East Point College of Pharmacy

East Point Campus, Jnana Prabha, Virgo
Nagar PostBengaluru – 560049, Karnataka

Approved
by
Pharmacy Council of India, New Delhi

Affiliated
to
Rajiv Gandhi University of Health SciencesKarnataka
Bengaluru – 560041 India

LAB MANUAL

MEDICINAL CHEMISTRY-III

B. PHARM 6th SEMESTER

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

B Pharmacy

Program Outcomes (PO's)

PO 1- Pharmacy Knowledge

Possess knowledge and comprehension of the core and basic knowledge associated with theprofession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

PO 2- Planning Abilities

Demonstrate effective planning abilities including time management, resource management,delegation skills and organizational skills. Develop and implement plans and organize workto meet deadlines.

PO 3- Problem analysis

Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, whilesolving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions

PO 4- Modern tool usage

Learn, select, and apply appropriate methods and procedures, resources, and modernpharmacy-related computing tools with an understanding of the limitations.

PO 5- Leadership skills

Understand and consider the human reaction to change, motivation issues, 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 wellbeing.

PO 6- Professional Identity

Understand, analyse and communicate the value of their professional roles in society (e.g.health care professionals, promoters of health, educators, managers, employers, employees).

PO 7- Pharmaceutical Ethics

Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behaviour 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

PO 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

PO 9- The Pharmacist and society

Apply reasoning informed by the contextual knowledge to assess societal, health, safety andlegal issues and the consequent responsibilities relevant to the professional pharmacy practice.

PO 10- Environment and sustainability

Understand the impact of the professional pharmacy solutions in societal and environmentalcontexts, and demonstrate the knowledge of, and need for sustainable development.

PO 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-access and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

Programme Specific Outcomes (PSO's)	
PSO 1	Acquire a thorough foundational knowledge in pharmaceutical sciences, including pharmacology, pharmaceutics, medicinal chemistry, and pharmacognosy, to excel in further academic pursuits
PSO 2	Gain expertise in the application of contemporary pharmaceutical techniques and technologies, enhancing employability across various sectors including the pharmaceutical industry, academia, and research institutions.
PSO 3	Equip with entrepreneurial skills and knowledge of pharmaceutical business management, including market analysis, product development, regulatory affairs, and financial planning, to initiate and run successful ventures in the pharmacy sector

Course Outcomes (CO's)	
Code: BP607P Medicinal Chemistry-III	
CO 1	Know about the principle of preparations, assay and ChemDraw, drug design
CO 2	Analyze the purity and estimate medicinal compounds and standardization of solutions by different titrimetric analyses
CO 3	Synthesize medicinal compounds by different chemical reactions and purify using recrystallization, calculating percentage yield
CO 4	Understand diseases drugs, and the classification used for treatment (viva voice)

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

Sl. NO	LIST OF THE EXPERIMENT	PAGE NO
1.	Preparation Of 2,4,5 Triphenyl Imidazole	02
2.	Preparation Of Chlorobutanol	03
3.	Preparation Of 7-Hyroxy, 4-Methyl Coumarin	04
4.	Preparation Of Hexamine	05
5.	Assay Of Isoniazid Tablets Tablet By Bromometry Titration	06
6.	Assay Of Metronidazole Tablets By Nonaqueous Titration	08
7.	Assay Of Chlroquine Phosphate Tablets By Nonaqueous Titration	10
8.	Assay Of Chlropheniramine Maleate Tablets Ip	12
9.	Assay Of Dapsone By Diazodization	13
10.	Assay Of Benzyl Penicillin	15
11.	Preparation Of Phenothiazine By Microwave Oven	17
12.	Preparation Of Phenytoin By Microwave Oven	18
13.	Drawing Structure And Reaction Using Chemdraw	19
14.	Determination Of Physicochemical Properties	23

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

Experiment No: 01

PREPARATION OF 2, 4, 5 -TRIPHENYL IMIDAZOLE

AIM: To prepare and submit 2, 4, 5 Triphenyl Imidazole from Benzoin

APPARATUS REQUIRED: Beaker. Glass rod funnel tripod stand conical flask

CHEMICALS REQUIRED: Benzil, benzaldehyde, ammonium acetate, Glacial acetic acid

PRINCIPLE:

The 2, 4, 5 trisubtituted imidazole is formed when 1, 2 diketone is heated with an aldehyde in presence of ammonia or ammonium salt like ammonium acetate in glacial acetic acid. Triphenyl imidazole is reacted with benzaldehyde.

PROCEDURE:

STEP 1: PREPARATION OF BENZIL FROM BENZOIN:

1. Place 10 gm benzoin and 25 ml of concentrated nitric caid in a 150ml flask fitted with a reflux condenser, and heat the flask on a boiling water bath.

2. Continue heating for 1 ½ hour when the crystalline benzoin has been replaced by oily benzyl. Then the pour the mixture into a beaker of cold water .

3. On vigorous stirring the oil will crystalise out into a yellow solid. Filter off the later at the pump and wash thoroughly with water to ensure complete elimination of water. Recrystalise from methylated or rectified sprit. Benzil separates out as clear yellow crystals.

STEP 2: PREPARATION OF 2,4,5 TRIPHENYL IMIDAZOLE FROM BENZIL:

1. Place 5.25 gm of benzil, 2.5ml of benzalaldehyde and 5 gm ammonium acetate in a 250 ml round bottom flask.

2. Add 100 ml of glacial acetic acid and dissolve.

3. Heat the reaction mixture on a boiling water bath for 1 hr. Cool the flask to room temperature.

Particulars	Practical Value
Theoritical yield	
Practical Yield (gm)	
Percentage Yield	

REPORT: 2, 4, 5 Triphenyl Imidazole was synthesized, submitted and reported the following

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

Experiment No: 02

PREPARATION OF CHLOROBUTANOL

AIM: To Prepare and submit chlorbutanol from acetone and calculate the Percentage Yield.

