IMPLEMENTATION PLAN FOR LEARNING  
ORGANIC CHEMISTRY LABORATORY II

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**By :**

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**FACULTY OF MATHEMATICS AND SCIENCE   
YOGYAKARTA STATE UNIVERSITY**

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IMPLEMENTATION PLAN FOR LEARNING

MEETING TO I

WORK ACCIDENTS IN THE LABORATORY

|  |  |
| --- | --- |
| Faculty / Study Program | : Faculty of Mathematics and Natural Sciences / Chemistry |
| Courses & Code | : Practical Organic Chemistry II |
| Number of credits | : 1 sks |
| Semester and Time | : 4 dan 2 x 50 xmenit |

**I. Standar Competence**

After completing this subject students master the material safety in the laboratory

**II. Basic competence**

Students can maintain safety in the experiment.

**III. Indicator**

1. Explaining the factors that cause workplace accidents

2. Explain the safe working conditions of the danger of accidents

**IV. Learning objectives**

1. Students can describe the factors that cause workplace accidents

**V. Learning Materials**

Before conducting experiments in organic chemistry lab then praktikan should do the following:

1. open all the windows to keep fresh air circulating well

2. turn on the blower if there is

3. wearing lab coats

Once completed practicum then praktikan must do the following:

1. turn off all the electricity

2. turn off the faucet

3. close window

4. clean lab table

5. not dispose of solid waste in the water bath

Work in the laboratory of organic chemistry has a huge risk to security, therefore praktikan required to understand and master some of the important things in working in the laboratory. Every experiment in the laboratory using chemicals and fittings as follows:

1. chemicals have the properties of explosive, flammable, corrosive and toxic

2. glassware is fragile and can be on a limb

3. reagents are highly reactive inorganic

4. power tools such as electric stoves, ovens, heating lamps, UV lamps, etc.

5. water used for cooling a current flow or leakage can berhennti

6. ultra-violet radiation

The use of hazardous chemicals should be avoided, but if it should be done then the use of hazardous chemicals is made as small as possible or should be designed first experiment to be conducted. For example the use of materials, equipment, experimental conditions that are safe in doing the work. Experiments that use hazardous chemicals must be done in the cupboard acid.

To keep it in case of fire in the laboratory should be available fire extinguishers. But its use must be considered from any source of fire took place. If the fire comes from the chemicals can not be extinguished with water but must use a dry chemical or carbon dioxide.

Things that need attention to maintain the safety of laboratory work in organic chemistry are:

1. work carefully and really should not make jokes sendau  
2. should not eat and drink  
3. keep your distance from the work of heating  
4. chemical substances should not use traditional heating tube is directed at friends and or to the location of chemical

**VI. Learning methods**

Method: Lecture, question and answer

Approach: -

Strategy: Learning-based life skill

**VII. Learning Steps**

|  |  |  |
| --- | --- | --- |
| **No** | Activity | **Time** |
| 1. | Preliminary a. opening 1). Lecturer in greeting (open class) 2). Lecturer check student attendance b. apperception 1). Lecturer gives examples of tools that can cause accidents 2). problem Why are tools in the laboratory can menimbulkaan workplace accidents. | 5 minutes |
| 2. | Core Activities lecturer: a. Inform briefly about work accidents b. Divide the class into 10 groups students: a. Noting the information from the lecturer b. Conducting experiments | 90 minutes |
| 3. | cover Message: do problems that exist in the user guide appropriate practicum practicum each event and make practical reports | 5 minutes |

**VIII. Tools and Learning Resources**

Worksheets experiments, equipment and lab materials, manuals Organic Chemistry II lab

**IX. Appraisal**

Assessment Sheet for Internship / Experiments in the laboratory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Student name | The presence in conducting | Activeness in   conducting | Cooperation in carrying out activities |
| 1. |  |  |  |  |
| 2. |  |  |  |  |
| 3. |  |  |  |  |
| 4. |  |  |  |  |

**X. Exercises**

1. What needs to be done by praktikan for security work in laboratirium mmenjaga?.  
Answer:  
For security mmenjaga work in laboratirium things - things that need to be done by praktikan are:  
1. work carefully and really should not make jokes sendau  
2. should not eat and drink  
3. keep your distance from the work of heating  
4. chemical substances should not use traditional heating tube is directed at friends and or to the location of chemical

IMPLEMENTATION PLAN FOR LEARNING

MEETING TO II

KNOW YOUR INGREDIENTS HAZARDOUS CHEMICHAL

|  |  |
| --- | --- |
| Faculty / Study Program | : Faculty of Mathematics and Natural Sciences / Chemistry |
| Courses & Code | : Practical Organic Chemistry II |
| Number of credits | : 1 sks |
| Semester and Time | : 4 dan 2 x 50 xmenit |

