

# Tutorial Letter 101/3/2018

## General Chemistry 1B CHE1502

Semesters 1 and 2

Department Of Chemistry

This tutorial letter contains important information  
about your module.

BARCODE

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Dear Student

## 1 INTRODUCTION

We take great pleasure in welcoming you as a student of the module General Chemistry 1B. This module deals with introductory principles and fundamental aspects of Organic Chemistry. We trust that you will find this module both interesting and rewarding and that you will have a successful academic semester.

The CHE1502 module is a **semester module** that is offered during each of the January-June and July-December semesters.

**Check your registration papers now to make sure for which semester you have registered.** Call the lecturer if in doubt or check on myUnisa.

It is very important to start studying immediately and to do your assignments properly. This tutorial letter contains important information to facilitate your studies. Please read it carefully and keep it for future reference.

### 1.1 myUnisa

It is important that you have access to the internet. You can gain access to the university's online learning portal, **myUnisa**, at <http://my.unisa.ac.za>.

You must be registered on (<http://my.unisa.ac.za>) to be able to submit assignments online, complete the online assignment, gain access to the library functions and various learning resources, download study material, communicate with your lecturer and fellow students about your studies and the challenges you encounter, and participate in online discussion forums. myUnisa provides additional opportunities to take part in activities and discussions of relevance to your module topics, assignments, marks and examinations. It is important to access myUnisa on a regular basis.

### 1.2 Tutorial matter

***A TUTORIAL LETTER IS OUR WAY OF COMMUNICATING WITH YOU ABOUT TEACHING, LEARNING AND ASSESSMENT.***

You will receive a number of tutorial letters during the semester.

An "**INVENTORY FOR THE CURRENT ACADEMIC YEAR**", which lists the tutorial matter for the 2018 academic year, will be distributed to each student.

The Department of DESPATCH will provide students with the following:

- Tutorial Letter 101 for the CHE1502 module
- Study guide for the CHE1502 module
- Tutorial Letter 301
- The solutions to the assignments which will be sent out after the relevant closing dates.

Tutorial Letter 101 contains the assignments and assessment criteria as well as instructions on the preparation and submission of the assignments. Furthermore, it also provides all the information with regards to the resources and certain general and administrative information for this module. This tutorial letter should be consulted when working through the study material, preparing the assignment(s), preparing for the examination and addressing questions to your lecturer.

**Read all the tutorial letters** upon receipt during the semester **immediately and carefully**, as these always contain important and, sometimes, urgent information.

Additional tutorial letters will be forwarded to students during the semester, where applicable.

The system used for numbering tutorial letters is explained in the brochure: "*Study @ Unisa*", included in the study package.

Some of the tutorial matter may not be available when you register. Tutorial matter that is not available upon registration will be posted to you as soon as possible, but is also available on *myUnisa*.

**PLEASE NOTE: Your lecturers cannot help you with missing study material.**

You can view the study guides and tutorial letters for the modules for which you are registered on *myUnisa* (see 1.1. above). In general, solutions may also be available on this website sooner than you will receive them in the post. We therefore advise you to access the website from time to time if possible. Note that you need to register on *myUnisa*.

Take note that the brochure, "*Study @ Unisa*", which you have received with your study material, contains an A–Z guide of the most relevant study information.

## **2 PURPOSE AND OUTCOMES**

### **2.1 Purpose**

The purpose of the CHE1502 module is that you, after completing this module, should be able to explain and apply chemical bonding and introductory organic chemistry principles. These principles include chemical bonding, physical properties, introduction to stereochemistry and the nature and behaviour of hydrocarbons, hydrocarbon derivatives (alkyl halides, alcohols and ethers), amines and carbonyl compounds (aldehydes, ketones, carboxylic acids, acid halides, esters and amides).

## 2.2 Outcomes

The learning outcomes of the General Chemistry 1B module are to demonstrate an understanding of the terminology and basic aspects in introductory organic chemistry on topics such as fundamental concepts in organic chemistry; the structure, properties, nomenclature and reactions of alkanes, alkenes, alkynes, alkyl halides, alcohols and ethers and the structure, properties, nomenclature and behaviour of amines, aldehydes, ketones, carboxylic acids and carboxylic acid derivatives.

After completing this module, you should be able to:

- explain and apply the basic concepts related to molecules and ions to illustrate properties, behaviour and reactivity;
- apply the IUPAC nomenclature rules to all classes of compounds;
- explain and apply concepts, properties and chemical reactivity related to saturated hydrocarbons;
- formulate and describe the following:
  - physical and chemical properties of unsaturated hydrocarbons (alkenes and alkynes);
  - various structural and stereoisomers;
  - physical and chemical properties of alcohols and ethers, alkyl halides, and amines;
- describe the electronic structure, physical properties and reactivity of carbonyl and carboxyl compounds.

### Module Content.

(1) **Fundamental Concepts in Organic Chemistry:** Hybridization of carbon-  $sp^3$ ,  $sp^2$ ,  $sp$ ; Bond polarity, dipole moment; Intermolecular forces – London dispersion forces, van der Waals forces, Dipole-dipole interaction and Hydrogen bonding; Polarity effects on solubility; Bond formation and bond breakage - Electron flow of homolytic and heterolytic processes; Lewis Acids and bases; Lewis structures and formal charges; Resonance structures and delocalization; Understanding the definition of electrophiles, nucleophiles and free radicals.

(2) **Alkanes and cycloalkanes:** Structure and nomenclature; Physical properties; Reactions; Mechanism for the halogenation of alkanes; Structural isomers; Conformations (Newman and Sawhorse projections)

(3) **Alkyl Halides:** Structure and nomenclature; Physical properties; Classification as primary, secondary, or tertiary alkyl halides; Stereochemistry; 3-Dimensional representations of simple organic molecules, Chirality and R- and S-configurations; Selected nucleophilic substitution reactions; Selected elimination reactions

(4) **Alcohols:** Structure and nomenclature; Physical properties; Classification of alcohols as primary, secondary, or tertiary; Stereochemistry - 3-Dimensional representations of simple organic molecules, Chirality and R- and S-configurations; Selected Reactions of alcohols: Oxidation and the formation of alkyl halides, ethers and alkenes

- (5) **Ethers:** Structure and nomenclature; Physical and chemical properties
- (6) **Amines:** Nomenclature, Classification and structure; Properties; Reactivity / basicity
- (7) **Alkenes:** Structure and nomenclature; Physical properties; Geometric isomerism (cis/trans and E/Z configurations); Reactions and mechanisms of hydrohalogenation, acid catalyzed hydration and halogenation of symmetrical and unsymmetrical alkenes and the application of Markovnikov's rule; Mechanism of hydrohalogenation of unsymmetrical alkenes in the presence of peroxides (anti-Markovnikov's addition); Hydrogenation of alkenes.
- (8) **Alkynes:** Structure and nomenclature; Physical properties; Reactions and mechanisms of hydration, halogenation and hydrohalogenation of symmetrical and unsymmetrical alkynes (Markovnikov's rule); Hydrogenation of alkynes; Acidity / Reactivity of terminal alkynes.
- (9) **Carbonyl compounds and derivatives:** Structure and nomenclature of ketones and aldehydes; Properties and reactivity of ketones and aldehydes.
- (10) **Carboxylic acids and derivatives:** Structure and nomenclature carboxylic acids and carboxylic acid derivatives (esters and amides); Properties and reactivity of carboxylic acids and carboxylic acid derivatives.

### 3 LECTURER(S) AND CONTACT DETAILS

#### 3.1 Lecturer(s)

The name and contact details of the staff member responsible for tuition of the CHE1502 module are:

<b>Name:</b>	<b>Professor C A Summers</b>
Office:	K-M 032 Eureka Building, Florida Campus
E-mail address:	<a href="mailto:summeca@unisa.ac.za">summeca@unisa.ac.za</a>
Telephone number:	(011) 670 9306 / (012) 429 8555

All queries related to the content of this module should be directed to your lecturer. E-mail is the preferred form of communication to use. Students who encounter any difficulties with the content associated with the CHE1502 module should not hesitate to contact the lecturer concerned by **letter, telephone or personal visit (please make sure that your lecturer is free to help you by making an appointment well before the time)**. You may select to meet your lecturer on the Pretoria campus or the Florida campus. Please have your study material with you when you contact the lecturer.

Please come to these appointments well prepared with specific questions that indicate your own efforts to have understood the basic concepts involved. **Student numbers should always be stated on any communication.**

You are also free to write to your lecturer about any of the difficulties you encounter with your work for this module. If these difficulties concern exercises, which you are unable to solve, you must send your attempts to your lecturer who will provide feedback.

Mail should be sent to:

Prof. CA Summers Department of Chemistry Private Bag X 6 Unisa (Florida Campus) Florida, 1710 South Africa  or E-mail: <a href="mailto:summecca@unisa.ac.za">summecca@unisa.ac.za</a>
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**PLEASE NOTE: Letters to lecturers may not be enclosed with or inserted into the assignments.**

Enquiries relating to **academic studies** e.g. **assignment marks, discussion classes** and **tutoring** should also be directed to **the lecturer** responsible for this module.

### 3.2 Department

In the event that the lecturer is not available contact the department secretarial staff at:

Department of Chemistry  
Corner of Christiaan de Wet & Pioneer Avenue  
Eureka Building  
Florida  
1709

**Office:** K-M-042

**Telephone:** (011) 670 9318 / 9327

**E-mail:** [chemistry@unisa.ac.za](mailto:chemistry@unisa.ac.za)

N.B. You should **CONTACT YOUR LECTURER FIRST BEFORE** consulting another person/office. Unisa is dedicated to service. Students are advised to resend their queries to the respective lecturers and then carbon copy the Secretary of Department ([chemistry@unisa.ac.za](mailto:chemistry@unisa.ac.za)) on queries that are not addressed by the lecturers within 3 working days.

### 3.3 University

If you need to contact the University about matters not related to the content of this module, please consult the brochure, “*Study @ Unisa*”, which you received with your study material.

This booklet contains information on how to contact the University (e.g. to whom you can write for different queries, important telephone and fax numbers, addresses and details of the times certain facilities are open). **Student numbers** should always be used when contacting the University.

General questions regarding registration may be directed to:

e-mail: [Scientia@unisa.ac.za](mailto:Scientia@unisa.ac.za)

tel: 012 441 5407  
11 1 3037

## 4 RESOURCES

### 4.1 Prescribed books

**READ THIS ENTIRE SECTION CAREFULLY BEFORE BUYING THE PRESCRIBED BOOK**

The **prescribed book** for **CHE1502** module:

**Organic Chemistry Plus *MasteringChemistry with Pearson eText* (Paperback) Global Edition, 9 Edition by Leroy G. Wade, Jr.; Jan William Simek, Pearson Education Ltd.**

ISBN-13: **9781292151229**

**N.B. DO NOT BUY A TEXTBOOK WITHOUT the ACCESS CODE** for the ***MasteringChemistry*® site** (See **Tutorial letter 102** for **further details regarding the *MasteringChemistry*® access**).

The **global edition / ninth edition e-book** can also be accessed on the *MasteringChemistry*® site. You can either obtain the access code for the *MasteringChemistry*® site

- with the **PURCHASE OF A COPY OF THE TEXTBOOK**

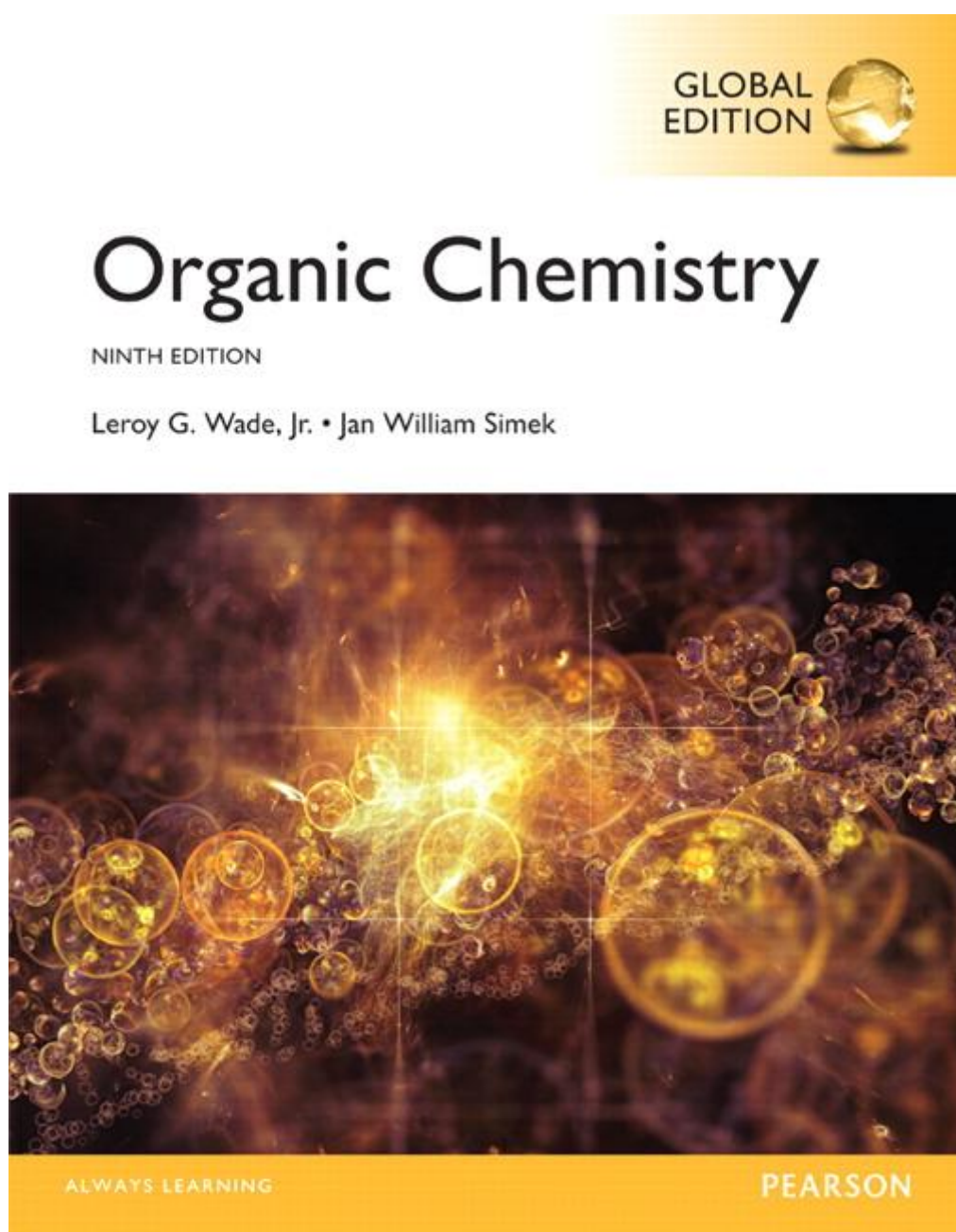
OR



- you **MAY BUY THE ACCESS CODE AT A CHEAPER PRICE BY CONTACTING PEARSON DIRECTLY.** The **ACCESS CODE** will also give you **ACCESS TO THE E-BOOK** (which can be accessed online).

The details for purchasing the access code can be found in Tutorial letter 102.

**Cover page of the textbook:**



Prescribed books can be obtained from the University's official booksellers. The **list of official booksellers and their addresses** can be found in the “*Study @ Unisa*” brochure. If you have difficulty locating your book(s) at these booksellers, please contact the **Prescribed Books Section** at 012 429 4152 or e-mail [vospresc@unisa.ac.za](mailto:vospresc@unisa.ac.za).

#### 4.2 Recommended books

Students may consult any textbook titled, **Organic Chemistry**.

#### 4.3 Electronic reserves (e-reserves)

There are no electronic reserves for this module.

#### 4.4 Library services and resources information

For brief information, go to [www.unisa.ac.za/brochures/studies](http://www.unisa.ac.za/brochures/studies)

For detailed information, go to <http://www.unisa.ac.za/library>. For research support and services of personal librarians, click on "Research support".

The library has compiled a number of library guides:

- finding recommended reading in the print collection and e-reserves – <http://libguides.unisa.ac.za/request/undergrad>
- requesting material – <http://libguides.unisa.ac.za/request/request>
- postgraduate information services – <http://libguides.unisa.ac.za/request/postgrad>
- finding, obtaining and using library resources and tools to assist in doing research – [http://libguides.unisa.ac.za/Research\\_Skills](http://libguides.unisa.ac.za/Research_Skills)
- how to contact the library/finding us on social media/frequently asked questions – <http://libguides.unisa.ac.za/ask>

## 5 STUDENT SUPPORT SERVICES

### 5.1 General support

For information on the various student support systems and services available at Unisa (e.g. student counseling, tutorial classes, language support), please consult the “*Study @ Unisa*” brochure.

