

Bago University
Department of Chemistry
First Semester Examination, March 2019

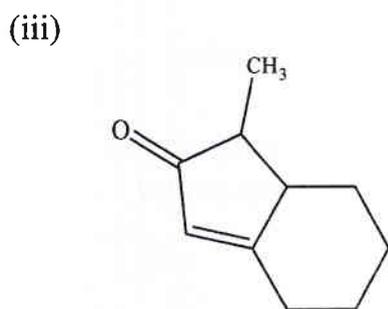
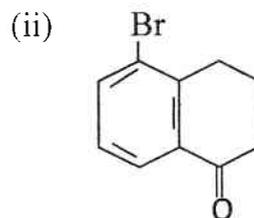
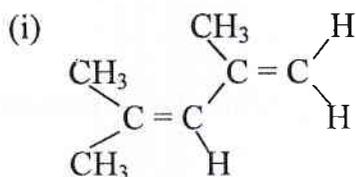
Fourth Year B Sc
(Chemistry Specialization)
Answer (any six) Questions

Chem-4103
Organic Chemistry V
Time allowed (3) hours

1. (a) Fill in the blanks with the correct word(s), unit(s), and etc., as necessary.
 - (i) Chloro- or bromo ----- are commonly referred to as halohydrins.
 - (ii) The reaction in which a ----- group is substituted for a hydrogen atom is called nitration.
 - (iii) The simplest carbene is named as -----.
 - (iv) Spectroscopy is the study of the interaction of matter and ----- radiation.
 - (v) The IR region is divided into three regions, the near, ----- and far IR.
 - (vi) Ultraviolet light has ----- energy than visible light.
- (b) Select the correct statement(s), word(s), unit(s) and etc., given in the followings.
 - (i) A (carbene, carbide, carbonate) is a highly reactive intermediate with a dicoordinate carbon atom.
 - (ii) (Epoxide, Peroxide, Borane) is a radical initiator that causes radical reactions.
 - (iii) The conversion of plant oils to margarine is (oxidation, hydrogenation, hydrohalogenation) reaction.
 - (iv) Water molecule (H_2O) which is has (two, three, four) fundamental vibrations.
 - (v) (Microwaves, Cosmic rays, Radio waves) have the lowest energy.
 - (vi) Band intensities can be expressed as (transmittance, wavelength, absorbance).
2. (a) Starting with 1-pentene, how would you synthesize 2-pentanol by oxymercuration-demercuration?
 - (b) Propose a mechanism for each of the following reactions.
 - (i) Hydration of 2-methyl propene
 - (ii) Addition of HBr to propene in the presence of peroxide
3. (a) Suggest the mechanisms for bromination and nitration of benzene.
 - (b) How would you convert phenol into the following compounds?
 - (i) *o*- bromophenol
 - (ii) *p*- nitrophenol

P.T.O

4. (a) Illustrate the reactions given below with equations.
 (i) Cycloaddition (ii) Hydroboration-oxidation (iii) Hydrohalogenation
 (b) Perform the following conversions.
 (i) methylene cyclopentane \longrightarrow cyclopentanone
 (ii) cyclohexene \longrightarrow cyclohexanol
 (iii) propene \longrightarrow 2-propanol
5. (a) Write down the equations for the following reactions.
 (i) Nitration of anisole (ii) Friedel-Crafts acylation of benzene
 (b) Predict the products that would be formed from the bromination of the following compounds.
 (i) p-nitrotoluene (ii) ethyl benzene (iii) anisole
6. (a) What is the frequency and energy of electromagnetic radiation with a wavelength of 1.0×10^4 nm? What type of radiation is it? ($h = 6.626 \times 10^{-34}$ Js)
 (b) Define the following terms.
 (i) Bathochromic shift (ii) Hypsochromic shift
 (iii) Chromophore (iv) Auxochromes
7. (a) Illustrate the stretching and bending vibrations of H_2O and CO_2 .
 (b) Calculate the predicted λ_{max} using Woodward-Fieser rules and point out the chromophores present in the following compounds. (If you want to use base values and auxochrome corrections, the references can be available at the end of your question).



References of diagnostic λ_{\max} value for UV-Vis spectral line

No.	Base values:	
1.	Conjugated diene correlation	
	(i) for acyclic (or) heteroannular (transoid)	214nm
	(ii) for homoannular (cisoid)	253nm
2.	Enone correlation	
	(i) for acyclic (or) cyclohexanone	215nm
	(ii) for cyclopentanone	202nm
3.	Benzoyl correlation	
	(i) X-C ₆ H ₄ -CO-OH / -OR	230nm
	(ii) Aliphatic, X-C ₆ H ₄ -COR	246nm
No.	Auxochrome corrections:	
1.	for each exocyclic olefin	+5
2.	for each extending olefin	+30
3.	for each alkoxy (-OR)	+6
4.	for each alkyl or ring residue	+5
5.	for each - Br (α)	+25
6.	for each - Br (β)	+30
7.	for each - Br (<i>o, m</i>)	+2
8.	for each - Br (<i>p</i>)	+15
9.	for each alkyl or ring residue (α)	+10
10.	for each alkyl or ring residue (β)	+12
11.	for each alkyl or ring residue (γ, δ)	+18
12.	for each <i>o</i> -ring residue	+3