APPARATUS REQUIRED: Round bottom flask, reflux condenser

CHEMICALS REQUIRED: Acetone, chloroform, potassium hydroxide

CATEGORY: Preservative, bacteriostatic, Hypnotic local anaesthetic in dental preparation and also antiseptic.

PRINCIPLE:

Chlorbutanol is also known as Chloroketone. It is a trichloro derivative of tertiary butyl alcohol. It is prepared by combination with acetone and chloroform in the presence of solid potassium hydroxide

It is prepared by the base catalyzed nucleophilic attack to the carbonyl carbon potassium hydroxide increases the nucleophilicity of chloroform which attacks the carbonyl carbon which is electrophilic in nature.

PROCEDURE:

1. Weigh 2.8gm of potassium hydroxide and 4.2ml of chloroform to this mixture.
2. Add 3.7ml of acetone with constant stirring using glass rod,until the effervescence ceases to get a yellow coloured product of chlorobutanol.
3. It is recrystallised from boiling water. Melting point -97ºc

REPORT: Chlorobutanol was synthesized, submitted and reported the following

Particulars	**Practical Value**
Theoritical yield	
Practical Yield (gm)	
Percentage Yield	

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

Experiment No: 03

PREPARATION OF 7-HYROXY, 4-METHYL COUMARIN

AIM: To prepare and submit 7-Hyroxy, 4-Methyl Coumarin from resorcinol

APPARATUS REQUIRED: Beaker, conical flask, water bath and glass rod

CHEMICALS REQUIRED: Resorcinol, concentrated H_2SO_4, ethyl acetoacetate, ethanol and distilled water

CATEGORY: anticonvulsant, anticancer, anti-infective

PRINCIPLE:

The preparation of 7-Hyroxy, 4-Methyl Coumarin is based on the reaction which involves condensation of phenol with β-ketoester in the presence of concentrated H_2SO_4 to form of 7-Hyroxy, 4-Methyl Coumarin.

The principle involves the transfer of proton from acidic catalyst to carbonyl group of β-ketoester acetoacetate. This results in the reaction electron density on carbon.

PROCEDURE:

1. Take 2.5gm of resorcinol in 250ml beaker and add 3.5ml of ethyl acetate and mix to get a clear solution.
2. Now cool 12.5ml of concentrated $H_2SO_4$to 10ºC and the reaction mixture is added by drop to it with vigorous shaking.
3. Cool and add 50-60ml of water to the resulting solution on a crushed ice, crude 7-Hyroxy, 4-Methyl Coumarin precipitate out.

Filter it under the suction pump and recrystallize from ethanol.

REPORT: 7-Hydroxy, 4-Methyl Coumarin was synthesized, submitted and reported the following

Particulars	**Practical Value**
Theoritical yield	
Practical Yield (gm)	
Percentage Yield	

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

Experiment No: 04

PREPARATION OF HEXAMINE

AIM: To prepare and submit hexamine from formaldehyde

APPARATUS REQUIRED: Round bottom flask, beaker, measuring cylinder, water bath, Buchner funnel.

CHEMICALS REQUIRED: Formaldehyde, Ammonium hydroxide, ethyl alcohol

CATEGORY: Urinary anti-infective agent

PRINCIPLE:

Hexamine is heterocyclic organic compound (CH2)6N4. It has symmetrical tetrahedral cage-like structure. Hexamine is synthesized by condensation of formaldehyde and ammonia

PROCEDURE:

1. 47.3gm of a 38% formaldehyde solution is reacted with 70g of 20% ammonium hydroxide solution until the solution is slightly alkaline.
2. The mixture is allowed to stand at room temperature for several hours and if necessary more ammonia being added.
3. The solution is filtered and then evaporated to a thick paste.
4. The hexamine crystals are filtered and washed with ethyl alcohol.
5. The pure hexamine is recrystallized from water or alcohol.

REPORT: Hexamine was synthesized, submitted and reported the following

Particulars	Practical Value
Theoritical yield	
Practical Yield (gm)	
Percentage Yield	

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

Experiment No: 05

ASSAY OF ISONIAZID BY BROMOMETRY

AIM: To carry out the assay of Isoniazid by bromometry

CHEMICALS REQUIRED: Hydrochloric acid potassium bromide, 0.167N potassium bromide, and methyl red indicator.

APPARATUS REQUIRED: Iodine flask, burette standard volumetric flask

PRINCIPLE:

The assay is based on an oxidation-reduction reaction. This is determined by the addition of KBr and direct titration in an acid solution with potassium bromate. Bromine is released as the titration proceeds and oxidizes isoniazid to isonicotinic acid or pyridine 4- 4-carboxylic acid. The excess bromine is present and oxidizes the methyl red (or ethoxy chrysodine) indicator, which becomes discoloured at the endpoint.

The solution of bromine is not stable; therefore the solution containing potassium bromide and potassium bromate is used. Potassium bromate is a powerful oxidizing agent, which is reduced smoothly to bromide and then gets converted into bromine on acidification.

PROCEDURE:

Preparation of 0.0167M potassium bromated solution

About 5.566g of potassium bromated was dissolved in water and made upto 100ml with distilled water.

Standardisation of 0.0167M Potassium bromate

20ml of above solution was transferred in a glass stoppered flask and 3g of potassium iodide and followed with 3ml of con.HCl was added .Allow it to stand for 5min ,titrate liberated iodine with 0.1M sodium thiosulphate adding 3ml of Starch solution and endpoint is approached.

$$\text{Concentration of 0.0167m potassium bromate} = \frac{\text{Molarity of sodium thiosulphate}}{\text{Volume of Potassium bromate}}$$

ASSAY OF ISONIAZID:

Weigh accurately about 0.25mg of isoniazid acid hydrazide, dissolve in sufficient water to produce 100ml. Pipette out 20ml of resulting solution add 20ml of conc hydrochloric acid and 0.2 gm of potassium bromide and titrate slowly with continuous shaking with 0.0167M potassium bromated using 0.05 ml of phenol red as indicator until the color changes to red to yellow.

