

2024

CHEMISTRY — HONOURS

Paper : CC-12

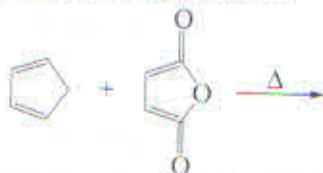
(Organic Chemistry)

Full Marks : 50

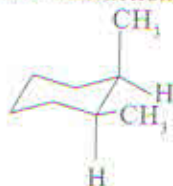
*The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.*Answer **question no. 1** (compulsory) and **any eight** questions from the rest. (**question nos. 2 to 12**).1. Answer **any ten** questions :

1×10

- (a) Pyrrole is less basic than pyridine. Explain.
- (b) D-Fructose responds positively to Tollens' reagent. Explain.
- (c) Give an example of [3, 3] sigmatropic reaction.
- (d) Draw the structure of Uracil.
- (e) Which reagent is used to protect the amino group of amino acids in solid phase peptide synthesis? Give the structure of the reagent.
- (f) Draw 4-epimer of D-glucose.
- (g) Identify the product of the following reaction :



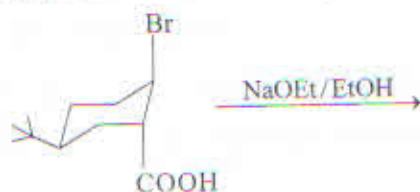
- (h) Phenanthrene gives typical reactions of olefinic double bond but anthracene does not. Why?
- (i) Draw the preferred conformation of *trans*-1-methyl-3-isopropylcyclohexane (structure only).
- (j) C-1 of naphthalene is more reactive than its C-2 position regarding electrophilic monosubstitution reaction. Explain in brief.
- (k) Choose the correct option to fill in the blank as follows :
Mutarotation of an aldose is exhibited in _____ (acidic/basic/amphoteric solvent).
- (l) How many tripeptides are possible from Gly, Ala, Val?
- (m) Mention the number of gauche-butane interactions in the following compound (Number only) :



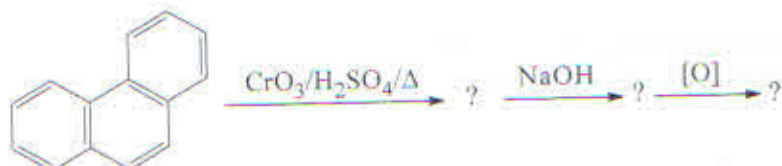
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(0639)

2. (a) *trans*-4-tertiarybutylcyclohexyl tosylate undergoes bimolecular elimination reaction with bromide ion rather than the stronger base ethoxide anion. Explain with mechanism. 3+2
- (b) Comment on the optical activity of (1*R*, 3*R*)-1,3-Dimethyl-cyclohexane. 3+2
3. (a) D-Glucose, D-mannose and D-fructose give the same osazone. Explain with mechanism. 3+2
- (b) Predict the product with plausible mechanism of the following reaction with mechanism. 3+2

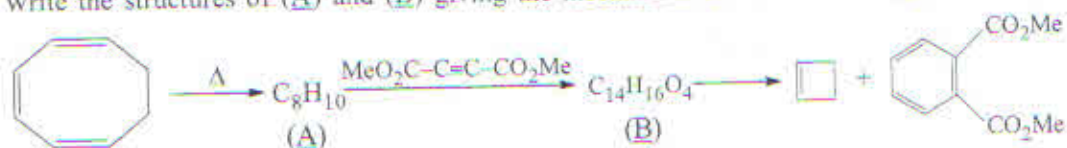


4. (a) Complete the following :

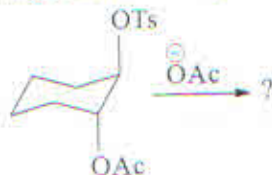


- (b) How would you synthesise anthracene by Diels-Alder reaction? 3+2

5. (a) Write the structures of (A) and (B) giving the mechanism of formation of (B) from (A).

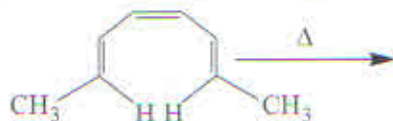


- (b) Write the product of the following reaction with plausible mechanism. 3+2

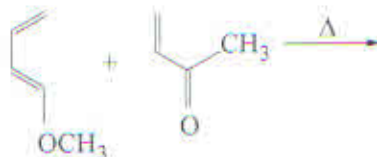


6. (a) Bromine water ($\text{Br}_2/\text{H}_2\text{O}$) oxidation of α -anomer of D-glucopyranose is 250 times slower than the β -anomer of the same compound. Explain with mechanism. 3+2
- (b) Why does D-fructose reduce Fehling's solution although it is a ketohexose? 3+2
7. (a) Show the mechanism of mutarotation of glucose in 2-pyridone as solvent. 3+2
- (b) What is DCC? How is it used in peptide synthesis? 3+2

8. (a) Write a brief account on the double helical structure of DNA proposed by Watson and Crick.
 (b) Write down the structure of the nucleoside adenosine taking D-ribose as the pentose sugar. 3+2
9. (a) Synthesise phenylalanine through azlactone.
 (b) Give a chemical method to determine the C-terminal residue of a tripeptide. 3+2
10. (a) Predict the products with stereochemistry showing the FMO interaction of the following:



- (b) Predict the products and discuss the regioselectivity of the following reaction: 3+2



11. (a) Convert:



- (b) Convert pyridine to 4-nitropyridine. 3+2

12. (a) Convert:

- (i) D-Glucose to D-glucuronic acid
 (ii) D-Glucose to D-glucose pentaacetate

- (b) Which conformation is preferred by *trans*-1,3-ditertiarybutyl-cyclohexane? Explain. 3+2