

[This question paper contains 4 printed pages.]

Sr. No. of Question Paper : 8441

C

Roll No.....

Unique Paper Code : 217103

Name of the Paper : CHHT-102 : Organic Chemistry

Name of the Course : B.Sc. (Hons) CHEMISTRY, Part I
(Admission after 2010 and onwards)

Semester : I

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Answer six questions in all.
3. Question No. 1 is compulsory.

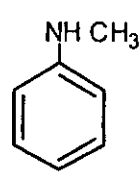
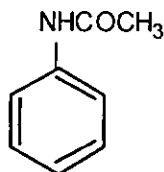
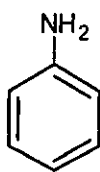
1. (a) An organic compound (A) $C_5H_{10}Br_2$ on reaction with sodamide produces (B). Compound (B) neither reacts with sodium nor forms any metal alkynide but reacts with Lindlar's catalyst to give (C) and on reaction with $Na/liq.NH_3$ produces (D). Both the compounds (C) and (D) are isomeric.

(i) Give the structures of (A), (B), (C), and (D).

(ii) Write all the reactions involved.

(iii) Write all the possible stereoisomers of compound (A) and give their relationship with each other.

- (b) Arrange the following in the increasing order of basic strength. Give reasons for your answer :



- (c) Draw the most stable conformer of :

(i) Ethylene glycol (ii) *trans*-1-tert-Butyl-3-methylcyclohexane

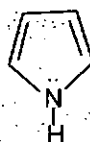
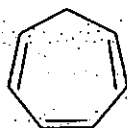
Justify your answer.

(9,2,4)

P.T.O.

2. (a) Calculate the percentage of monochlorinated and monobrominated alkane obtained by substitution of 3° H of 2-methylpropane. Compare the percentages of the products formed and explain. (relative rates of hydrogens $3^\circ:2^\circ:1^\circ$ towards chlorination at room temperature are 5.0:3.8:1 and bromination at 125°C are 1600:82:1).

- (b) Classify the following as aromatic, non-aromatic, and anti-aromatic and give reasons for your answer :

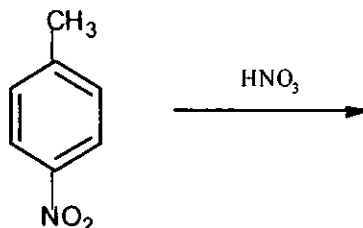


- (c) Why does propene react with HBr in presence of peroxides to give 1-bromopropane whereas in absence of peroxides it gives 2-bromopropane ?
(4×3)

3. Explain the following (attempt any **three**) :

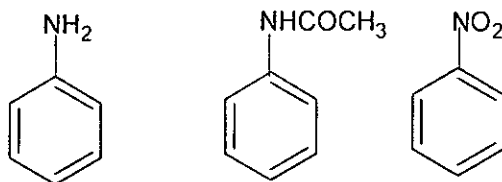
- (a) Pent-2-ene when treated with NBS in presence of CH_2Cl_2 gives a single product.
- (b) *o*-Hydroxybenzaldehyde has lower boiling point and decreased water solubility as compared to its *m*- or *p*- isomers.
- (c) *p*-Chloronitrobenzene has lower dipole moment (2.4 D) than *p*-nitrotoluene (4.4D).
- (d) pK_a values for *p*-nitrophenol and phenol are 7.14 and 9.95, respectively.
(4×3)

4. (a) Write the product(s) formed and the mechanism of the following reaction :



