO(acac)_2$*	*9)*	*$[Ni(dmg)_2]$*
2)	*$K_3[Fe(C_2O_4)_3]$*	*10)*	*$[Cu(NH_3)_4]SO_4.H_2O$*
3)	*Prussian Blue, Turnbull's Blue*	*11)*	*$K_3[Cr(C_2O_4)_3]$*
4)	*Cis – $[Co(trien)(NO_2)_2]Cl.H_2O$*	*12)*	*$[Cu(thiourea)_3]Cl$*
5)	*$Na[Cr(NH_3)_2(SCN)_4]$*	*13)*	*$[Co(NH_3)_5(NO_2)](NO_3)_2$*
6)	*$Hg[Co(SCN)_4]$*	*14)*	*$Mg(C_9H_6ON)_2] . 2H_2O$*
7)	*$[Co(Py)2Cl_2]$*	*15)*	*$[Fe(acac)_3]$*
8)	*$[Ni(NH_3)_6]Cl_2$*		

4.

4. Inorganic Quantitative Analysis (Any three)

Separation and determination of two metal ions Cu-Ni, Ni-Zn, Cu-Fe, Ca-Ba, Cu-Zn, Fe-Ni etc. involving volumetric and gravimetric methods.

5. Spectral characterization of any two synthesized inorganic complexes – Class work (Demonstration only)

a) Evaluation of 10Dq, β'and β from UV-Visible spectrum.
b) Evaluation of IR frequencies of stretching and bending vibration of selected inorganic complexes.
c) Calculation of g and A values from EPR spectrum evaluation.
d) Evaluation of thermal stability of inorganic complexes by TGA, DTA and DSC studies.

6. External 60 Marks: Internal: 40 Marks
Record Note Books – 5 Marks
Viva-voce – 5 Marks

Practical 2 - Organic preparation , Qualitative and Quantitative Analysis

Separation and analysis of two component mixtures. Identification of the components and preparation ofsolid derivative.

1. Quantitative analysis

a) Estimation of glucose by Lane and Eynon method and Bertrand method.
b) Estimation of glycine
c) Estimation of formalin
d) Estimation of methylketone

2. Organic preparations (only for class work)
   About 5 (five) two stage preparations :
   a) p - Nitroaniline from acetanilide
   b) P-Bromoaniline from acetanilide
   c) m – Nitrobenzoic acid from methyl benzoate
   d) Benzanilide from benzophenone
   e) sym – Tribromobenzene from aniline.
3. Spectral analysis of synthesised compounds using FTIR, NMR, LC-MS, etc