CHE1502 102 2015 1 B - Previous Exam Paper

Chemistry B (University of South Africa)

Tutorial Letter 102/1/2015

General Chemistry 1B

CHE1502

Semester 1

Chemistry Department

IMPORTANT INFORMATION

1. **The detailed study plan for CHE1502.**
2. **MasteringChemistry Access.**
3. **Assignment Questions: Assignment 2 Part A.**

BAR CODE

The information in this tutorial letter is extremely important.

1 Detailed Study Plan for CHE1502.

The text book should be your primary study material.

The study guide that was part of your study package is not the primary source of study material, and was written mainly to simplify topics in the textbooks which students have trouble understanding. It is not complete and does not cover all the material in the course. It is also outdated (note that UNISA only allows the study guide to be revised every three years, and as such, it contains material that was previously covered in this module (such as Introductory Physical Chemistry), which have now been shifted to other modules), and was written at a time when the syllabus was different to the current syllabus.

Topics in the study guide which are not in section 6.1 in Tutorial letter 101 will not be examined and can be omitted. Use the information given below as the definitive guide as to what is or is not examinable. If you have trouble with the textbook, then consult the relevant section in the study guide.

In light of the above, **it is imperative that you use the textbook and not the study guide as your primary study material in this module.**

As indicated in the Tutorial letter 101, the study units refer to the Unisa Study Guide and the chapters with sections refer to the prescribed textbook.
If you are using **the textbook, 'Organic Chemistry', Pearson New International edition by Wade,** then the information in A applies.
If you are using the **e-book, 'Organic Chemistry' Eighth edition by Wade, (obtained via the MasteringChemistry site)** then you should use the information listed in B.

CHE1502 STUDY GUIDE:

- **PART 1 is no longer relevant – IGNORE.**
- **PART 2, Study Units 4 to 11, covers the topics of this module.**

1.1 Study Plan for Assignment 1.

Assignment 1 covers **Topics (1) - (5) in 6.1 in Tutorial letter 101.**

The specific study units (in the study guide) and the sections to be studied in the textbook by Wade are given below.

Study Unit 4. *Overview of Chemical Bonding*. Most of this chapter is a revision of the work covered in CHE1501.

A. Textbook**, 'Organic Chemistry', Pearson New International edition** by **Wade**

Wade Chapter: Introduction and Review Read section 1 and Study sections 2 to 14.
Wade Chapter: Structure and Properties of Organic Molecules Read section 1, Study sections 1A, 2 to 11 and Read sections 12 to 14.

Or

B. The **e-book, 'Organic Chemistry' Eighth edition by Wade:**

Chapter 1: Read sections 1-1, Study sections 1-2 to 1-14
Chapter 2: Read sections 2-1, Study sections 2-1 A, 2-2 to 2-11, Read 2-12 to 2-14

Study Unit 5. Hydrocarbons – Structure, Nomenclature, Reactions

A. Textbook**, 'Organic Chemistry', Pearson New International edition** by **Wade:**

Wade Chapter: Structure and Stereochemistry of Alkanes Study sections 1 to 4. Read section 5, Study sections 6 and 7 to 11.

Wade Chapter: The Study of Chemical Reactions Read section 1, Study sections 2 to 3, Read sections 4 and 6 to 11, Study section 13, Read section 14

N.B. Study Reactive intermediates 16A to 16C.

Or

B. The **e-book, 'Organic Chemistry' Eighth edition by Wade:**

Chapter 3: Study sections 3-1 to 3-4. Read section 3-5, Study sections 3-6 and 3-7 to 3-11

Chapter 4: Read section 4-1, Study sections 4-2 to 4-3, Read sections 4-4 and sections 4-6 to 4-10, Study sections 4-13, Read section 4-14

NB. Study Reactive intermediates 4-16A to 4-16C.

Study Unit 7 Introduction to Stereochemistry

A. Textbook**, 'Organic Chemistry', Pearson New International edition** by **Wade:**

Wade Chapter: Stereochemistry Study sections 1 to 4B.