I.P.Factor: Each ml of 0.0167 M Potassium bromate is equivalent to 0.003429 gm of Isoniazid.

FORMULA: **%Purity** = $\frac{\text{burette reading –blank X exact normality X I.P.Factor X 100}}{\text{Wt of sample X Approximate. Normality}}$

REPORT: The Molarity of 0.0167 M Potassium bromate was found to be

The percentage purity of given isoniazid was found to be

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

Experiment No: 06

ASSAY OF METRONIDAZOLE TABLETS BY NONAQUEOUS TITRATION

AIM: To perform the assay of metronidazole by non-aqueous titration.

CHEMICALS REQUIRED: Potassium hydrogen phthalate, glacial acetic acid, 0.1N perchloric acid, crystal violet indicator

APPARATUS REQUIRED: Burette, pipette, conical flask and burette stand.

PRINCIPLE:

Substances that are weakly basic /weakly acidic drugs may not give a sharp end point in aqueous solvents. Hence non aqueous solvents like glacial acetic acid, methanol, toluene, and perchloric acid are employed. Weakly basic solvents are titrated against perchloric acid using a crystal violet indicator. Metronoidazole being a weak base can be by nonaqueous titration method.

Acetic acid alone behaves as a weak base because of poor dissociation into hydrogen ions. But when a strong acid perchloric acid is added to acetic acid there is a formation of onium ions which can readily give up protons to react with bases. When metronidazole is dissolved in acetic acid equivalent amount of acetate ions are produced which have more tendency to accept protons. Hence titration of metronidazole is carried out in acetic acid against standard perchloric acid using crystal violet as indicator.

PROCEDURE

STANDARDISATION OF 0.1NPERCHLORIC ACID:

Weigh accurately 0.14gm of potassium hydrogen phthalate in 100ml conical flask .dissolve it in 10ml of glacial acetic acid .Add 2 drops of 0.5% acetous crystal violet or 0.5% w/v acetous oracet blue B (blue to pink) as indicator and titrate with 0.1N perchloric acid until violet color changes to emerald green.

ASSAY OF MERONIDAZOLE:

Weigh and powder 20 tablets, weigh accurately quantity equivalent to 0.2 gm of metronidazole .Transfer it to sintered glass funnel and extract with six quantities of each .Each of 15 ml of hot acetone, cool and add to the combined extract 50 ml of acetic anhydride, 0.3ml of 1%w/v solution of brilliant green in glacial acetic acid as an indicator and titrate with 0.1N perchloric acid until yellowish green color is the end point .Perform blank determination.

I.P.Factor: Each ml of 0.1Nperchloric acid === 0.0172gmof metronidazole

FORMULA **%Purity** = Burette reading –blank X exact normality X I.P.Factor X 100

Wt. of sample X Approximate. Normality

REPORT: The Molarity of 0.1N perchloric acid was found to be

The Percentage purity of given metronidazole was found to be

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

Experiment No: 07

ASSAY OF CHLROQUINE PHOSPHATE TABLETS BY NONAQUEOUS TITRATION

AIM: To perform the assay of chloroquine phosphate by Non aqueous titration

CHEMICALS REQUIRED: Chloroquine phosphate tablets, 1MNaoH, chloroform, glacial acetic acid 0.1N perchloric acid, crystal violet indicator.

APPARATUS REQUIRED: Conical flask, pipette burette and glass rod

PRINICIPLE:

The assay of chloroquine phosphate is based on nonaqueous titration. Chloroquine is liberated when chloroquine phosphate is treated with sodium hydroxide which is then extracted with chloroform.

The solution of chloroquine, the free base which too weakly basic does not give sharp endpoints in aqueous solution hence; they have to be carried out by non aqueous solvents such as glacial acetic acid and perchloric acid. The end point can be determined by color change from violet to bluish green using crystal violet as indicator. A blank is usually performed to overcome errors.

PROCEDURE:

STANDARDISATION OF 0.1NPERCHLORIC ACID:

Weigh accurately 0.14gm of potassium hydrogen phthalate in 100ml conical flask .dissolve it in 10ml of glacial acetic acid. Add 2 drops of 0.5% acetous crystal violet or 0.5% w/v acetous oracet blue B (blue to pink) as indicator and titrate with 0.1N perchloric acid until violet color changes to emerald green.

ASSAY OF CHLOROQUINE PHOSPHATE:

Weigh and powder 20 tablets .Weigh accurately a quantity of product to 0.5 gm of chloroquine phosphate. Add 20ml of 0.1M NaoH. Extract with 25ml of chloroform .Evaporate to about 10ml.Add 40ml of glacial acetic acid and 2drops of 0.5% w/v acetous crystal violet indicator or 0.5%oracet blue (blue to pink)rand titrate against 0.1n perchloric acid until color changes from blue to emerald green color.

I.P.Factor: Each ml of 0.1Nperchloric acid ==0.025gm of chloroquine phosphate

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

FORMULA **%Purity** = burette reading –blank X exact normality XI.P.FactorX100

Wt of samples X Approximate. Normality

REPORT: The Molarity of

The percentage purity of

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

Experiment No: 08

ASSAY OF CHLROPHENIRAMINE MALEATE TABLETS IP

AIM: To determine the percentage purity of given sample of chlorpheniramine maleate tablets

CHEMICALS REQUIRED: chlorpheniramine maleate, glacial acetic acid, perchloric acid, crystal violet indicator

APPARATUS REQUIRED: Conical flask, burette, burette stand and glass rod

CATEGORY: Antihistaminic

PRINICIPLE:

The assay of chlorpheniramine maleate is carried by non aqueous titration. It involves reaction between non aqueous medium weakly protophilic substances i.e., a reaction between acid base. Chlorpheniramine maleate is weakly basic out sufficient to react with perchloric acid by using crystal violet as an indicator, colour changes from violet purple to greenish blue colour.