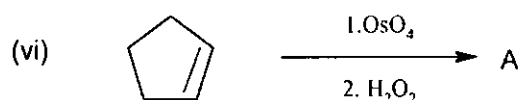
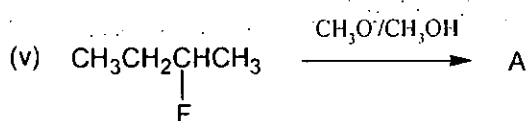
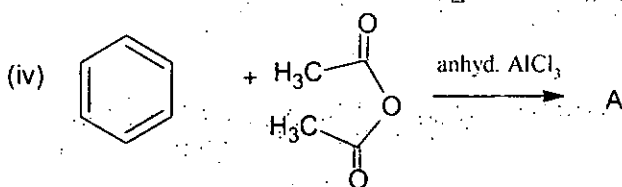
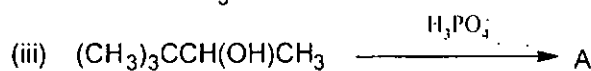
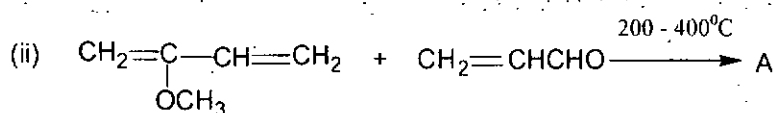
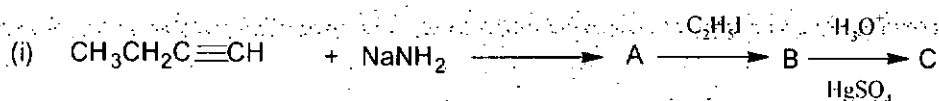
- (b) Taking the example of 1-bromo-2-phenylethane, explain the elimination reaction via E1cB pathway.

- (c) Arrange in the order of decreasing reactivity towards electrophilic substitution and give reasons :



(4×3)

5. Complete the following reactions and identify A, B and C :

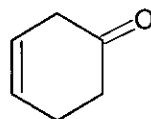
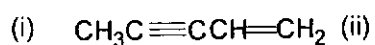


12 (1.5 for each product)

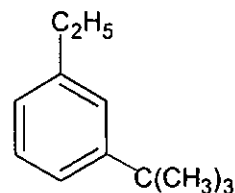
6. Attempt any **three** :

(a) Write the structural formula of (*E*)(*S*)-5-Bromo-2,7-dimethyl-4-nonene.

(b) Write the IUPAC names of the following :

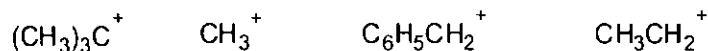


(iii)

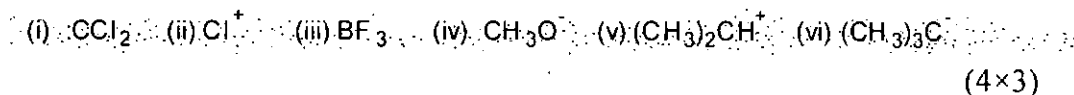


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- (c) Arrange the following in increasing order of their stability and give reason in support of your answer.



- (d) Classify each of the following species as electrophiles or nucleophiles :

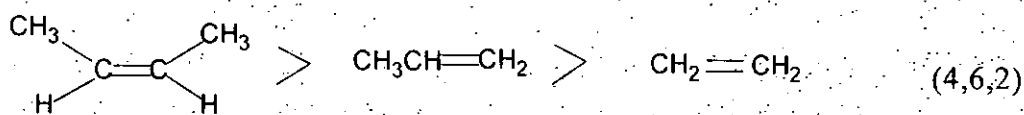


7. (a) Why is nitration of nitrobenzene slow as compared to nitration of toluene?

- (b) Giving mechanism involved write the structure of alcohols formed from cyclohexene, $\text{C}_6\text{H}_{11}\text{CH}=\text{CH}_2$, under following conditions :

- (i) hydroboration-oxidation
 (ii) oxymercuration-demercuration
 (iii) acid catalysed hydration

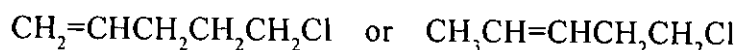
- (c) Explain the decreasing order of stability of alkenes



8. Attempt any **three** :

- (a) What happens when propene is reacted with hypochlorous acid? Support your answer with mechanism.

- (b) Which compound will undergo dehydrohalogenation in presence of alc. KOH at a faster rate?



- (c) Show steps involved in reductive ozonolysis of cyclohexene. What are the reaction conditions?

- (d) On the basis of Baeyer's strain theory explain why cyclobutane is less stable than cyclohexane? (4×3)