SL-31

Total No. of Pages : 4

Seat No.	205

M.Sc. (Part - I) (Semester - I) (NEP1.0) Examination, November - 2023

CHEMISTRY - I

Organic Chemistry - I (Paper - II)

Sub. Code : 87850 / 92118

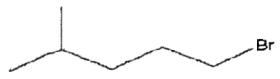
Day and Date : Thursday, 30 - 11 - 2023 **Total Marks : 80**

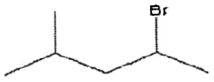
Time : 10.30 a.m. to 01.30 p.m.

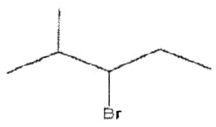
Instructions :
1) Attempt in all five questions.
2) Question no. 1 is compulsory.
3) All questions carry equal marks.
4) Answer to the all questions (Section-I AND II) must be written in the same answer book.
5) Figure to the right indicate marks.
6) Attempt at least any two questions from both the sections.

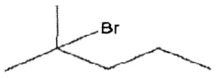
Q1) Answer the followings : **[16]**

a) Which of the following compound undergoes substitution by the SN^2 mechanism at the fastest rate?

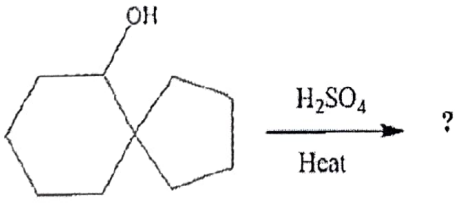
1. 

2. 

3. 

4. 

b) Predict the product



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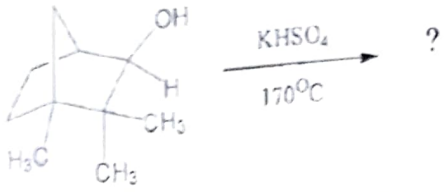
c) Identify the product in following reaction.



d) Which of the following is chiral?

i) 2-methyl-2. 3-hexadiene

ii) 4-methyl-2. 3-hexadiene

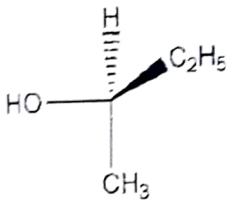
iii) 2. 4-dimethyl-2. 3-pentadiene

iv) cyclobutane.

e) The cycloheptatriene is not aromatic in nature, justify.

f) How will you find out enantiomeric excess?

g) Assign R or S configuration to the following



h) Write the structure of tropone.

i) Heterolytic bond cleavage produces _____ as an intermediates.

j) The weakest base is amongst the following is _____.

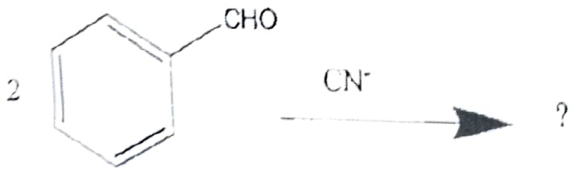
i) Br^-

ii) Cl^-

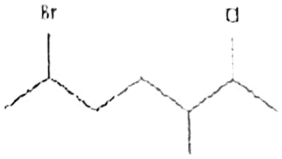
iii) I^-

iv) None of these

k)



l) Name the following using systematic IUPAC nomenclature.



m) What is Nef reaction?

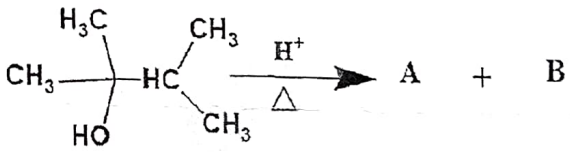
n) What is homotopic group?

o) What are ambident nucleophiles? Give any two examples.

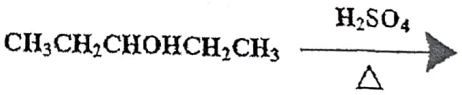
p) Give one example of thermodynamic control reaction.

SECTION - I

Q2) a) Each one of the following alcohols has been subjected to acid-catalyzed dehydration and yields a mixture of two isomeric alkenes. Write the structure of the two alkenes in each case and identify the major product. Justify your answer in each case.

i) 

[4]

ii) 

[4]

b) How many alkenes would you expect to be formed from each of the following alkyl bromides under conditions of E_2 elimination? [8]

i] 3-bromo hexane

ii) 2-bromo-3-methyl pentane

iii) 3-bromo-2,2-dimethyl butane

iv) 3-bromo-2-methyl pentane.