**I. Competency Standards**

After completing the student master the subject matter of this types of hazardous chemicals

**II. Basic Competence**   
Students can treat the chemicals according to the type and nature

**III. Indicator**

1. Explains hazardous chemicals   
2. Explain the safe handling of chemicals in the lab so that

**IV. Learning Objectives**   
Students can describe the chemicals are dangerous

**V. Learning Materials**

In the organic chemistry laboratory available hazardous chemicals, the use of hazardous chemicals should be avoided. But if in the experiment used the material so the process must be done in the cupboard acid. From the observation of each practicum was praktikan less attention to the risks arising from use of these chemicals. This is due to a lack of knowledge and understanding of the nature and types of chemicals that exist in the laboratory.

The nature and types of chemicals can be known from the legislation on packaging and labeling of hazardous materials, which determine the hazardous chemicals (hazardous chemicals), for example:   
1. Corrosive: products of these chemicals affect the body's tissues and eye damage   
2. Explosive: This product chemicals can explode by heat and sparks., Shock or friction.   
3. Oxidizing: the product of these chemicals can cause a fire, these materials generate heat when in contact with other organic materials.   
4. Flammable: products of these chemicals have a "flash point" low easily react with water or air to produce flammable gases, such as the hydrogen from metal hydride   
5. Harmful: products of these chemicals are irritants can cause burns to the skin and disrupt the respiratory system.   
**VI. Learning Methods**   
Method: Lecture, question and answer   
Approach: -   
Strategy: Learning-based life skill   
  
**VII. Learning Steps**

|  |  |  |
| --- | --- | --- |
| **No** | Activity | **Time** |
| 1. | preliminary a. opening 1). Lecturer in greeting (open class) 2). Lecturer check student attendance b. apperception 1). Lecturer gives examples of these chemicals are dangerous 2). problem Why are chemicals in the laboratory can menimbulkaan kecelakaan kerja . | 5 minutes |
| 2. | core Activities lecturer: a. Inform briefly about hazardous chemicals b. Divide the class into 10 groups students: a. Noting the information from the lecturer b. Conducting experiments | 90 minutes |
| 3. | cover Message: do problems that exist in the user guide appropriate practicum practicum each event and make practical reports | 5 minutes |

**VIII. Tools and Learning Resources**

Worksheets experiments, equipment and lab materials, manuals Organic Chemistry II lab

**IX. Appraisal**

Assessment Sheet for Internship / Experiments in the laboratory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Student name | The presence in conducting | Activeness in   conducting | Cooperation in carrying out activities |
| 1. |  |  |  |  |
| 2. |  |  |  |  |
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| 4. |  |  |  |  |

**X.** **Exercises**

1. Give five examples of the chemicals are flammable

2. Give two examples of highly toxic chemicals

Answer:

1. Examples of flammable chemicals that were spirits, ether, chloroform, acetone, etc.

2. Examples of highly toxic chemicals are cyanide compounds (methyl cyanide, sodium cyanide, cyanide)

IMPLEMENTATION PLAN FOR LEARNING

MEETING TO III  
PRE TEST GENERAL

|  |  |
| --- | --- |
| Faculty / Study Program | : Faculty of Mathematics and Natural Sciences / Chemistry |
| Courses & Code | : Practical Organic Chemistry II |
| Number of credits | : 1 sks |
| Semester and Time | : 4 dan 2 x 50 xmenit |

**I. Competency Standards** Upon completion of the test questions students master the tools installed of VI trial to trial IX.

**II. Basic competence**  
Students can complete the organic chemistry II prakktikum well

**III. Indicator**  
1. Installing the tools every lab  
2. Mebguasai separation, and synthesis of organic compounds issolasi

**IV. Learning objectives**  
Students can describe the experiments organic chemistry lab II

**V. Learning Materials**  
Experiment IV to IX contained in the hand out organic chemistry lab II

**VI. Learning methods**  
Method: test  
Approach: -  
Sttrategi: -

**VII. Learning Steps**  
1. Lecturer check student attendance  
2. Lecturer distributing test questions  
3. lecturer collect job file

IMPLEMENTATION PLAN FOR LEARNING

MEETING TO IV  
IDENTIFICATIONS OF ORGANIC COMPOUNDS

|  |  |
| --- | --- |
| Faculty / Study Program | : Faculty of Mathematics and Natural Sciences / Chemistry |
| Courses & Code | : Practical Organic Chemistry II |
| Number of credits | : 1 sks |
| Semester and Time | : 4 dan 2 x 50 xmenit |

**I . Satndar Competency:**

Understanding the properties of organic compounds, methods of identification and organic reactions of organic compounds.

