ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) , VISAKHAPATNAM

II SEMESTER CHEMISTRY 5 Hrs/Week

CH 2201 (3) GENERAL & ORGANIC CHEMISTRY Max. Marks : 60

w.e.f 2017-2018 ('17AE' batch) SYLLABUS

OBJECTIVES: To enable the students to

1. To gain insight into toxic chemicals and environmental quality
2. To motivate the students to behave in a more socially responsible manner.
3. Learn basics of Organic Chemistry in the topics of Basic concepts of Organic Chemistry and Types of organic reactions.
4. Apply the knowledge for the synthesis of various organic compounds through synthetic applications of Grignard reagents, Aceto acetic ester and ethylmalonate.

COURSE

UNIT – I:

1. ENVIRONMENTAL CHEMISTRY-I

Chemical Toxicology: Toxic chemicals in the environment – effects of toxic chemicals – cyanide and its toxic effects – pesticides and its biochemical effects – toxicity of lead, mercury, arsenic and cadmium. **AirPollution** Definition – Sources of air pollution – Classification of air pollution – Acid rain – Photochemical smog – Green house effect – Formation and depletion of ozone – Bhopal gas disaster – Controlling methods of air pollution.

2. ENVIRONMENTAL CHEMISTRY-II

Water pollution: Unique physical and chemical properties of water – water quality and criteria for finding of water quality – Dissolved oxygen – BOD, COD, Suspended solids, total dissolved solids, alkalinity – Hardness of water – Methods to convert temporary hard water into soft water – Methods to convert permanent hard water into soft water – eutrophication and its effects – principal wastage treatment – Industrial waste water treatment.

UNIT – II:

3. A. Halogen compounds: Nomenclature and classification of alkyl (into primary, secondary, tertiary), aryl, aryl alkyl, allyl, vinyl, benzyl halides. Nucleophilic aliphatic substitution reaction- classification into SN^1 and SN^2 – reaction mechanism with examples – Ethyl chloride, t-butyl chloride and optically active alkyl halide 2- bromobutane.

B. **Hydroxy compounds:** Nomenclature and classification of hydroxy compounds. Alcohols: Preparation with hydroboration reaction, Grignard synthesis of alcohols. Phenols: Preparation i) from diazonium salt, ii) from aryl sulphonates. Physical properties- Hydrogen bonding (intermolecular and intramolecular). Effect of hydrogen bonding on boiling point and solubility in water. Identification of alcohols by oxidation with $KMnO_4$, Ceric ammonium nitrate, Luca's reagent and phenols by reaction with $FeCl_3$. Chemical properties: a) Dehydration of alcohols. b) Oxidation of alcohols by CrO_3, $KMnO_4$. c) Special reaction of phenols, Bromination, Kolbe-Schmidt reaction, Riemer-Tiemann reaction, Fries rearrangement, azocoupling, Pinacol-Pinacolone rearrangement.

4. Carbonyl compounds: 1. Nomenclature of aliphatic and aromatic carbonyl compounds, structure of the carbonyl group. 2. Synthesis of aldehydes from acid Chlorides, synthesis of aldehydes and ketones using 1,3 –dithianes, synthesis of ketones from nitriles and from carboxylic acids. physical properties; reactivity of carbonyl group in aldehydes and ketones. 3. Nucleophilic addition reaction with a) $NaHSO_3$, b) HCN c) RMgX, d) NH_2OH, e) $C_6H_5NHNH_2$ f) 2,4 DNPH g) Alcohols – formation of hemiacetal and acetal h) Halogenation using Pcl_5 4. Base catalysed reactions: a) Aldol condensation b)Benzoin condensation, c)Cannizzaros reaction d) Haloform reaction, e) Perkins reaction. oxidation of aldehydes – Baeyer – Viliger oxidation of Ketones 5. Reduction : Clemmensen reduction, Wolf- kishner reduction, MPV Reduction, reduction with $LiAIH_4$, and $NaBH_4$. Analysis of aldehydes and

ketones with a)2,3 – DNPH Test b) Tollen's test c) Fehling test d) Schiff's test e) Haloform test.

