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Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2023/2024**

- COURSE NAME : ORGANIC CHEMISTRY
- COURSE CODE : DAK 22002
- PROGRAMME CODE : DAK
- EXAMINATION DATE : JANUARY/ FEBRUARY 2024
- DURATION : 2 HOURS 30 MINUTES
- INSTRUCTIONS :
1. ANSWER **ALL** QUESTIONS
 2. THIS FINAL EXAMINATION IS CONDUCTED VIA
 - Open book
 - Closed book
 3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF **NINE (9)** PAGES

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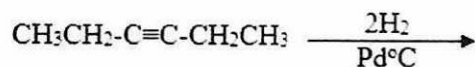
Q1 Answer the following questions.

- (a) Double bonds can exist as geometric isomers and these isomers are designated by using either the *cis* or *trans* designation. Explain the differences between *cis* and *trans*.

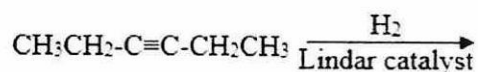
(2 marks)

- (b) Predict the major products of the following reactions.

(i)



(ii)



(iii)

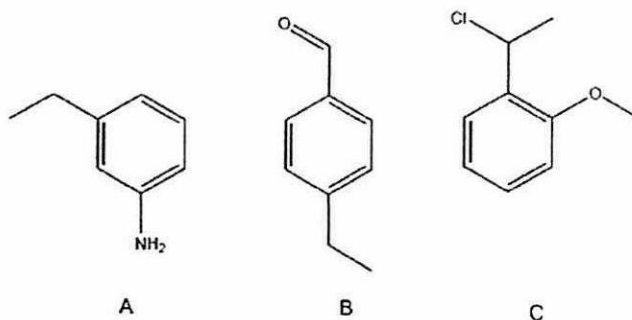


(6 marks)

- (c) Show the synthesis mechanism of the hex-1-yne from 2-bromohex-2-ene.

(8 marks)

- (d) Identify the compounds A, B and C as para, meta and ortho-substituted.

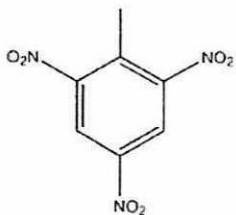


(3 marks)

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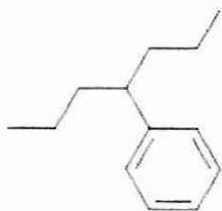
(e) State the IUPAC name of the following compound.

(i)



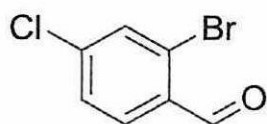
(1 mark)

(ii)



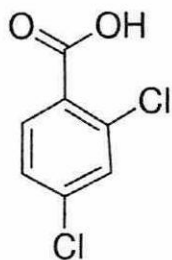
(1 mark)

(iii)



(1 mark)

(iv)



(1 mark)

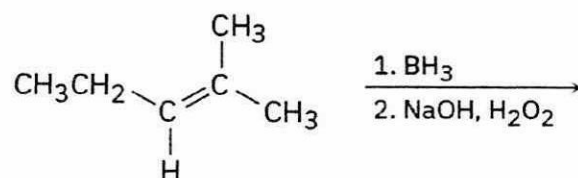
(f) Write the condition and reagent used for the reaction.



(2 marks)

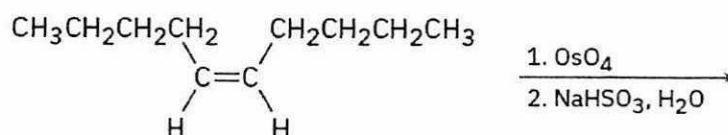
- (d) Predict the major product and identify the reactant used in the following reactions.

(i)



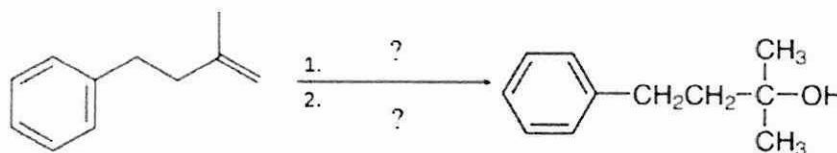
(2 marks)

(ii)



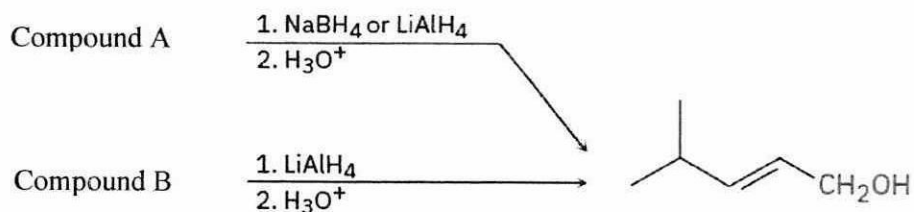
(2 marks)

- (e) Identify the reactant used in the reaction.



