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(CBCS)

(6th Semester)

CHEMISTRY

TENTH PAPER

(Organic Chemistry—III)

Full Marks : 75

Time : 3 hours

(PART : A—OBJECTIVE)

(*Marks : 25*)

The figures in the margin indicate full marks for the questions

SECTION—A

(*Marks : 10*)

Tick (✓) the correct answer in the brackets provided :

1×10=10

1. The wavelength of phosphorescence compared to fluorescence is

- (a) shorter ()
- (b) longer ()
- (c) same ()
- (d) None of the above ()

2. Internal conversion of excited states to lower energy states takes place with

- (a) gain of light energy ()
- (b) loss of energy as light ()
- (c) gain of heat energy ()
- (d) loss of energy as heat ()

- 3.** Diels-Alder reaction involves
- (a) the consumption of one π -bond and formation of one σ -bond ()
 - (b) the consumption of two π -bonds and formation of two σ -bonds ()
 - (c) the consumption of one π -bond and formation of two σ -bonds ()
 - (d) the consumption of two π -bonds and formation of one σ -bond ()
- 4.** Electrocyclic reaction involves the formation or breaking of
- (a) one π -bond ()
 - (b) two π -bonds ()
 - (c) three π -bonds ()
 - (d) four π -bonds ()
- 5.** Thiols react with ketones in the presence of hydrochloric acid to give
- (a) mercaptals ()
 - (b) mercaptols ()
 - (c) mercaptides ()
 - (d) thiol esters ()
- 6.** Grignard reagent on protonation gives
- (a) alcohol ()
 - (b) aldehyde ()
 - (c) ketone ()
 - (d) alkane ()
- 7.** The product of Wittig reaction is
- (a) alcohol ()
 - (b) aldehyde ()
 - (c) alkane ()
 - (d) alkene ()
- 8.** 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 the chemical product and process that work most efficiently ()
 - (d) utilization of non-renewable energy ()

9. In mass spectroscopy, the molecular ion
- (a) has negative charge ()
 - (b) has positive charge ()
 - (c) is neutral ()
 - (d) None of the above ()
10. In NMR, the signal for deshielded proton will be observed in
- (a) downfield ()
 - (b) upfield ()
 - (c) intermediate ()
 - (d) beyond TMS value ()

SECTION—B

(Marks : 15)

Answer the following questions :

3×5=15

1. Write a brief note on photosensitizers with examples.

OR

2. Briefly explain intersystem crossing.
3. What are dienes and dienophiles? Give examples.

OR

4. What is a pericyclic reaction? What are the three classes of pericyclic reaction?

5. Write the preparation of organolithium compound.

OR

6. Explain the advantages of organolithium in hindered carbonyl groups giving example.

7. Write three important principles of green chemistry.

OR

8. Discuss green method of aldol condensation with suitable example.

9. Discuss the basic principle of mass spectroscopy.

OR

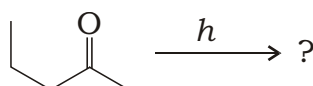
10. Giving example, explain what chemically and magnetically equivalent protons are.

(PART : B—DESCRIPTIVE)

(Marks : 50)

The figures in the margin indicate full marks for the questions

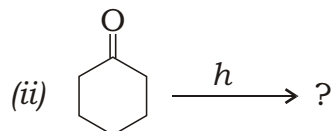
1. (a) Describe different types of electronic excitation of organic compound on irradiation with light. 3
- (b) Write the Norrish type-I and Norrish type-II product(s) of the following reaction : 3



- (c) Explain the following : 2×2=4
- (i) Phosphorescence
- (ii) Quantum yield

OR

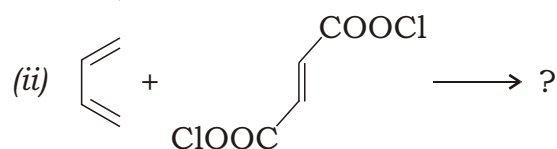
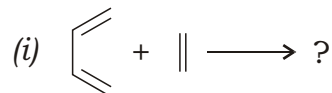
2. (a) Write a note on photoreduction using an example and explain the mechanism. 3
- (b) Complete the following reactions with mechanisms : 1½×2=3
- (i) $\text{Ph}_2\text{C}=\text{O} + (\text{CH}_3)_2=\text{CH}_2 \longrightarrow ?$



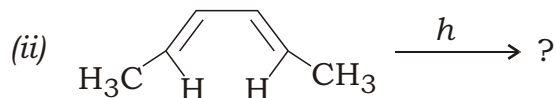
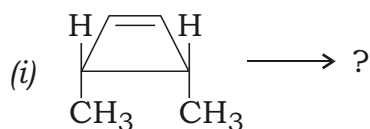
- (c) Explain the following : 2×2=4
- (i) Fluorescence
- (ii) Quenching

3. (a) Discuss the Woodward-Hoffmann rule for electrocyclic reaction. 3

(b) Complete the following cycloaddition reactions : 1×3=3



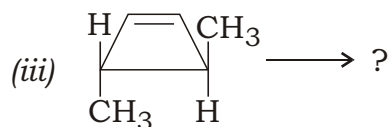
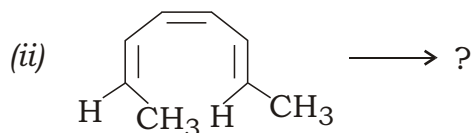
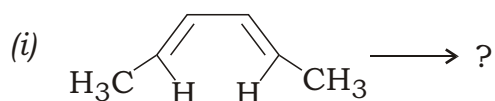
(c) Based on FMO approach, predict the products of the following electrocyclic reactions with proper stereochemistry : 4