### 5.2 E-Tutors

Please be informed that Unisa offers online tutorials (e-tutoring) free of charge to students registered for modules at NQF level 5 and 6, in other words, for qualifying first year and second year modules.

The University approved the Integrated Tutor Model (ITM) as a strategy for providing students with the support required for success and for enhancing their learning experience. Through this initiative, an e-tutor will be assigned to each student and activities with the e-tutor take place via the e-tutor link on the myUnisa site of this module.

There are modules which students have been found to repeatedly fail, these modules are allocated face-to-face tutors and tutorials for these modules take place at the Unisa regional centres. These tutorials are also offered free of charge, however, it is important for you to register at your nearest Unisa Regional Centre to secure attendance of these classes. Consult the the brochure, “*Study @ Unisa*” for more information.

### 5.3 myUnisa

The myUnisa system is Unisa’s online campus that will help you communicate with other students, your lecturers and the administrative departments of the University. You can quickly access resources and information at the University on the internet.

To go to the myUnisa website, start at the main Unisa website, <http://www.unisa.ac.za> and then click on the ‘Login to myUnisa’ link on the right-hand side of the screen. This should take you to the myUnisa website. You can also access myUnisa directly by typing in <http://my.unisa.ac.za>

You don’t need to have internet at home to use myUnisa. You can use the computers free of charge at Unisa regional offices. You could even sign up for the e-mail alerts and have them routed to your cellphone, though if you are capable of that, you probably have Internet access already.

On myUnisa, you will see two sites:

#### Semester 1

- The semester 1 main teaching site with the code **CHE1502-18-S1**
- The tutoring site with the code **CHE1502-18-S1-[Group Number]S**.

#### Semester 2

- The semester 2 main teaching site with the code **CHE1502-18-S2**
- The tutoring site with the code **CHE1502-18-S2-[Group Number]S**.

The main teaching site contains the study material for the module. The lecturer will also use this site to communicate various learning activities during the year. The tutorial site is hosted by your e-tutor and contains the tutorials and online assignments.

**The module CHE1502 has an active discussion forum on myUnisa.** Many resources are made available throughout the year, and these are not necessarily posted to students but can be found under the ‘Additional Resources’ link on the course site. We have found that students who use myUNISA regularly for this module perform much better than those who do not.

We recommend that you check in at myUnisa regularly for correction of the study material, discussions, additional tasks, announcements and new resources.

## 5.4 Study Groups

Students are advised to form study groups with fellow students to discuss the content of the CHE1502 module as well as study and work together in preparation for the assignments and the examinations but each student should compile his or her own assignment answers.

## 5.5 Discussion Classes, Video Conference and Satellite Broadcast Sessions

The Department of Chemistry **may** schedule discussion classes, video conference and satellite broadcast sessions for the CHE1502 module during the 2018 academic year. Information about the dates, times and venues of the discussion classes, video conference and satellite broadcast sessions will be forwarded to each student in a separate tutorial letter / via myUnisa and sms.

# 6 STUDY PLAN

Consult your “*Study @ Unisa*” brochure for suggestions about general time management and planning skills.

This is a semester module offered over about 15 weeks, and requires at least 120 hours of study time. This means that you will have to study at least 8 hours per week for this module.

The use of molecular models is permissible (see paragraph 10 below). Molecular models are physical models that represent the orientation of and connectivity in molecules. These are useful tools for a better understanding of Organic Chemistry. Models show the nature and characteristics of the chemical bond linking atoms and are particularly useful to understand stereochemistry.

The Unisa Library has a limited number of molecular model sets available – consult the brochure, “*Study @ Unisa*”, for information on how to access the Library resources.

We may add additional information to assist you in your studies on the myUnisa website. Consult the *myUnisa* site for this module and look under ‘Resources’.

You will be well on your way to success if you start studying early in the semester and resolve to do the assignment(s) properly before the specific dates below:

### Semester 1

Assignment	Broad Textbook Reference	Due date
01	<b>Chapter 1:</b> Structure and Bonding <b>Chapter 2:</b> Acids, Bases, Functional Groups <b>Chapter 3:</b> Structure and Stereochemistry of Alkanes <b>Chapter 4:</b> Study of Chemical Reactions	19 February 2018

02	<b>Chapter 5:</b> Stereochemistry <b>Chapter 6:</b> Alkyl Halides Nucleophilic Substitution <b>Chapter 7:</b> Dehydrohalogenation	9 March 2018
03	<b>Chapter 10:</b> Structure and Synthesis of Alcohols <b>Chapter 11:</b> Reactions of Alcohols <b>Chapter 14:</b> Ethers <b>Chapter 19:</b> Amines <b>Chapter 7:</b> Structure and Synthesis of Alkenes	3 April 2018
04	<b>Chapter 8:</b> Reactions of Alkenes <b>Chapter 9:</b> Alkynes <b>Wade Chapter 18:</b> Ketones and Aldehydes <b>Wade Chapter 20:</b> Carboxylic Acids <b>Wade Chapter 21:</b> Carboxylic Acid Derivatives	26 April 2018
05	Sections listed for Assignments 1 to 4.	Ongoing Self-Assessment – DO NOT SUBMIT

## Semester 2

Assignment		Due date
01	<b>Chapter 1:</b> Structure and Bonding <b>Chapter 2:</b> Acids, Bases, Functional Groups <b>Chapter 3:</b> Structure and Stereochemistry of Alkanes <b>Chapter 4:</b> Study of Chemical Reactions	27 July 2018
02	<b>Chapter 5:</b> Stereochemistry <b>Chapter 6:</b> Alkyl Halides Nucleophilic Substitution	20 August 2018

	<b>Chapter 7: Dehydrohalogenation</b>	
03	<b>Chapter 10: Structure and Synthesis of Alcohols</b>  <b>Chapter 11: Reactions of Alcohols</b>  <b>Chapter 14: Ethers</b>  <b>Chapter 19: Amines</b>  <b>Chapter 7: Structure and Synthesis of Alkenes</b>	17 September 2018
04	<b>Chapter 8: Reactions of Alkenes</b>  <b>Chapter 9: Alkynes</b>  <b>Wade Chapter 18: Ketones and Aldehydes</b>  <b>Wade Chapter 20: Carboxylic Acids</b>  <b>Wade Chapter 21: Carboxylic Acid Derivatives</b>	5 October 2018
05	Sections listed for Assignments 1 to 4.	Ongoing Self-Assessment – DO NOT SUBMIT

**A detailed study plan is provided in Tutorial letter 102.**

However, these objectives will be defeated if you do not study the relevant sections in the study resources prior to attempting the assignment and instead just page through the textbook until you find something similar and just write it down. These objectives will also be defeated if you copy from someone else or get someone else to do the assignment for you. You may seek assistance from others or discuss your studies with other students but thereafter each student must do his/her own assignment. Do not hesitate to contact the lecturer concerned if you have any problems.

## **7 PRACTICAL WORK AND WORK-INTEGRATED LEARNING**

There are **no practicals and work-integrated learning requirements** for this module.

## **8 ASSESSMENT**

The setting of assignment questions by UNISA staff and the completion of assignments by students form essential components of the tuition functions of the Open and Distance Learning (ODL) model of education at UNISA. **Students are instructed to study the relevant sections of the work outlined in the prescribed textbook and study guide before completion of the assignment questions.**

## 8.1 Assessment criteria

Within a given semester:

You need a **final mark of 50%** in order **to pass** the subject with a **subminimum of 40% on your examination mark**.

The **year mark** and the **examination mark** will contribute towards your final mark as follows:

Type of assessment	Contribution to the final mark
<b>Formative: Year Mark</b> (Assignments)	20%
<b>Summative: Examination Mark</b> (The final exam)	80%
<b>Final mark</b>	<b>100%</b>

The **Year Mark for the CHE1502 module** is calculated as follows:

**20%** of the **marks** obtained for the **assignment 1 plus**

**20%** of the **marks** obtained for the **assignment 2 plus**

**30%** of the **marks** obtained for the **assignment 3 plus**

**30%** of the **marks** obtained for the **assignment 4**.

$$\text{Year Mark} = (0.2 \times \text{Assignment 1 Mark}) + (0.2 \times \text{Assignment 2 Mark}) + (0.3 \times \text{Assignment 3 Mark}) + (0.3 \times \text{Assignment 4 Mark})$$

A mark of zero will be allocated for assignments not submitted by the student.

**NB.** If a student obtains **40% or LESS THAN 40% IN THE EXAMINATION**, then the **YEAR MARK IS NOT TAKEN INTO ACCOUNT** when the **FINAL MARK IS CALCULATED** i.e. the **EXAMINATION MARK** counts **100%** towards your **FINAL MARK**.

### Admission to the Examinations

Please note that **LECTURERS** are **NOT RESPONSIBLE** for **EXAMINATION ADMISSION**.

**Assignment 1 is a compulsory assignment** and each student registered for the CHE1502 module **MUST SUBMIT THIS ASSIGNMENT.**

**Students who are REPEATING THE MODULE must also submit ASSIGNMENT 1.**

## 8.2 Assessment plan

### Semester 1

Assignment	Due date	Weight	Type of Assignment	Remarks
01	19 February 2018	20%	MCQ	Compulsory
02	9 March 2018	20%	Online	Important.
03	3 April 2018	30%	MCQ	Important.
04	26 April 2018	30%	Online	Important

If you are **registered for semester 1** you will write your **final examination in May/June 2018** and qualify for this by **completing and submitting the assignments for semester 1.**

### Semester 2

Assignment	Due date	Weight	Type of Assignment	Remarks
01	27 July 2018	20%	MCQ	Compulsory
02	20 August 2018	20%	Online	Important.
03	17 September 2018	30%	MCQ	Important.
04	5 October 2018	30%	Online	Important

If you are **registered for semester 2** you will write your **final examination in October/November 2018** and qualify for this by **completing and submitting the assignments for semester 2.**

Corrected assignments will not be returned to students. Therefore, it is advisable to make a copy of the completed assignment mark reading sheet before submitting it. A Tutorial letter containing the answers to the assignment will be posted to all students registered for this module after each assignment has been marked. The tutorial letter number will be 201, 202, etc.

## 8.3 Assignment numbers

### 8.3.1 General assignment numbers

Assignments are numbered consecutively per module, starting from 01.



### 8.3.2 Unique assignment numbers

The **unique number** linked to a specific assignment with multiple choice questions must be entered on the optical mark reading sheet or the cover assignment page when the assignments are completed by each student. The unique number for each assignment is given in 8.4 below.

### 8.4 Assignment due dates

The due dates for the assignments for the CHE1502 module are:

#### SEMESTER 1: January-June 2018:

Assignment No.	1	2	3	4
Type	Multiple choice	Online	Multiple choice	Online
Unique Number	<b>825566</b>	<b>678749</b>	<b>698697</b>	<b>851681</b>
Due date	<b>19 February 2018</b>	<b>9 March 2018</b>	<b>3 April 2018</b>	<b>26 April 2018</b>

#### SEMESTER 2: July-December 2018:

Assignment No.	1	2	3	4
Type	Multiple choice	Online	Multiple choice	Online
Unique Number	<b>739733</b>	<b>684669</b>	<b>767695</b>	<b>889243</b>
Due date	<b>27 July 2018</b>	<b>20 August 2018</b>	<b>17 September 2018</b>	<b>5 October 2018</b>

#### Remember:

- Assignment 01 is compulsory and counts towards your year mark.
- Assignment 02 is not compulsory, but is important and counts towards your year mark.
- Assignment 03 is not compulsory, but is important and counts towards your year mark.
- Assignment 04 is not compulsory, but is important and counts towards your year mark.

**THE CLOSING DATES FOR THE ASSIGNMENTS ARE FIXED** - No extensions will be granted since the assignments carry a year mark, and the solutions to the assignments are posted immediately after the closing dates. Assignments reaching us after the closing dates will contribute 0% towards the year-mark.

## 8.5 Submission of assignments

The format of the CHE1502 assignments involves **multiple choice questions, written questions and online questions (via *MasteringChemistry*®)**. There are **two multiple choice assignments, two assignments containing online questions and one assignment containing written questions per semester** for the CHE1502 module.

The format of the CHE1502 assignments:

- **Multiple choice questions (Assignments 1 and 3)**. Each question in the multiple choice assignment is allocated one mark. The answers to the multiple choice questions must be entered on **optical mark reading sheets** which are provided as part of the study material.
- **The online assignments** must be done on the ***MasteringChemistry*® website (Assignments 2 and 4)**
- **Assignment 5** contain **written questions that** must be done as a **self-assessment** assignment i.e. the assignment **MUST NOT BE SUBMITTED** to Unisa.

Completed multiple choice assignments can be submitted via the **postal service** to the formal university address **or Mobile MCQ** submission **or** electronically via **myUnisa** learning management system of UNISA.

**Completed assignments must reach the University on or before the due dates.** A mark of zero will be allocated for assignments submitted by the student after the due date for submission of assignments.

**Please make a copy of your assignment before you submit!**

Details for the completion and submission of assignments are given in the brochure: “*Study @ Unisa*”, included in the study package. There are two options for submission of assignments:

- 1) **Assignments by post.** Make sure that you complete the assignment cover. If the subject or assignment number is incorrect your assignment cannot be registered as received. Each assignment must have a separate cover with its unique number. Submit one assignment per envelope. All regional offices have Unisa post boxes. Only use the SA postal services if you cannot get to a regional office.

Assignments should be addressed to: The Registrar, PO Box 392, UNISA, 0003

2) Submit via **myUnisa**. You can **scan your optical mark reading sheet** to be submitted electronically. **Don't scan the assignment cover** as the **system will create a cover** for you when you upload the assignment. Your assignment must be combined in one document. **Only one document can be uploaded per assignment.**

**Steps for submission of an assignment via myUnisa:**

- **Go to myUnisa.**
- **Log in** with your **student number** and **password**.
- **Select the module code.**
- **Click on assignments** in the **menu on the left-hand side of the screen.**
- **Click on the assignment number** you wish to **submit.**
- **Follow the instructions.**

**Plagiarism:**

**Please note: Although students may work together when preparing for the assignments, each student must write and submit his or her own individual assignment. In other words, each student must submit his/her own ideas in their own words. It is unacceptable for students to submit identical assignments on the basis that they worked together. That is copying (a form of plagiarism) and these assignments will NOT be marked. Furthermore, you may be penalised or subjected to disciplinary proceedings by the University.**

## 8.6 The assignments

### FIRST SEMESTER ASSIGNMENTS

- You are not required to memorize the actual **values of specific properties** of compounds.
- Questions which involve the **comparison of physical properties** such as boiling point, melting point, solubility etc. or the **comparison of chemical properties** such as **acidity, basicity, etc. do not require the knowledge of the actual values** related to these properties. You have to USE FACTORS such as **chemical structure, bonding, steric factors, etc. to predict trends in the property or compare properties – DO NOT USE ACTUAL VALUES THAT CAN BE FOUND IN TABLES IN THE TEXTBOOK.**

#### ONLY FOR SEMESTER 1 STUDENTS

#### ASSIGNMENT 1

**DUE DATE: 19 February 2018**

**UNIQUE NUMBER: 825566**

This assignment is a multiple choice assignment.

Please note that it is compulsory to submit this assignment. No late submissions will be accepted.

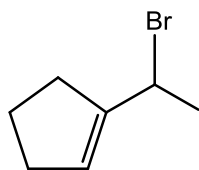
This assignment contributes 20% to your year mark.

#### QUESTIONS

The multiple choice questions have four possible answers. In each case, provide only **ONE** answer to each question. Answer **ALL** questions.

**Fundamental Concepts in Organic Chemistry:** Hybridization of carbon-  $sp^3$ ,  $sp^2$ ,  $sp$ ; Bond polarity, dipole moment; Intermolecular forces – London dispersion forces, van der Waals forces, Dipole-dipole interaction and Hydrogen bonding; Polarity effects on solubility; Bond formation and bond breakage - Electron flow of homolytic and heterolytic processes; Lewis Acids and bases; Lewis structures and formal charges; Resonance structures and delocalization; Understanding the definition of electrophiles, nucleophiles and free radicals.

1. Based on the structure of the following compound, which statement is INCORRECT?



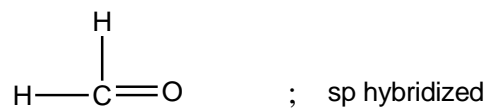
- (1) It contains a  $\sigma$  molecular orbital formed by the overlap of two carbon  $sp^3$  hybrid orbitals.
- (2) It contains a  $\pi$  molecular orbital formed by the overlap of two carbon p atomic orbitals.
- (3) It contains a  $\sigma$  molecular orbital formed by the overlap of one carbon  $sp^2$  hybrid orbitals and one hydrogen  $sp^3$  hybrid orbital.
- (4) It contains a polar bond.
2. What type of bonding is most important in the following compound?



