2015

(6th Semester)

CHEMISTRY

NINTH PAPER

Course No. : CHEM–361

(Organic Chemistry—III)

Full Marks : 55

Time : 2½ hours

(PART : B—DESCRIPTIVE)

(*Marks* : 35)

The figures in the margin indicate full marks for the questions

1. *(a)* What are the different modes of dissipation of energy? 4

   (b) Discuss the following with examples : 3

   (i) Photochemical reduction

   (ii) Norrish type-II cleavage

OR

2. *(a)* What types of excitation are possible in a compound containing carbonyl group on irradiation with UV light? 4

(b) Comment upon the following : 3

(i) Singlet and triplet states

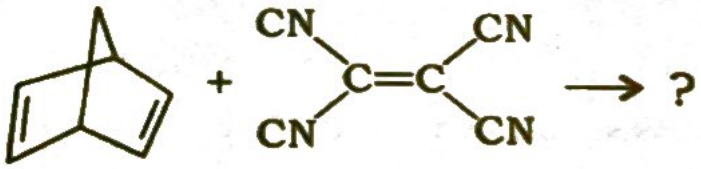
(ii) Quantum yield

3. *(a)* With the help of Frontier molecular orbital method, explain why disrotatory ring closure is allowed in photoinduced reaction in 1,4-disubstituted 1,3-butadiene. 4

(b) Complete the following reactions naming the type of cycloaddition reaction : 3

(i) $= + = \longrightarrow ?$

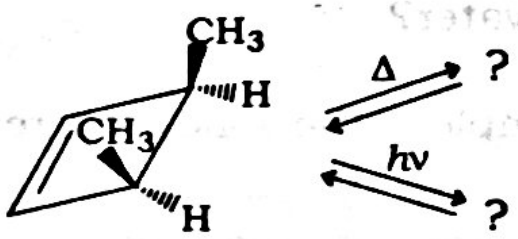
(ii)  $+ = \longrightarrow ?$

(iii) 

OR

4. *(a)* Write brief notes on suprafacial and antarafacial processes in cycloaddition pericyclic reaction. 4

(b) Predict the products from the following reactions : 3



5. (a) What happens when thiol is treated with mild oxidizing agent such as bromine? Write the chemical equations involved. 3

(b) The diequatorial conformer is more stable than diaxial conformer. Explain it. 4

OR

6. (a) Write all the possible conformational structures of 1,4-dimethylcyclohexane. 3

(b) How will you prepare thiol from—

(i) R—S—S—R;

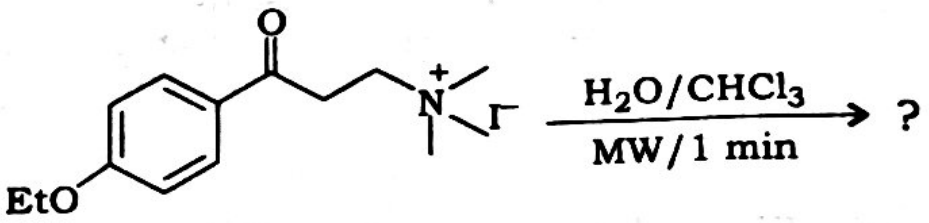
(ii) R—X;

(iii) $CH_3CH{=}CH_2$? 3

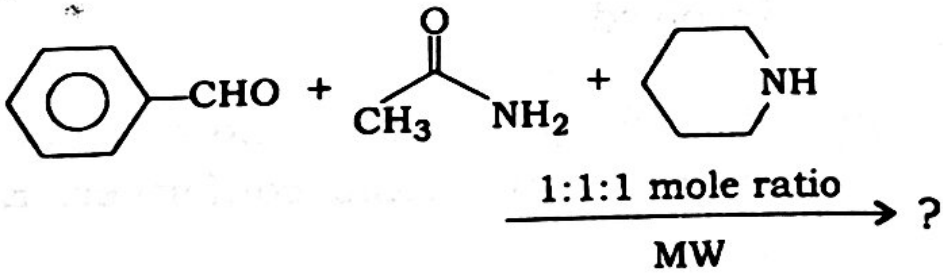
(c) What happens when thiols react with NaOH? 1

7. *(a)* How can you synthesize Mannich base with the help of microwave in presence of water? 3

