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AR-19

M.SC

M.Sc 1ST SEMESTER REGULAR EXAMINATIONS, NOV/DEC 2019-20

CHPC101-ORGANIC CHEMISTRY-I

Time: 3 Hours

Max Marks: 80

The figures in the right hand margin indicate marks.

SECTION A

Q.1 Answer any four of the following:

[4 X 4 =16]

a Explain the following trend of acidity. Give reasoning to your answer.

4



b Cryptands are better host than crown ethers.

4

c Explain with suitable examples, how stereochemistry helps to determine the mechanism of a chemical reaction?

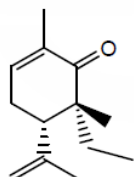
4

d Justify the existence of nonclassical carbocations through a reaction?

4

e Assign the absolute configuration (R/S) of the two stereogenic (chiral) centers in the following molecule.

4



f Arrange the following compounds in order of increasing reactivity towards cyanide ion under S_N1 condition with suitable explanation.

4

Benzyl bromide, ethyl bromide, sec-butyl bromide, allyl bromide, tert-butyl bromide

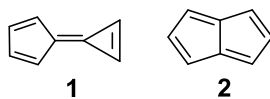
Or

2. Answer all questions from the following

[2 x 8 =16]

a Comment on the aromaticity of the following compounds.

2



b What do you mean by thermodynamic and kinetic control of a chemical reaction?

2

c Why 12-crown-4 binds Li⁺ but not K⁺ while 18-crown-6 binds K⁺ but not Li⁺?

2

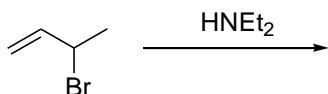
d Draw the stereo chemical structures of the following molecules.

2

(2S, 3S)-3-Bromo-2-butanol

e Write down the product of the following reaction with mechanism.

2



f Explain with a general example why in S_N2 reaction front side attack is not feasible.

2

g What will be the major product when 1-bromo-1,2-dimethylcyclohexane undergoes an elimination reaction in presence of NaOEt in ethanol medium?

2

h Write down the chemical structure of (E)-1-bromo-penta-1,2,3-triene.

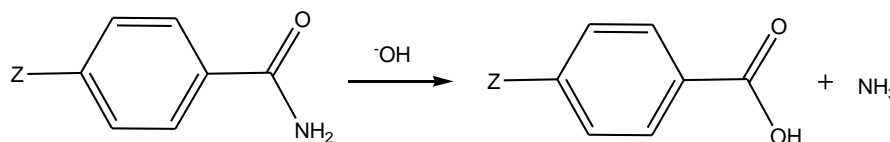
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SECTION-B

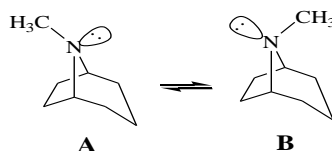
3. Answer all Questions: [16 x4 =64]
- a (i) Discuss the stability of carbene. Describe two methods of preparation of this intermediate. 4+4
- (ii) What is free radical ? How it is detected ? How it is stabilized? What are the type of compounds generally used for generation of free radicals 1+1+2+4

Or

- b Write notes on the following: 4x4
- (i) Resonance effect
- (ii) Inclusion complexes
- (iii) Catenanes
- (iv) Nonbenzenoid compounds
- 4.
- a (i) For the following hydrolysis reaction, explain the trend of σ values for Z= -CN, -Cl, -OCH₃ and -H. 8



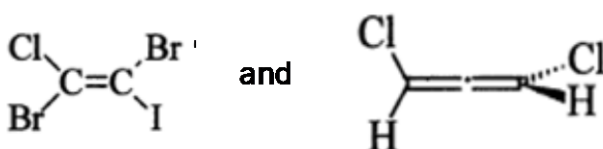
- (ii) State and explain Curtin-Hammett principle. In the following Tropanes, B produces major quaternary salt and A produces minor. Explain on the basis of Curtin-Hammett principle. 4+4



Or

- b State Hammond's postulate 2
- (i)
- (ii) 1,2 and 1,4-addition of HBr to butadiene are kinetically and thermodynamically controlled reactions respectively. Explain this statement with energy profile diagram 4+4
- Explain the hard-soft concept of acid base with suitable examples. 6

- 5.
- a Explain Optical activity of allenes and spirans in spite of absence of chiral carbon. 2+2
- (i)
- (ii) The menthyl chloride on elimination with NaOEt in EtOH produces 100% 2-menthene, but neomenthyl chloride under similar reaction conditions affords the mixture of 2-menthene and 3-menthene in ratio of 1:3. 4+4
- (iii) Give precise names for the following compounds with proper stereochemical notation. 2+2



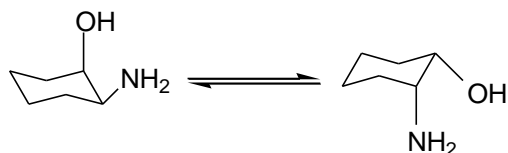
Or

- b Define Helicity rule with suitable example. 2+2



Find out the products of the following conformers in equilibrium in presence of NaNO_2 and HCl .

3+3



Discuss the various methods for resolution of racemic mixture

6

6.
a

- (i) Define $\text{S}_{\text{N}}1$ mechanism? Discuss the mechanism with suitable example to explain the observed results of these reactions including stereochemistry.
- (ii) What is Neighboring group participation? Explain with suitable example.
- (iii) Discuss the stability of non-classical carbocation

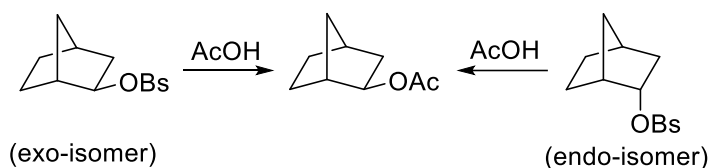
6+4+6

Or

b Explain,

4x4

- i) Vinyl halide is unreactive towards nucleophilic substitution reaction.
- ii) Electron withdrawing group at the vinyl carbon enhance the nucleophilic substitution.
- (iii) Explain with mechanism why solvolysis of exo- and endo-2-norbornyl brosylate in acetic acid give exo-2-norbornyl acetate and the exo-isomer reacts 350 times faster compared to endo-isomer.



- (iv) Iodide ion is both a good nucleophile and a good leaving group.