- (1) polar covalent
- (2) non-polar covalent
- (3) ionic
- (4) hydrogen

3. Which of the following represent the CORRECT hybridization state of the CARBON atoms in the structures shown below?

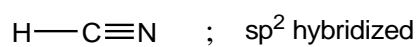
(1)



(2)



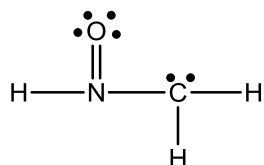
(3)



(4)



4. In the structure below, the NON-ZERO formal charges are



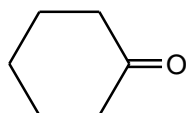
- (1) +1 on N and -1 on O
- (2) -1 on N and +1 on C
- (3) -1 on N and +1 on O
- (4) +1 on N and -1 on C

5. Which of the following compounds CANNOT function as an electron pair acceptor?

(1)  $\text{CH}_3\text{OH}$

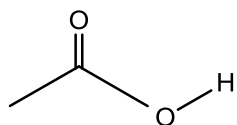
(2)  $\text{BH}_3$

(3)



(4)  $\text{NH}_3$

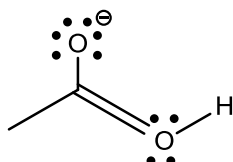
Use the structure of the following compound to answer questions 6 and 7 below



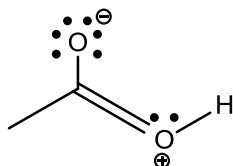
You have to use the correct Lewis structure to answer the questions.

6. Which structure represents a correct resonance form of the given structure

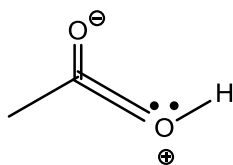
(1)



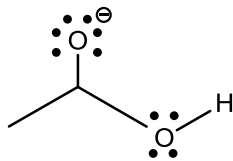
(2)



(3)



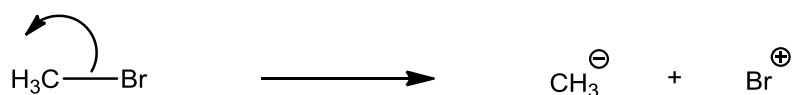
(4)



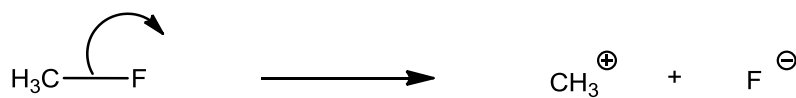
7. Based on the structure of the given compound, which statement is CORRECT?
- (1) the carbon–oxygen bond is polar
  - (2) there are no non-bonding electron pairs on oxygen
  - (3) the sigma bond of the carbonyl group is formed from the overlap of a  $sp^3$  hybrid atomic orbital of carbon and a  $sp^2$  hybrid atomic orbital of oxygen
  - (4) the O-H bond is non-polar

8. Which of the following reactions is a CORRECT example of homolysis?

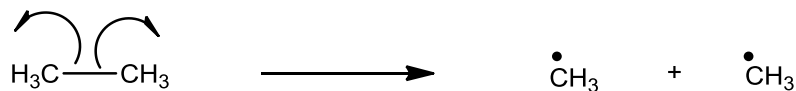
(1)



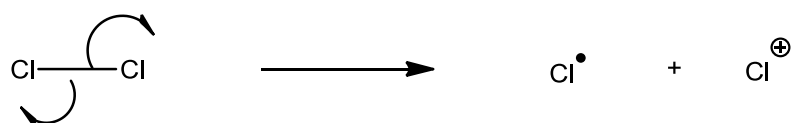
(2)



(3)



(4)



9. Arrange the following in order of increasing Bronsted basicity (weakest first):

1.  $\text{NH}_3$       2.  $\text{OH}^-$       3.  $\text{Cl}^-$       4.  $\text{H}_2\text{O}$

(1) 1 < 2 < 3 < 4

(2) 4 < 1 < 3 < 2

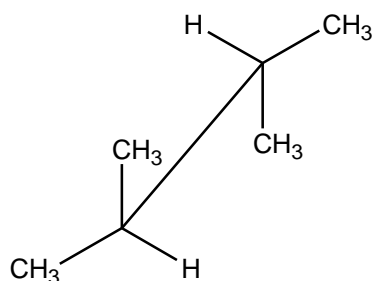


(3)  $3 < 4 < 1 < 2$ (4)  $4 < 1 < 2 < 3$ 

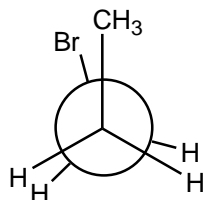
**Alkanes and cycloalkanes:** Structure and nomenclature; Physical properties; Reactions; Mechanism for the halogenation of alkanes; Structural isomers; Conformations (Newman and Sawhorse projections)

10. Which of the following structures represents an ECLIPSED conformation?

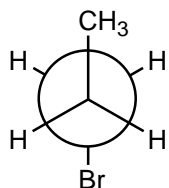
(1)



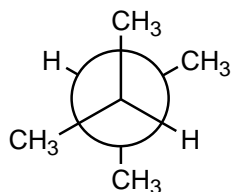
(2)



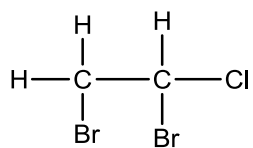
(3)



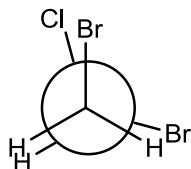
(4)



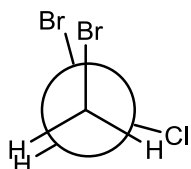
11. Which of the following Newman projections represent the MOST stable conformation of the compound below?



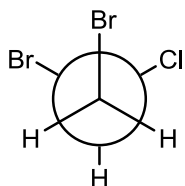
(1)



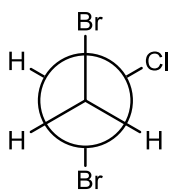
(2)



(3)



(4)

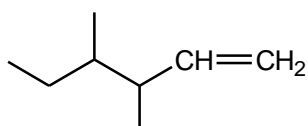


12. Which of the following pairs of structures represent constitutional isomers?

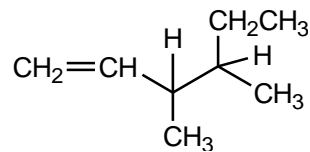
(1)



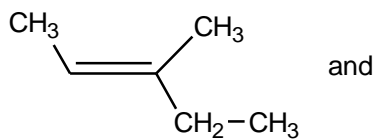
(2)



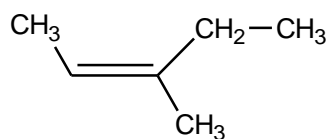
and



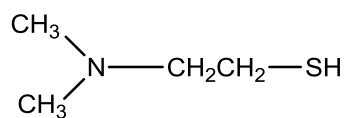
(3)



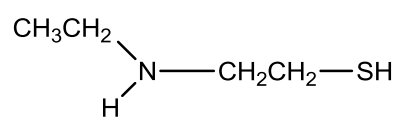
and



(4)

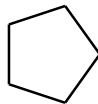


and

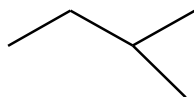


13. Which of the following molecules has the MOST secondary ( $2^\circ$ ) hydrogens?

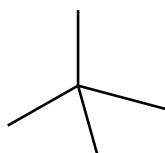
(1)



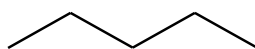
(2)



(3)

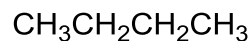


(4)

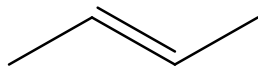


14. Which of the following is NOT a structural formula of the compound with molecular formula  $C_4H_{10}$ ?

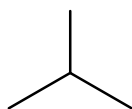
(1)



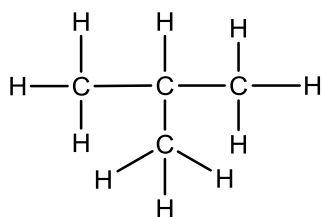
(2)



(3)



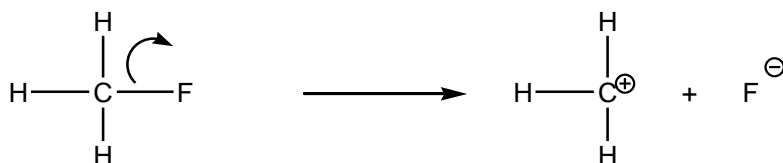
(4)



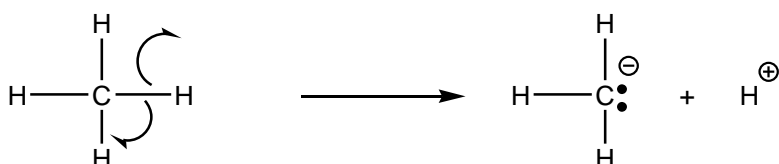
**The Study of Chemical Reactions:** Bond Dissociation, Free radical Chain Reaction Mechanism in the Halogenation of alkanes, Reactive Intermediates and factors influencing their stabilities

15. Identify the CORRECT process of bond breaking below:

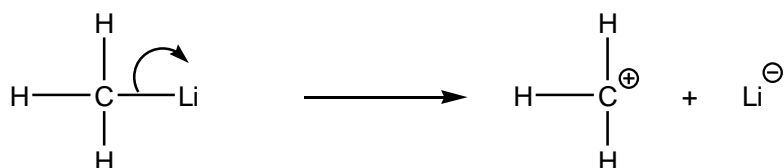
(1)



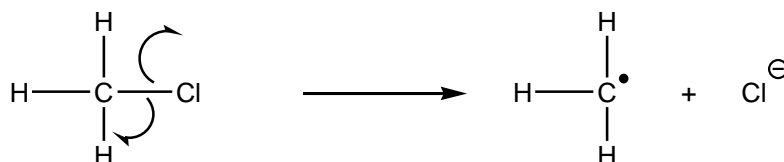
(2)



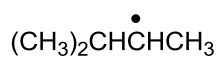
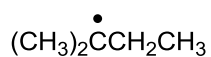
(3)



(4)

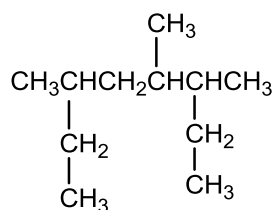


16. Rank the following radicals in order of INCREASING stability (from least stable to most stable):

**A****B****C**

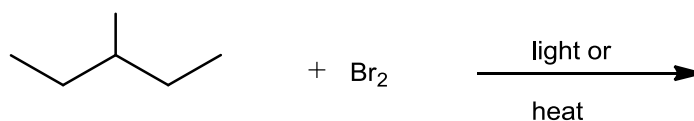
- (1) C < A < B  
 (2) A < B < C  
 (3) B < C < A  
 (4) B < A < C

17. Name the following compound according to the IUPAC rules.



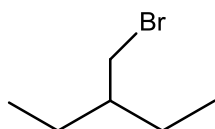
- (1) 2,5-diethyl-2-methylhexane  
 (2) 2-ethyl-3,5-dimethylheptane  
 (3) 3,5,6-trimethyloctane  
 (4) 3,4,6-trimethyloctane

Use the following reaction equation to answer questions **18** and **19** below:

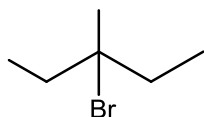


18. What is the MAJOR monobrominated product formed in the following reaction?

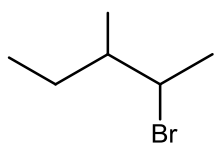
(1)



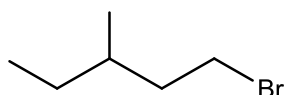
(2)



(3)



(4)

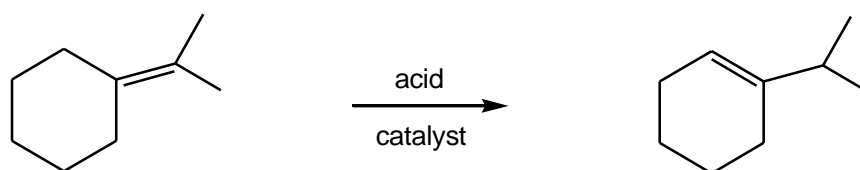


19. The reaction produces the major reaction product because

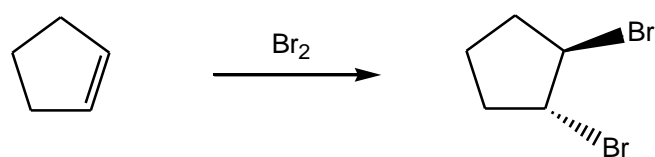
- (1) tertiary carbon free radicals have a higher stability than secondary carbon free radicals and are more readily formed
- (2) secondary carbon free radicals have a higher stability than primary carbon free radicals
- (3) the alkane does not easily form free radicals
- (4) bromine forms reactive free radicals.

20. Identify the substitution reaction below:

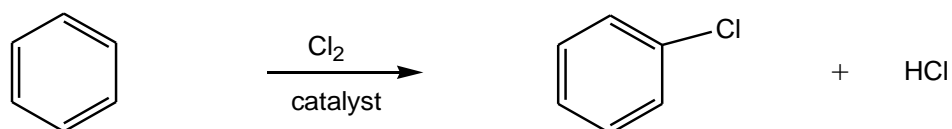
(1)



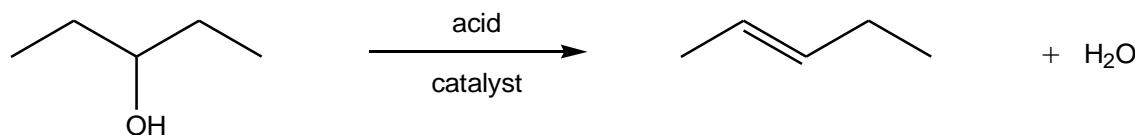
(2)



(3)



(4)



**TOTAL [20]**

## **ONLY FOR SEMESTER 1 STUDENTS**

### **ASSIGNMENT 2**

**Due Date: 9 MARCH 2018**

**Unique number: 678749**

The assignment consists of two parts:

**Consists of online tasks based on Section 6.2.**

Please note that it is important to complete this assignment.

This assignment contributes 20% to your year mark.

**The assignment must be completed online on the MasteringChemistry® site.**

#### **IMPORTANT:**

You will need two codes to access the MasteringChemistry® site and to do the assignment, namely:

- 1) To **access the MasteringChemistry® site**, you must use the **access code** that was included in the textbook package or that you bought directly from Pearson.
- 2) Once you **have the access code** and **have finished registering for the MasteringChemistry® site linked to the textbook** or already have access to MasteringChemistry®, then, you need to **locate the course by entering the course code:**

**CHE1502S12018**

Any changes to the above will be announced on myUnisa, so it is important to check for announcements regularly. Once the due date for assignment 2 has passed, your mark on MasteringChemistry® will be automatically transferred to the Unisa assignment system.

You may complete the online tasks at your own pace, provided that you have completed **all tasks by the due date**. Your final mark for assignment 2 will be determined by your performance on the tasks that you have done on MasteringChemistry®.

**THE DETAILS OF THIS ASSIGNMENT CAN BE FOUND ON myUnisa. (Go to the CHE1502 announcements) IF YOU HAVE ANY QUESTIONS REGARDING THIS ASSIGNMENT, PLEASE POST YOUR QUESTIONS ON THE myUnisa CHE1502 DISCUSSION FORUM IN THE FORUM CALLED ASSIGNMENT 2.**



**Topics covered:**

**Stereochemistry:** 3-Dimensional representations of simple organic molecules, Chirality and R- and S-configurations.

**Alkyl Halides:** Structure and nomenclature; Physical properties; Classification as primary, secondary, or tertiary alkyl halides; Selected nucleophilic substitution reactions and Selected elimination reactions

**ONLY FOR SEMESTER 1 STUDENTS**  
**ASSIGNMENT 3**

**Due Date: 3 April 2018**

**Unique number: 698697**

This assignment is a multiple choice assignment based on section 6.3.

Please note that it is important to return this assignment. No late submissions will be accepted.

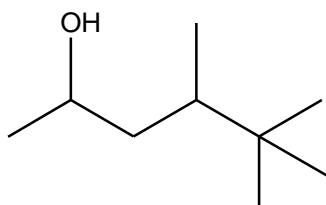
This assignment contributes 30% to your year mark.