PROCEDURE:

STANDARDISATION OF 0.1NPERCHLORIC ACID:

Weigh accurately 0.14gm of potassium hydrogen phthalate in 100ml conical flask .dissolve it in 10ml of glacial acetic acid. Add 2 drops of 0.5% acetous crystal violet or 0.5% w/v acetous oracet blue B (blue to pink) as indicator and titrate with 0.1N perchloric acid until violet color changes to emerald green.

I.P.Factor: Each ml of 0.1Nperchloric acid ==0.02042gm of potassium hydrogen phthalate

ASSAY OF CHLOROQUINE PHOSPHATE:

Weigh accurately about 0.5gm of CPM dissolve it in 20ml of glacial acetic acid, titrate with 0.1N perchloric acid using crystal violet as an indicator until the colour change from purple to greenish blue colour .Perform a blank determination and make any corrections if necessary.

I.P.Factor: Each ml of 0.1Nperchloric acid ==0.01954gm CPM

FORMULA $\%\text{Purity} = \dfrac{\text{burette reading} - \text{blank X exact normality XI.P.FactorX100}}{\text{Wt of samples X Approximate. Normality}}$

REPORT: The Molarity of

The percentage purity of

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

Experiment No: 09

ASSAY OF DAPSONE BY DIAZODIZATION

AIM: To carry out the assay of dapsone tablets.

APPARATUS REQUIRED: Conical flask, burette, burette stand pipette

CHEMICALS REQUIRED: Sulphanilamide, 0.1M sodium nitrite, Hydrochloric acid, dapsone tablets, starch iodide paper

PRINCIPLE:

In general aromatic primary amine present in most of sulfa drugs reacts with sodium nitrite in an acidic medium undergoes diazotization reaction to yield the corresponding diazonium salts.

$ArNH_2 + NaNO_2 + Hcl \longrightarrow ArNH_2Cl + 2H_2O$

When diazotization reaction is used analytically, the sample is dissolved in an excess of strong mineral acid (hydrochloric acid) and titrated with a standard solution of sodium nitrite. The endpoint is detected either potentiometrically or by the blue color obtained on streaking a few drops of the titrated solution upon starch iodide paper, as an external indicator .Excess nitrous acid oxides the iodide in the indictor to iodine, which gives a blue color with starch. Nitrous acid is formed by the interaction of sodium nitrite and hydrochloric as follows

$NaNO_2 + HCl \longrightarrow NaCl + HNO_2$

The endpoint in the sodium nitrite titration is determined by the liberation of iodine from iodide, which may be expressed by the following equations:

$KI + HCl \longrightarrow HI + KCl$

$2HI + 2HNO_2 \longrightarrow I_2 + 2NO + 2H_2O$

PROCEDURE:

STANDARDISATION OF 0.1M SODIUM NITRITE:

Weigh accurately 0.5gm of sulphanilamide and transfer to a beaker. Add to it 20 ml of hydrochloric acid and 50ml of distilled water, stir until dissolves and cool to 15 degree I an ice bath .Add to it 25gm of crushed ice, and titrate slowly with sodium nitrite solution, stirring vigorously, until the tip of the glass rod dipped into the titrated solution immediately produces distinct blue ring on being touched to starch iodide paper. The titration is supposed to be complete when the endpoint is deducible after the resulting mixture has been allowed to stand for 1 minute.

Each ml of 0.1MSodium nitrite solution is equivalent to 0.01722 gm of sulphanilamide.

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

ASSAY OF DAPSONE:

Weigh and powder 20 tablets. Weigh accurately a quantity of powder equivalent to 0.25 gm of dapsone and dissolve in a mixture of 15ml of water and 15ml of 2M hydrochloric acid. Cool the solution to 15 degree and titrate the resulting solution against standard 0.1M sodium nitrite using starch iodide papers external indicator until a distinct blue color is obtained on a starch iodide paper that lasts for five minutes.

I.P FACTOR:

Each ml of 0.1M Sodium nitrite solution is equivalent to 0.01242 gm Dapsone.

FORMULA **%Purity** = $\frac{\text{burette reading –blank X exact normality XI.P.FactorX100}}{\text{Wt.of sample X Approximate. Normality}}$

REPORT: The Molarity of

The percentage purity of

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

Experiment No: 10

ASSAY OF BENZYL PENICILLIN

AIM: To determine the percentage purity of given sample of Benzyl penicillin tablets

CHEMICALS REQUIRED: 0.02Nsodium thiosulphate, Potassium bromate, Potassium iodide Hydrochloric acid , Sodium hydroxide,

APPARATUS REQUIRED: Conical flask, burette, burette stand and glass rod

CATEGORY: Antibiotic

PRINICIPLE:

Benzyl penicillin is assayed by iodometric titration method. The titration in which equivalent amount of iodine is liberated to form potassium iodide by the sample and the liberated iodine is titrated against the standard sodium thio sulphate solution . In the tritration benzyl penicillin is first hydrolysed with sodium hydroxide solution converted topenicilloic acid (dicarboxylic acid). Then the penicillin acid is further treated with mineral acid to form D Penicillamine and benzyl penicilic acid .An obtained DPencillamine is further oxidized quantitatively iodine to give disulphide ,excess of iodine is back titrated with 0.02M sodium thio sulphate .Starch as an indicator ,which is near the endpoint as it get hydrolysed by Hcl acid and iodine gets trapped in the matrix of starch, Due to this there is no continuous liberation of iodine.An endpoint is blue to apple green.

PROCEDURE :

Preparation of 0.02N Sodium thiosulphate :

0.02N Sodiu thio sulphate (4.564) and 250mg sodium carbonate make upto 1000ml with water .

Standardization of 0.02N Sodium thio sulphate :

Dissolve accurately weighed 0.2g of potassium bromated in 250 ml water taken in a conical flask. From this take 50ml of the solution ,add 2g of potassium iodide ,3ml of 2MHCl and titrate with sodium thiosulphate solution using starch as an indicator until the blue colour is discharged

Each ml of 0.01Nsodium thiosulphate =0.002784g of KBr

Assay of Benzyl Penicillin :

Weighed accurately about 0.1g of sodium salt of benzyl penicillin taken in astoppered flask,dissolve in 10 ml of water and dilute to 100ml .10ml of solution was transferred into iodine flask ,5ml of 1n NaOH was added , allowed to stand for 20 mins .Then freshly prepared buffer solution ,5ml of 1N HCl acid and 25ml of excess of 0.02N iodine solution were added to stopperd flask and aside for 20 min in dark place. Excess of iodine is titrated with 0.0N sodium

thio sulphate using freshly prepared starch solution as indicator .The endpoint is discoloration of blue colour . To another 10ml of initial solution add 20ml of buffer solution ,allowed to stand for 20min in a dark place and titrate with the same. The difference between two titration represents the volume of 0.02N iodine equivalent to the total amount penicillin present in the given sample of Benzyl Penicillin

I.P FACTOR:

Each ml of 0.02N Soium thio sulphate is =0.06888g of Benzyl Penicillin

FORMULA **%Purity** = $\frac{\text{burette reading –blank X exact normality XI.P.FactorX100}}{\text{Wt.of sample X Approximate. Normality}}$

REPORT: The Molarity of

The percentage purity of

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

Experiment No: 11

PREPARATION OF PHENOTHIAZINE BY USING MICRO OVEN

AIM: To prepare and submit phenothiazine from diphenylamine

APPARATUS REQUIRED: China dish, microwave oven, spatula

CHEMICALS REQUIRED: diphenylamine, sulphur, iodine

CATEGORY: antipsychotic, antihistaminic drug

PRINCIPLE: Phenothiazine is a heterocyclic compound prepared by cyclization by diphenylamine and sulphur in the presence of iodine as a catalyst

SYNONYM: Dibenzo 1,4-diazine, thiodiphenylamine

PROCEDURE:

1. Place 2.5gm of diphenylamine, 0.5g of sulphur and a few crystals of iodine in a china dish and keep in a microwave oven for 50 seconds
2. A bulky brownish mass is formed which is then allowed to cool. Yellowish brown crystal is obtained.

REPORT: Phenytoin was synthesized, submitted and reported the following

Particulars	Practical Value
Theoritical yield	
Practical Yield (gm)	
Percentage Yield	

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

Experiment No: 12

PREPARATION OF PHENYTOIN BY USING MICRO OVEN

AIM: To synthesis and submit phenytoin from benzil by using microwave oven and calculate its percentage yield.

APPARATUS REQUIRED: Round bottom flask, microwave

CHEMICALS REQUIRED: Urea, benzyl, ethanol, NaOH, con HCl

CATEGORY: Antiepileptic

PRINCIPLE:

The microwave region of Electro Magnetic spectrum light between IR irradiation and frequency corresponding to the wavelength of 1cm-1 to 1m. The organic compound can be heated by applying energy in the form of microwave high frequency IR irradiation. The use of this technique can have substantial saving time for laboratory synthesis of drugs and chemicals. This reaction is completed to take place only 2 to 3 minutes microwave irradiation.

Phenytoin is prepared by condensation of benzil and urea under reflux condensation to give heterocyclic compound Pinnacol. When the pinnacol is treated with sodium hydroxide it's rearrangement to produce 5, 5-diphenyl hydantoin as sodium salt and the esterification gives phenytoin as crude product. This rearrangement is called pinacol pinacolone rearrangement

PROCEDURE:

1.25gm of benzil, 0.75gm urea, 3.75ml 30% sodium hydroxide and 18.75 ml methanol was taken in a beaker and kept in a Microwave oven for 3 minutes. Then it was cooled to room temperature and 50ml of water was poured, mixed well and filtered. To the filtrate con. HCl, was added to get the crude product. Then the product was recrystallized from ethanol.

Melting point is 296-298ºC.

REPORT: Phenytoin was synthesized, submitted and reported the following

Particulars	Practical Value
Theoritical yield	
Practical Yield (gm)	
Percentage Yield	

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

Experiment No: 13

DRAWING STRUCTURE AND REACTION USING CHEMDRAW

AIM: To draw structure and reactions using Chemdraw Software.

PRINCIPLE:

ChemDraw is a molecule editor first developed in 1985 by Selena "Sally" Evans, her husband David A. Evans, and Stewart Rubenstein (later by the cheminformatics company CambridgeSoft). The company was sold to PerkinElmer in 2011.ChemDraw, along with Chem3D and ChemFinder, is part of the ChemOffice suite of programs and is available for Macintosh and Microsoft Windows. Using ChemDraw Software: An Introduction Chemical drawing programs enable scientists to communicate chemical structures. Examples of popular chemical drawing programs include ChemDraw, ChemSketch, and ISISDraw.

Features of ChemDraw

- Chemical structure to name conversion
- Chemical name to structure conversion
- NMR spectrum simulation (^{1}H and ^{13}C)
- Mass spectrum simulation

PROCEDURE:

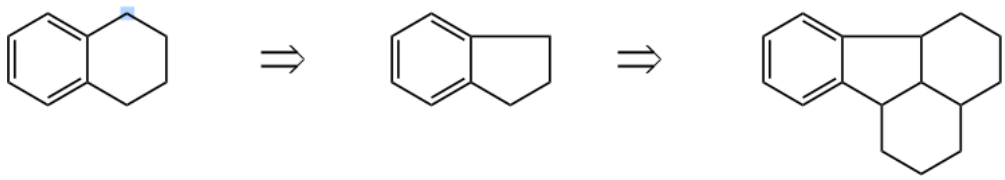
Drawing Structures

When starting the ChemDraw program, a new blank document or a previously used document opens. In addition to the window on which to draw, a vertical palette of tools ("Main Toolbar") on the left, a main menu bar at the top of the screen and additional toolbars below it (usually the General Toolbar and the Style Toolbar) appear. If toolbars are missing, they can be activated from the pull-down menu under "View" in the main menu bar. The use of the several tools is straightforward and highly intuitive. Some hints, however, might be helpful for efficient drawing.

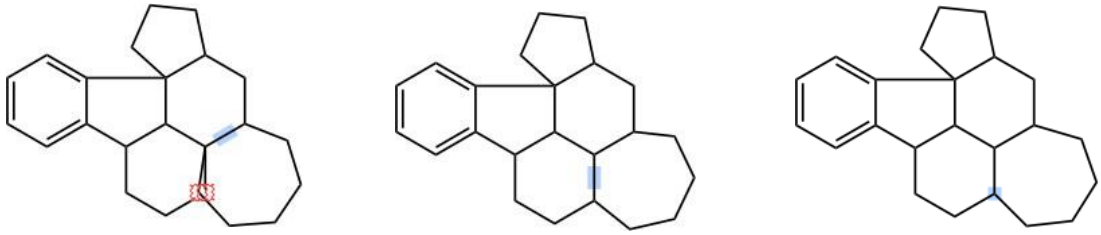
Draw the structural framework of strychnine (B) following the step-to-step instructions below.

1. Choose the "Benzene" tool and click into the drawing area. Annulate a saturated cyclo-hexane to the right by clicking with the "Cyclohexane Ring" tool onto the appropriate benzene bond.
2. Delete the labeled atom by clicking it with the "Erase" tool or by using the "select delete" method.

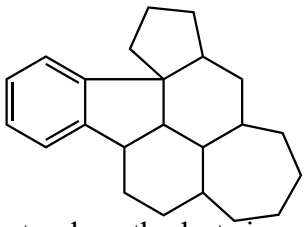
3. Close the five-membered ring by drawing a horizontal bond between the two appropriate atoms with the “Solid Bond” tool. Click on one of the atoms and hold-drag-release to the other atom. Alternatively to (2) and (3), you may click the labeled atom with the “Lasso” tool and hold- drag it onto the “target atom”. The two atoms melt together this way
4. Choose the “Cyclohexane Ring” tool and annulate two cyclohexane rings to the five-membered ring by clicking onto the appropriate bonds:



5. Annulate the cyclopentane and the cycloheptane rings to the framework using the respec- tive ring tools from the “Main Toolbar”. See how the result differs for the annulation of the seven-membered ring depending on the bond you choose to click onto! It is also possible to annulate the seven-membered ring by clicking on an atom (labeled) and “hold-drag (rotate-release” the template.

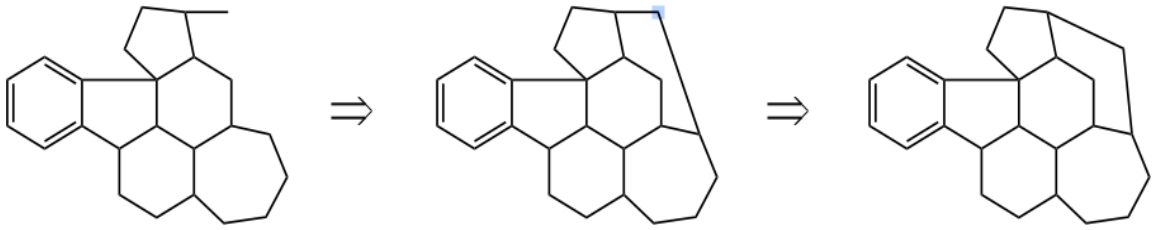


you may adjust the atom positions of the seven-membered ring by selecting them with the “Lasso” tool. Moving the “Lasso” cursor on top of the selection changes its shape into a “Hand”. Move the selected atom with the “Hand” cursor to the desired place:

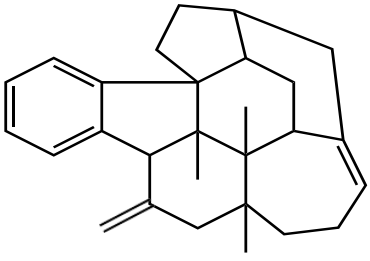


6. Draw the missing bonds to close the last ring with the “Solid Bond” tool by drawing one bond first (with the default dimensions) and closing the ring by “click-hold-drag”.

then adjust the position of the labeled atom by selecting it and dragging it to a more appropriate position.



7. Add the additionally required single bonds to the H-atoms into the structure, best by "click- hold-drag".
8. Add the carboxyl double bond by clicking onto the appropriate C-atom of the cyclohexane ring with the "Solid Bond" tool, followed by clicking onto the single bond that has to become a double bond.
9. You may draw multiple bonds by several methods.
10. clicking with the "Solid Bond" tool onto a single bond gives a double bond. Repetitive clicking adjusts the position of the two bond lines.
11. drawing a second bond on top of a single bond by "click-hold-drag" gives a double bond. Repetitive drawing bonds on top of existing bonds gives triple bonds, quadruple bonds, and then again single bonds.
12. Using one of the "Multiple Bonds" tools of the "Main Toolbar" gives directly the respective bond type.
13. Clicking with the "Eraser" tool on multiple bonds erases successively one bond after the other.
14. Introduce the required double bond in the seven-membered ring to complete the frame-work.