Q3) a) Nature of groups affects the strength of acids and bases in organic chemistry. On this context, explain the acidity of mono, di and trichloro acetic acid and basicity of ortho and para-nitro anilines. [8]

b) Discuss the key role of neighboring group participation concept in rate of the reaction. Explore your input with suitable examples. [8]

Q4) a) Why does the carbocation intermediates in the hydrolysis of 2-bromo-3-methyl butane rearrange by way of a hydride shift rather than a methyl shift? **[4]**

b) Predict the major organic product of each of the following conversion. **[4]**

i) See-butyl bromide by solvolysis in methanol.

ii) Reaction of cyclohexyl bromide and potassium ethoxide.

c) Friedel-Crafts acylation of the individual isomers of xylene with acetyl chloride and aluminium chloride yields a single product, different for each xylene isomer, in high yield in each case. Write the structures of the products of acetylation of o-, m-, and p-xylene. **[8]**

SECTION - II

Q5) a) Explain the reaction mechanism and applications of the following reactions. **[8]**

i) Mitsunobu reaction

ii) Robinson Annulation

b) Explain the concept of prochirality with suitable examples. **[8]**

Q6) a) Discuss the preparation and reactivity of carbenes and nitrenes. **[8]**

b) Explain the different methods used for the resolution of a racemic mixture. **[8]**

Q7) Write notes on (Any four) the following. **[16]**

a) Diazocoupling

b) Aromaticity of Tropone

c) Energy profile diagram

d) Stobbe condensation

e) Rules of R and S nomenclature.

SV-62

Total No. of Pages : 03

Seat No.	

M.Sc. (Part-I) (Semester-I) (CBCS)

Examination, May 2024

Chemistry/Applied Chemistry/Industrial Chemistry

MMT-101: Organic Chemistry - I

Sub. Code : 74578 / 83400 / 87850 / 92118

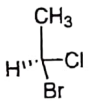
Day and Date: Friday, 10-05-2024 **Total Marks: 80**

Time: 02.30 p.m. to 05.30 p.m.

Instructions:
1) **Question No. 1 is compulsory.**
2) **Attempt ANY TWO questions from EACH section.**
3) **All questions carry equal marks.**
4) **Figures to the right indicate full marks.**

Q.1 Solve the following. **(16)**

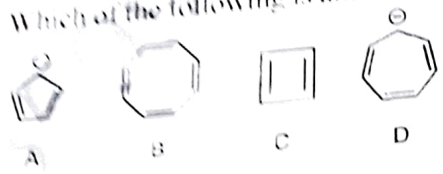
1) Mention types of carbene and comment on its stability.
2) What do you mean by thermodynamic control reaction?
3) Which diastereomers of 1-bromo-4-tert-butylcyclohexane, the cis or the trans, undergo elimination more rapidly when treated with sodium ethoxide?
4) What is Zaitsev's rule?
5) How many stereoisomers can exist in 2, 3-diamino butane? Justify your answer.
6) Draw the stable conformation of 1-tert.butyl-1-methylcyclohexane and justify your answer.
7) Assign R or S nomenclature to the following compound:



9) Mention total number of isomers including stereoisomers for 1, 3-dimethyl cyclohexane

10) What are homoaromatic compounds? Give two examples.

10) Which of the following is antiaromatic?



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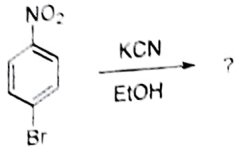
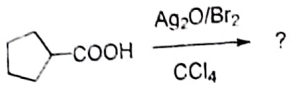
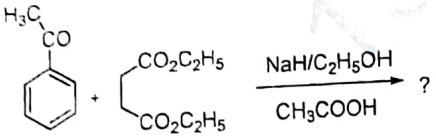
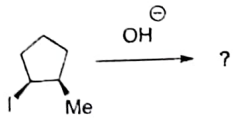
12) 

13) 

14) 

15) 

16) Define the term, 'ambident nucleophiles'. Give two examples.

SECTION - I

Q.2 **a)** Explain nucleophilic substitutions at vinylic carbons. **(6)**

b) Explain the aromaticity of tropone, tropolone, tropylium salts. **(6)**

c) Discuss neighboring group participation with a suitable example. **(4)**

Q.3 a) Indicate any two reactions involving nitrenes as an intermediate with proper mechanism. (6)

b) Explain Hofmann elimination with a suitable example. (4)

c) Explain concept of R and S nomenclature with suitable examples. (6)

Q.4 a) Write the mechanism of E2 reaction. Explain the effect of solvent and leaving group on E2 reaction. (8)

b) Discuss the chemical and biological methods of racemic resolution with suitable examples. (8)

SECTION - II

Q.5 a) Write the mechanism of following reactions: (8)

i) Benzoin condensation

2) Robinson annulation

b) Explain different factors affecting strength of acids and bases. (8)

Q.6 a) Explain nucleophilic aromatic substitution reactions, SN1 and SN2. (8)

b) Draw the conformations of 1, 3 and 1,4 dimethyl cyclohexane. Explain their stability. (8)

Q.7 **Write notes on the following. (Any four)** (16)

a) Diazo coupling reaction

b) Kinetic and thermodynamic control reaction

c) Nef reaction

d) Enantiotopic faces

e) Mitsunobu reaction

f) Huckel's rule of aromaticity