**QUESTIONS**

The multiple choice questions have four possible answers. In each case, provide only **ONE** answer to each question. Answer **ALL** questions

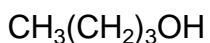
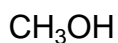
**Alcohols:** Structure and nomenclature; Physical properties; Classification of alcohols as primary, secondary, or tertiary; Stereochemistry - 3-Dimensional representations of simple organic molecules, Chirality and R- and S-configurations; Selected Reactions of alcohols: oxidation and the formation of alkyl halides, ethers and alkenes

1. What is the IUPAC name of the molecule shown below?



- (1) 2,2,3-trimethylhexan-5-ol  
 (2) 4,5,5-trimethylhexan-2-ol  
 (3) 1,1,1,2-tetramethylpentan-4-ol  
 (4) 4,5,5,5-tetramethylpentan-2-ol

2. Arrange the following alcohols in order of increasing solubility in water (from lowest to highest solubility):



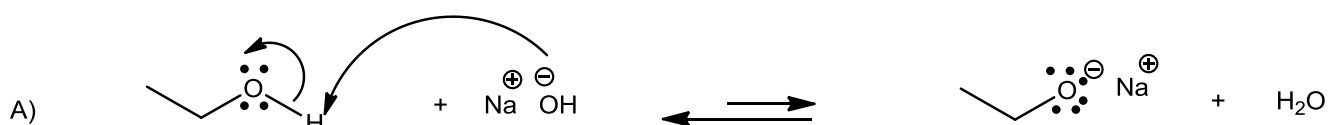
**A**

**B**

**C**

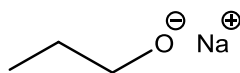
- (1) B < C < A
- (2) A < B < C
- (3) B < A < C
- (4) C < A < B

3. Consider the reactions below:

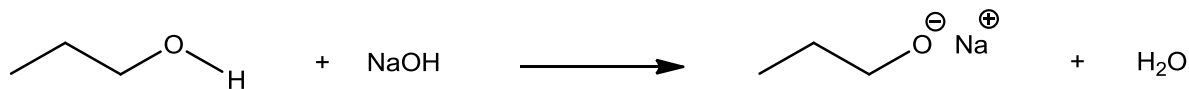


Which of the following statement is INCORRECT?

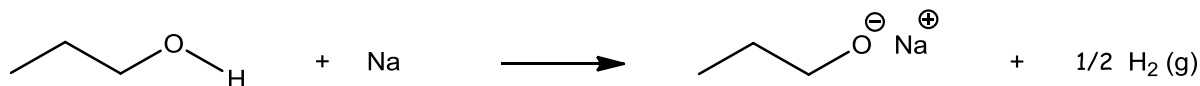
- (1) The alkoxide formed in reaction B is more stable than the alkoxide formed in reaction A.
  - (2) The bromine atom stabilizes the ion formed in reaction B.
  - (3) The alcohol in reaction A is a weaker acid than the alcohol in reaction B.
  - (4) Reaction A takes place faster than reaction B.
4. Which reaction represents the best method to prepare the alkoxide below?



(1)



(2)



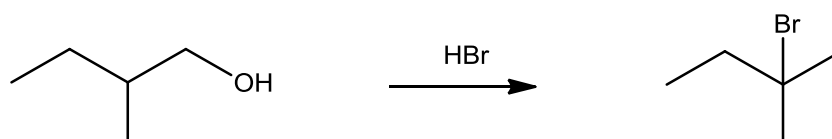
(3)



(4)

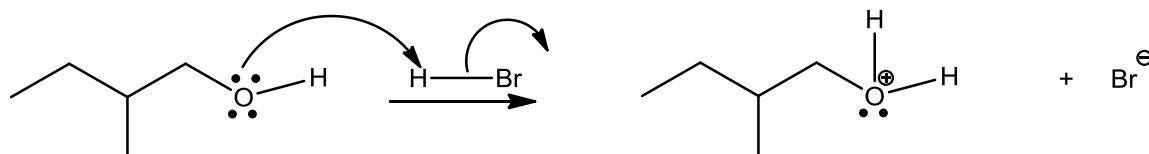


5. Consider the following reaction:

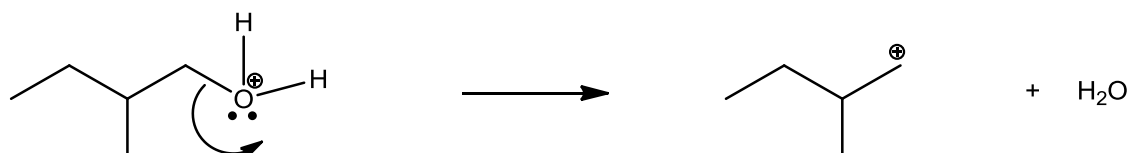


Which step is LEAST LIKELY to occur in the reaction mechanism?

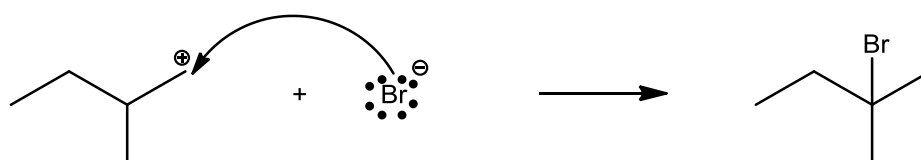
(1)



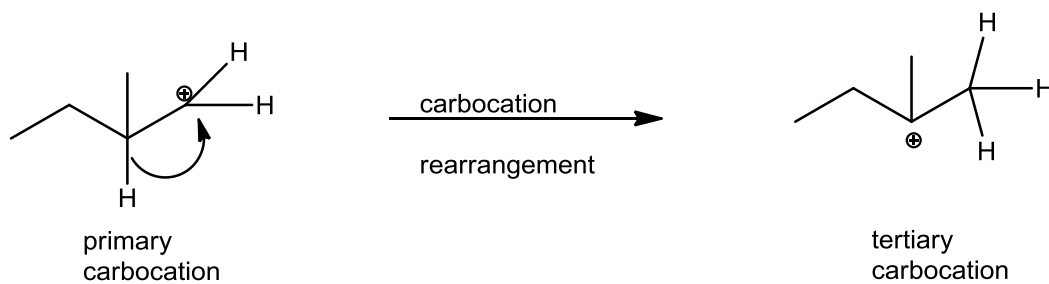
(2)



(3)

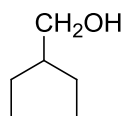


(4)

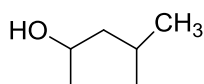


6. Which of the following alcohols will produce a carboxylic acid in a reaction with chromic acid?

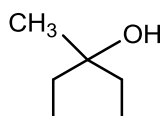
(1)



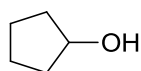
(2)



(3)

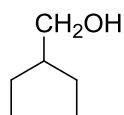


(4)

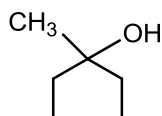


7. Alcohols undergo dehydration when heated in the presence of a strong acid. Which of the following alcohols undergoes dehydration at the FASTEST rate?

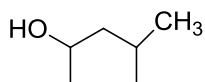
(1)



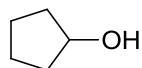
(2)



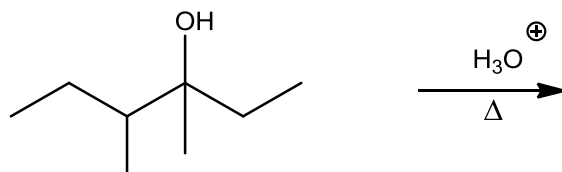
(3)



(4)

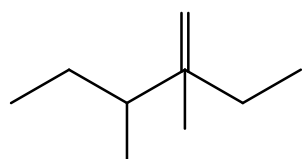


Use the following reaction equation to answer questions **8** and **9** below.

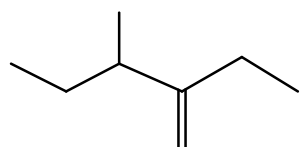


8. The MAJOR product formed in the reaction is:

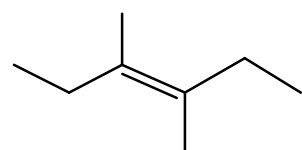
(1)



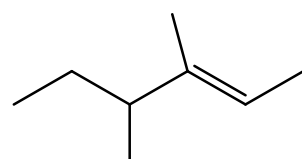
(2)



(3)



(4)

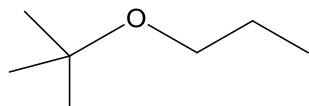


9. The product selected in 8 is in accordance to

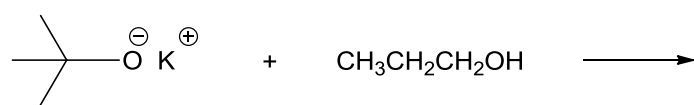
- (1) Hund's rule
- (2) The octet rule
- (3) Markovnikov's rule
- (4) Zaitzev's rule

**Ethers:** Structure and nomenclature; Physical and chemical properties

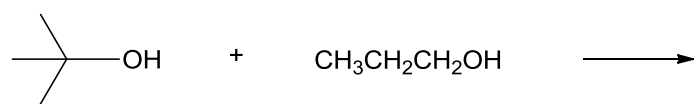
10. What is the correct structure of 3-ethoxybutan-1-ol?
- (1)  $\text{CH}_3\text{OCH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{OH}$
  - (2)  $\text{HOCH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{OCH}_3$
  - (3)  $\text{CH}_3\text{OCH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
  - (4)  $\text{CH}_3\text{CH}(\text{OCH}_2\text{CH}_3)\text{CH}_2\text{CH}_2\text{OH}$
11. Which of the following represents the correct ranking in terms of increasing boiling point?
- (1) *n*-butane < 1-butanol < diethyl ether < 2-butanone
  - (2) *n*-butane < diethyl ether < 2-butanone < 1-butanol
  - (3) 2-butanone < *n*-butane < diethyl ether < 1-butanol
  - (4) *n*-butane < diethyl ether < 1-butanol < 2-butanone
12. Which reaction is the most appropriate to prepare the following compound?



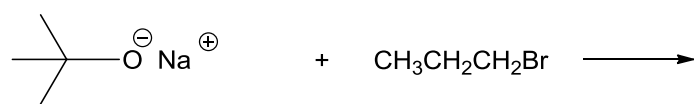
(1)



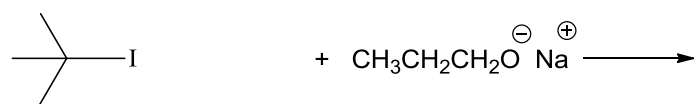
(2)



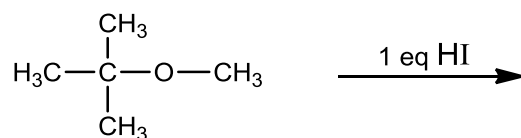
(3)



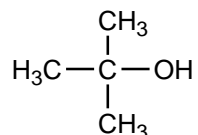
(4)



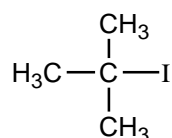
13. Ethers react with strong acids in water. What is the major product formed in the following reaction?



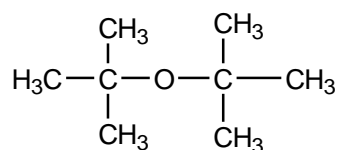
(1)



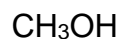
(2)



(3)

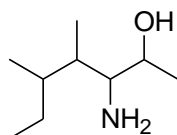


(4)



**Amines:** Nomenclature, classification and structure; Properties; Reactivity / basicity

14. Name the following compound according to the IUPAC rules.



- (1) 3-amino-4,5-dimethylheptan-2-ol  
 (2) 3-amino-5-ethyl-2-hydroxy-4-methylhexane  
 (3) 2-hydroxy-4,5-dimethyl-3-heptyl amine  
 (4) 4-amino-2-ethyl-5-hydroxy-3-methylhexane

15. Which of the following amines is most soluble in water?

- (1)  $\text{CH}_3\text{CH}_2\text{NH}_2$
- (2)  $(\text{CH}_3)_3\text{N}$
- (3)  $\text{PhNH}_2$
- (4)  $(\text{CH}_3\text{CH}_2\text{CH}_2)_2\text{NH}$

16. Identify the secondary amine(s) in question 14 above.

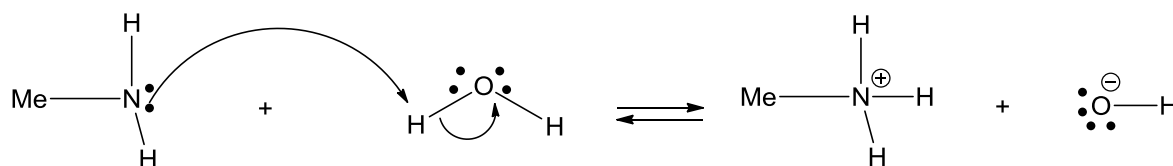
- (1) (1) and (3)
- (2) (4) only
- (3) (2) only
- (4) none of the options is a secondary amine

17. List the substances  $\text{NH}_3$ ,  $\text{CH}_3\text{CH}_2\text{NH}_2$ ,  $(\text{CH}_3\text{CH}_2)_2\text{NH}$  in order of increasing basicity (weakest first).

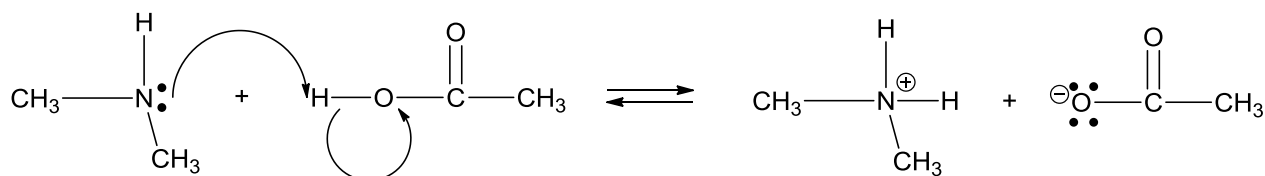
- (1)  $\text{CH}_3\text{CH}_2\text{NH}_2 < (\text{CH}_3\text{CH}_2)_2\text{NH} < \text{NH}_3$
- (2)  $(\text{CH}_3\text{CH}_2)_2\text{NH} < \text{NH}_3 < \text{CH}_3\text{CH}_2\text{NH}_2$
- (3)  $\text{NH}_3 < \text{CH}_3\text{CH}_2\text{NH}_2 < (\text{CH}_3\text{CH}_2)_2\text{NH}$
- (4)  $\text{CH}_3\text{CH}_2\text{NH}_2 < \text{NH}_3 < (\text{CH}_3\text{CH}_2)_2\text{NH}$

18. Which of the following is INCORRECT?

(1)

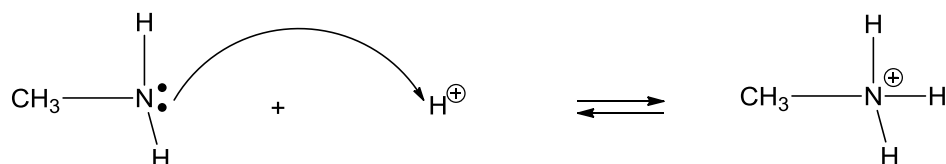


(2)

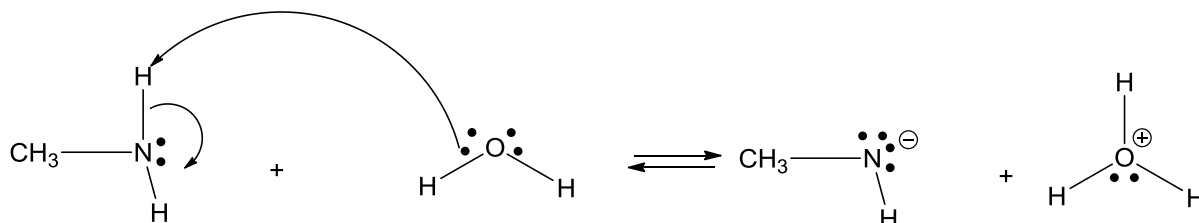




(3)



(4)

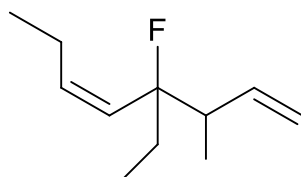


**Alkenes:** Structure and nomenclature; Physical properties; Geometric isomerism (cis/trans and E/Z configurations); Synthesis of Alkenes.

19. In ethene, the C–H bond is formed by the overlap of...

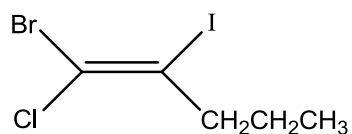
- (1) a C  $\text{sp}^2$  hybrid orbital and a H 1s atomic orbital
- (2) a C  $\text{sp}^3$  hybrid orbital + a H 1s atomic orbital
- (3) a C sp hybrid orbital + a H 1s atomic orbital
- (4) a C p atomic orbital + a H 1s atomic orbital

20. Name the following compound according to the IUPAC rules.



- (1) 5-Ethyl-5-fluoro-6-methylocta-3,7-diene
- (2) 4-Ethyl-4-fluoro-3-methylocta-1,5-diene
- (3) 4-Fluoro-4-Ethyl-3-methylocta-1,5-diene
- (4) 1,3-Diethyl-3-fluoro-4-methylhexa-1,5-diene

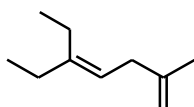
21. What is the IUPAC name of the following compound?



