TECHNOCRATS

Lab Work Book of

Medicinal Chemistry-III

(BP - 607 P)

Department of Pharmacy

Lab Manual of

Medicinal Chemistry-III

(BP - 607 P)

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TECHNOCRATS
PUBLICATIONS

Lab Work Book
of

Medicinal Chemistry-III

(BP-607 P)

(Strictly According to RGPV Syllabus)

Name : .....

Enrollment No. : .....

Institute : .....

Academic Session : .....

Department of Pharmacy

TECHNOCRATS
PUBLICATIONS

Vision of the Institute

To grow as an institute of Excellence for Pharmacy Education and Research and to serve the humanity by sowing the seeds of intellectual, cultural, ethical, and humane sensitivities in the students to develop a scientific temper, and to promote professional and technological expertise.

Mission of the Institute

M 1: To inculcate ethical, moral, cultural and professional values in students

M 2: To provide state of art infrastructure facilities to the staff and students so as to enable them to learn latest technological advancements

M 3: State of art learning of professionalism by the faculty and students

M 4: To produce well learned, devoted and proficient pharmacists

M 5: To make the students competent to meet the professional challenges of future

M 6: To develop entrepreneurship qualities and abilities in the students

PROGRAM OUTCOMES (POs)

1. **Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
2. **Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
3. **Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
4. **Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of thelimitations.
5. **Leadership skills:** Understand and consider the human reaction to change, motivationissues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.
6. **Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
7. **Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
8. **Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.
9. **The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
10. **Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
11. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

PEOs

PEO 1: To inculcate quality pharmacy education and training through innovative Teaching Learning Process.

PEO 2: To promote professionalism, team spirit, social and ethical commitment with effective interpersonal communication skills to boost leadership role assisting improvement in healthcare sector.

PEO 3: To enhance Industry-Institute-Interaction for industry oriented education and research, which will overcome healthcare problems of the society.

PEO 4: To adapt and implement best practices in the profession by enrichment of knowledge and skills in research and critical thinking

PEO 5: To generate potential knowledge pools with interpersonal and collaborative skills to identify, assess and formulate problems and execute the solution in closely related pharmaceutical industries and to nurture striving desire in students for higher education and career growth.

Course Outcomes (COs):

Student will be able to:

- CO1: Experiment with chemicals to prepare drugs and Intermediates.
- CO2: Estimate the percentage purity of the compounds by performing different types of assay techniques.
- CO3: Utilize the microwave irradiation technique for the preparation of drugs and intermediates.
- CO4: Design the structures and reactions using chem draw.
- CO5: Determine the physiological properties of drugs.

Index

Experiment No. 1

OBJECT:

To synthesize 4-methyl-7-hydroxy coumarin from resorcinal

REFERENCE:

1. Furniss B.S., Hannaford A.J., Smith P.W.G and Tatchell A.R., Vogel's Textbook of Practical Organic Chemistry. Fifth edition-2007, Dorling Kindersley Publications Pvt. Ltd., India. Page no-1193.

2. Mann F. G. and Saunders B.C., Practical Organic Chemistry, Fourth edition-1960. Orient Longman Raven Publications Pvt. Ltd. New Delhi, Page no-307.

APPARATUS AND CHEMICAL REQUIREMENT:

Resorcinol, Ethylacetoacetate, H_2SO_4, Ethanol, Round bottom flask, Beaker, Funnel, Filter paper, Condenser, Heating mantel, Glass rod, Hot air oven

THEORY :

Coumarin is a fragrant organic chemical compound in the benzopyrone chemical class, which is a colorless crystalline substance. The name comes from a French term for the Coumarin is used in certain perfumes and fabric conditioners. Coumarin has been used as an aroma enhancer in pipe tobaccos and certain alcoholic drinks, although in general it is banned as a flavorant food additive, due to concerns regarding its hepatotoxicity in animal models. In pharmaceutical industry as a precursor reagent in the synthesis of a number of synthetic and some even more potent rodenticides that work by the same anticoagulant mechanism. So-called "coumarins" are a type of vitamin K antagonists. Pharmaceutical coumarins were all developed from the study of sweet clover disease. However, unmodified coumarin itself, as it occurs in plants, has no effect on the vitamin K coagulation system, or on the action of warfarin-type drugs.

PROCEDURE:

1. Add 15 ml of H_2SO_4 to 3.7 gm powered resorcinol and 4.5 ml of ethylacetoacetate in RBF.
2. Heat the mixture at 80. C on heating mantel for 1 hrs.
3. Cool the mixture and pour it on 100 gm of ice water with stirring.
4. Filter and collect the pale yellow solid.
5. Wash yellow crystals of coumarine.
6. Recrystallize with ethanol.

REACTION:

OBSERVATION:

Theoretical yield: 4 gm

Practical yield: .....

% yield: .....

Melting Point: .....

RESULT

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VIVA QUESTIONS

Q.-1. What are anti-coagulants ?

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Q.-2. What is the chemical name of coumarin ?

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Q.-3. What are the use of coumarine derivatives ?

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Q.-4. What is the use of H_2SO_4 in the synthesis procedure of coumarin ?

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Q.-5. What is the colour of coumarin and how can it purify ?

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Experiment No. 2

OBJECT

Synthesis and characterisation of Sulphanilamide.

REFERENCE

Mann F.G., and Sounders B.C., Practical Organic Chemistry. Page No. 181

APPARATUS AND CHEMICAL REQUIREMENT

Acetanilide, Chlorosulphonic acid, Ammonia, Round bottom flask, Beaker, Funnel, Heating mantel, Condenser, Litmus paper, Conical flask, Separating funnel, Glass rod,

THEORY

Sulphanilamide the simplest member of a large series of bacteriostatic drugs, an readily be prepared by the following reaction. Acetanilide, when treated with an excess of chlorosulphonic acid, gives p-acetamidobenzenesulphonyl chloride (Reaction A), with readily reacts with ammonia to give p-aectamido-benzenesulphonamide (Reaction B). The acetamido-groupin the letter.

$CH_3CO.NHC_6H_5+HOSO_2CI=CH_3CO.NHC_6H_4SO_2CI+H_2O$ (A)

$CH_3CO.NH.C_6H_4.SO_2CI+_2NH_3=CH_3CO.NH.C_6H_4\ SO_2NH_2+NH_4CI$ (B)

$CH_3CO\ NH\ C_6H_4\ SO_2NH_2+H_2O=NH_2\ C_6H_4\ SO_2NH_2+CH_3COOH$ (C)

Compound can be readily hydrolysed under condition which leaves the sulphone- amido group unaffected, and sulphanilamide can thus be obtained (Reaction C).