**II. Basic competence**

Predicting the occurrence of a positive reaction to the identification of reactions of organic compounds.

**III. indicator**

1. Explaining the effect of adding chemical reagents to organic compounds that have a particular functional group.

2. Determine changes that occur from raeksi-reaction identification of organic compounds. \

**IV. Learning objectives**

1. Students can describe organic compounds through the reagent identification

2. Students can write the reaction that occurs from the identification of organic compounds

**V. Learning Materials**

1. Identification of Compounds alkenes

Reagent bromine in carbon tetra chloride Br2/CCl4 red brown, his reaction to alkenes are addition reactions. Bromine heterolisis split into Br + and Br-alkene π electrons then strike Br + ions form a cyclic bromonium. Ion is attacked by nukleoofil Br-form colorless reaction products are compounds 1,2 - dibromo alkene. Molecular reaction is as follows:



**2**. **Identification of Alkyl halide compounds**

Compounds alkyl halide or halogen senywa has the formula RX with R = alkyl or aryl and X is halogen (F, Cl, Br and I). If R = alkyl is an alkyl halide alifatis and if R = aryl / phenyl is an alkyl halide aromatic. Alkyl halide compound functional group is - X (- F, - Cl, - Br, - I). Functional groups using reagents can diidenntifikasi perag nitrate. Idetifikasi reaction is for example are:



If the halogen X is Cl in the compounds R - X will happen a white precipitate, if X = Br will happen yellowish white precipitate, and if X = I will place a yellow precipitate.

**3.** Identification of Compounds Alcohol

Alcohol has the formula R-OH when R = alkyl alcohol is alifatis and if R = aryl is an aromatic alcohol. Alcohol alifatis can be identified using chromic acid reagent. Primary alcohols with chromic acid will occur aldehydes and ketones secondary alcohol will occur. . While the aromatic alcohol can be identified using 5% FeCl3 reagent.

**4.** Identification of Compounds Aldehydes

Aldehyde has the formula R - COH can be identified using Fehling reagent, Benedict's reagent and reagent Tollen.s. Fehling and Benedict's reagent with aldehyde compounds at the end of the reaction will occur Cu2O precipitate the red brick. While reagents Tollen.s at the end of the silver mirror reaction will occur. Fehling reagent Fehling differentiated into A which consists of a solution of CuSO4 and. NaOH, while Fehling B solution consisting of sodium potassium tartrate together with Benedict's reagent Fehling reagent Benedict used the difference in citric acid instead of potassium sodium tartrate solution .. Reagents Tollen, s is a solution of silver diamine which can be made from a solution of AgNO3 added a solution of NH4OH. Aldehydes with the reagent Tollen, s will form a silver mirror: The reaction is as follows:



**5.** Identification of Compounds Ketones

Ketone has the formula R - CO - R can be identified using the reagent 2,4 - dinitro fenilhidrazin.

The reaction was positive if a yellow precipitate of compound terbenntuk osazon



**6**. Identification of Phenol Compounds

Phenol compounds are aromatic alcohol compounds, can be identified using FeCl3 Ragen 5% will occur komnplek compounds that bermerah, blue green or purple. For the phenol class of compounds of natural materials usually memnerikan violet color.

**VI. Learning Methods**   
Method: Lecture, question and answer   
Approach: -

**VII. Learning Steps**

|  |  |  |
| --- | --- | --- |
| **No** | **Activity** | **Time** |
| 1. | Preliminary a. opening 1). Lecturer in greeting (open class) 2). Lecturer check student attendance 3). Collect lab reports from previous b. apperception 1). Lecturer gives an example of installing a practicum 2). problem Why are organic compounds can be identified and fantasize that the influence of the functional group. | 5 minutes |
| 2. | Core Activities lecturer: a. Inform briefly about the identification of reaction b. Divide the class into 10 groups students: a. Noting the information from the lecturer b. Conducting experiments | 90 minutes |
| 3. | Cover Message: do problems that exist in the user guide appropriate practicum practicum each event and make practical reports | 5 minutes |

**VIII.** Tools and Learning Resources

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**IX. Appraisal**

Assessment Sheet for Internship / Experiments in the laboratory

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X. Exercises

1. Explain what changes occur if the compound bbromin alkene plus reagent in the solvent carbon tetra chloride and write down the reaction mechanism?