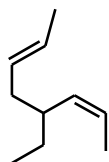
- (1) (E)-1-bromo-1-chloro-2-iodopent-1-ene
- (2) (Z)-1-bromo-1-chloro-2-ethyl-2-iodoethene
- (3) (Z)-1-bromo-1-chloro-2-iodopent-1-ene
- (4) (E)-5-bromo-5-chloro-4-iodopent-4-ene

22. Which of the following structures contains ONE *trans* and ONE *cis* double bond?

(1)



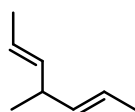
(2)



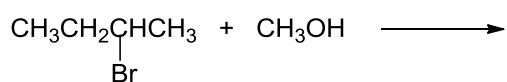
(3)



(4)

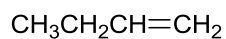


Use the following reaction to answer questions **23 to 25** below

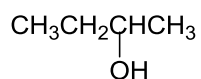


23. The product formed from nucleophilic substitution is:

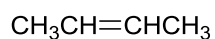
(1)



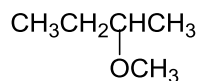
(2)



(3)

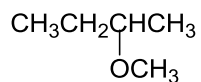


(4)

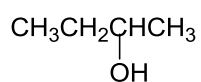


24 The MAJOR elimination product formed is:

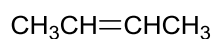
(1)



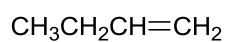
(2)



(3)

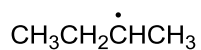


(4)

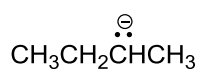


25. The intermediate for the reaction is:

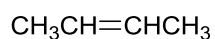
(1)



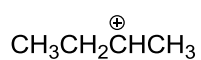
(2)



(3)



(4)



**TOTAL [25]**

## **ONLY FOR SEMESTER 1 STUDENTS**

### **ASSIGNMENT 4**

**Due Date: 26 APRIL 2018**

**Unique number: 851681**

The assignment consists of **online tasks to be completed** on the **MasteringChemistry® site**.

Please note that it is important to complete this assignment.

This assignment contributes 30% to your year mark.

**The assignment must be completed online on the MasteringChemistry® site.**

#### **IMPORTANT:**

You will need two codes to access to MasteringChemistry and to do the assignment. The first code is the **access code**, which you got when you bought the textbook, and the second is the **course code**, which is given below:

To access MasteringChemistry, you must use the **access code** that came with the textbook that you bought.

Once you have the access code and have finished registering for MasteringChemistry and already have access to MasteringChemistry, then, you need to locate the course by entering the **course code: CHE1502S12018**

Any changes to the above will be announced on myUnisa, so it is important to check for announcements regularly.

Once the due date for assignment 4 has passed, your mark on MasteringChemistry® will be automatically transferred to the Unisa assignment system.

You may complete the online tasks at your own pace, provided that you have completed all tasks by the due date. Your final mark for assignment 4 will be determined by your performance on the tasks that you have done on MasteringChemistry®.

**THE DETAILS OF THIS ASSIGNMENT CAN BE FOUND ON myUnisa. (Go to the CHE1502 announcements)**

**IF YOU HAVE ANY QUESTIONS REGARDING THIS ASSIGNMENT, PLEASE POST YOUR QUESTIONS ON THE *myUnisa* CHE1502 DISCUSSION FORUM IN THE FORUM CALLED ASSIGNMENT 4.**

**Contents:**

**Alkenes:** Reactions and mechanisms of hydrohalogenation, acid catalyzed hydration and halogenation of symmetrical and unsymmetrical alkenes and the application of Markovnikov's rule; Mechanism of hydrohalogenation of unsymmetrical alkenes in the presence of peroxides (anti-Markovnikov's addition); Hydrogenation of alkenes.

**Alkynes:** Structure and nomenclature; Physical properties; Reactions and mechanisms of hydration, halogenation and hydrohalogenation of symmetrical and unsymmetrical alkynes (Markovnikov's rule); Hydrogenation of alkynes; Acidity / Reactivity of terminal alkynes.

**Carbonyl compounds and derivatives:** Structure and nomenclature of ketones and aldehydes; Properties and reactivity of ketones and aldehydes.

**Carboxylic acids and derivatives:** Structure and nomenclature carboxylic acids and carboxylic acid derivatives (esters and amides); Properties and reactivity of carboxylic acids and carboxylic acid derivatives.

**ONLY FOR SEMESTER 1 STUDENTS**  
**ASSIGNMENT 5**

The assignment consists of written questions

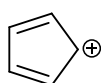
The assignment can be completed throughout the semester and **SHOULD NOT BE SUBMITTED** to Unisa.

**Self – Assessment Assignment****Do not submit this assignment!**

1. Determine the formal charge of B in the compound,  $B(OH)_3$

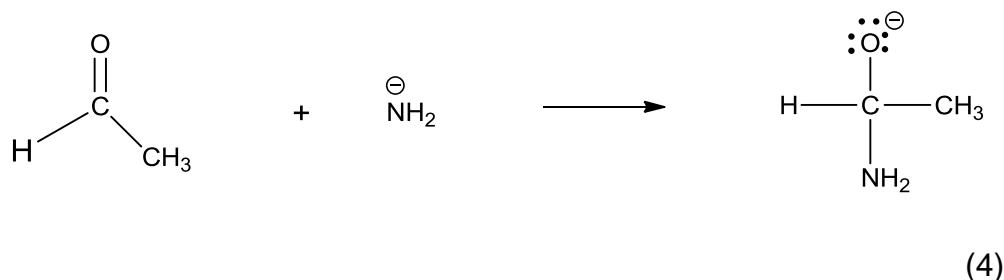
(2)

2. Draw the important resonance forms to show the delocalization of charges in the following structure. Indicate the movement of electrons with curved arrows.



(4)

3. In the reaction below, label the reactants as Lewis bases (nucleophiles) or Lewis acids (electrophiles). Use curved arrows to show the movement of electron pairs in the reactions. Draw any nonbonding electrons (NOT ILLUSTRATED IN THE REACTION) to show how they participate in the reactions.



4. Draw the structural formulas of four hydrocarbon compounds which are structural (constitutional) isomers having a molecular formula of  $\text{C}_5\text{H}_{10}$ . Provide the IUPAC name for each compound.

(16)

5. Consider the compound with the proposed name: 2-methyl-1,1, dichloropent-3-yne

- (a) Draw the structure of the compound that is consistent with the proposed name given above.

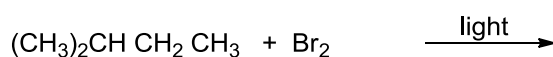
(2)

- (b) Explain what is wrong with the name provided (state each violation of the IUPAC nomenclature rules and give the correct IUPAC name for the compound.

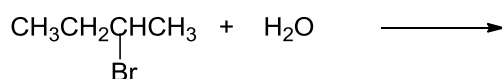
(4)

6. Draw the structures for MAJOR product of each reaction/ reaction sequence shown below:

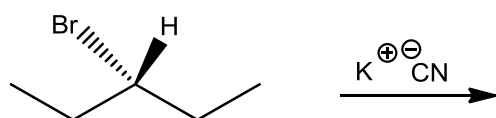
(a)



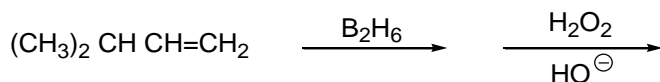
(b)



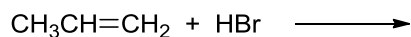
(c)



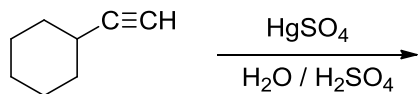
(d)



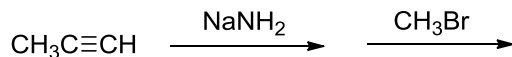
(e)



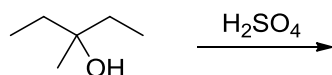
(f)



(g)



(h)



7x (2) = (14)

7. Give the detailed reaction mechanism for the reactions shown in:

(i) Question 6(a) (4)

(ii) Question 6(b)

(iii) Question 6(c) (4)

(iv) Question 6(e) (4)

(v) Question 6 (g) (4)

(vi) Question 6(h) (4)

8. Draw the different Newman projections for the molecule, CH<sub>2</sub>ClCH<sub>2</sub>Br. Identify the most stable and least stable conformation.

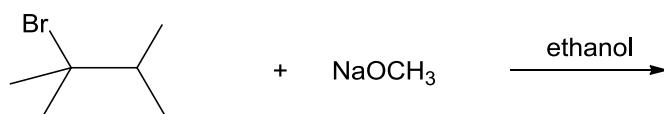
(6)

9. (a) Draw the structure of a primary, secondary or tertiary alcohol. Label each and also give the IUPAC name of each compound

(b) Draw the structure of a chiral molecule which contains a halogen atoms. Draw the 3-dimensional structures of the two enantiomers of the compound and name them according to the Cahn–Ingold Prelog rules.

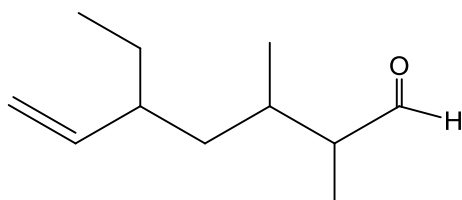
(7)

10. (a) What is the major organic product formed in the following reaction?



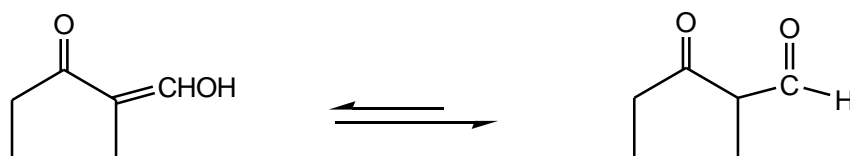
- (b) Give a detailed mechanism for the reaction.

11. Name the following compound according to the IUPAC rules:

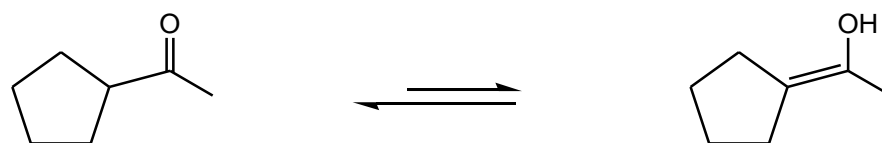


12. Which of the following DOES NOT represent keto-enol tautomerism?

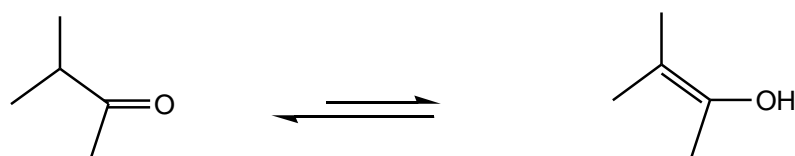
(1)



(2)

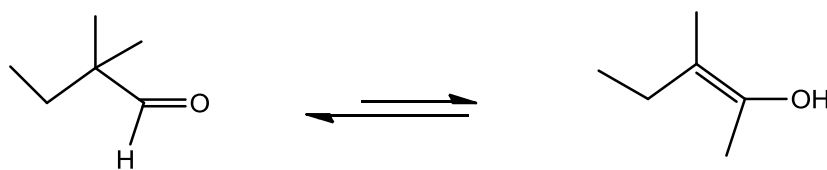


(3)

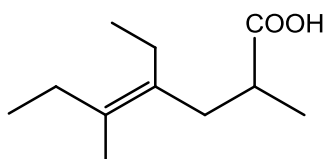




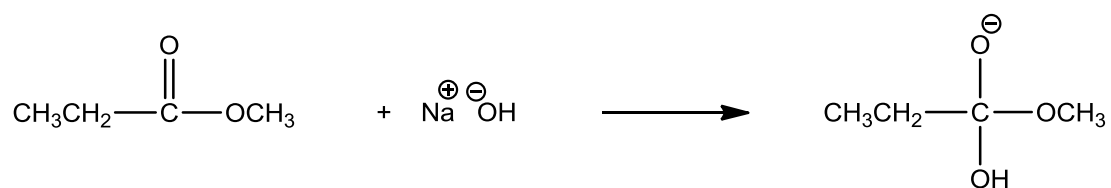
(4)



13. Name the following compound according to the IUPAC rules.



14. Illustrate the reactivity of the carbonyl group by using arrows to show how the electrons move in the following process:



(2)

15. Draw the correct structure of ethyl 2-phenylbutanoate.

(2)

## SECOND SEMESTER ASSIGNMENTS

- You are not required to memorize the actual **values of specific properties** of compounds.
- Questions which involve the **comparison of physical properties** such as boiling point, melting point, solubility etc. or the **comparison of chemical properties** such as **acidity, basicity, etc.** do not require the knowledge of the actual **values** related to these properties.
- You have to USE FACTORS such as **chemical structure, bonding, steric factors, etc.** to **predict trends in the property or compare properties** – **DO NOT USE ACTUAL VALUES THAT CAN BE FOUND IN TABLES IN THE TEXTBOOK.**

### ONLY FOR SEMESTER 2 STUDENTS

#### ASSIGNMENT 1

DUE DATE: 27 July 2018

UNIQUE NUMBER: 739733

This assignment is a multiple choice assignment based on Section 6.1.

Please note that it is compulsory to return this assignment, as failure to do so will automatically prevent you from writing your examination at the end of your course. No late submissions will be accepted.

This assignment contributes 20% to your year mark.

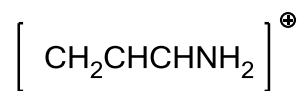
### QUESTIONS

The multiple choice questions have four possible answers. In each case, provide only **ONE** answer to each question. Answer **ALL** questions.

**Fundamental Concepts in Organic Chemistry:** Hybridization of carbon-  $sp^3$ ,  $sp^2$ ,  $sp$ ; Bond polarity, dipole moment; Intermolecular forces – London dispersion forces, van der Waals forces, Dipole-dipole interaction and Hydrogen bonding; Polarity effects on solubility; Bond formation and bond breakage - Electron flow of homolytic and heterolytic processes; Lewis Acids and bases; Lewis structures and formal charges; Resonance structures and delocalization; Understanding the definition of electrophiles, nucleophiles and free radicals.

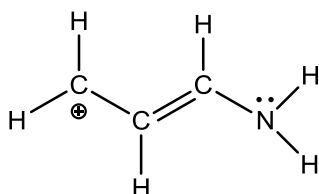


4. Consider the cation shown below:

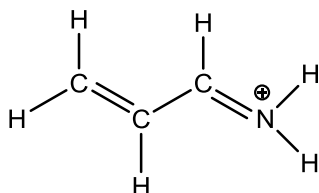


Which of the following is NOT A REASONABLE resonance structure of this cation?