Or

B. The **e-book, 'Organic Chemistry' Eighth edition by Wade:**

Chapter 5: Study sections 5-1 to 5-4B

Study Unit 8 Alkyl Halides

A. Textbook**, 'Organic Chemistry', Pearson New International edition** by **Wade:**

Chapter: Alkyl Halides: Nucleophilic Substitution and Elimination

Read section 1, Study sections 2, 4, 5A and 6 to 10A, Study sections 11 to 13A and 16 to 21.

Chapter: Structure and Synthesis of Alkenes Study sections 9A and 9 E.

Or

B. The **e-book, 'Organic Chemistry' Eighth edition by Wade:**

Alkyl Halides: Chapter 6: Read sections 6-1, Study sections 6-2, 6-4, 6-5A and 6-6 to 6-10A, Study sections 6-11 to 6-13A and 6-16 to 6-21

Chapter 7: Study sections 7-9A and 7-9 E

Study Unit 9. Alcohols and Ethers

A. The textbook**, 'Organic Chemistry', Pearson New International edition** by **Wade:**

Chapter: Structure and Synthesis of Alcohols Read section 1, Study sections 2 to 3A, 3C and 4, Read section 5, Study sections 6 and 11.

Chapter: Reactions of Alcohols Study sections 1 to 2, 5 (leave out tosylates), 6 to 7, 10A and a good review of how to write reactions mechanism can be found in 'PROBLEM-SOLVING STRATEGY' (AFTER 10B).

Chapter: Structure and Synthesis of Alkenes Study section 10.

Chapter: Ethers, Epoxides and Thioethers Study sections 1 to 2 C [understand trends based on bonding and intermolecular forces do not use values of physical properties to compare properties of compounds], Study sections 3 to 3B, 5 and 8.

B. The **e-book, 'Organic Chemistry' Eighth edition by Wade:**

Alcohols: Chapter 10: Read section 10-1, Study sections 10-2 to 10-3A, 10-3C and 10-4, Read section 10-5, Study section 10-6 and 10-11

Chapter 11: Study sections 11-1 to 11.2, 11-5 (leave out tosylates), 11-6, 11-7 and 11-10A and a good review of how to write reaction mechanisms can be found in 'PROBLEM-SOLVING STRATEGY' (AFTER 11-10B).

Chapter 7: Study section 7-10

Ethers: Chapter 14: Study sections 14-1 to 14-2C [understand trends based on bonding and intermolecular forces do not use values of the physical properties to compare properties of compounds], Study sections 14-3 to14-3B, 14-5 and 14-8.

1.2 Study Plan for Assignment 2

Assignment 2 covers

a) REVISION of selected sections covered in assignment 1 [sections from Topics (2) - (4) of 6.1 in Tutorial Letter 101]: Review of Conformations, Mechanism of the halogenation of alkanes, Mechanisms of nucleophilic substitution and elimination reactions of alkyl halides and alcohols as well as structure of chiral compounds.

b) Selected sections of Topics (7) - (8) of 6.1 in Tutorial Letter 101, details:

Study Unit 6. Unsaturated Hydrocarbons (Alkenes and Alkynes)

A. The textbook**, 'Organic Chemistry', Pearson New International edition** by **Wade:**

Chapter: Structure and Synthesis of Alkenes Read section 1, Study sections 2 to 3A, Study sections 4 to 5, Read sections 6 to 7A, Study sections 7 B, Read section 8 and Study sections 9 and 10.

Chapter: Reactions of Alkenes Study section 1 to 7A, 8 to 10 (up to figure 6), Study sections 14 and 15.

Chapter Alkynes: Study sections 1 to 2, Read sections 3 to 4 and Study sections 5 to 10.

Or

B. The **e-book, 'Organic Chemistry' Eighth edition by Wade:**

Alkenes: Chapter 7: Read section 7-1, Study sections 7-2 to 7-3A, Study sections 7-4 to 7-5, Read sections 7-6 to 7-7A, Study section 7-7B, Read section 7-8, and Study sections 7-9 and 7-10.

Chapter 8: Study sections 8-1 to 8-7A, 8-8 to 8-10 (up to figure 8-6), Study sections 8-14 and 8-15.