2. Phenol can be identified using FeCl3 reagent 5% how molecules react?

3 Answer :

1. Changes that occur in the identification of alkenes with Br2/CCl4 reagents can be described as follows:



Reaction mechanism is:







2. Phenol compounds and natural materials phenol group usually gives violet color. With 5% FeCl3 reagent. The reaction is as follows:



IMPLEMENTATION PLAN FOR LEARNING

MEETING TO V  
THIN LAYER CHROMATOGRAPHY

|  |  |
| --- | --- |
| Faculty / Study Program | : Faculty of Mathematics and Natural Sciences / Chemistry |
| Courses & Code | : Practical Organic Chemistry II |
| Number of credits | : 1 sks |
| Semester and Time | : 4 dan 2 x 50 xmenit |

**I Competency Standards:**

Understanding the properties of the eluent, adsoeben and analysis of thin-layer chromatography (TLC)

:**II. Basic Competence**

Predicting the appropriate use of the eluent to separate the organic compounds

**III. Indicator**

1. Menjelaskan penggunaan eluen murni dan eluen campuran
2. Menentukan harga Rf dari suatu senyawa organik tertentu

**IV. Learning objectives**

1. Students can determine the appropriate eluent for TLC analysis
2. Students can determine which compounds were analyzed based on the price of Rf obtained from TLC analysis.

3. Students can purify the compound by TLC analysis

**V. Learning Materials**

Analysis of thin-layer chromatography (TLC) is based on the distribution of liquid-solid phase  
where the solid phase or the absorbent in the form of a thin layer made ​​of silica gel or alumina coated on a sheet of glass or plastic., As the liquid phase is the eluent used for the analyzed compounds merambatkan move through the solid phase. Pennting properties of the absorber is the size of the particles and the homogeneity. Large particles commonly used are 1-25 microns..

Particles of coarse grains will not provide a good separation of fine particles while providing a good separation as the eluent flow faster. Absorbers are widely used in TLC analysis are silica (SiO2) x and alumina (Al2O3) x. Silica is used given the binder (binder) which allows the calcium sulfate layer to be strong and adding to its adhesion to the glass backer. Silica like this in the trade were coded silica gel G. Alumina is widely used in TLC and in the trade of a layer of alumina can be either acidic or alkaline. Therefore, alumina for the separation of aromatic hydrocarbon compounds.

For the mobile phase usually digun will have a mixture of organic eluent polarity as low as possible so that the absorption components of the mixture can be reduced, eluent and sample propagates through the stationary phase and mobile phase interacts with the absorber. The main factor that causes the interaction is the polarity of the mobile phase and polarity of the compounds analyzed.

Movement (how quickly) the sample travels influenced by several factors: 1). chemical structure of the compounds analyzed, 2). Eluent, eluent used must have high purity, if the eluent used a mixture of some of the comparisons the eluent mixture must be precise. 3). Absorbent, absorbent activity can be achieved by eliminating water molecules that occupy the center of uptake of the absorber. Absorber will give you the price difference Rf (retordation factor) are different despite using the same eluent.

Rf eg price calculation is:



Rf compound A = 1,5 Cm / 6 Cm = 0,25

Rf compound B = 4,7 Cm/6 Cm = 0,78

**VI. Learning Methods**   
Method: Lecture, question and answer   
Approach: -

**VII. Learning Steps**

|  |  |  |
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| **No** | **Activity** | **Time** |
| 1. | Preliminary a. opening 1). Lecturer in greeting (open class) 2). Lecturer check student attendance 3). Collect lab reports from previous b. apperception 1). Lecturer gives an example of installing a practicum 2). problem Why on TLC analysis on the inner wall of the tube chamber was given a filter paper. | 5minutes |
| 2. | Core Activities lecturer: a. Inform briefly about the TLC analysis b. Divide the class into 10 groups students: a. Noting the information from the lecturer b. Conducting experiments | 90 minutes |
| 3. | cover Message: do problems that exist in the user guide appropriate practicum practicum each event and make practical reports | 5 minutes |

**VIII.** Tools and Learning Resources

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**X. Exercises**

1. Type of bill: the task of practical reports

2. Istrumen shape: a matter of description, spreadsheet

3. Problems

1. How do I choose an appropriate eluent in TLC analysis

2. Why the price of Rf can be to determine which compounds identified?.

3. Is TLC analysis to determine purity can be a compound?.

4. Answer

1. How to choose a proper eluent eluents with the polarities are adjacent to the compound to be identified. If the polarity is higher eluent eluent can be added other low polarity in order to reduce the polarity of the eluent mixture. Conversely, if the non-polar compounds as the compounds are non-polar eluent pililah.