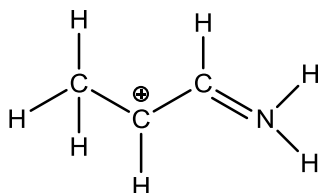
(1)



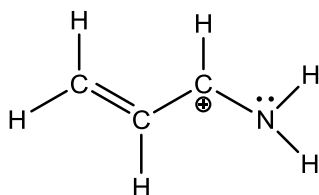
(2)



(3)

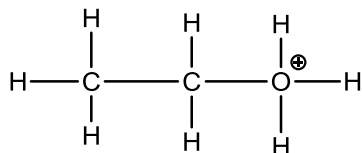


(4)

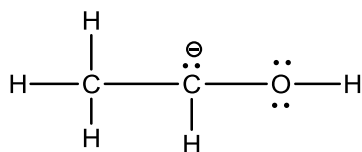


5. The compound,  $\text{CH}_3\text{CH}_2\text{OH}$ , is a Lewis base. The Lewis structure of the conjugate acid of  $\text{CH}_3\text{CH}_2\text{OH}$  is:

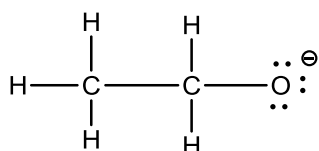
(1)



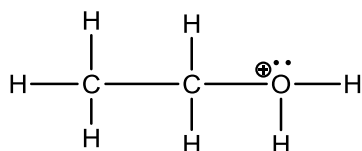
(2)



(3)

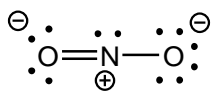


(4)

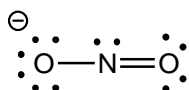


6. Which of the following is NOT a valid Lewis structure of  $\text{NO}_2^-$ ?

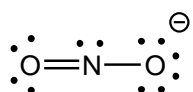
(1)



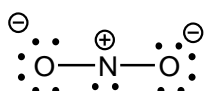
(2)



(3)



(4)

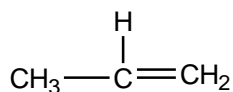


7. Which of the following compounds are covalent compounds?

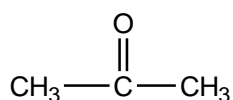
- (1)  $\text{BH}_3$
- (2) Both (1) and (4)
- (3)  $\text{KBr}$
- (4)  $\text{HCCl}_3$

8. Which of the structures shown below contains two  $\text{sp}^3$  and one  $\text{sp}^2$  hybridized carbon atoms?

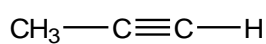
(1)



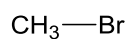
(2)



(3)

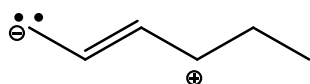


(4)

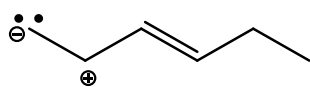


9. Which of the following is **NOT** a proper resonance form of 1,3-hexadiene?

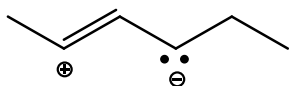
(1)



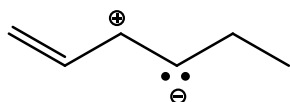
(2)



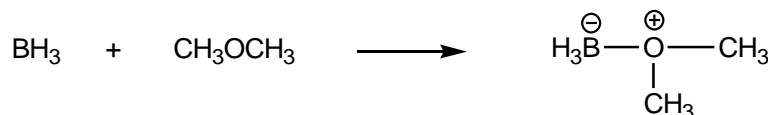
(3)



(4)



10. Consider the reaction below:



Which of the following is INCORRECT?

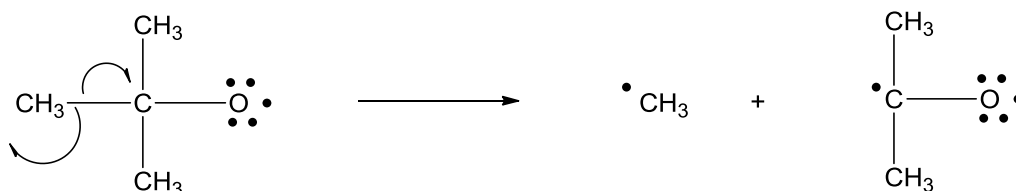
- (1) This is an example of a substitution reaction
- (2)  $\text{BH}_3$  is an electrophile
- (3) This is an acid-base reaction
- (4)  $\text{CH}_3\text{OCH}_3$  is a nucleophile

11. Which of the following reactions is a correct example of heterolysis?

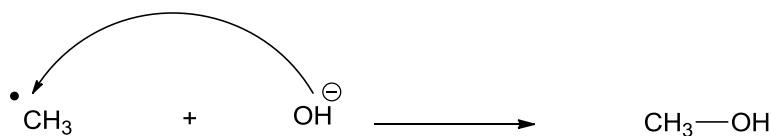
(1)



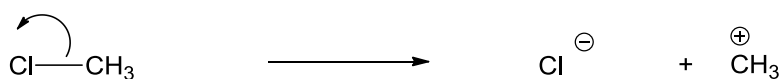
(2)



(3)



(4)



**Alkanes and cycloalkanes:** Structure and nomenclature; Physical properties; Reactions; Mechanism for the halogenation of alkanes; Structural isomers; Conformations (Newman and Sawhorse projections)

12. Which of the following pairs of compounds are structural / constitutional isomers?

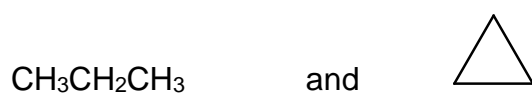
(1)



(2)



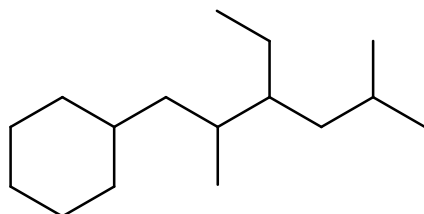
(3)



(4)



13. What is the IUPAC name of the molecule shown below?



- (1) 2-bromo-6-cyclopentyl-5-methylhexane
- (2) 4-ethyl-6-cyclohexyl-2,5-dimethylhexane
- (3) 3-ethyl-1-cyclohexyl-2,5-dimethylhexane
- (4) 3-ethyl-5-cyclohexyl-1,1,4-trimethylpentane

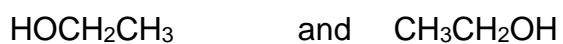
14. Which of the following pairs of compounds are constitutional (structural) isomers?

(1)

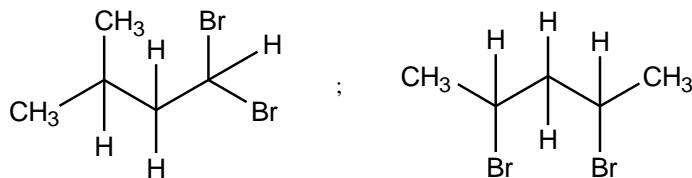




(2)



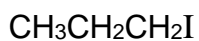
(3)



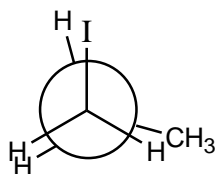
(3)



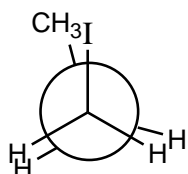
15. Which of the following conformations of the molecule with the structural formula given below has the HIGHEST energy (LEAST STABLE)?



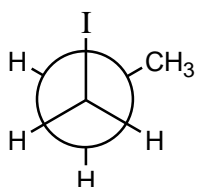
(1)



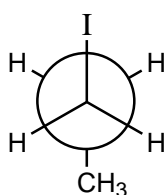
(2)



(3)

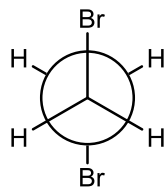


(4)

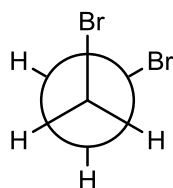


16. Which of the following structures represents the most stable conformation of  $\text{CH}_2\text{BrCH}_2\text{Br}$ ?

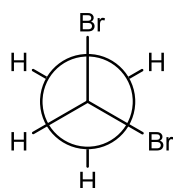
(1)



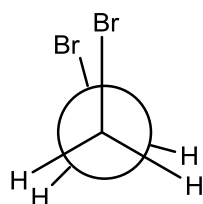
(2)



(3)



(4)



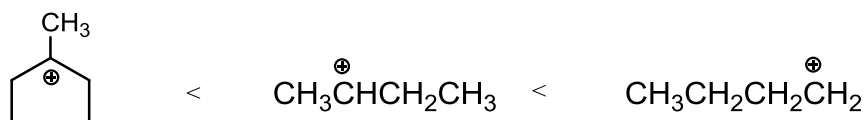
**The Study of Chemical Reactions:** Bond Dissociation, Free radical Chain Reaction Mechanism in the Halogenation of alkanes, Reactive Intermediates and factors influencing their stabilities

17. Which of the following statements are INCORRECT?

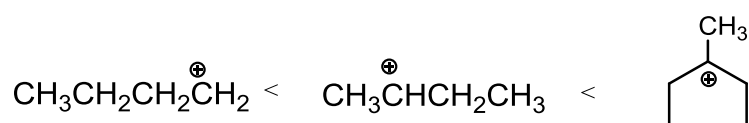
- (1) Carbocations are strongly basic
- (2) Carbanions are nucleophilic
- (3) Free radicals contain an unpaired electron.
- (4) Carbocations are electron deficient.

18. Which of the following set of carbocation represent an order of increasing stabilities, i.e. from the least stable to the most stable.

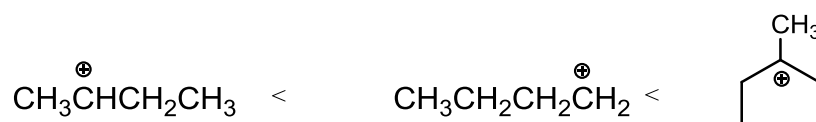
(1)



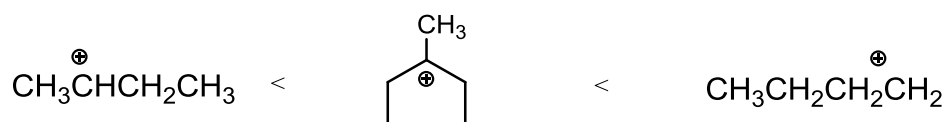
(2)



(3)

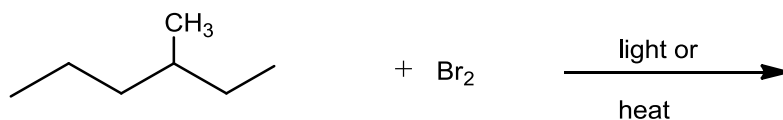


(4)



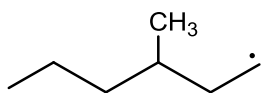
Use the information below to answer questions 19 and 20 below.

Consider the reaction:

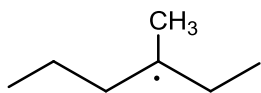


19. The MOST STABLE radical formed in the reaction is:

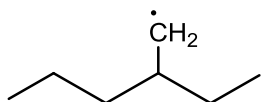
(1)



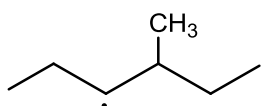
(2)



(3)

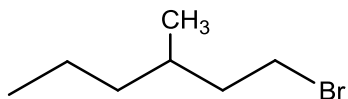


(4)

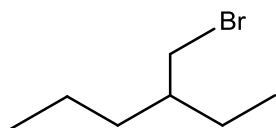


20. What is the MAJOR monobrominated product formed in the reaction?

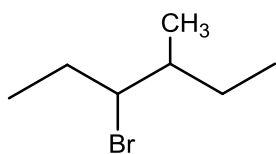
(1)



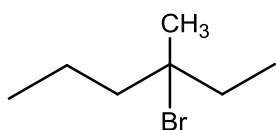
(2)



(3)



(4)



TOTAL [20]

**ONLY FOR SEMESTER 2 STUDENTS**  
**ASSIGNMENT 2**

**Due Date: 20 August 2018**

**Unique number: 684669**

The assignment is an online assignment based on Section 6.2.

The assignment must be completed on the MasteringChemistry® site

This assignment contributes 20% to your year mark.

**The assignment must be completed online on the MasteringChemistry® site.**

**Contents:**

**Stereochemistry** - 3-Dimensional representations of simple organic molecules, Chirality and R- and S-configurations.

**Alkyl Halides:** Structure and nomenclature; Physical properties; Classification as primary, secondary, or tertiary alkyl halides; Selected nucleophilic substitution reactions

**IMPORTANT:**

You will need two codes to access to MasteringChemistry and to do the assignment. The first code is the **access code**, which you got when you bought the textbook, and the second is the **course code**, which is given below:

To access MasteringChemistry, you must use the **access code** that came with the textbook that you bought.

Once you have the access code and have finished registering for MasteringChemistry and already have access to MasteringChemistry, then, you need to locate the course by entering the **course code: CHE1502S22018.**

Any changes to the above will be announced on myUnisa, so it is important to check for announcements regularly. Once the due date for assignment 2 has passed, your mark on MasteringChemistry® will be automatically transferred to the Unisa assignment system.

You may complete the online tasks at your own pace, provided that you have completed all tasks by the due date. Your final mark for assignment 2 will be determined by your performance on the tasks that you have done on MasteringChemistry®.

**THE DETAILS OF THIS ASSIGNMENT CAN BE FOUND ON myUnisa. (Go to the CHE1502 announcements)**

**IF YOU HAVE ANY QUESTIONS REGARDING THIS ASSIGNMENT, PLEASE POST YOUR QUESTIONS ON THE myUnisa CHE1502 DISCUSSION FORUM IN THE FORUM CALLED ASSIGNMENT 2.**

**ONLY FOR SEMESTER 2 STUDENTS  
ASSIGNMENT 3**

**Due Date: 17 September 2018**

**Unique number: 767695**

This assignment is a multiple choice assignment based on section 6.3.

Please note that it is important to return this assignment. No late submissions will be accepted.

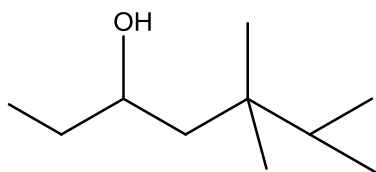
This assignment contributes 30% to your year mark.

## **QUESTIONS**

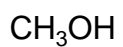
**The multiple choice questions have four possible answers. In each case, provide only ONE answer to each question. Answer ALL questions.**

**Alcohols:** Structure and nomenclature; Physical properties; Classification of alcohols as primary, secondary, or tertiary; Stereochemistry - 3-Dimensional representations of simple organic molecules, Chirality and R- and S-configurations; Selected Reactions of alcohols: oxidation and the formation of alkyl halides, ethers and alkenes

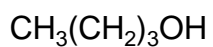
1. What is the IUPAC name of the molecule shown below?



- (1) 2,3,3-trimethylheptan-5-ol  
 (2) 5,5,6-trimethylheptan-3-ol  
 (3) 1,1,2,2-tetramethylhexan-4-ol  
 (4) 5,5,6,6-tetramethylhexan-3-ol
2. The compound in question 1 above is a
- (1) Tertiary alcohol  
 (2) Primary alcohol  
 (3) Phenol  
 (4) Secondary alcohol
3. Arrange the following alcohols in order of increasing boiling point (from lowest to highest solubility):



**A**



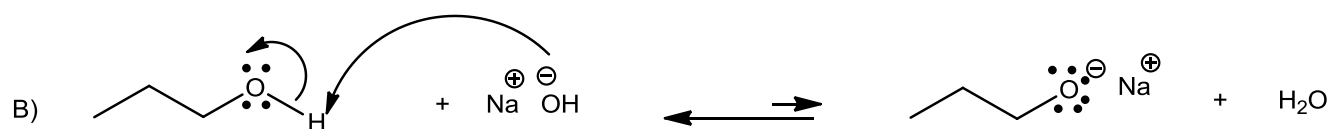
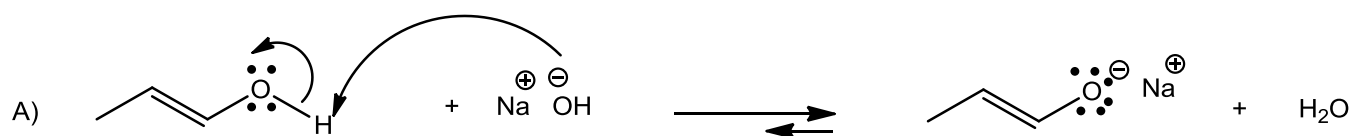
**B**



**C**

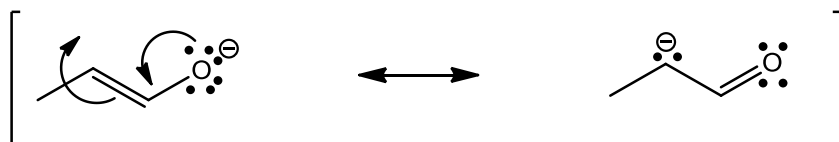
- (1) B<C<A  
 (2) A<C<B  
 (3) B<A<C  
 (4) C<A<B

4. Consider the reactions below:



Which of the following statements is CORRECT?

(1) The alkoxide ion formed in reaction A is stabilized as follows:



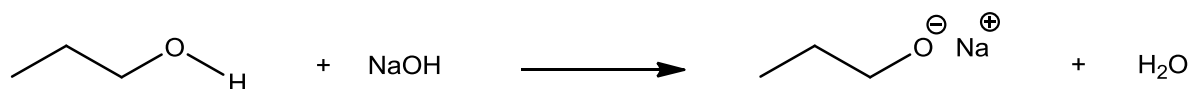
(2) The alkoxide formed in reaction B is more stable than the alkoxide formed in reaction A.

(3) The alcohol in reaction A is a weaker acid than the alcohol in reaction B.

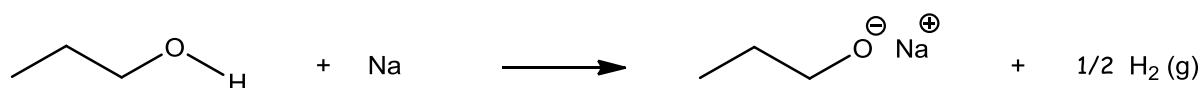
(4) Reaction A takes place at a slower rate than reaction B.