Note that p-acetamidobensiulphonyl chloride will similarly react with group, may furnish notable drugs: e.g. the condensation products, with 2- amino-provide and 2- aminothiazole, after removal of the acetyl groups provide the drugs commonly know as sulphapyridine (M & B 693) and sulphathiazole respectively.

PROCEDURE

P-ACETAMIDOBENZENESULPHONLY CHLORIDE.

(Reaction A.) Carefully add add 25g. Of dry powdered acetanilide, with occasional shaking, to 63 ml (110 g., i.e., 5 molecular equivalents) of chlorsulphonic acid contained in a 250 ml. conical flask (fume – cupboard), and then heat the solution to 60-70 for two hours. Cool the mixture and pour it carefully on to about 500 g. of crushed ice, whereupon the silphonly chloride at the pump, wash it thourghly with water, and drain. Yhis crude product (weight when dry, ca. 3_8 g.) is sufficiently pure to use dircty in the next stage. A small sample may be dride and recrystallised from next stage. A small sample may dried and recrystallised from chloroform, and finally obtained as colorless crystals, m.p. 149-150.

P-ACETAMIDOBENZENESULPHONAMID.

(Reaction B.) Place the above crude damp sulphonyl chloride in a 500 ml. conical flask and countiously add

120ml. of concentrated ammonia solution of heat will follow. Stir the mixture until a smooth thin paste is obtained, and then heat at 70` for 30` minutes with occasional stirring. Cool the mixture and make it just acid actamidobenzenesulphonamide at the pump, wash it well with cold water, and drain it thoroughly (yield almost theoretical.) Again this material is pure enough for the next stage;

a sample may be recrystallised from hot water and the pure sulphonamide obtained as colorless crystals, m.p. 219_0

SULPHANILAMIDE.

(Reaction C.) Add 15 g. of the above thoroughly drained sulphonamide to ıo ml. of concentrated hydrochloric acid diluted with 20 ml. water, and boil the mixture gently under reflux for I hour. Then add 30 ml. of water and heat the mixture again to boiling, with the addition water of small quantity of animal charcoal. Filter the boiling solution and add heat powder sodium carbonate in small quantities to the filtrate with stirring until all effervescence in small quantities to the filtrate with stirring until all effervescence ceases and filtrate of the Sulphanilamide at the pump wash with water and dry. Yield, 10 g.Purify by recrystallistaion from hot water: the Sulphanilamide is obtained as colorless crystals, m.p. 163.

OBSERVATION:

Theoretical yield: 8.4 gm

Practical yield: .....

% yield: .....

Melting Point: .....

RESULT

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VIVA QUESTIONS

Q.-1. What is Sulphanilamide Drug.

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Q.-2. What are Mech of action of Sulphanilamide

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Q.-3. Adverse effect of sulphanilamide.

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Experiment No. 3

OBJECT

To synthesize & Characterized Hexamine

REFERENCE:

1. Furniss B.S., Hannaford A.J., Smith P.W.G and Tatchell A.R., Vogel's Textbook of Practical Organic Chemistry. Fifth edition-2007, Dorling Kindersley Publications Pvt. Ltd., India. Page no-342-349.

2. Mann F. G. and Saunders B.C., Practical Organic Chemistry, Fourth edition-1960. Orient Longman Raven Publications Pvt. Ltd. New Delhi, Page no-307.

APPARATUS AND CHEMICAL REQUIREMENT:

Formaldehyde, ammonium hydroxide, ethyl alcohol,

THEORY :

Hexamethylenetetramine or hexamine is a heterocyclic organic compound with the formula (CH2)6N4. This white crystalline compound is highly soluble in water and polar organic solvents. It has a cage-like structure similar to adamantane. It is useful in the synthesis of other chemical compounds, e.g., plastics, pharmaceuticals, rubber additives. It sublimes in vacuum at 280 °C.

PROCEDURE:

1. 47 g of a 38 % formaldehyde solution, is treated with 70 g of 20% ammonium hydroxide solution until the solution is slightly alkaline.
2. The mixture is allowed to stand, for several hours and if necessary more ammonia being added.
3. The solution is filtered and then evaporated in vacuum to a thick paste.
4. The hexamine crystals are filtered off washed with ethyl alcohol, and dried.
5. To obtain pure hexamine it is recrystallized from water or alcohol.
6. Hexamine forms colorless, odorless crystals, which are soluble in water, and 90 % alcohol.
7. It does not melt on heating, but sublimes at a temperature of about 260° C.

REACTION:

OBSERVATION:

Theoretical yield:.....

Practical yield: .....

% yield: .....

Melting Point: .....

RESULT

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VIVA QUESTIONS

Q.-1. What is the category of hexamine

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Q.-2. Give the structure of hexamine.

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Q.-3. Uses of hexamine.

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Q.-4. What is polar organic solvents.

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Experiment No. 4

OBJECT:

To synthesize & Characterized Chlorobutanol

REFERENCE:

1. Furniss B.S., Hannaford A.J., Smith P.W.G and Tatchell A.R., Vogel's Textbook of Practical Organic Chemistry. Fifth edition-2007, Dorling Kindersley Publications Pvt. Ltd., India. Page no 1150.

2. Mann F. G. and Saunders B.C., Practical Organic Chemistry, Fourth edition-1960. Orient Longman Raven Publications Pvt. Ltd. New Delhi, Page No-.

APPARATUS AND CHEMICAL REQUIREMENT:

Acetone, Chloroform, Potassium Hydroxide.

THEORY :

Chlorobutanol (trichloro-2-methyl-2-propanol) is a preservative, sedative, hypnotic and weak local anesthetic similar in nature to chloral hydrate. It has antibacterial and antifungal properties. Chlorobutanol is typically used at a concentration of 0.5% where it lends long term stability to multi-ingredient formulations. However, it retains antimicrobial activity at 0.05% in water. In pure state it is a white, volatile solid with a menthol-like odor. Chlorobutanol is formed by the simple nucleophilic addition of chloroform and acetone. The reaction is base driven by potassium or sodium hydroxide. Chlorobutanol is highly toxic to the liver, is a skin irritant and a severe eye irritant.

PROCEDURE:

1. To a mixture of 500 g of dry acetone and 1000 g of chloroform, cooled to below 0° C and continuously stirred.

2. added gradually over a period of 60 hours, 325 g of finely powdered potassium hydroxide.

3. After being allowed to stand at room temperature for a further 36 hours with intermittent stirring the mass is filtered and the residue washed with acetone.