OR

4. (a) Discuss Frontier molecular orbital theory. 3

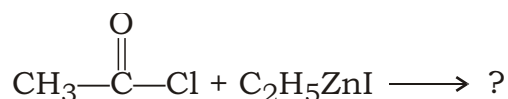
(b) Complete the following reactions : 1×3=3



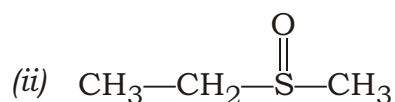
(c) Briefly explain the supra-supra and antara-antara modes of cycloaddition using an example. 4

5. (a) Give a suitable reaction for the preparation of alcohol from Grignard reagent with mechanism. 3

(b) Write the preparation of organozinc compound and complete the reaction given below : 3



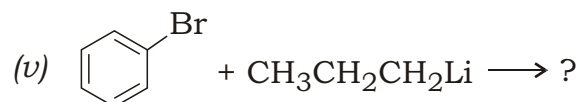
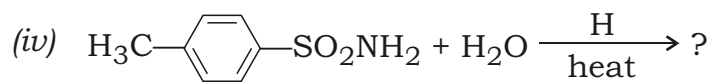
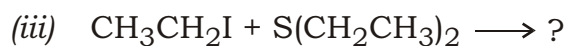
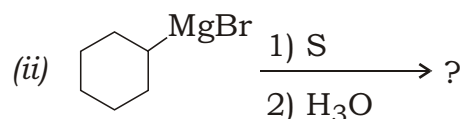
(c) Write the IUPAC names of the following compounds : 1×2=2



(d) Write one preparation of sulphonamides. 2

OR

6. (a) Complete the following reactions (mechanism not required) : 1×5=5

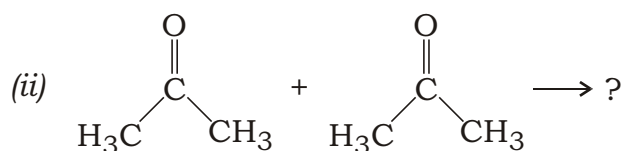
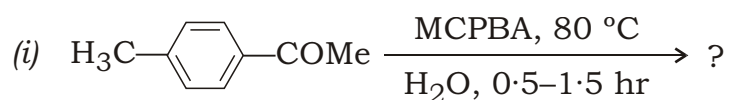


- (b) Give an account on the strong acidic behaviour of sulphonic acid. Compare between the acidities of carboxylic acid and sulphonic acid. 1+2=3
- (c) Explain the salient structural features of organosulphur compounds. 2

7. (a) Write a note on microwave assisted Hoffmann elimination reaction. 3

(b) Write the preparation of 2-chloro-*N*-aryl anthranilic acid by sonication process. 3

(c) Complete the following reactions : 2×2=4

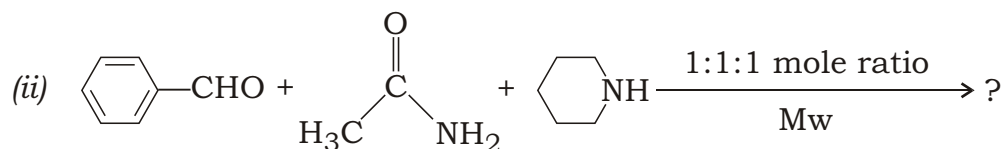
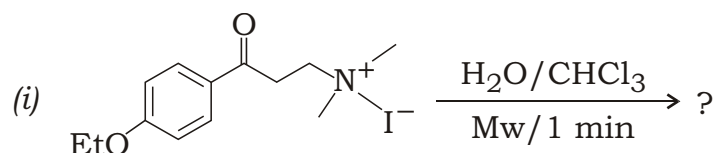


OR

8. (a) Write a note on microwave assisted Mannich reaction. 3

(b) Explain the synthesis of alcohol by microbial method using biocatalyst. 3

(c) Complete the following reactions : 2×2=4



9. (a) What do you mean by chemically and magnetically equivalent protons? 3

(b) Distinguish between ethyl bromide and ethanol using ^1H NMR spectroscopy. 3

- (c) In a mass spectrometer, 2-hexanol shows peaks at $m/z = 102, 87, 84$ and 45 . Showing the entire fragmentation pattern, determine the structures of these fragments. 4

OR

10. (a) Write the possible fragmentation and related m/z values of different fragments of n -pentane in mass spectroscopy. 3

- (b) A compound ($C_4H_8O_2$) shows IR absorption band at 2992 cm^{-1} and 1742 cm^{-1} . In its NMR spectrum, a triplet at 1.31 ppm ($3H$), a singlet at 2.01 ppm ($3H$) and a quartet at 4.12 ppm ($2H$) were observed. What is the structure of the compound? 3

- (c) Discuss the following in brief : 2×2=4

- (i) Base peak
(ii) Molecular ion peak