5. Which of the following reactions will take place the FASTEST?

(1)

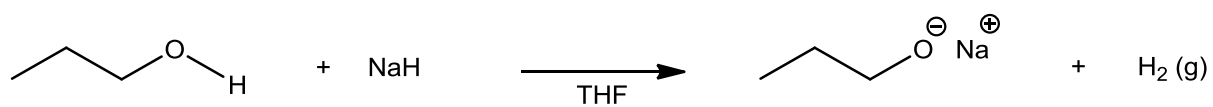


(2)





(3)

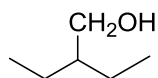


(4)

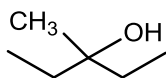


6. Which of the following alcohols will produce a ketone in a reaction with chromic acid?

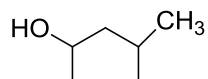
(1)



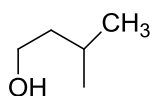
(2)



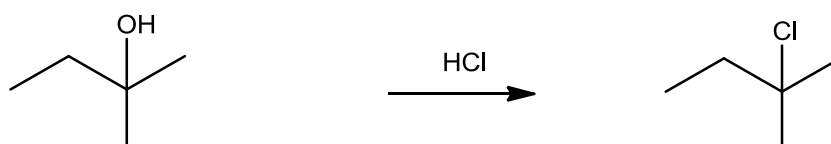
(3)



(4)



7. Consider the following reaction:

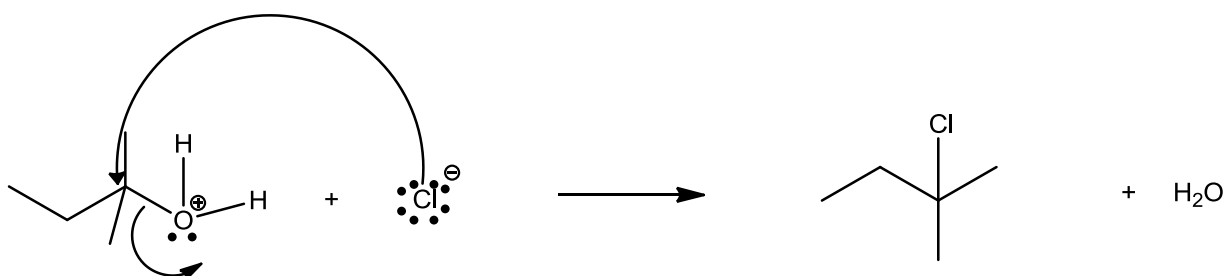


Which step is LEAST LIKELY to occur in the reaction mechanism?

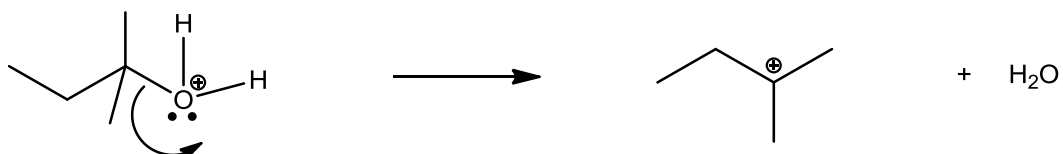
(1)



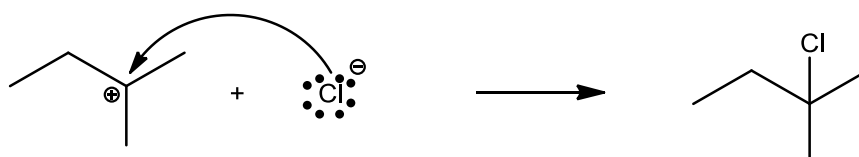
(2)



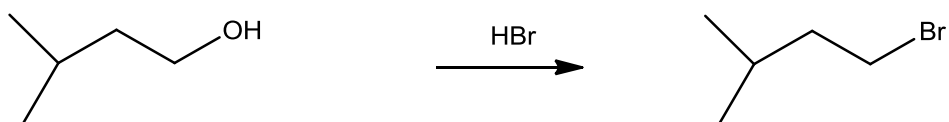
(3)



(4)

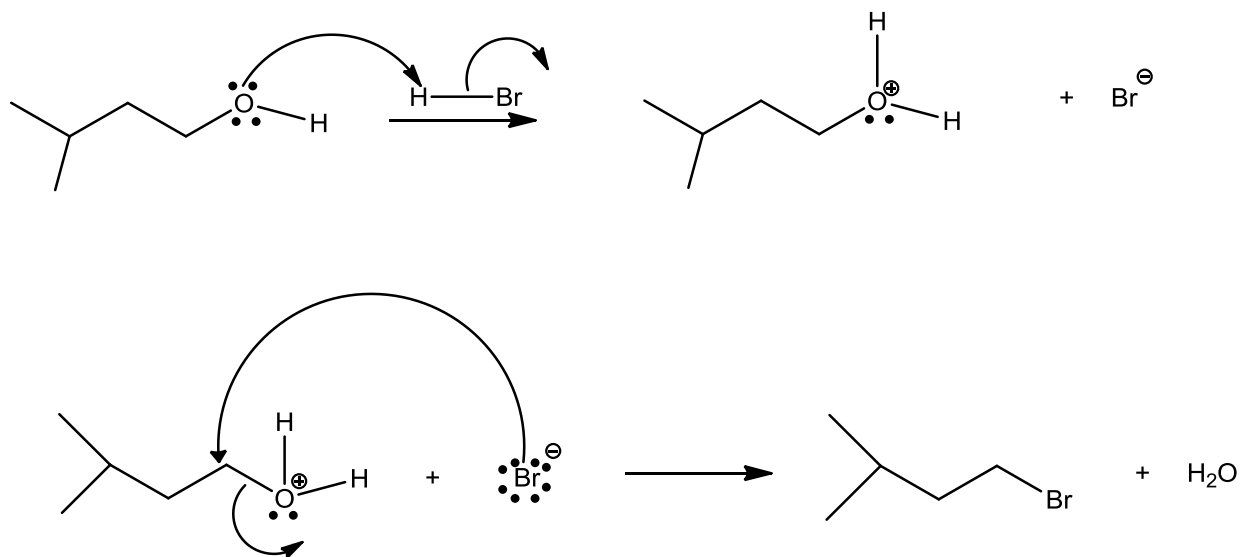


8. Consider the following reaction:

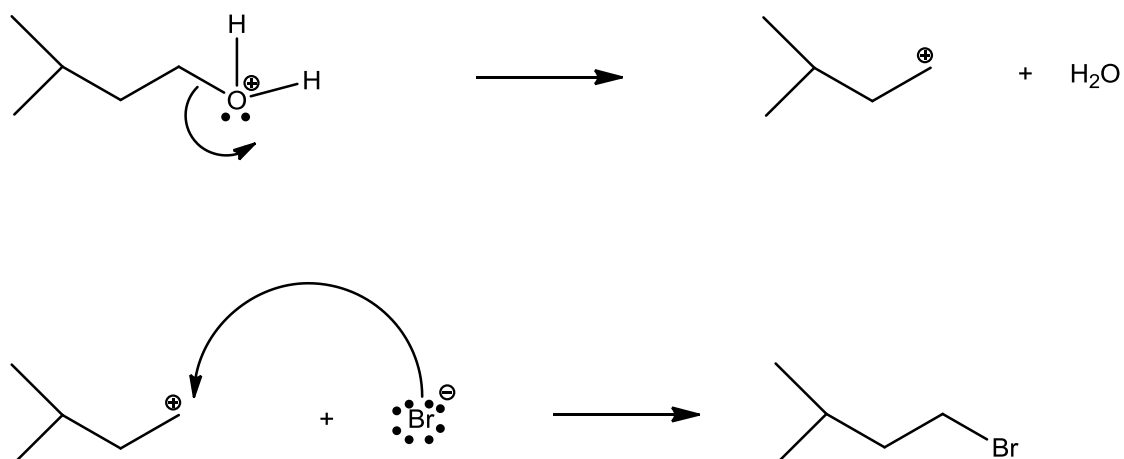


Which steps occur in the mechanism of the reaction?

(1)



(2)

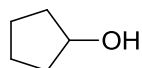


(3) The steps outlined in (2)

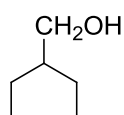
(4) The steps outlined in (1)

9. Alcohols undergo dehydration when heated in the presence of a strong acid. Which of the following alcohols undergoes dehydration at the SLOWEST rate?

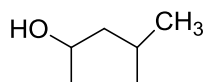
(1)



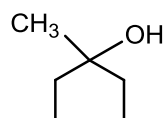
(2)



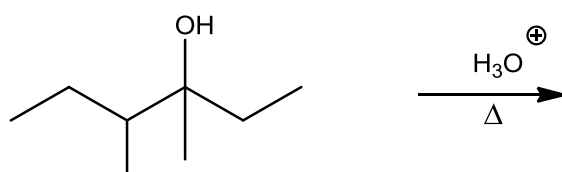
(3)



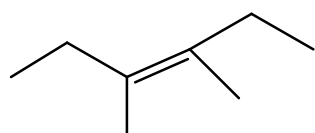
(4)



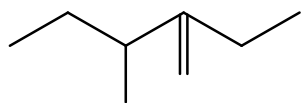
10 The MAJOR product formed in the following reaction is:



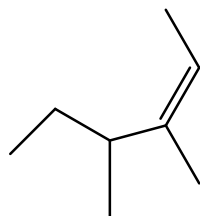
(1)



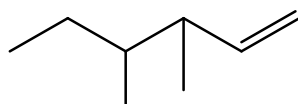
(2)



(3)



(4)



**Ethers:** Structure and nomenclature; Physical and chemical properties

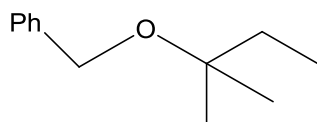
11 What is the correct structure of 3-ethoxybutan-1-ol?

- (1)  $\text{CH}_3\text{CH}(\text{OCH}_2\text{CH}_3)\text{CH}_2\text{CH}_2\text{OH}$
- (2)  $\text{HOCH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{OCH}_3$
- (3)  $\text{CH}_3\text{OCH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
- (4)  $\text{CH}_3\text{OCH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{OH}$

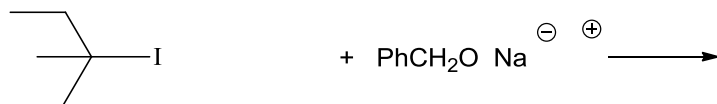
12. Which of the following represents the correct ranking in terms of increasing solubility in water?

- (1) *n*-butane < 1-butanol < diethyl ether < 2-butanone
- (2) *n*-butane < diethyl ether < 2-butanone < 1-butanol
- (3) 2-butanone < *n*-butane < diethyl ether < 1-butanol
- (4) *n*-butane < diethyl ether < 1-butanol < 2-butanone

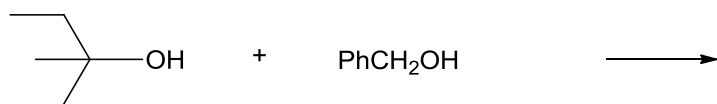
13. Which reaction is the most appropriate to prepare the following compound?



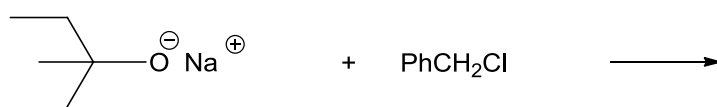
(1)



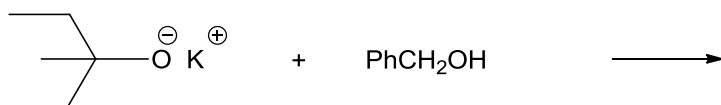
(2)



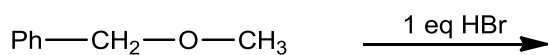
(3)



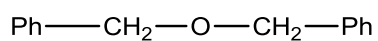
(4)



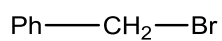
14. Ethers react with strong acids in water. What is the major product formed in the following reaction?



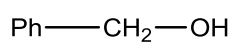
(1)



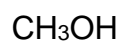
(2)



(3)

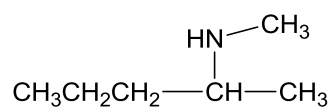


(4)



**Amines:** Nomenclature, classification and structure; Properties; Reactivity / basicity

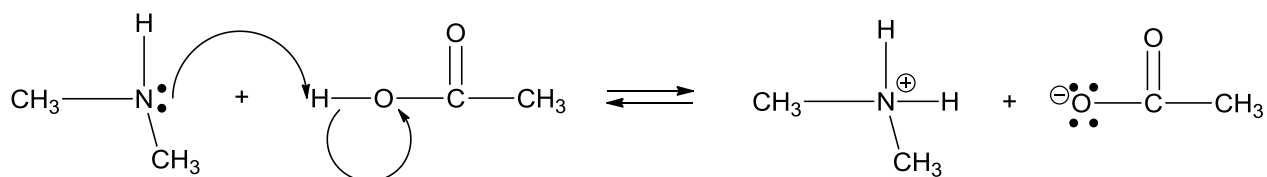
15. Name the following compound according to the IUPAC rules.



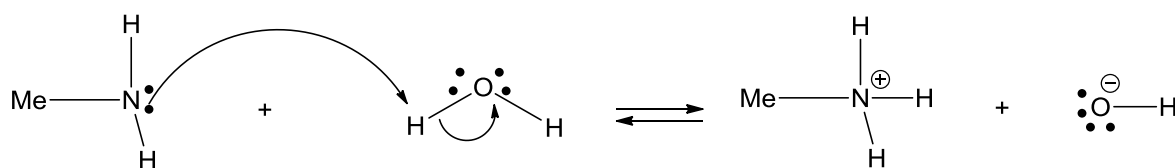
- (1) 2-nitromethylpentane
  - (2) N-methylpentan-2-amine
  - (3) N-methylpentan-4-amine
  - (4) 2-methylaminopentane
16. Which of the following amines is the weakest base?
- (1)  $\text{CH}_3\text{NH}_2$
  - (2)  $(\text{CH}_3\text{CH}_2)_3\text{N}$
  - (3)  $\text{PhNH}_2$
  - (4)  $(\text{CH}_3\text{CH}_2)_2\text{NH}$
17. Identify the compound with the highest boiling point.
- (1)  $\text{CH}_3\text{CH}_3$
  - (2)  $\text{CH}_3\text{CH}_2\text{NH}_2$
  - (3)  $\text{CH}_3\text{OCH}_3$
  - (4)  $\text{CH}_3\text{CH}_2\text{OH}$

18. Which of the following is INCORRECT?

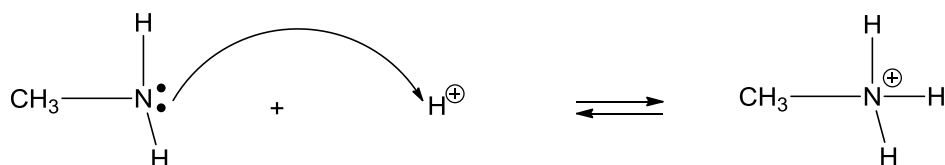
(1)



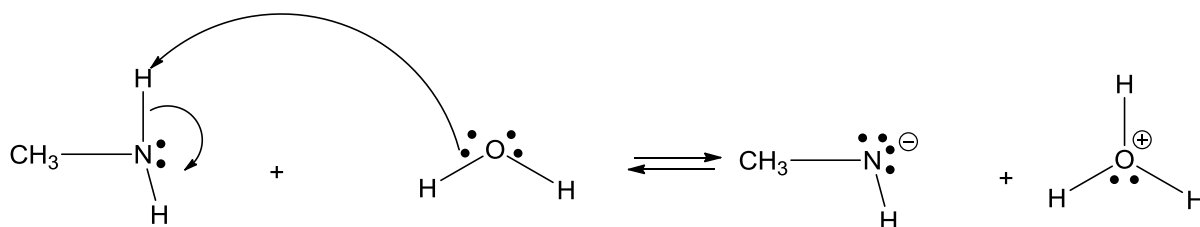
(2)



(3)



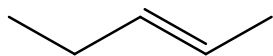
(4)



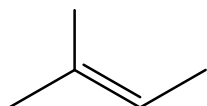
**Alkenes:** Structure and nomenclature; Physical properties; Geometric isomerism (cis/trans and E/Z configurations); Synthesis of Alkenes.

