

B.Sc. Semester–II (Honours) Examination, 2022 (CBCS)

Sub: Chemistry

Course Code: CC–4

Course Title: Organic Chemistry-II (Theo)

Time: 2 hours

Full marks: 40

Candidates are required to give their answers in their own words as far as practicable.

A. Answer any five questions.

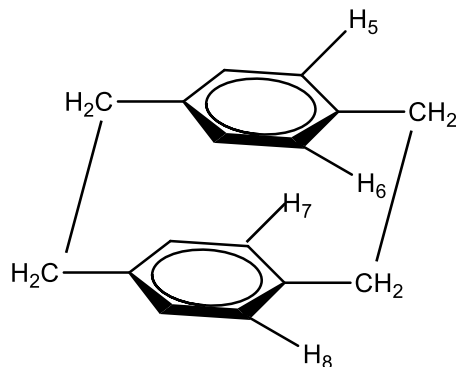
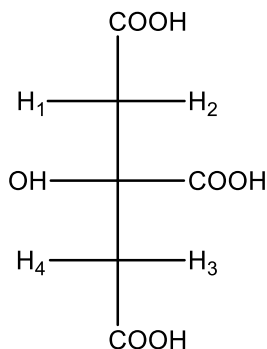
5×2=10

1. What is leaving group in nucleophilic substitution reaction? Cite an example.
2. What is primary kinetic isotope effect? Explain with an example.
3. What do you mean by proton sponge?
4. What is buttressing effect in chemistry? Explain with an example.
5. What are the differences between a dihedral angle and a torsion angle?
6. With suitable examples show two tautomerism other than keto-enol system
7. How stereoselectivity differs from regioselectivity?
8. In stereochemistry what do you mean by P/M descriptors? Show with suitable conformations.

B. Answer any two questions.

2×5=10

1. a) Define ambident nucleophiles. Explain with two examples.
b) Explain with an example how NGP can affect the rate and stereochemical features of nucleophilic substitution reactions. **2+3**
2. a) Draw the Energy profile diagram of different conformational isomers of 2-methylbutane.
b) Explain pictorially what is Gauche Effect? **3+2**
3. Predict the topicity of the marked *H*-atoms (H_1/H_2 ; H_3/H_4 ; H_5/H_6 ; and H_7/H_8) of the following compounds. **2.5+2.5**

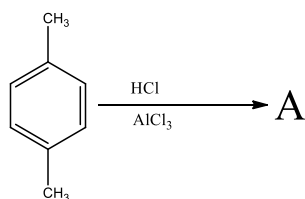


4. a) Primary-, secondary- and tertiary-butylamines show the basicity order of $\text{BuNH}_2 < \text{Bu}_2\text{NH} < \text{Bu}_3\text{N}$ in chlorobenzene, but in water it is $\text{Bu}_3\text{N} < \text{BuNH}_2 < \text{Bu}_2\text{NH}$ -Explain
- b) The second dissociation of *trans*-butenedioic acid occurs more readily than that of its *cis*-isomer. Justify. 3+2

C. Answer any two questions.

2×10=20

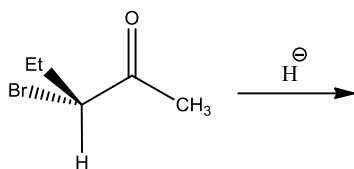
1. a) Although Phenol and Resorcinol do not exist in the keto form but Phloroglucinol does. Explain.
- b) Secondary amine is the best amine for the enamine formation. Why?
- c)



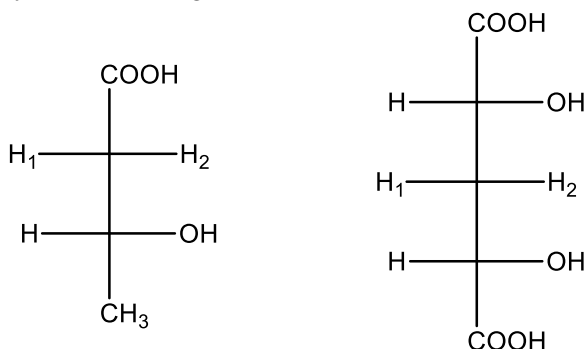
Identify 'A' and give explanation.

4+3+3

2. a) Triethylmethylchloride undergoes nucleophilic substitution reaction 10^6 times faster than 1-chlorobicyclo-[2,2,2] octane-Justify.
- b) But-2-eneoic acid undergoes decarboxylation at faster rate than 4,4-dimethylpent-2-eneoic acid-Explain with mechanism.
- c) Write a short note on phase transfer catalyst. 3+4+3
3. a) Name two borderline bases according to HSAB Principle. Why are they called borderline bases?
- b) Draw the stereochemical structures of the products formed when hydride ion attacks both the faces of the following compound? State the stereochemical relationship of the products formed?



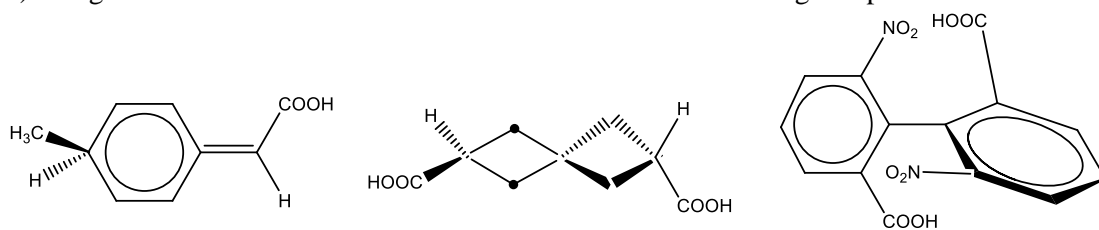
- c) Identify the marked ligands as *Pro-R* and *Pro-S* of the following compounds.



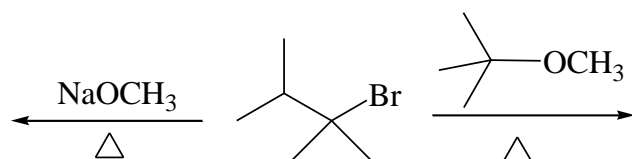
3+4+3

4. a) Cite example(s) where a non-stereogenic centre may be chirotopic and an achirotopic centre may be stereogenic. Give reason in favor of your answer.

b) Assign the R/S nomenclature to the stereocentres of the following compounds.



c) Predict the major product formed in the following reaction. Justify your choice.



3+3+4