



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2021/2022**

COURSE NAME : ORGANIC CHEMISTRY I
COURSE CODE : BWK 10303
PROGRAMME CODE : BWK
EXAMINATION DATE : JANUARY / FEBRUARY 2022
DURATION : 3 HOURS
INSTRUCTION : 1. ANSWER ALL QUESTIONS.
2. THIS FINAL EXAMINATION IS AN **ONLINE** ASSESSMENT AND CONDUCTED VIA **OPEN BOOK**

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

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- Q1** (a) Draw a plausible structure for the compounds listed, by following the guideline procedures for writing the Lewis structure of molecules and polyatomic ions:
- (i) nitrosyl bromide, BrNO , (5 marks)
 - (ii) hydroxylamine, H_3NO , (5 marks)
- (b) (i) Illustrate the chemical structure corresponding to 2,3-dibromocyclobutene. (2 marks)
- (ii) Express the name of an alkyl halide with the chemical structure of CF_3CHClBr . (2 marks)
- (iii) List **FOUR (4)** structural formulae and their IUPAC name of isomers corresponding to the chemical formula of $\text{C}_4\text{H}_{10}\text{O}$. (6 marks)
- Q2** Two students conducted an experiment burning nonane (C_9H_{20}) compound in the air separately. The combustion resulted in two different observations. Student A discovered that the combustion was complete, whereas student B discovered that it was incomplete. The incomplete combustion produced carbon monoxide and water.
- (a) (i) Write the correct chemical reaction equations for each combustion. (6 marks)
- (ii) Based on **Q2(a)(i)**, explain the different observations of each combustion. (4 marks)
- (b) C_9H_{20} can be cracked to form two compounds. The compounds possibly produced are butane and **X** compounds.
- (i) Present the cracking reaction of C_9H_{20} by writing a chemical reaction equation. (6 marks)
- (ii) Compound **X** can react with hydrogen iodide at room temperature. Show a mechanism reaction and name all compounds involved according to IUPAC nomenclature. (4 marks)
- Q3** (a) Propane and propene have different reactions. In the presence of ultraviolet light, propane reacts with bromine. In contrast, the propene reacts readily with bromine. In order to demonstrate the two compounds' dissimilar reactions:
- (i) Discuss the reaction of propane with bromine when exposed to ultraviolet light. (4 marks)

- (ii) Show the chemical reaction equation of propene with bromine. (4 marks)
- (b) An unsaturated hydrocarbon with the molecular formula, C_8H_{14} is labelled as compound **Y**. Outline the mechanism for the predominant product yielded when compound **Y** reacts with:
- (i) Concentrated sulphuric acid. (4 marks)
- (ii) Bromine water. (4 marks)
- (iii) Hydrogen bromide and benzoyl peroxide. (4 marks)
- Q4** (a) A group of students was given a task to determine unsaturated compounds resulted from 3,3-dimethylcyclooctyne with reagent A and reagent B, separately. Illustrate the complete chemical reaction equations for each reagent. (4 marks)
- (b) Sodium amide is a strong base and a very effective nucleophile. It is used in weak acid deprotonation and also in elimination reactions. Distinguish between the reactions of each compound in **Figure Q4(b)** when they are extremely reacted with sodium amide. (6 marks)
- (c) Correlate the increased boiling point in **Table Q4(c)** with the chemical structure of alkyl halides. (10 marks)
- Q5** (a) Some compounds have several chiral atoms in their structures. By referring to the compound in **Figure Q5(a)**, label chiral atom(s) and explain your answer. (4 marks)
- (b) For the following IR Spectroscopy table (**Table Q5(b)**), complete the table by assigning the correct frequency and wavenumber to the right functional group and structural unit accordingly. (8 marks)
- (c) Explain whether UV-Vis spectroscopy is a qualitative or quantitative tool. (8 marks)

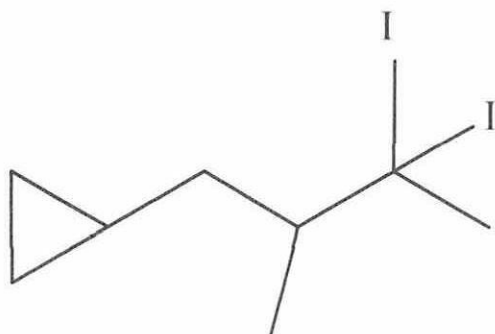
– END OF QUESTIONS –

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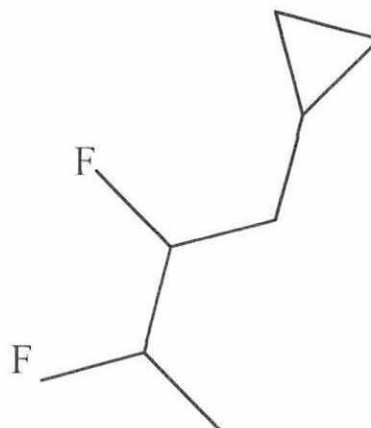
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(i)



(ii)

Figure Q4(b)

Table Q4(c)

R	X =	H	F	Cl
CH ₃		-161.7	-78.4	-24.2
CH ₃ CH ₂		-88.6	-37.7	12.3
CH ₃ (CH ₂) ₂		-42.1	-2.5	46.6

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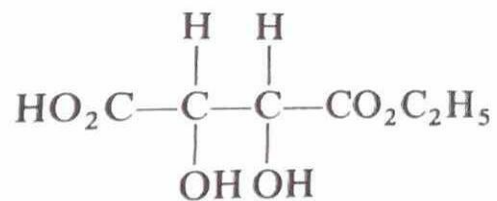
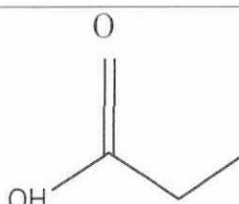

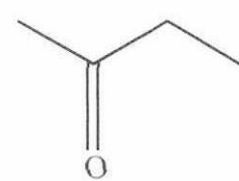



Figure Q5(a)

Table Q5(b)

Structural unit	Wavenumber (cm ⁻¹)	frequency
		
		
		
		

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