Roll No. | | | | | | | | | | | | | Total No. of Pages : 03

Total No. of Questions : 19

M.Sc.(CHEMISTRY)PIT (Sem.-3)

PHOTOCHEMISTRY AND PERICYCLIC RELATIONS

Subject Code : CHL-501

Paper ID : [74888]

Time : 3 Hrs. Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying FIVE marks each and students have to attempt ALL questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Q1 What do you understand by quantum yield in photochemical reactions?

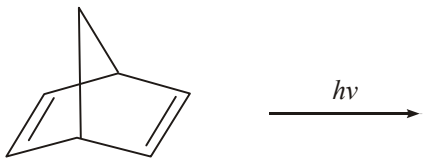
Q2 Comment upon the stability of singlet and triplet states.

Q3 Find the molecular orbitals of conjugated diene and tell which molecular orbital is HOMO and which is LUMO for ground state.

Q4 Explain the formation of smog by photochemical reaction.

Q5 Give photochemical dimerization reaction of alkenes.

Q6 Predict the product of the following photochemical transformations :

(*i*) 

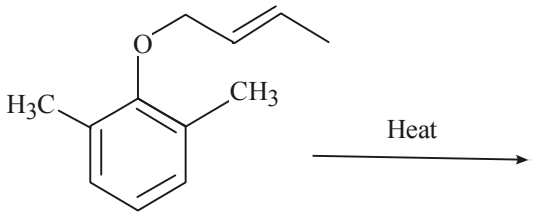
(*ii*) $CH_2COCH_2CH_2CH_3 \xrightarrow{h\nu}$

Q7 What is Ene reaction? Write the mechanism of Ene reaction.

Q8 What are electrocyclic reactions? Explain with example.

Q9 What are suprafacial and antarafacial processes in sigmatropic rearrangements?

Q10 Show the product and name of following reaction :



SECTION-B

Q11 Explain the various types of electronic transitions used in photochemical reactions.

Q12 Depict Barton reaction and Photo-Fries reactions as examples of photochemical reactions.

Q13 Write a short note on the formation of oxetane by photoaddition of excited carbonyl compounds with electron rich substrates.

Q14 Explain the photocycloaddition reaction of α,β-unsaturated ketones.

Q15 With the help of correlation diagram, show that [2+2] cycloaddition reaction is a thermally forbidden and photochemically allowed reaction.

Q16 What do you understand by chelotropic reactions? Explain chelotropic reaction with the help of molecular orbital diagrams.

SECTION-C

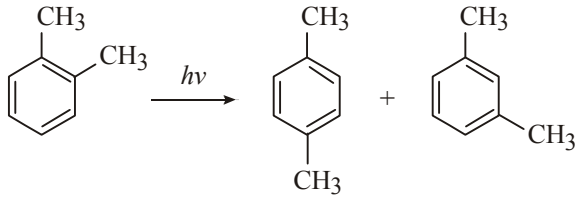
Q17 (a) Depict the photochemical reactions of cis-trans isomerism of alkenes and conjugated dienes? Why in such reactions, generally the thermodynamically less stable form predominantly, in the product mixture? (6)

(b) What are the likely product(s) formed from the irradiation of 2, 4-cyclohexadienones? Explain. (4)

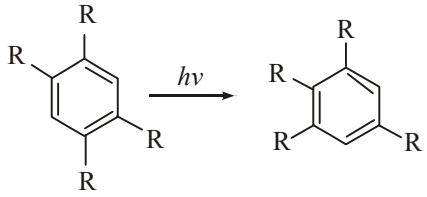
Q18 (a) Classify photochemical reaction. What is the effect of light intensity upon the rate of photochemical reaction? (6)

(b) Explain the photoisomerization of the following benzene derivatives. (4)

(*i*)



(*ii*)



Q19 (a) What are suprafacial and antarafacial processes in sigmatropic rearrangements? Illustrate these processes by examining a suprafacial 1,5-sigmatropic shift of hydrogen in which hemolytic cleavage results in the production of a hydrogen atom and pentadienyl radicals. Explain with energy level diagram. (6)

(b) What do you understand by 1,3-dipolar cycloaddition reactions? Explain dipolar reaction with the help of molecular orbital diagrams. (4)