Alkynes: Chapter 9: Study sections 9-1 to 9-2, Read sections 9-3 to 9-4, Study sections 9-5 to 9-10

1.3 Study Plan for Assignment 3

Assignment 3 covers **Topics (6) - (10) in 6.1 in Tutorial letter 101.**

Study Unit 6. Unsaturated Hydrocarbons (Alkenes and Alkynes) [also done in Assignment 2]

A. The textbook**, 'Organic Chemistry', Pearson New International edition** by **Wade:**

Chapter: Structure and Synthesis of Alkenes Read section 1, Study sections 2 to 3A, Study sections 4 to 5, Read sections 6 to 7A, Study sections 7 B, Read section 8 and Study sections 9 and 10.

Chapter: Reactions of Alkenes Study section 1 to 7A, 8 to 10 (up to figure 6), Study sections 14 and 15.

Chapter Alkynes: Study sections 1 to 2, Read sections 3 to 4 and Study sections 5 to 10.

Or

B. The **e-book, 'Organic Chemistry' Eighth edition by Wade:**

Alkenes: Chapter 7: Read section 7-1, Study sections 7-2 to 7-3A, Study sections 7-4 to 7-5, Read sections 7-6 to 7-7A, Study section 7-7B, Read section 7-8, and Study sections 7-9 and 7-10.

Chapter 8: Study sections 8-1 to 8-7A, 8-8 to 8-10 (up to figure 8-6), Study sections 8-14 and 8-15.

Alkynes: Chapter 9: Study sections 9-1 to 9-2, Read sections 9-3 to 9-4, Study sections 9-5 to 9-10

Study Unit 10. Amines

A. The textbook**, 'Organic Chemistry', Pearson New International edition** by **Wade:**

Chapter: Amines Read section 1, Study sections 2 (excluding names of aromatic and heterocyclic amines), Study sections 3 to 7 and 11 (S_N2 reactions).

B. The **e-book, 'Organic Chemistry' Eighth edition by Wade:**

Chapter 19: Read section 19-1, Study section 19-2 (excluding names of aromatic and heterocyclic amines), Study sections 19-3 to 19-7 and 19-11 (S_N2 reactions)

Study Unit 11. Carbonyl Compounds and their Derivatives

A. The textbook**, 'Organic Chemistry', Pearson New International edition** by **Wade:**

Wade Chapter: Ketones and Aldehydes Study sections 1 to 4, Read section 6, Study section 11, Read sections 13, 14 and 17 (up to Equilibrium of Acetal Formation), Read sections 9 and 20. **Wade Chapter: Carboxylic Acids:** Read section 1, Study sections 2 to 5 (up to nomenclature of carboxylic acid salts), Study sections 9 and 10. **Wade Chapter: Carboxylic Acid derivatives:** Read section 1, Study section 2 (excluding lactones and lactams), Study sections 3 and 5.

B. The **e-book, 'Organic Chemistry' Eighth edition by Wade:**

Ketones and Aldehydes: Chapter 18: Study sections 18-1 to 18-4, Read section 18-6, Study section 18-11, Read sections 18-13, 18-14 and 18-17 (up to Equilibrium of Acetal Formation), Read sections 18-9 and 18-20 **Carboxylic Acids:** Chapter 20: Read section 20-1, Study sections 20-2 to 20-5 (up to nomenclature of carboxylic acid salts), Study sections 20-9 and 20-10 **Carboxylic Acid derivatives:** Chapter 21: Read section 21-1, Study sections 21-2 (excluding lactones and lactams), Study sections 21-3 and 21-5

2. MasteringChemistry ACCESS

This section contains information related to:

2.1 Access Code

2.2 Registration on Masteringchemistry

2.3 Technical Requirements For Masteringchemistry

2.1 Access Code

The access code can be obtained via either process (i) or process (ii) below:

(i) To access MasteringChemistry, you must use the **access code** that is included in the prescibed textbook that you bought (see Tutorial Letter 101 for the textbook details.

Also note that if y**ou intend studying Chemistry at second and third level then you are advised to purchase the book since this textbook is also prescribed for the Organic Chemistry, CHE2613 and CHE3703 modules**).

N.B KEEP THE ACCESS CODE IN A SAFE PLACE - WE ARE NOT IN A POSITION TO PROVIDE YOU WITH ANOTHER ACCESS CODE.

If you have the access code, then proceed to reading sections 2.2 and 2.3 below.