Drawing Schemes

A reaction scheme in a report is an eye-catcher and often the source for the first impression one gets about a whole document. If schemes are not prepared properly and neatly, clearly and plain, the quality of the whole document is doubted. Thus, to be able to create high-quality reaction schemes is of greatest importance for any chemist.

The following points shall always be considered:

• Use the same settings for drawing all individual formulae within a scheme and a set of schemes in the same document.

.• Use (as far as possible) the same formula type and the same type of atom labels for all compounds within a scheme and within a set of schemes in the same document.

• Choose the orientation of the educt molecules such that it corresponds to the orientation of the components within the products.

• Choose proper alignments of formulae, formula numbers, reaction arrows, and text objects (horizontally and vertically).

• Combine associated reactions (discussed within the report in the same context) within a single scheme but avoid creating too crowded schemes containing too much information.

• Make sure that the schemes are properly placed within a document. They shall be placed close to the paragraphs where their content is discussed. In case of doubt, rather prepare an additional scheme or figure, even if information is repeated.

• Use formula numbers for all formulae. In special cases, also the names (mostly trivial names for natural products or pharmaceuticals) may be added. Always start with formula number 1 in the first graph and proceed with gapless counting. Relevant to the counting order is the "reaction flow" of the scheme (and not the "text flow" of the report).

• All formula numbers have to be used in the text of the report. Ensure that the reference to the respective scheme or figure is also given in the text.

• Choose a single font type (default = Arial) only and only two font sizes: 10 pt for atom labels and caption text, 12pt for formula numbers (in bold).

REPORT:

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

Experiment No: 14

DETERMINATION OF PHYSICOCHEMICAL PROPERTIES

AIM: To Determine physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs course content using drug design software Drug likeliness screening (Lipinskies RO5), Molinspiration.

MOLINSPIRATION

Molinspiration is an independent research organization focused on development and application of modern cheminformatics techniques, especially in connection with the internet.

Molinspiration offers broad range of cheminformatics software tools supporting molecule manipulation and processing, including SMILES and SDfile conversion, normalization of molecules, generation of tautomers, molecule fragmentation, calculation of various molecular properties needed in QSAR, molecular modelling and drug design, high quality molecule depiction, molecular database tools supporting substructure search or similarity and pharmacophore similarity search. This also support fragment-based virtual screening, bioactivity prediction and data visualization

Molinspiration supports also internet chemistry community by offering free on-line cheminformatics services for

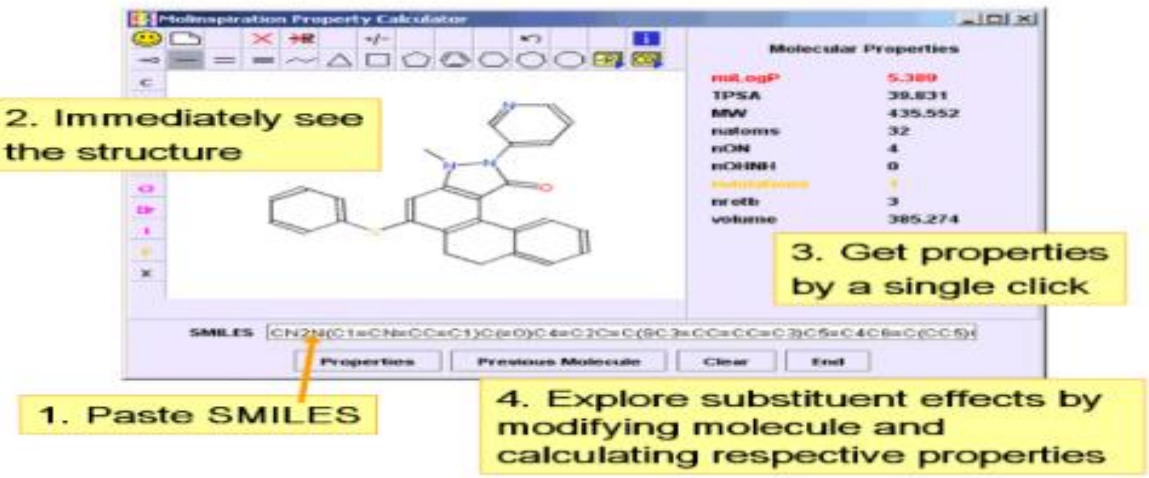
1. Calculation of important molecular properties (for example logP, polar surface area, number of hydrogen bond donors and acceptors).
2. Prediction of bioactivity score for the most important drug targets (GPCR ligands, kinase inhibitors, ion channel modulators, nuclear receptors) and possible molecular toxicity.

New Molinspiration Galaxy 3D Structure Generator

Galaxy generates reliable 3D molecular structures from molecular connectivity (2D information) such Daylight SMILES or MDL Molfile. Galaxy is fast, what allows generation of 3D molecular structures for large chemical databases easily. Galaxy comes with a built-in 3D molecule viewer Galaxy Visualizer which allows also generation of molecular images in various formats.

mipc - Molinspiration Property Calculator

mipc is a desktop program, which allows easy interactive calculation of molecular properties, as well as generation of data tables which may be used for structure-activity QSAR studies.



CALCULATION OF MOLECULAR PHYSICOCHEMICAL PROPERTIES

LogP (octanol / water partition coefficient)

LogP is calculated by the methodology developed by Molinspiration as a sum of fragment-based contributions and correction factors. Method is very robust and is able to process practically all organic, and most organo metallic molecules.

Molecular Polar Surface Area TPSA

It is calculated based on the methodology published by Ertl et al. [1] as a sum of fragment contributions. O- And N- centred polar fragments are considered. PSA has been shown to be a very good descriptor characterizing drug absorption, including intestinal absorption, bioavailability, Caco-2 permeability and blood-brain barrier penetration.