2. Price Rf can be analyzed to determine if the compound has a standard compound, comparing the price of a standard compound with Rf compound being analyzed. If it is found in the literature that analyzed the compound Rf prices it can also for comparison of compounds in accordance with the analysis of compounds having Rf rates in the literature.

3. TLC analysis to determine the pure compound can be a way to do anaalisis adsorbennya TLC one spot and then scraped off and subsequently dissolved in the same eluaen. After the eluent is evaporated it will get a pure compound.

IMPLEMENTATION PLAN FOR LEARNING

MEETING TO VI

SOXHLET EXTRACTION   
ISOLATION OF SEEDS TRIMIRISTIN PALA

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| --- | --- |
| Faculty / Study Program | : Faculty of Mathematics and Natural Sciences / Chemistry |
| Courses & Code | : Practical Organic Chemistry II |
| Number of credits | : 1 sks |
| Semester and Time | : 4 dan 2 x 50 xmenit |

**I Standard Competency::**

Understanding the properties of the eluent, adsoeben and analysis of thin-layer chromatography (TLC)

:**II**. **Basic competence**

Predicting the appropriate use of the eluent to separate the organic compounds

**III. Indicator**

1. Explaining the use of pure eluent and the eluent mixture

2. Rf determine the price of a particular organic compound

**IV. Learning objectives**

1. Can determine the proper eluent for TLC analysis
2. Students can determine which compounds were analyzed based on the price of Rf obtained from TLC analysis..
3. Students can purify the compound by TLC analysis

**V. Learning Materials**

A common way used for the separation of a mixture of organic compounds obtained from the reaction is the extraction of the liquid with liquid. The way the separation is based on comparison of the distribution of substances (samples) are dissolved in two solvents are not mutually dissolved. Comparison of solute in two solvents in the process of partitioning is called the distribution constant K, the balance at a specific temperature and state of the substance dissolved in a solution of the same substance and the distribution of solute A in solution 1 and solution 2 is formulated as follows:



If the weight of the solute = CE extracted using a solution whose volume is equal to the volume palarut and C0 is the weight of the substance before it is extracted:

CE = C0 ( K/K + 1 )

So for example, 2 parts of the solute can be dissolved in solvent ether and water and if the partition coefficient = 2 or 67% can be extracted using ether solvent then :

K = C eter /C H2O = 2/1 = 2

C eter = 100 ( 2 + 2 + 1 ) = 67 %

In the second extraction (extraction residue) extracted suppose there is 22% and the third extraction (extraction residue is extracted a second) there are 4% of the solute which can be seen in the ether layer :

C2 eter = ( 100 – 67 )(2/3 ) = 22 %(

C3 eter = ( 100 – 67 – 22 ) (2/3 ) = 7 %

C H2O sesudah ekstraksi = ( 100 – 67 – 22 – 7 ) = 4 %

Extraction can be divided into cold extraction (solvent extraction) and heat extraction (Soxhlet extraction). Cold extraction performed unntuk liquid - liquid substances which are not mutually mixed and used in separating funnel. In this case must be considered agitation should be homogeneous. Heat extraction done to attract organic compounds contained in natural materials such as roots, stems, leaves, flowers and seeds, this extraction using Soxhlet.

Organic compounds contained in natural materials such as trimiristin contained in nutmeg. Trimiristin is a triglyceride ester which is pretty much contained in nutmeg (miristica fragrans). Trimiristin molecular formula is C45H86O6. If it will happen trimiristin hydrolyzed myristic acid and glycerol. Hydrolysis reaction can take place in an atmosphere of sam or alkali.

For Soxhlet extraction trimiristin used tools, nutmeg mashed and then wrapped using fat-free filter paper. Then inserted into a Soxhlet device. Tools associated with the Soxhlet flask filled with a solvent as much as 2 / 3 volume of the flask and then heated. At the time of heating the solvent will boil and steam will rise to the cooler and then steam mmengembun and will fall into the sample and Soxhlet meet trimiristin will dissolve. After the solvent memenuhia solvent will descend into the Soxhlet flask .. One round is called a circulating solvent. In general, extraction done as much, 8, 10, 12, 14 or 16 circulating solvent.