(ii) If you do not have the prescribed textbook, 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).

You can purchase the access code by:

a) sending an e-mail to: pearson-za.ebooksupport@pearson.com

This is a central e-mail address where more than one person is dealing with UNISA's licences.

When you send the e-mail request, please specify that:

* **you are a registered Unisa CHE1502 Chemistry student**
* **you need to purchase an access code for your course**
* the **course code** is: **CHE1502S12015**
* **the textbook is Organic Chemistry by LG Wade (8th edition) - the New International edition is not listed but the relevant content is the same.**

(b) After you have sent the request via e-mail, you will receive a return e-mail which will provide you with the information on the procedure (for payment, etc.) to obtain the correct access code.

(c) Follow ALL the STEPS given in the reply e-message in (b). Note, if you do not follow all the steps as stipulated in the reply e-mail message to you, then you WILL NOT BE ABLE TO RECEIVE THE CORRECT ACCESS CODE.

❖ Once **you have the access code, then proceed to reading sections 2.2 and 2.3 below.**

2.2. Registration on Masteringchemistry

All students should use **the access code** for the textbook, Organic Chemistry by Wade to register for **MasteringChemistry**.

Once you have access to MasteringChemistry, then, you need to locate the course by entering the **course code**: **CHE1502S12015**

N.B. When **prompted for the textbook version, you MUST CHOOSE**:

"Wade, Organic Chemistry, 8e, since the New Pearson International Edition is not listed in the dropdown menu. [Also, **if you do not select this textbook, you will be routed to the site for the CHE1501 textbook**]. The eighth edition e-book can also be accessed on the MasteringChemistry site.

On the course site (CHE1502S12015) you will find ***The Introduction to MasteringChemistry***. You MUST go through this Introduction since it explains how MasteringChemistry works and it also contains instructions on how to draw structures, write names, etc.

NB. The Study Area on the MasteringChemistry site also has resources such as notes, PowerPoint presentations, etc. that will assist you with your studies.

The Tasks 1 to Task 4 will be posted later.

2.3. Technical Requirements For Masteringchemistry

The important technical requirements for complete utilization of the MasteringChemistry site are:

- **Windows 7 or 8**
- **Java Version 7**
- **Google Chrome or Firefox**

If you do not have the above loaded on your computer, you will not be able to do the tasks properly.

3. Assignment Questions: Assignment 2 Part A

ASSIGNMENT 2
Due Date: 26 March 2015
Unique number: 594305

IMPORTANT:

PART A must be submitted as a written assignment (make sure **you write the unique number on the assignment cover**).

PART B must be completed online on the MasteringChemistry® site.

PART A QUESTIONS

1. Consider the compound, CH_3CH_2CN.

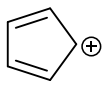
   (a) Draw Lewis structures for the compound. Include all nonbonding pairs of electrons.

   (2)

   (b) Draw a line-angle formula for the compound.

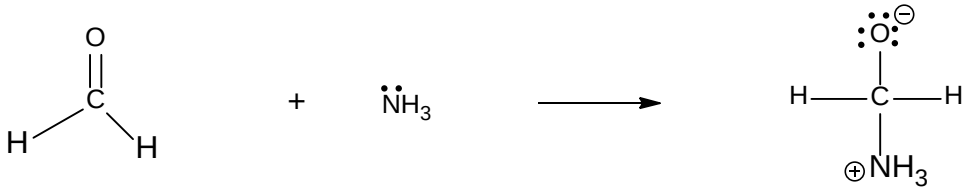
   (2)

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



(4)

4. Propose a detailed reaction mechanism for the reaction of (R)-2-bromobutane with

   (a) H_2O

   (b) ^-SH

   (6)

5. Draw the geometric isomers (E or Z) of $CH_3(OH)C=C(Br)CH_2CH_3$.

   Give the IUPAC name of each isomer.

   (6)

6. Consider the compound 4-methylhept-5-ol-2-yn.

   (a) Draw the structure of the compound from the name given above.

   (2)

   (b) Explain what is wrong with the name provided and give the correct IUPAC name for compound.

   (4)

7. Give the mechanism of the reaction of H_2O with $(CH_3)_2C=CHCH_3$ in the presence of an acid catalyst

   (5)