UNIT-III

5. Carboxylic acids and derivatives: 1. Nomenclature, classification and structure of carboxylic acids. 2. Methods of preparation by a) hydrolysis of nitriles, amides. b) hydrolysis of esters(Mechanism in Acidic and Basic medium) c) Carbonation of Grignard reagents. 3. Special methods of preparation of aromatic acids by a. Oxidation of side chain. b. Hydrolysis by benzo trichlorides. c. Kolbe reaction 4. **Physical properties :** Hydrogen bonding, dimeric association, acidity – strength of acids with examples of trimethyl acetic acid and trichloro acetic acid. Relative differences in the acidities of aromatic and aliphatic acids. **5. Chemical properties :** Reactions involving H, OH and COOH groups – salt formation, anhydride formation, acid chloride formation, amide formation and esterificaiton (mechanism). Degradation of carboxylic acids by Huns – Diecker reaction, decarboxylaiton by Schimdt reation, Arndt – Eistert synthesis, halogenation by Hell – Volhard – Zelinsky reaction.

6. Active methylene compounds: Acetoacetic ester: keto-enol tautomerism, preparation by Claisen condensation, Acid hydrolysis and ketonic hydrolysis. **Synthetic applications**: Preparation of a) monocarboxylic acids. b) Dicarboxylic acids. c) Reaction with urea. **Malonic ester**: preparation from acetic acid. **Synthetic applications**: Preparation of a) monocarboxylic acids (propionic acid and n-butyric acid). b) Dicarboxylic acids (succinic acid and adipic acid) c) α,β-unsaturated carboxylic acids(crotonic acid). d) Reaction with urea.

REFERENCE BOOKS:

1. A Text book of Environmental chemistry by W. Moore and F.A. Moore
2. Environmental Chemistry by Samir k. Banerji
3. Organic Chemistry – Robert T.Morrison & Robert B.Boyd – Published by Prentice Hall or India Pvt. Ltd., New Delhi – 110001.
4. Advanced Organic chemistry – B.S.Bahl & Arun Bahl – S.Chand & Company – Ramnagar, New Delhi –110055.
5. Organic Chemistry – Vol. I – The Fundamental Principles – I.L.Finar – (ELBS) English Language Books Society / Longman – Longman Scientific & Technical, Longman Group UK Ltd., Longman House, Bunt Mill, Harlow, Essex CH 20, 2JE England.
6. A Guide book to Mechanism in Organic Chemistry – Peter Sykes – Longman Group Ltd., London, Divisional Director, Orient Longman Ltd. – Published by V.Abdulla 36A Annasalai, Mount Road, Madras –600002.
7. Unified Chemistry – Vol.I,II&III – Kalyani Publishers – 1/1 Rajender Nagar, Ludhiana – 141008.
8. Organic chemistry by Bruice
9. Organic chemistry by Clayden

Practical paper - II

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

II SEMESTER **CHEMISTRY** **3 Hrs/Week**

CH 2251 (1) **QUALITATIVE INORGANIC ANALYSIS –II** **Max. Marks: 50**

w. e .f 2017-2018'AE' batch **PRACTICAL SYLLABUS**

OBJECTIVE : To enable the students to acquire skills necessary for qualitative analysis of salts containing two anions and two cations from two different groups.

Analysis of mixture salt containing two anions and two cations (From two different groups) from the following:

Anions: Sulphate, chloride, bromide, nitrate, acetate, borate, phosphate, tartrate, oxalate.

cations: Lead, copper, cadmium, iron, aluminum, zinc, chromium, manganese, nickel, cobalt, calcium, strontium, barium, potassium, ammonium and Magnesium.

REFERENCE BOOKS:

1. Vogel's Test Book of Macro & Semimicro Qualitative Inorganic Analysis – V Edition Revised by G.Svehla – Orient Longman Ltd., New Delhi.
2. Semimicro Qualitative Analysis – V. V. Ramanujam
3. Advanced practical Inorganic Chemistry – Gurdeep Raj GOEL Publishing House, Meerut, 11th Edition.
4. Vogel's Qualitative Inorganic Analysis – G.Svehla Pearson Education, VII Edition.