19. Which compound is not a constitutional isomer of the compound with molecular formula of  $\text{C}_5\text{H}_{10}$ .

(1)

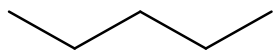


(2)

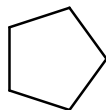




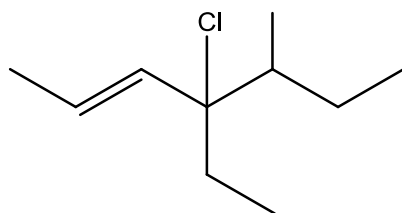
(3)



(4)

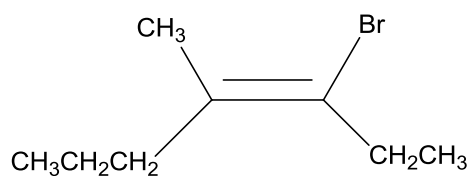


20. Name the following compound according to the IUPAC rules.



- (1) 3-chloro-2,3-diethyl-1,4-hex-4-ene
- (2) 4-chloro-4-ethyl-5-methylhept-2-ene
- (3) 4-chloro-4-ethyl-3-methylhept-5-ene
- (4) 4-chloro-4,5-diethylhex-2-ene

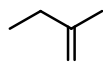
21. What is the IUPAC name of the following compound?



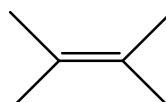
- (1) (E)-3-bromo-4-methylhept-3-ene
- (2) (E)-1-bromo-1-ethyl-2-methylpent-1-ene
- (3) (Z)-3-bromo-4-methylhept-3-ene
- (4) (Z)-3-bromo-2-propylpent-2-ene

22. Which of the following structures represent the MOST STABLE alkene?

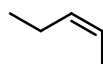
(1)



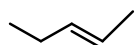
(2)



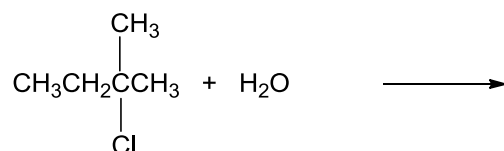
(3)



(4)

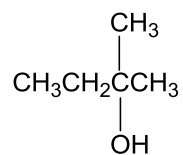


Use the following reaction to answer questions **23 to 25** below

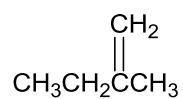


23. The product formed from nucleophilic substitution is:

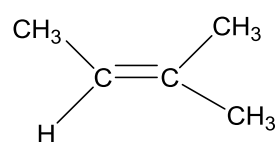
(1)



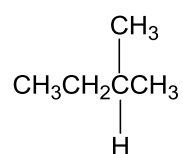
(2)



(3)

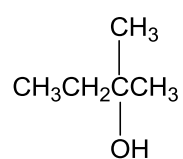


(4)

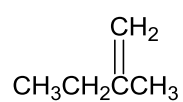


24. The MAJOR elimination product formed is:

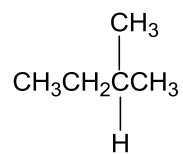
(1)



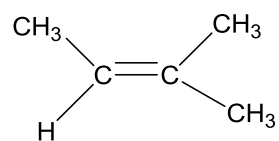
(2)



(3)

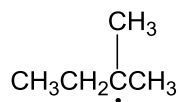


(4)

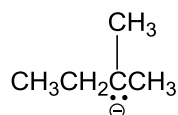


25. The intermediate for the reaction is:

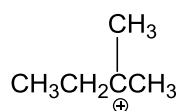
(1)



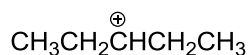
(2)



(3)



(4)



TOTAL [25]

**ONLY FOR SEMESTER 2 STUDENTS**

**ASSIGNMENT 4**

**Due Date: 5 October 2018**

**Unique number: 889243**

The assignment **consists of online tasks which must be completed on the MasteringChemistry® site.**

Please note that it is important to complete this assignment.  
This assignment contributes 30% to your year mark.

**Alkenes:** Reactions and mechanisms of hydrohalogenation, acid catalyzed hydration and halogenation of symmetrical and unsymmetrical alkenes and the application of Markovnikov's rule; Mechanism of hydrohalogenation of unsymmetrical alkenes in the presence of peroxides (anti-Markovnikov's addition); Hydrogenation of alkenes.

**Alkynes:** Structure and nomenclature; Physical properties; Reactions and mechanisms of hydration, halogenation and hydrohalogenation of symmetrical and unsymmetrical alkynes (Markovnikov's rule); Hydrogenation of alkynes; Acidity / Reactivity of terminal alkynes.

**Carbonyl compounds and derivatives:** Structure and nomenclature of ketones and aldehydes; Properties and reactivity of ketones and aldehydes.

**Carboxylic acids and derivatives:** Structure and nomenclature carboxylic acids and carboxylic acid derivatives (esters and amides); Properties and reactivity of carboxylic acids and carboxylic acid derivatives.

**The assignment must be completed online on the MasteringChemistry® site.**

**IMPORTANT:**

You will need two codes to access to MasteringChemistry and to do the assignment. The first code is the **access code**, which you got when you bought the textbook, and the second is the **course code**, which is given below:

To access MasteringChemistry, you must use the **access code** that came with the textbook that you bought.

Once you have the access code and have finished registering for MasteringChemistry and already have access to MasteringChemistry, then, you need to locate the course by entering the **course code: CHE1502S22018**

Any changes to the above will be announced on myUnisa, so it is important to check for announcements regularly.

Once the due date for assignment 4 has passed, your mark on MasteringChemistry® will be automatically transferred to the Unisa assignment system.

You may complete the online tasks at your own pace, provided that you have completed all tasks by the due date. Your final mark for assignment 4 will be determined by your performance on the tasks that you have done on MasteringChemistry®.

**THE DETAILS OF THIS ASSIGNMENT CAN BE FOUND ON myUnisa. (Go to the CHE1502 announcements)**

**IF YOU HAVE ANY QUESTIONS REGARDING THIS ASSIGNMENT, PLEASE POST YOUR QUESTIONS ON THE *myUnisa* CHE1502 DISCUSSION FORUM IN THE FORUM CALLED ASSIGNMENT 4.**

## ONLY FOR SEMESTER 2 STUDENTS

### ASSIGNMENT 5

The assignment consists of written questions

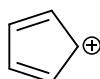
The assignment can be attempted throughout the semester and SHOULD NOT BE SUBMITTED to Unisa.

#### DO NOT SUBMIT

1. Determine the formal charge of B in the compound,  $B(OH)_3$

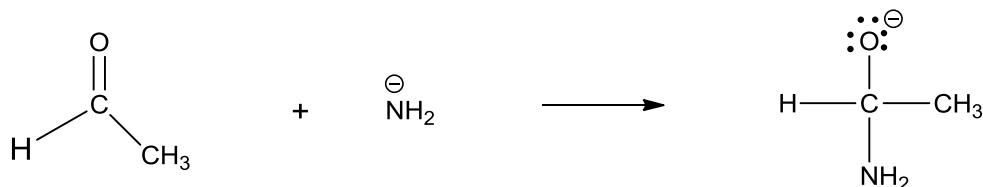
(2)

2. Draw the important resonance forms to show the delocalization of charges in the following structure. Indicate the movement of electrons with curved arrows.



(4)

3. In the reaction below, label the reactants as Lewis bases (nucleophiles) or Lewis acids (electrophiles). Use curved arrows to show the movement of electron pairs in the reactions. Draw any nonbonding electrons (NOT ILLUSTRATED IN THE REACTION) to show how they participate in the reactions.



(4)

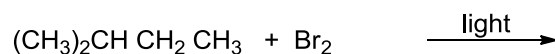
4. Draw the structural formulas of four hydrocarbon compounds which are structural (constitutional) isomers having a molecular formula of  $C_5H_{10}$ . Provide the IUPAC name for each compound.

(16)

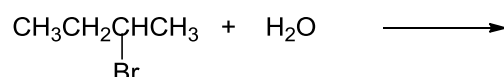
5. Consider the compound with the proposed name: 2-methyl-1,1, dichloropent-3-yne)i
- (i) Draw the structure of the compound that is consistent with the proposed name given above. (2)
- (ii) Explain what is wrong with the name provided (state each violation of the IUPAC nomenclature rules and give the correct IUPAC name for the compound. (4)

6. Draw the structures for MAJOR product of each reaction/ reaction sequence shown below:

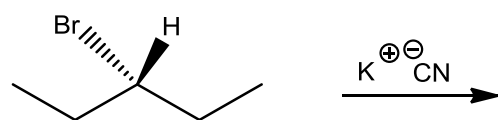
(a)



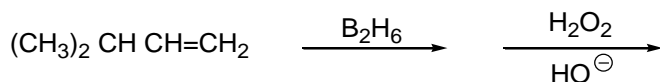
(b)



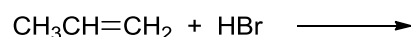
(c)



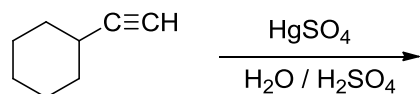
(d)



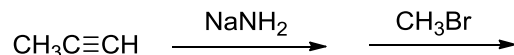
(e)



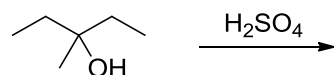
(f)



(g)



(h)



8x (2) = (16)

7. Give the detailed reaction mechanism for the reactions shown in:

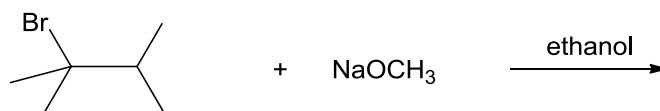
- (i) Question 6(a) (4)

- (ii) Question 6(b)
- (iii) Question 6(c) (4)
- (iv) Question 6(e) (4)
- (v) Question 6 (g) (4)
- (vi) Question 6(h) (4)

8. Draw the different Newman projections for the molecule,  $\text{CH}_2\text{ClCH}_2\text{Br}$ . Identify the most stable and least stable conformation. (6)

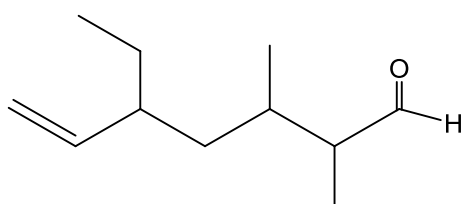
9. (a) Draw the structure of a primary, secondary or tertiary alcohol. Label each and also give the IUPAC name of each compound
- (b) Draw the structure of a chiral molecule which contains a halogen atoms. Draw the 3-dimensional structures of the two enantiomers of the compound and name them according to the Cahn–Ingold Prelog rules. (7)

10. (a) What is the major organic product formed in the following reaction?



- (b) Give a detailed mechanism for the reaction. (4)

11. Name the following compound according to the IUPAC rules:

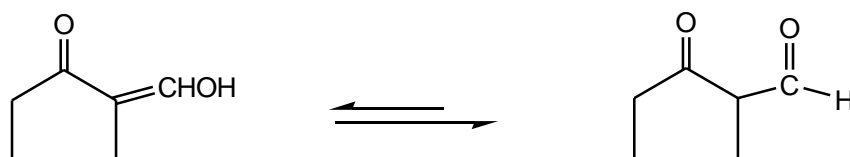


(2)

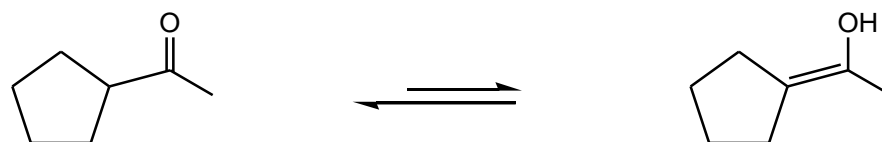


12. Which of the following DOES NOT represent keto-enol tautomerism?

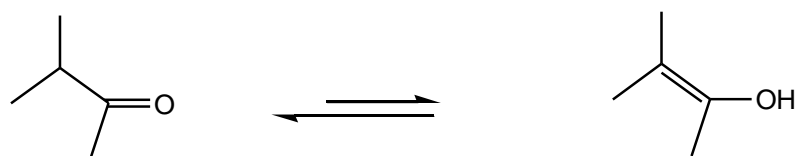
(1)



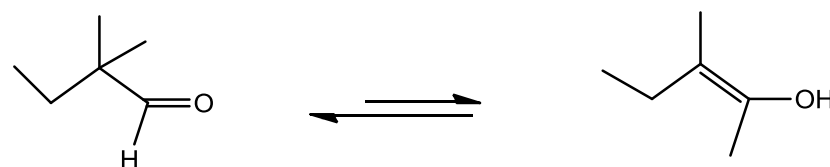
(2)



(3)

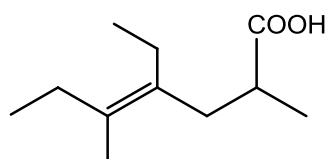


(4)



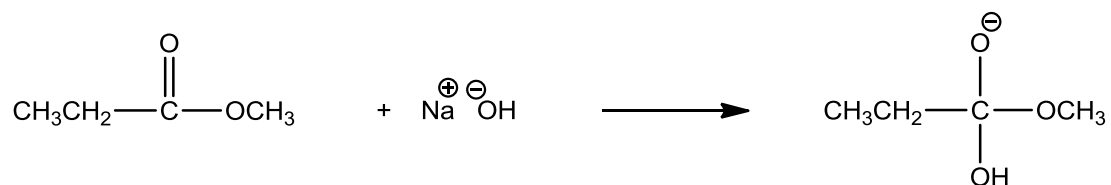
(2)

13. Name the following compound according to the IUPAC rules.



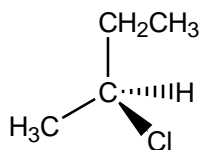
(2)

14. Illustrate the reactivity of the carbonyl group by using arrows to show how the electrons move in the following process:



(4)

15. Consider the following compound



- Give the IUPAC name of the compound according to the Cahn-Ingold-Prelog rules.
- Draw the mechanism of the nucleophilic substitution reaction when the compound is reacted with water.
- Draw the mechanism of the nucleophilic substitution reaction when the compound is reacted with sodium cyanide (NaCN) in solution.

(10)

## 8.7 Other assessment methods

There are no other assessment methods for this module.

## 8.8 The examination

For general information and requirements about the examinations, see the brochure: "*Study @ Unisa*".

### Examination admission

Submission of the first assignment **before 1 March (Semester 1) or 11 August (Semester 2)** will confirm your registration for that semester.

**NB: Please note that if you do not submit this assignment on time you will NOT be allowed to write the examination. There will be NO extensions given and NO exceptions made.**

### A sub-minimum of 40%

The university requires that a sub-minimum of 40% must be achieved in the examination to pass the module.

### Written Examinations

The official examination for the CHE1502 module will be a **one 2-hour examination** to be written during the May-June and October/November periods for the first and second semester, respectively.

During the relevant semester, the Examination Section will provide you with information and notifications regarding the examination in general, examination venues, examination dates (including supplementary examination) and examination times.

### Examination Paper

The **format of the examination paper** will be **multiple choice questions and written questions**. No periodic table is provided in the examination. The use of molecular models is permitted in the examination.

The **pass mark and subminimum requirement** are given in the brochure, "*Study @ Unisa*".

## Supplementary Examinations

If you are not successful in the May/June or October/November exam (i.e. if you have less than 50%) you may write the supplementary exam in October/November or May/June respectively, **provided** that you obtained at least 40% for the previous exam.

This means that if you are registered for the first semester, you will write the examination in May/June 2018 and the supplementary examination will be written in October/November 2018. If you are registered for the second semester you will write the examination in October /November 2018 and the supplementary examination will be written in May/June 2019.

Students who **qualify to write the supplementary examination do not receive additional study material** from Unisa. The subject content may change from one academic year to another. It is therefore your responsibility as a student to contact the responsible lecturer for guidance regarding the syllabus, examination and related information of the module. Also, **consult the CHE1502 module site on myUnisa for the semester** that you qualified a supplementary examination. **Additional information will be posted on myUnisa by your lecturer to assist you with your preparation for the supplementary examination.**

## 9 FREQUENTLY ASKED QUESTIONS

The “**Study @ Unisa**” brochure contains an **A-Z guide** of the **most relevant study information**.

## 10 SOURCES CONSULTED

In the compilation of the tutorial letter, the following sources were consulted:

- (1) L.G. Wade Jr., "**Organic Chemistry**", **9th edn.**, Prentice Hall Inc., Engelwood Cliffs, New Jersey (U.S.A.)
- (2) McMurry, J., **Organic Chemistry**, **8<sup>th</sup> edn.**, Brooks-Cole Publishing Company London.
- (3) Instructor's resources, Pearson.

## **11 IN CLOSING**

Chemistry is not an easy subject but with regular study students can be successful. Remember, you are important to us and therefore, your lecturer is very willing and available to assist you with your course content related problems. Please feel free to contact me at any time. Best wishes.

## **12 ADDENDUM**

There is no addendum.

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