**VI. Learning methods**

Methods: Practical

Approach : -

Strategy: Learning-based life skill

**VII. Learning Steps**

|  |  |  |
| --- | --- | --- |
| **No** | **Kegiatan** | **Waktu** |
| 1. | Preliminary a. opening 1). Lecturer in greeting (open class) 2). Lecturer check student attendance 3). Collect lab reports from previous b. apperception 1). Lecturer gives an example of installing a practicum 2). problem Why is the coolant used Soxhlet extraction ball?. | 5 minutes |
| 2. | Core Activities lecturer: a. Inform briefly about the TLC analysis b. Divide the class into 10 groups students: a. Noting the information from the lecturer b. Conducting experiments | 90 minutes |
| 3. | Cover Message: do problems that exist in the user guide appropriate practicum practicum each event and make practical reports | 5 minutes |

**VIII. Tools and Learning Resources**

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**IX. Appraisal**

Assessment Sheet for Internship / Experiments in the laboratory

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| 4. |  |  |  |  |

**X. Solved**

1. Type of bill: the task of practical reports

2. Istrumen shape: a matter of description, spreadsheet

3. about

1. Mention solvents other than hexane can be used for the isolation trimirisin

2. Soxhlet extraction for the separation of organic compounds from natural materials, whether daasr determination of the solvent.

4. Answer :

1. Solvents other than hexane can be used for isolation trimirisin are polar solvents that have approached the polar hexane. Since then the hexane is non polar solvents have been used also must be non-polar. Example is the solvent n-pentane, and cyclohexane isooktana.

2. he basis for the separation of organic senhyawa ekstraaksi natural materials are polar compounds derived from natural materials and the polar solvent used.

IMPLEMENTATION PLAN FOR LEARNING

MEETING TO VII  
ALDOL CONDENSATION CROSS

|  |  |
| --- | --- |
| Faculty / Study Program | : Faculty of Mathematics and Natural Sciences / Chemistry |
| Courses & Code | : Practical Organic Chemistry II |
| Number of credits | : 1 sks |
| Semester and Time | : 4 dan 2 x 50 xmenit |

**I. Standard Competency:**

The student has the ability to synthesize organic compounds through the cross-aldol reaction.

**II. Basic Competence:**

Predicting reaction in the synthesis of organic compounds via cross-aldol reaction.

III. indicator

1. Describes materials - chemicals used for synthesis of compounds via cross-aldol reaction.

2. Determine the reactions that occur in organic compounds sinstesis through cross-aldol reaction.

**IV. Learning Objectives:**

1. Students can menenntukan chemicals for the synthesis of organic compounds via cross-aldol reaction.

2. Students can write the reaction in the synthesis of organic compounds via cross-aldol reaction.

**V. Learning Materials**

Condensation is a reaction in which two small molecules combine to form one large molecule with or without the loss of a small molecule. Misaalnya Claisen condensation of ethyl acetate which occurs in the presence of sodium etojsida in ethanol. Ά carbon atom of the ethyl acetate condenses with the carbonyl carbon of the ethyl acetate molecules to form carbon-carbon bonds are new.



Aldol condensation is a nucleophilic addition reaction of enolate ion to the carbonyl group with the reaction product β-hydroxy ketones or β-hydroxy aldehydes, enolate and a carbonyl group is attacked is the same two compounds. The reaction is called aldol condensation of aldehydes and because dituurunkan alcohol. Examples of aldol condensation reaction is the reaction between asetaldehid with an aqueous solution of sodium hydroxide to form enolate ions in low concentrations. Goes a reversible reaction, namely when the enolate ion reacts it will form another new enolate ion. Enolate ion reacts with another aldehyde molecule by mengadisi on the carbonyl carbon to form the alkoxide ion which then reacts with protons from water to produce the aldol product. Aldehydes which can condense with aldehydes aldol is Hά atom of the aldehyde carbonyl group that can form enolate ions in alkaline.



Condensation reaction between aldehydes or ketones with aldehyde or ketone carbonyl of the other so-called cross aldol condensation (cross aldol condensation). This reaction of aldehydes with no Hά atoms can not form enolate ions and so can not berdimerisasi in an aldol condensation. But if the aldehyde iitu mixed with another aldehyde or ketone having atomic Hά there will be a condensation of two molecules that.

Cross-aldol condensation reaction involving the use of aromatic aldehyde compounds and ketone compounds or alkyl aryl ketone as reactant is known as the Claisen-Schmidt reaction. This reaction involves the enolate ion of the ketone compounds that act as nukleofilyang will attack the carbonyl carbon of aromatic aldehyde compounds to produce β-hydroxy ketone compounds which further dehydrated compound ά, β-unsaturated ketone.