Molecular Volume

Method for calculation of molecule volume developed at Molinspiration is based on group contributions. These have been obtained by fitting sum of fragment contributions to "real" 3D volume for a training set of about twelve thousand, mostly drug-like molecules. 3D molecular geometries for a training set were fully optimized by the semi empirical AM1 method.

"**Rule of 5" Properties**

It is set of simple molecular descriptors used by Lipinski in formulating his "Rule of 5" [2]. The rule states, that most "drug-like" molecules have logP <= 5, molecular weight <= 500, number of hydrogen bond acceptors <= 10, and number of hydrogen bond donors <= 5. Molecules violating more than one of these rules may have problems with bioavailability. The rule is called "Rule of 5", because the border values are 5, 500, 2*5, and 5.

Number of Rotatable Bonds - nrotb

This simple topological parameter is a measure of molecular flexibility. It has been shown to be a very good descriptor of oral bioavailability of drugs [3]. Rotatable bond is defined as any single non-ring bond, bounded to nonterminal heavy (i.e., non-hydrogen) atom. Amide CN bonds are not considered because of their high rotational energy barrier.

Molinspiration Batch Property Calculation Toolkit mib

Molinspiration offers a molecular processing and property calculation toolkit written in Java. The toolkit may be used in a batch mode to process large number of molecules (processing speed is about 10,000 molecules/minute), or accessed through web interface directly on your intranet. Calculated molecular descriptors may be used for property based virtual screening of large collections of molecules to discard structures with not drug-like properties and to pick potential drug candidates

Drug likeness

It may be defined as a complex balance of various molecular properties and structure features which determine whether particular molecule is similar to the known drugs .These properties ,mainly hydrophobicity ,electronic distribution ,hydrogen bonding characteristics ,molecule size and flexibility and presence of various pharmacophoric features influence the behaviour of molecule in a living organism, including bioavailability ,transport properties, affinity to proteins ,reactivity, toxicity, metabolic stability and many others.

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

MOLINSPIRATION SOFTWARE PRODUCTS

Molinspiration specializes in the development of cheminformatics software in Java. Molinspiration tools are therefore platform independent and may be run on any PC, Mac, UNIX or LINUX machine. The software is distributed in a form of engines, which may be used as stand-alone computational engines, used to power web-based tools, or easily incorporated into larger in-house Java applications.

APPLICATIONS

Molinspiration offers consultancy / contract research in all areas of cheminformatics, including:

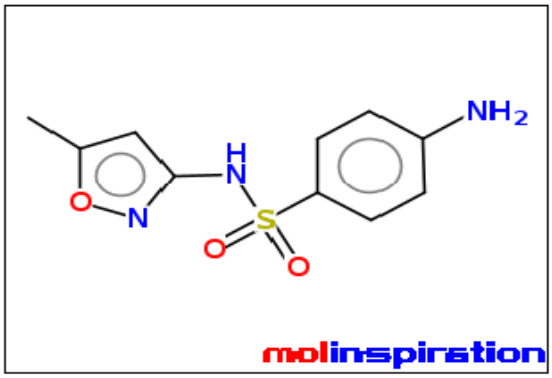
1. Calculation of molecular properties for large molecular databases
2. QSAR and structure-activity analysis
3. Development of activity models for (nearly) any required target, efficient fragment based virtual screening
4. Design of targeted combinatorial libraries
5. Diversity selection from large molecular collections
6. Support in development and implementation of in-house web-based cheminformatics tools.

SOME EXAMPLES OF CALCULATION OF MOLECULAR PROPERTIES

SULFAMETHOXAZOLE

molinspiration

miSMILES: Cc2cc(NS(=O)(=O)c1ccc(N)cc1)no2
Sulfamethoxazole



Molinspiration property engine v2022.08

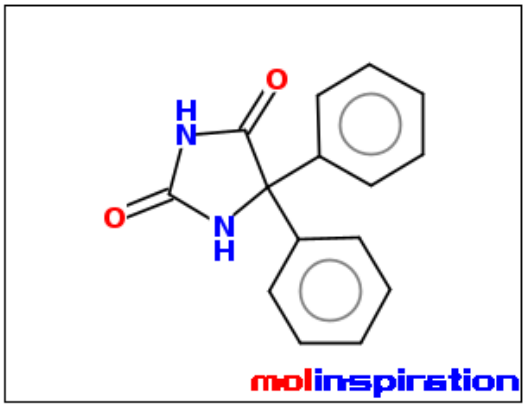
miLogP	0.61
TPSA	98.22
natoms	17
MW	253.28
nON	6
nOHNH	3
nviolations	0
nrotb	3
volume	204.55

EAST POINT COLLEGE OF PHARMACY
East Point Campus, Jnana Prabha, Virgo Nagar Post,
Bengaluru – 560049, Karnataka

PHENYTOIN

molinspiration

miSMILES: O=C3NC(=O)C(c1ccccc1)(c2ccccc2)N3
Phenytoin



Molinspiration property engine v2022.08

miLogP	2.18
TPSA	58.20
natoms	19
MW	252.27
nON	4
nOHNH	2
nviolations	0
nrotb	2
volume	223.89

REPORT:

Vision and Mission of the Institution

Vision

The East Point College of Pharmacy aspires to be a globally acclaimed institution, **recognized** for **excellence in** pharmaceutical education, research and nurturing students for **holistic development.**

Mission

M1 Create pharmacy graduates through **quality education**

M2 Promote innovation, **creativity**, and excellence **in teaching**, learning, and **research**

M3 **Inspire** integrity, teamwork, critical thinking**, personal** development, and ethics in **students** and lay **the** foundation for lifelong learning

M4 **Serve** the **healthcare, technological, scientific**, and **economic** needs of then **society**.