(b) Complete the following reaction : 2



(c) Complete the following product in presence of microwave : 2

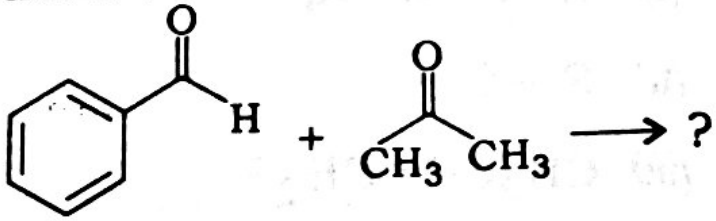


OR

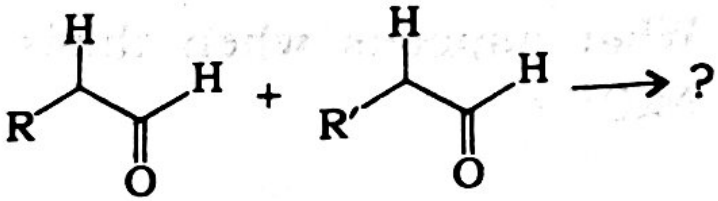
8. *(a)* Discuss the use of microwave in Hofmann elimination reaction. 3

(b) Predict the products from the following reactions : 2+2=4

(i)

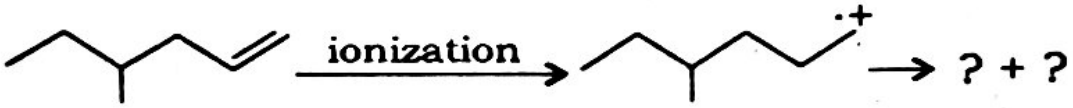


(ii)



9. *(a)* How can you differentiate between shielding and deshielding shifts in NMR spectroscopy? 3

(b) Propose the structures and fragmentation mechanisms corresponding to ions with m/z 57 and 41 in the mass spectrum of 4-methyl-1-hexene : 4



OR

10. *(a)* Predict the chemical shift for toluene and acetophenone. 2

(b) Explain the principle of NMR spectroscopy. 2

(c) What approximate intensities would you expect for the M^+ and $M^+ + 2$ peaks of CH_3Cl? 3

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(PART : A—OBJECTIVE)

(*Marks* : 20)

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SECTION—A

(*Marks* : 5)

Put a Tick (✓) mark against the correct answer in the brackets provided for it : 1×5=5

1. Norrish type-I reaction is

(a) γ-bond cleavage ( )

(b) δ-bond cleavage ( )

(c) β-bond cleavage ( )

(d) α-bond cleavage ( )

2. The Diels-Alder reaction is an example of

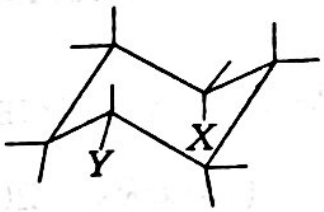
(a) polar elimination reaction ( )

(b) pericyclic electrocyclic reaction ( )

(c) pericyclic cycloaddition reaction ( )

(d) polar addition reaction ( )

3. In the given chair conformation structure of *X*, *Y*-disubstituted cyclohexane, the positions of *X* and *Y* are



(a) *X* axial and *Y* equatorial ( )

(b) *Y* axial and *X* equatorial ( )

(c) Both in equatorial ( )

(d) Both in axial ( )

4. The aim of green chemistry is

(a) to design the chemical product and process that maximize profits ( )

(b) to design the chemical product and process that reduce hazardous substance ( )

(c) to design chemical products and process that work most efficiently ( )

(d) utilization of non-renewable energy ( )

5. In the mass spectroscopy of mass spectrum, collector records

(a) only negative charged fragment ( )

(b) only positive charged fragment ( )

(c) free radical fragment ( )

(d) negative and positive charged fragments ( )

SECTION—B

(*Marks* : 15)

Answer the following questions : 3×5=15

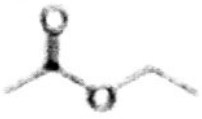
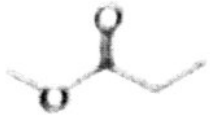
1. Explain the role of photosensitizer in some photochemical reactions.

2. What is the pericyclic reaction? Explain with example of Diels Alder reaction

3. Thiolate ions ($CH_3CH_2S^-$) are stronger nucleophile than correaponding alkoxides ($CH_3CH_2O^-$). Explain.

4. What are Baker's yeast and how are they taking for selective reduction β-ketoesters?

8. How will you distinguish between the following compounds using ^1H-NMR spectroscopy?

 and 

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