**VI. Learning methods**

Methods: Practical

Approach : -

Strategy: Learning-based life skill

**VII. Learning Steps**

|  |  |  |
| --- | --- | --- |
| **No** | **Activity** | **Time** |
| 1. | preliminary a. opening 1). Lecturer in greeting (open class) 2). Lecturer check student attendance 3). Collect lab reports from previous b. apperception 1). Lecturer gives an example of installing a practicum 2). problem Why is condensation between the aldehydes and ketones is called aldol kendensasi? | 5 minutes |
| 2. | core Activities lecturer: a. Inform briefly about the TLC analysis b. Divide the class into 10 groups students: a. Noting the information from the lecturer b. Conducting experiments | 90 minutes |
| 3. | Penutup  Pesan : kerjakan soal yang ada di buku petunjuk praktikum sesuai acara praktikum masing-masing dan buatlah laporan praktikum | 5 minutes |

**VIII.** Tools and Learning Resources

Worksheets experiments, equipment and lab materials, manuals Organic Chemistry II lab

**IX. Appraisal**

Assessment Sheet for Internship / Experiments in laboraorium

|  |  |  |  |  |
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| 2. |  |  |  |  |
| 3. |  |  |  |  |
| 4. |  |  |  |  |

**X. Solved**

1. Type of bill: the task of practical reports

2. Istrumen shape: a matter of description, spreadsheet

3. Problem

1. Write the reaction of aldol komdensasi asetaldehid with the base NaOH?

4. Answer :

Aldol reaction of asetaldehid komdensasi with the bases NaOH is:



IMPLEMENTATION PLAN FOR LEARNING

MEETING TO VIII  
SYNTHESIS SALICYLIC ACID

|  |  |
| --- | --- |
| Faculty / Study Program | : Faculty of Mathematics and Natural Sciences / Chemistry |
| Courses & Code | : Practical Organic Chemistry II |
| Number of credits | : 1 sks |
| Semester and Time | : 4 dan 2 x 50 menit |

**I Standard I Competency:**

The student has the ability to synthesize organic compounds through a saponification reaction

:**II. Basic Competence:**

Predicting the hydrolysis reactions that occur in organic ester compound in the presence of acid or base.

**III. Indicator**

1. Describes materials - chemicals used for synthesis of compounds through the reaction of saponification

2. Menentukan reaksi yang terjadi dalam sinstesis senyawa metil salisilat .

**IV. Learning objectives:**

1. Students can menenntukan chemicals for the synthesis of organic compounds in the reaction of ester saponification

2. Determine the reactions that occur in sinstesis compound methyl salicylate.

**V. Learning Materials**

R-COOR1 esters can be synthesized through the esterification reaction of carboxylic acids with alcohols using a catalyst of concentrated sulfuric acid. Example is the reaction between acetic acid with 1-propanol, propyl acetate will produce.



Esterification reaction is a reversible reaction and therefore formed ester can be hydrolyzed to form carboxylic acid and alcohol again. Ester hydrolysis reaction of carboxylic acid and alcohol into a reaction called saponification. Ester hydrolysis reactions can occur due to the influence of acid or alkaline, acid hydrolysis of esters under the influence of the reaction can be through several mechanisms tergazntung ester structure.

Ester methyl salicylate are contained in gondopuro oil, can be converted into salicylic acid in the presence of alkaline catalysts. . For example reaction following hydrolysis of propyl acetate esters:



Methyl salicylate is a major component in gondopuro oil which is about 96-99%., The other component is a paraffin, alcohols, aldehydes and ketones. Hydrolysis reaction of methyl salicylate is as follows :



Salicylic acid has a relative molecular 138.12 as a crystalline compound with lelih point 159 ° C, the heating will decompose into phenol and carbon dioxide.

**VI. Learning methods**

Methods: Practical

Approach : -

Strategy: Learning-based life skill

**VII. Learning Steps**

|  |  |  |
| --- | --- | --- |
| **No** | **Activity** | **Time** |
| 1. | preliminary a. opening 1). Lecturer in greeting (open class) 2). Lecturer check student attendance 3). Collect lab reports from previous b. apperception 1). Lecturer gives an example of installing a practicum 2). problem Why the hydrolysis reaction of ethyl ester of salicylic needed bases?. | 5 minutes |
| 2. | core Activities lecturer: a. Inform briefly about the TLC analysis b. Divide the class into 10 groups students: a. Noting the information from the lecturer b. Conducting experiments | 90 minutes |
| 3. | cover Message: do problems that exist in the user guide appropriate practicum practicum each event and make practical reports | 5 minutes |

**VIII. Tools and Learning Resources**

Worksheets experiments, equipment and lab materials, manuals Organic Chemistry II lab