(2 marks)

- (f) Draw the structure of carbonyl compounds A and B that would be reduced to obtain the alcohol compound.



(4 marks)

- (g) Show the reaction mechanism of the ester reduction to produce 2-penten-1-ol from methyl-2-pentenoate.

(6 marks)

Q3 (a) Aldehyde and ketones are essential organic compounds found in various natural resources.

(i) State the functional group of aldehyde and ketones and draw the general chemical structure of aldehyde and ketones.

(3 marks)

(ii) Discuss four (4) properties of aldehyde and ketone.

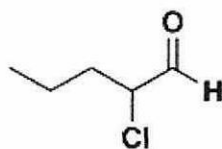
(4 marks)

(iii) Provide general applications of aldehyde and ketones in industries with specific examples.

(4 marks)

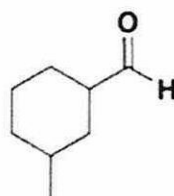
(b) Name the following compounds based on the IUPAC system.

(i)



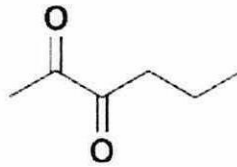
(1 mark)

(ii)



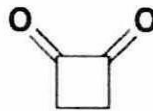
(1 mark)

(iii)



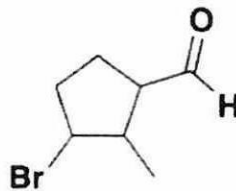
(1 mark)

(iv)



(1 mark)

(v)



(1 mark)

(c) Aldehyde and ketone could be synthesized from primary and secondary alcohol via a suitable reaction mechanism.

(i) Based on the above statement, state the name of the reaction.

(1 mark)

(ii) Illustrate the aldehyde and ketone formation routes using alcohol by showing a suitable chemical structure.

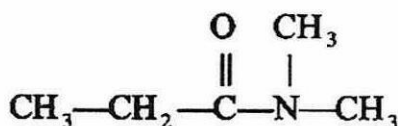
(4 marks)

- (iii) A subsequent reaction could be performed on aldehyde to produce a new compound; however, a similar reaction could not be performed on ketone as no further reaction would occur. Name the functional group due to the reaction on aldehyde.
(1 mark)
- (iv) Discuss the reasons why the reaction is unable to proceed on ketone.
(2 marks)
- (v) Name a test that could be used to distinguish between aldehyde compound and ketone compound based on the reaction differences.
(1 mark)

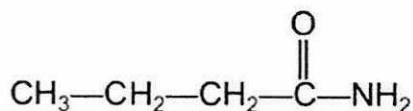
- Q4** (a) Amine and amide are natural and abundant organic compounds that contain nitrogen elements.
- (i) Give two (2) examples of materials that naturally contain amine or amide.
(2 marks)
- (ii) State the applications of amine and amide in pharmaceutical field.
(2 marks)
- (iii) Draw the chemical structures of amine and amide.
(2 marks)

- (b) Write the IUPAC name for the following compound and classify the compound as primary (1°), secondary (2°) or tertiary (3°).

(i)



(ii)



(4 marks)

- (iii) List three (3) differences in physical properties for primary, secondary, and tertiary amine.
(3 marks)

- (c) Low molecular-weight amines tend to have sharp, penetrating odours similar to ammonia while higher molecular-weight amines smell like rotting fish and are often found in decaying animal tissues. Trimethylamine (TMA) is the simplest tertiary aliphatic amine responsible for the pungent odour given off by fish and other marine and aquatic animals. Lemon juice is often used to neutralize the 'fishy' smell of trimethylamine found in fish. In the laboratory, trimethylamine could be prepared by the reaction of ammonia and methanol employing a catalyst.
- (i) Draw the chemical structure of trimethylamine. (1 mark)
- (ii) Show the reaction of ammonia and methanol to produce trimethylamine. (2 marks)
- (iii) Based on the above statement, describe the physical and chemical characteristics of amines. (3 marks)
- (d) Discuss the preparation of amines from the reaction of ammonia with an alkyl halide and show suitable mechanism. (6 marks)

-END OF QUESTIONS -