4. The combined filtrates are distilled, unchanged chloroformand acetone are recovered, and the fraction passing over between 165° C and 172° C is collected separately.

5. The distillate is poured in water, crystallisation sets in, and when this is complete the solid is filtered off and recrystallized from a mixture of alcohol and water.

6. Chlorobutanol is extremely volatile even at ordinary temperatures, and requires to be dried with great care to avoid loss.

7. Chlorobutanol forms white glistening crystals having a camphoraceous odor and taste.

8. Chlorobutanol melts, when anhydrous, 96-97° C. Soluble in water and in 90% ethyl alcohol.

REACTION:

OBSERVATION:

Theoretical yield:

Practical yield: .....

% yield: .....

Melting Point: .....

RESULT AND DISCUSSION:

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VIVA QUESTIONS

Q.-1. What is the structure of chlorobutanol

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Q.-2. Category of chlorobutanol

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Q.-3. What is sedative and hypnotics

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Q.-4. Side effect of chlorobutanol

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Experiment No. 5

OBJECT:

To synthesize & Characterized Triphenyl imidazole

REFERENCE:

1. Furniss B.S., Hannaford A.J., Smith P.W.G and Tatchell A.R., Vogel's Textbook of Practical Organic Chemistry. Fifth edition-2007, Dorling Kindersley Publications Pvt. Ltd., India. Page no 880.

APPARATUS AND CHEMICAL REQUIREMENT:

Benzoin, benzaldehyde, ammonia solution.

THEORY :

Imidazole is an organic compound with the formula $C_3N_2H_4$. It is a white or colourless solid that is soluble in water, producing a mildly alkaline solution. In chemistry, it is an aromatic heterocycle, classified as a diazole, and having non-adjacent nitrogen atoms.

Many natural products, especially alkaloids, contain the imidazole ring. These imidazoles share the 1,3-C_3N_2 ring but feature varied substituents. This ring system is present in important biological building blocks, such as histidine and the related hormone histamine. Many drugs contain an imidazole ring, such as certain antifungal drugs, the nitroimidazole series of antibiotics, and the sedative midazolam.

When fused to a pyrimidine ring, it forms purine, which is the most widely occurring nitrogen-containing heterocycle in nature

PROCEDURE:

1. Mixed together Benzoin (5 g,) and benzaldehyde 5 mL in a 250 ml Flask
2. Then add ammonia solution and refluxed for 4 hr with gently stirring.
3. Then the resulting mixture was cooled, filtered to get 2,4,5-triphenylimidazole.
4. The precipitate was filtered, dried and recrystallized from ethanol

REACTION:

OBSERVATION:

Theoretical yield:.....

Practical yield: .....

% yield: .....

Melting Point: .....

RESULT

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VIVA QUESTIONS

Q.-1. What is the structure of imidazole

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Q.-2. Give the uses of synthesized compound

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Q.-3. What are alkaloids.

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Experiment No. 6

OBJECT

To synthesize and characterize Antipyrine

REFERENCE

1. Brain S.F., Antony J.H., Peter W.G., Smith and Austin R.T., "Vogel's textbook iof practical Organic chemistry" fifth edition, Pearson education, Page No. 1150.

APPARATUS AND CHEMICAL REQUIREMENT

Ethyl aceto acetate, Phenyl Hydrazine, Ether, Round bottom flask, Beaker, Funnel, Heating mantel, Condenser, Litmus paper, Conical flask, Separating funnel, Glass rod,

PROCEDURE

1. Mix together 50 gm of redistilled Ethyl acetoacetate and 40 gm of Phenyl hydrazine, in a large evaporting disk.
2. Heat the mixture on a boiling water bath in a fume cup board for about 2 hrs. And stir from time to time with a glass rod.
3. Allow the heavy reddish syrup to cool somewhat add about 100 ml of ether and stir the mixture vigorously.
4. The syrup which is insoluble in ether will solidify ether to remove the colored impurities Recrystallize it from hot water or from a mixture of equal volume of ethanol and water.
5. The Yield of **Antipyrine** (Methyl Pyrazolone) (Coloress crystal, m.p. 127^0C) is 52 gm.

REACTION

OBSERVATION:

Theoretical yield: 8.4 gm

Practical yield: .....

% yield: .....

Melting Point: .....

RESULT

VIVA QUESTIONS

Q.-1. What is the structure of antipyrine

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Q.-2. Give the uses of synthesized compound

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Q.-3. Category of antipyrine.

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Experiment – 7

OBJECT

Microwave mediate synthesis of Mannich base.

REFERENCE

1. Furniss B.S., Hannaford A.J., Smith P.W.G and Tatchell A.R., Vogel's Textbook of Practical Organic Chemistry. Fifth edition-2007, Dorling Kindersley Publications Pvt. Ltd., India. Page no-910-911.

2. Mann F. G. and Saunders B.C., Practical Organic Chemistry, Fourth edition-1960. Orient Longman Raven Publications Pvt. Ltd. New Delhi, Page no-.

APPARATUS AND CHEMICAL REQUIREMENT

Benzaldehyde, Diethylamine**,** Acetone**,** Microwave**,** Beaker**,** Funnel**,** Filter paper**,** Glass rod**,** Hot air oven

THEORY

The Mannich reaction is an organic reaction which consists of an amino alkylation of an acidic proton placed next to a carbonyl functional group by formaldehyde and a primary or secondary amine or ammonia. The final product is a β-amino-carbonyl compound also known as mannich base. Reactions between aldimines and α-methylene carbonyls are also considered mannich reactions because these imines form between amines and aldehydes. The reaction is named after chemist carl mannich. The mannich reaction is an organic reaction used to convert a primary or secondary amine and two carbonyl compound (one non-enolizable and one enolizable) to a β-amino carbonyl compound, also known as a mannich base use an acid or base catalyst. Mannich reaction is a carbon-carbon bond forming nucleophilic addition reaction and is a key step in synthesis of a wide variety of natural products, pharmaceuticals, and so forth.

PROCEDURE:

1. 10.6 gm benzaldehyde, 7.3 gm diethylamine and acetone 5.8 gm were taken in beaker (1:1:1).
2. Kept the reaction mixture under microwave for 1-2 min.
3. Poured the reaction mixture into a 125 ml of water.
4. Allowed to stand for 20 min, filtered and collect the product.
5. Recrystallized with ethanol.

OBSERVATION

Theoretical yield: 8 gm

Practical yield:.....

% yield: .....

Melting Point:.....

RESULT AND DISCUSSION

VIVA QUESTIONS

Q.-1. What is mannich base

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Q.-2. Give the reaction mechanism of mannich base synthesis.

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Q.-3. What are the uses of mannich base.

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Q.-4. What are the advantage of microwave mediate synthesis.

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Q.-5. What are the temperature and time use for the synthesis of mannich base in microwave.

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Experiment – 8

OBJECT

Microwave mediate synthesis of Schiff's base.

REFERENCE

1. Furniss B.S., Hannaford A.J., Smith P.W.G and Tatchell A.R., Vogel's Textbook of Practical Organic Chemistry. Fifth edition-2007, Dorling Kindersley Publications Pvt. Ltd., India. Page no-782-693.

2. Mann F. G. and Saunders B.C., Practical Organic Chemistry, Fourth edition-1960. Orient Longman Raven Publications Pvt. Ltd. New Delhi, Page no-230.

APPARATUS AND CHEMICAL REQUIREMENT

Aniline, Methanol, Benzaldehyde, Zinc chloride, Round bottom flask, Beaker, Funnel, Filter paper, Condenser, Heating mantel, Glass rod, Hot air oven

THEORY

Schiff bases can be synthesized from an aliphatic or aromatic amine and the carbonyl compound by the nucleophilic addition reaction. The Schiff bases are common ligands in coordination chemistry. The imine nitrogen is basic and exhibits pi-acceptor properties. The ligands are typically derived from alkyl diamines and aromatic aldehydes.

The term schiff base is normally applied to these compounds when they are being used as ligands to form coordination complexes with metal ions. Such complexes do occur naturally but the majority of schiff bases are artificial and used to form many important catalysts. Schiff bases are common enzymatic intermediates where an amine, such as the terminal group of a lysine residue reversibly reacts with an aldehyde or ketone of a cofactor or substrate

PROCEDURE:

1. A solution of aniline 9.3 gm (0.1 mol) was prepared in 10 ml methanol were taken in beaker.
2. Benzaldehyde 10.6 gm (0.1 mol) and zinc chloride (1 gm) was added to it.
3. Kept the reaction mixture under microwave for 1-2 min.
4. The resulting solution was poured on crushed ice.
5. White precipitate obtained was separated by filtration, dried and recrystallized by ethanol.

OBSERVATION

Theoretical yield: 8.4 gm

Practical yield:.....

% yield: .....

Melting Point:.....

RESULT AND DISCUSSION

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VIVA QUESTIONS

Q.-1. What is Schiff's base.

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Q.-2. What are the uses of Schiff's base.

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Q.-3. What are the principal involve in synthesis of Schiff's base

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Q.-4. What is the use of methanol and zinc chloride in the synthesis Schiff's base

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Q.-5. Give the example of different amine and aldehyde which are also use for the synthesis of Schiff's base.

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Experiment – 9

OBJECT

Microwave mediate synthesis of Chalcone derivatives

REFERENCE

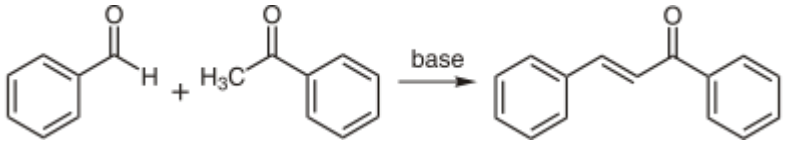
1. Furniss B.S., Hannaford A.J., Smith P.W.G and Tatchell A.R., Vogel's Textbook of Practical Organic Chemistry. Fifth edition-2007, Dorling Kindersley Publications Pvt. Ltd., India. Page no-854.

2. Mann F. G. and Saunders B.C., Practical Organic Chemistry, Fourth edition-1960. Orient Longman Raven Publications Pvt. Ltd. New Delhi, Page no-232.

THEORY

Chalcone is an aromatic ketone and an enone that forms the central core for a variety of important biological compounds, which are known collectively as chalcones or chalconoids. Benzylideneacetophenone is the parent member of the chalcone series. The alternative name given to chalcone are phenyl styryl ketone, benzalacetophenone, β-phenylacrylophenone, γ-oxo-α,γ-diphenyl-α-propylene and α-phenyl-β-benzoylethylene.

Chalcones and their derivatives demonstrate wide range of biological activities benefical for anti-inflammation. They show antibacterial, antifungal, antitumor and anti-inflammatory properties. They are also intermediates in the biosynthesis of flavonoids. Chalcones can be prepared by an aldol condensation between benzaldehydeand acetophenone in the presence of sodium hydroxide as a catalyst.



This reaction can be carried out without any solvent as a solid-state reaction.The reaction between substituted benzaldehydes and acetophenones can be used as an example of green chemistry in undergraduate education. In a study investigating green syntheses, chalcones were synthesized from the same starting materials in high-temperature water (200 to 350 °C). Substituted chalcones were also synthesised by piperidine-mediated condensation to avoid side reactions such as multiple condensations, polymerizations and rearrangements.

PROCEDURE:

1. A solution of Aqueous ethanolic NaOH solution prepared by mixing of NaOH (0.05 mol) in water (5 ml) and ethanol (5 ml) was prepared taken in beaker.
2. To this above solution, Benzaldehyde 10.6 gm (0.1 mol) and appropriate ketone (0.1 mol) was added.
3. Kept the reaction mixture under microwave for 1-2 min for 3 times.
4. The resulting solution was poured on crushed ice.
5. White precipitate obtained was separated by filtration, dried and recrystallized by ethanol.

OBSERVATION

Theoretical yield: 8.4 gm

Practical yield:.....

% yield:.....

Melting Point:.....

RESULT AND DISCUSSION

VIVA QUESTIONS:

Q.-1. What is Chalcone.

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Q.-2. What are the uses of Chalcone.

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Q.-3. What are the principal involve in synthesis of Chalcone.

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Q.-4. What is the importance microwave mediate synthesis

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Q.-5. Give the example of different ketone and aldehyde which are also use for the synthesis of Chalcone.

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Experiment – 10

OBJECT

Drawing structures and reactions using chem draw.

THEORY

Chem Draw is a tool to enable professional scientists, science students, and scientific authors to communicate chemical structures. It is designed to work according to conventions we found most intuitive for such users. Our goal has been to make ChemDraw as easy to use as possible while providing superior drawing quality.

Chem Draw Basics :

- The information required to begin using ChemDraw includes how to do the following:
- Identify the parts of the ChemDraw interface.
- Customize parts of the user environment.
- Create, open, and save documents.
- Set printing preferences.

Tutorials

The tutorials are designed to teach you the fundamental drawing techniques available in Chem Draw. Before you begin, you may want to review "Conventions" to familiarize yourself with the terminology used in the tutorials. You may also want to use your Quick Reference Card while you perform the tutorials.

Chem Draw automatically checks for correct chemical syntax as you draw. If ChemDraw finds a potential problem, a red box is displayed around the erroneous object. The red box is displayed on screen only and does not print.

To disable the automatic warning on a specific object:

- Right-click the object and deselect Display Warnings.

Drawing Chemical Structures

- ChemDraw provides the following tools for drawing chemical structures:
- Bond tools.
- Ring tools.
- Text tools.
- An acyclic chain tool.
- Automatic error checking.

- The ability to draw structures automatically from chemical names (ChemDraw Ultra only).

Drawing Captions and Atom Labels

1. Creating Text

- ChemDraw enables you to create the following types of text:

2. Caption text

- Create annotations, chemical names, chemical formulas, page titles and information in tables.

3. Atom label text

- Identify atoms and substructures by their chemical symbols and formulas. The behavior of atom labels is controlled by the "Automatic Atom Labels" checkbox on the "General" tab of the Preferences dialog box. This preference controls two aspects of the behavior of atom labels. The default preference is to use Automatic Atom Labels.

4. When Automatic Atom Labels is selected

- The alignment of atom labels will adjust according to the positions of any bonds attached to the atom label.

For example, a "CH3" atom label entered at the left end of a horizontal bond would reverse itself to "H3C".

- Hydrogens will be added to or removed from atom labels as necessary to preserve standard valences when bonds are added or changed.

You can use HotKeys to quickly label atoms. For more information see "Labeling Atoms with HotKeys".

You create and edit caption and atom label text with the Text tool. You set the text format in the Document Settings or Object Settings dialog box.

ChemDraw does not install its own fonts. If a ChemDraw document contains fonts that are not available on a particular computer, they are substituted with available fonts.

5. Drawing Orbitals, Symbols, Arrows, Arcs, and Other Shapes

ChemDraw provides the following tools and tool palettes that enable you to add chemical symbols and shapes to your documents (A tool palette is indicated by a in the lower right corner of the tool.):

- **Orbital tools palette -**to draw orbitals.
- **Chemical Symbols tools palette -**to draw charges, radicals, and other symbols.
- **Arrow tools palette -**to draw arrows.
- **Drawing Elements tools palette -**to draw boxes, circles, and lines.
- **Brackets tools palette -**to draw brackets, braces, parentheses, and daggers.
- **Arc tools palette -**to draw arcs.

- **Pen tool -**to draw freehand shapes.
- T**LC tool -**to reproduce TLC experiments.

You can use the tool palettes as extensions of the Main Tool Palette, or you can tear them off and place them anywhere on your screen.

6. Advanced Drawing Techniques

ChemDraw provides advanced drawing features that allow you to:

- Label functional groups with Nicknames.
- Contract and expand sections of structures.
- Add bonds to specific characters in atom labels.
- Create bonds whose attachment is not explicitly defined.
- Color objects.
- Draw with Templates.
- Clean up structures.

7. Working With Structures

You can perform the following functions on the structures you create:

- **Check a structure to identify valence and label errors.**
- **View analysis information about a structure.**
- **Assign Atom-to-Atom mapping.**
- **Show Stereochemistry.**
- **In ChemDraw Pro, display the chemical properties for a structure.**
- **In ChemDraw Pro, break existing structures across one or more bonds to mimic the fragmentation in a mass spectrometer.**
- **In ChemDraw Ultra, assign structures to spectra and calculate NMR shift information.**

8. Drawing Query Structures

Using a query structure to specify properties for atoms and bonds provides an efficient way to search chemical databases such as ChemFinder, DARC, RS^3, or ISIS/Base. You can use a query structure to narrow or broaden your search.

For example, creating a query structure indicating a bond as either double or single might broaden your search. Indicating atom properties where a particular atom must have a charge of +3 might narrow your search.

Because ChemDraw is not a chemical database application, the interpretation of query structures involves

other programs. Not all databases support the same query properties. If you use a query structure containing properties not understood by a given database, one of the following may happen:

- An error message appears
- The unsupported properties are ignored

To use query structures for searching you may do either of the following:

- Paste the query structure into a database search window and initiate a search.
- Save the structure in an appropriate file format and open the file in the database application.

9. Sharing Information

ChemDraw includes many of the standard system commands for transferring information within and between ChemDraw documents, and between ChemDraw and documents created using other applications.

You can transfer information using:

- The Clipboard
- Drag and drop
- File formats

When you drag-and-drop ChemDraw information, or use the clipboard, the object you are copying can be edited.

10. Shortcuts and Hotkeys

ChemDraw Shortcuts

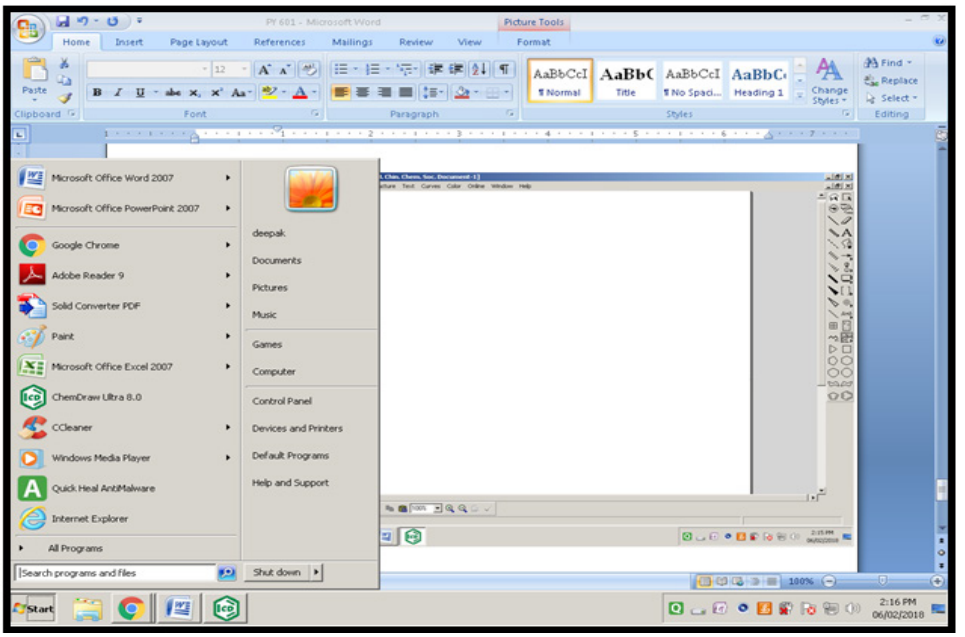
"ChemDraw Hotkeys".

File Commands			
Ctrl+N	new document	Ctrl+S	save document
Ctrl+O	open document	Shift+Ctrl+S	save as...
Ctrl+W	close document	Shift+Ctrl+P	page set up...
Alt+F4	exit	Ctrl+P	print...
Edit Commands			
Ctrl+Z	undo	Shift+Ctrl+Z	redo
Ctrl+X	cut	Del	clear
Ctrl+C	copy	Ctrl+A	select all
Ctrl+V	paste	Ctrl+Y	repeat last command
View Commands			
Ctrl+H	toggle crosshair	F11	toggle rulers
F5	actual size	F7	magnify
F6	fit to window	F8	reduce

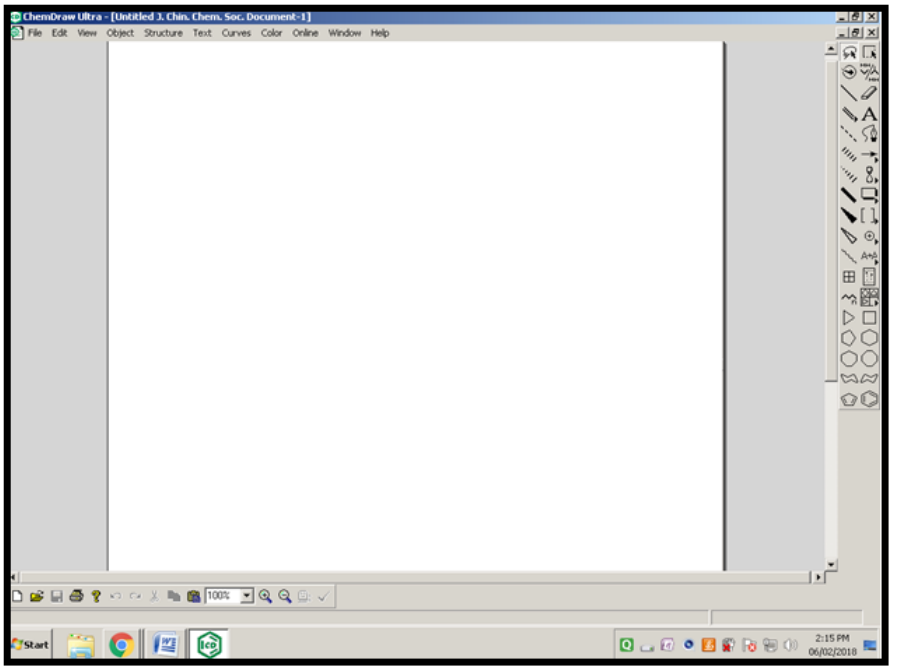
Object Commands			
Ctrl+L	toggle fixed lengths	Ctrl+K	scale selected object
Ctrl+E	toggle fixed angles	Ctrl+R	rotate
Ctrl+G	group selected objects	Shift+Ctrl+H	flip horizontal
Shift+Ctrl+G	ungroup objects	Alt+Shift+H	rotate 180° horizontal
Ctrl+J	join selected objects	Shift+Ctrl+V	flip vertical
F2	bring to front	Alt+Shift+V	rotate 180° vertical
F3	send to back	Shift+Click (w/Lasso, Marquee, or Structure Perspective tools)	select multiple objects
Structure Commands			
Shift+Ctrl+N	convert name to structure	Shift+Ctrl+K	clean up structure
Alt+Shift+Ctrl+N	convert structure to name		
Text Commands			
Shift+Ctrl+L	flush left	Shift+Ctrl+J	justified
Shift+Ctrl+C	centered	Shift+Ctrl+M	automatic justification
Shift+Ctrl+R	flush right		
F9 (in a label)	subscript the selected character or the next character typed	F10 (in a label)	superscript the selected character or the next character typed
Help Commands			
F1	Help contents	Shift+F1	context sensitive Help
Drawing Commands			
Ctrl+Alt+Tab	toggle the previous drawing tool	Alt+Shift+click (w/pen tool)	remove a curve segment
Ctrl+drag	copy a selected object	Shift+Ctrl+drag	copy a selected object (constrained to X and Y axes)
Shift+click	change orientation of double bonds (w/ saturated double bond ring tools)	Ctrl+click (w/ring tools except chairs)	create resonance delocalized ring
)Shift+drag (w/ resize handle)	distort (limit resize to X or Y axis	Ctrl+drag (w/alkane chain tool)	change direction of a chain

PROCEDURE

Step:01 Chem draw is computer software based program which help for draw the structure of compounds. First open the all program window in computer



Step:02 Select the Chem draw and open the Chem draw program from all program. The following window is display on computer screen.



Step: 03 Apply the various tool display on computer screening side window like

A. Chemical bond

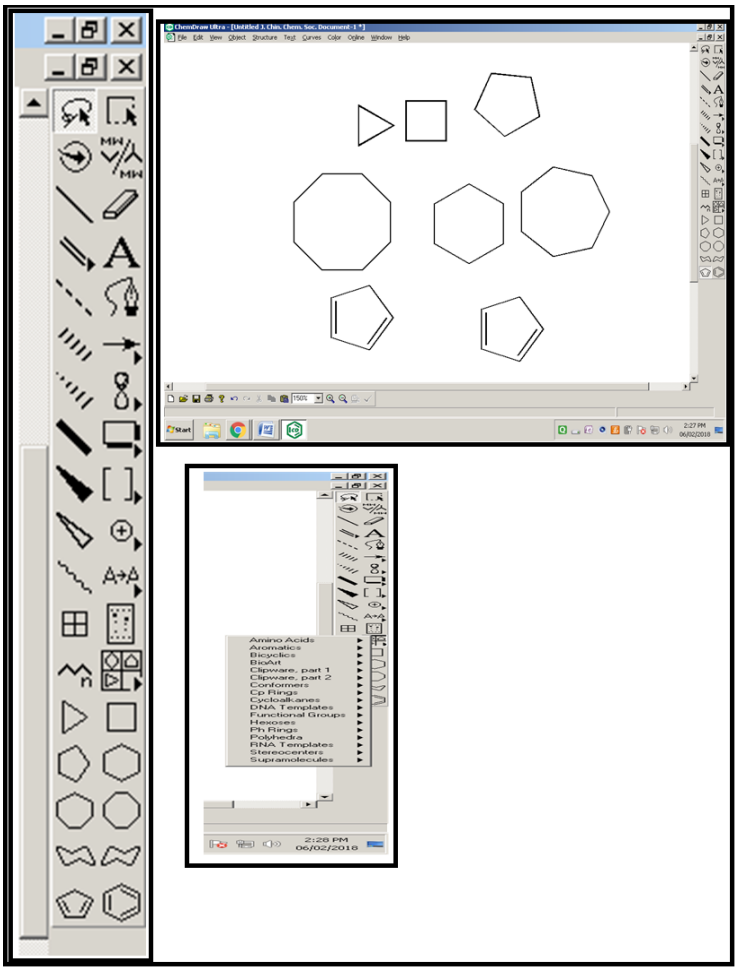
B. Atoms, Group, Molecules

C. Alicyclic rings

D. Aromatic rings

E. Heterocyclic rings

F. Other Functional group, Amino acid, DNA, Stereo isomer.



By the apply the above tool can easily draw the chemical structure of any medicinal compounds.

Experiment – 11

OBJECT

To synthesize and Characterize the Benzocaine from p-amine-benzoic acid

REFERENCE:

1. Furniss B.S., Hannaford A.J., Smith P.W.G and Tatchell A.R., Vogel's Textbook of Practical Organic Chemistry. Fifth edition-2007, Pearson education pvt.Ltd. Page No. 120.

2. Lemke L. Thomas ; Williams David a; Rache.Victoria F.and Zito S. Williams "Foye's Principles of Medicinal Chemistry" Edition -6th; 2008; Published by Lippin colt, Williams & Wilkins, New Delhi. Page No.463.

THEORY

Benzacaine, an effective topical anaesthetic agent was synthesized by Ritsert in 1890 and was found to have good anaesthetic properties and low toxicities Benzocaine**,** however has limited water solubility except at low pH values because of the lack of a Basic aliphatic amino group. Thereby disallowing the preparation of pharmaceutically acceptable parenteral solutions.

Benzacaine (ethyl P-aminobenzoate) is used topically by itself or in combination with menthol or phenol in non-prescription dosage forms such as gels, creams, ointments, lotions, aerosols and Lozenses to relieve pain or irritation caused by such conditions as sunburn, insect bites, toothache, teething, cold sores or cankers sores in or around the mouth and fever blisters. Benzocalme is a lipophilic local anaesthetic agent with a short duration or action.

Like most amino ester type local anaesthetics, it is easily hydrolyzed by plasma Cholinesterase. Because of its low pka. However it is unionized under most physiological conditions and therefore, can only bind to the lipid side of the local anaesthetic receptor. Aromatic esters may be prepared by direct esterification method. A large range of example of sample alkyl esters of aromatic carboxylic acid is included in experiment methyl benzoate.

PROCEDURE

1. 3.4 gm of p-amino benzoic acid, 30 ml ethanol and 5 ml H2SO4 was taken in a 100 ml. RBF.
2. Above mixture was placed on reflux at 70 for 2hrs.
3. After two hrs the solution was allowed to cool and this mixture was poured into a 20 ml 10% NaOH solution and 50 gm ice.
4. Above solution was filtered through a filter paper, Crystal was isolated after washing.

OBSERVATION

Theoretical yield: 3 gm

Practical yield:.....

% yield:.....

Melting Point:.....

RESULT AND DISCUSSION

VIVA QUESTIONS:

Q.-1. What are topical anaesthetic agent.

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Q.-2. What are the uses of Benzocaine.

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Q.-3. What are the principal involve in synthesis of Benzocaine.

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Q.-4. What is the uses of NaOH in synthesis of Benzocaine.

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Q.-5. Give the example of different local anaesthetics

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Experiment – 12

OBJECT

To determine the π value (π substitution) constant in Salicylic acid derivative.

REFERENCE:-

1. William and Smith " Principle of Drug Design " Edition -8th, Page No. 225.
2. Ilango K and valenfina P " Text book of medicinal chemistry" Vol –II; Edition –I; 2007; keerthi publishers, Page No.401-403.
3. Lemke L. Thomas ; Williams David a; Rache.Victoria F.and Zito S. Williams "Foye's Principles of Medicinal Chemistry" Edition -6th; 2008; Lippin colt publishers, Williams & Wilkins, New Delhi. Page No.1098.

APPARATUS AND CHEMICAL REQUIREMENT:

Separating funnel. Conical flask, Burette, Pipette, Reagent bottles, Octanol, Phenolphthalein.

THEORY

QUANTITATIVE STRUCTURE ACTIVITY RELATION

QSAR involves the derivation of mathematical formula which relates the biological activities of a group of compounds to their measurable physicochemical parameters. These parameters have major influence on the drug's activity. QSAR derived equation take the general form: Biological activity = function (parameters) Activity is expressed as log (1/c). C is the minimum concentration required to cause a defined biological response.

PARAMETERS

The parameter is the measure of the potential contribution of its group to a particular property of the parent drug. Various parameters used in QSAR studies are

1. Lipophilic parameters: partition coefficient, π-substitution constant
2. Polarizability parameters: molar refractivity, parachor
3. Electronic parameters: Hammet constant, dipole moment.
4. Steric parameters: Taft's constant.
5. Miscellaneous parameters: molecular weight, geometric parameters.

LIPOPHILIC PARAMETERS

Lipophilicity is partitioning of the compound between an aqueous and non-aqueous phase.

Partition coefficient: P = [drug] in octanol / [drug] in water

Typically over a small range of log P, e.g. 1-4, a straight line is obtained e.g. log 1/C = 0.75 log P + 2.30, If

graph is extended to very high log P values, then get a parabolic curve log 1/C = - k1 (log P) 2 + k 2 log P + k3, When P small, dominated by log P term When P large, log P squared dominates & so activity decreases

π-substituent **constant or hydrophobic substituent constants:** The π-substituent constant defined by hansch and co-workers by the following equation.

$Px = \log Px - \log P_H$

A positive π value indicates that the π substituent has a higher lipophilicity than hydrogen and the drug favours the organic phase. A negative π value indicates that the π substituent has a lower lipophilicity than hydrogen and the drug favours the aqueous phase. ike Hammetl values, Hansch's lipophilicity parameters is based on how a substituent objects the position of an equilibrium Hansch values specifically address the effect of a substituent on the partitionins of a molecule between two solvent, typically water and n-Octanol. Octanol and water have been found to closely model the membrane aqueous interface in biological systems.

PROCEDURE

1. 0.5 gm of sample was added to the mixture of 20 ml n- Octanol and 20 ml water.
2. The above solution was transferred to the separating funnel which was further shaked well for 15 minutes repeatedly 3 times.
3. This was allowed to stand till both surface separates in separating funnel.
4. Both surfaces were separated out in different conical flask.
5. Both conical flask material was titrated with 0.01 N NaOH with phenol Red or
6. Phenolphthalein.
7. After titration concentration of sample drug determine in both phase.
8. By putting this value of in equation-01 determine the Log P Value.
9. Repeated the procedure for substituted derivative of Salicylic acid and determine the Log P Value from equation-01.
10. By putting this value of Log P in equation-02 determine π –substitution coefficient.

OBSERVATIONS

Table B. Titration of aqueous layer

S. No.	Container	Volume taken (ml)	Burette reading		Volume (ml)
			Initial reading	Final reading	
1.	A				V_1
2.	B				V_2
3.	C				V_3

Table B. Titration of organic layer

S. No.	Container	Volume taken (ml)	Burette reading		Volume (ml)
			Initial reading	Final reading	
1.	A^I				V_1^I
2.	B^I				V_2^I
3.	C^I				V_3^I

CALCULATION

For aqueous layer

Concentration of Drug in container A

$N_1V_1 = N_2V_2$

$N_1 =$

Concentration of Drug in container (C_1)

$C_1 =$

Similarly calculate the concentration of Drug in other flask (B and C)

For organic layer

Concentration of Drug in container A^I

$N_1^IV_1 = N_2^IV_2^I$

$N_1^I =$

Concentration of Drug in water layer (C_2)

$C_2 =$

concentration of Drug in other flask (B^I and C')

Partition coefficient $K = C_2 / C_1$

Equation-01

$$\text{Log P} = \frac{\text{C lipid}}{\text{C water}}$$

Equation-02

$\pi_R = \text{Log } P_R - \text{Log } P_H$

RESULT AND DISCUSSION

VIVA QUESTIONS

Q.-1. What is distribution coefficient ?

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Q.-2. What is the role of partition coefficient in the dosage formulation.

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Q.-3. What is QSAR ?

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Q.-4. Why you should know partition coefficient of a drug ?

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Q.-5. What is π-substituent constant ?

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Experiment No. 13

OBJECT

To prepare and characterize Ethyl nicotinate from Nicotinic acid.

REFERENCE

1. Furnish B. S. Vogels " A text book of Practical Organic Chemistry", Darlling kinderley (India) Pvt. Ltd, Page No. 1076-1079

2. Pandeya S. N. "A Text Book of medicinal Chemistrys" Edition III; 2004 ; Vol.1; S.G. publisher, Varanasi, Page No. 251

THEORY

Niacin also known as nicotinic acid, is an organic compound and is depending on the definition used, one of the 20 to 80 essential human nutrients. Together with nicotinamide it makes up the group known as vitamin B3 complex. It has formula C6H5NO2 and belongs to the group of the pyridinecarboxylic acids.

Medication and supplemental niacin are primarily used to treat high blood cholesterol and pellagra (niacin deficiency). Insufficient niacin in the diet can cause nausea, skin and mouth lesions, anemia, headaches, and tiredness. The lack of niacin may also be observed in pandemic deficiency disease, which is caused by a lack of five crucial vitamins (niacin, vitamin C, thiamin, vitamin D and vitamin A) and is usually found in areas of widespread poverty and malnutrition. Niacin is provided in the diet from a variety of whole and processed foods, with highest contents in fortified packaged foods, tuna, some vegetable and other animal sources. Some countries require its addition to grains.

This colorless, water-soluble solid is a derivative of pyridine, with a carboxyl group (COOH) at the 3-position. Other forms of vitamin B3 include the corresponding amide nicotinamide ("niacinamide"), where the carboxyl group has been replaced by a carboxamide group (CONH2), as well as more complex amides and a variety of esters. Nicotinic acid and niacinamide are convertible to each other with steady world demand rising from 8,500 tonnes per year in the 1980s to 40,000 in recent years.

Niacin cannot be directly converted to nicotinamide, but both compounds are precursors of the coenzymes nicotinamide adenine dinucleotide (NAD) and nicotinamide adenine dinucleotide phosphate (NADP) in vivo. NAD converts to NADP by phosphorylation in the presence of the enzyme NAD+ kinase. NADP and NAD are coenzymes for many dehydrogenases, participating in many hydrogen transfer processes. NAD is important in catabolism of fat, carbohydrate, protein, and alcohol, as well as cell signaling and DNA repair, and NADP mostly in anabolism reactions such as fatty acid and cholesterol synthesis. High energy requirements (brain) or high turnover rate (gut, skin) organs are usually the most susceptible to their deficiency.

Niacin supplementation has not been found useful for decreasing the risk of cardiovascular disease in those already on a statin, but appears to be effective in those not taking a statin. Although niacin and nicotinamide are identical in their vitamin activity, nicotinamide does not have the same pharmacological effects (lipid modifying effects) as niacin. Nicotinamide does not reduce cholesterol or cause flushing. As the precursor for NAD and NADP, niacin is also involved in DNA repair.

USES

1. It is useful for type –II Hyper proteinemia characterized by Hypertriglyceridemia.
2. Used in familial lipoprotein deficiency.
3. Niacin reduces serum triglycerides by lowering VLDL(in 1-4 days)
4. Decrease the production of LDL
5. Also inhibits lipolysis in adipocytes esterification of hepatic triglycerides.

REQUIREMENT

S.N.	Ingradients	Quantity
1.	Nicotinic acid	9.25 gm
2.	Ethanol	92 ml
3.	Con.H2SO4	50 ml

PROCEDURE

1. Reflex a mixture of 9.25 gm Nicotinic acid in 92 of absolute ethanol and 50 ml of Con. H2SO4 on the steam bath.
2. Cool the solution and pure slowly with stirring into crushed ice add sufficient ammonia solution to render the resulting solution strongly alkaline.
3. Generally some esters separates as an oil but most of at remains dissolve in the alkaline solution.
4. Extract the mixture with 5.25 ml. Portion of ether dry the combined ethereal extracts over MgSO4.
5. Remove the ether by flash distillation and distill the residue under reduced pressure
6. Ethyl Nicotinate separate out and recrystallized.

OBSERVATION

Theoretical yield: 7.5 gm

Practical yield:

% yield:

Melting Point:

RESULT AND DISCUSSION:

VIVA QUESTIONS

Q.-1. What are the uses of Ethyl Nicotinate.

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Q.-2. What is VLDL.

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Q.-3. What are the principal involve in synthesis of Ethyl Nicotinate.

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Q.-4. What is the uses Niacin.

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Q.-5. What are the uses of ether in synthesis of Ethyl Nicotinate.

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