**IX. Appraisal**

Assessment Sheet for Internship / Experiments in laboraorium

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Student name | The presence in conducting | Activeness in   conducting | Cooperation in carrying out activities |
| 1. |  |  |  |  |
| 2. |  |  |  |  |
| 3. |  |  |  |  |
| 4. |  |  |  |  |

**X. Solved**

1. Type of bill: the task of practical reports

2. Istrumen shape: a matter of description, spreadsheet

3. about

Answer

Hydolisis of metyl salicilic



IMPLEMENTATION PLAN FOR LEARNING

MEETING TO IX  
STEREOCHEMICAL   
COMPOUNDS WITH ONE ATOM C CHIRAL

|  |  |
| --- | --- |
| Faculty / Study Program | : Faculty of Mathematics and Natural Sciences / Chemistry |
| Courses & Code | : Practical Organic Chemistry II |
| Number of credits | : 1 sks |
| Semester and Time | : 4 dan 2 x 50 menit |

**I Standard Competency:**

The student has the ability to synthesize organic compounds through a saponification reaction

**II. Basic Competence:**

Predicting the hydrolysis reactions that occur in organic ester compound in the presence of acid or base.

**III. Indicator**

1. Describes materials - chemicals used for synthesis of compounds through the reaction of saponification

2. Determine the reactions that occur in sinstesis compound methyl salicylate.

**IV. Learning Objectives:**

1. Students can menenntukan chemicals for the synthesis of organic compounds in the reaction of ester saponification

2. Students can write the reaction that occurs in the hydrolysis reaction of methyl salicylate

**V. Learning Materials**

Organic compounds that have carbon atoms bind to four different groups of atoms called C asimetrrs or chiral C atom. Such compounds would form two molecules that are mirror shadows that are not close to each other. Molecular compounds which are not close to each other are called enantiomers. Enantiomer derived from the Greek (Greek) of the enantio word (Opposite) and meros (part) Example: lactic acid and 2-methyl-1-butanol has a chiral C atom.   
.



Fischer projection of a compound having one chiral C atom can be described as follows:



Nomenclature (nomenclature) R-S is determined by the rules of Cham-Prelog-Ingold as follows:

1. Determine priority atom / group attached to the chiral C atom. A high priority - the lowest priority D

1 - 2 - 3 - 4

2. The molecule viewed from the direction contrary to the atom / group has the lowest priority.

3. When the group ABC has a clockwise sequence makaa compounds or chiral C atom has an R configuration (rekter = right and if BC has a sequence of counter-clockwise then the configuration S (sinester = left).

The order of priority groups**:**

a). The order of priority groups: I > Br > Cl > SH> F > OH > NH2 > CH3 > H

b). ( CH3 )2 – CH – > CH3 – CH2 – CH2 –

c). CH3 – CH2 – > CH3 –

d). CH3O - > - OH

e). – OH > – CO2H > - CH3 > - H

Example :



Then the configuration R is:



Examples of R and S configuration of lactic acid and gliseraldehid

a). Lactic acid



b). Gliseraldehid



**VII. Learning Steps**

|  |  |  |
| --- | --- | --- |
| **No** | **Activity** | **Time** |
| 1. | Preliminary a. opening 1). Lecturer in greeting (open class) 2). Lecturer check student attendance 3). Collect lab reports from previous b. apperception 1). Lecturer gives an example of installing a practicum 2). problem Does the RS enantiomer relationship with active optical properties of an organic compound.. | 5 minutes |
| 2. | Core Activities lecturer: a. Inform briefly about the TLC analysis b. Divide the class into 10 groups students: a. Noting the information from the lecturer b. Conducting experiments | 90 minutes |
| 3. | cover Message: do problems that exist in the user guide appropriate practicum practicum each event and make practical reports | 5 minutes |

**VIII. Tools and Learning Resources**

Worksheets experiments, equipment and lab materials, manuals Organic Chemistry II lab

**IX. Appraisal**

Assessment Sheet for Internship / Experiments in laboraorium

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Student name | The presence in conducting | Activeness in   conducting | Cooperation in carrying out activities |
| 1. |  |  |  |  |
| 2. |  |  |  |  |
| 3. |  |  |  |  |
| 4. |  |  |  |  |

**X. Solved**

1. Type of bill: the task of practical reports

2. Istrumen shape: a matter of description, spreadsheet

3. about

Determine the structure of the compound RS alanineCH3 – CHNH2 – COOH

4. Answers

The compound CH3 – CHNH2 – COOH group structure with one chiral C atom as follows:



R - S enantiomernya is:

