

Birla Institute of Technology & Science, Pilani, Rajasthan
2nd Semester, 2017-2018

CHEM F243 Organic Chemistry-II

Comprehensive Examination (Closed Book)

Max. Marks: 40

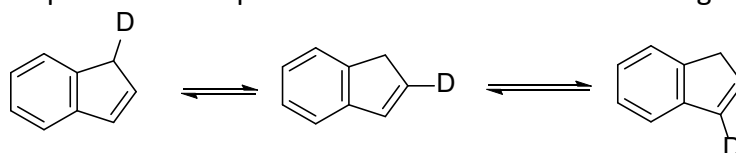
Time: 90 min

Date 10-05-2018

Q 1. (a) *trans*-3,4-Dimethylcyclobutene can open by two conrotatory paths to give either (2E,4E)-hexa-2,4-diene or (2Z,4Z)-hexa-2,4-diene. Explain why both products are symmetry-allowed, and then account for the fact that only the 2E,4E isomer is obtained in practice. **4**

(b) What stereochemistry would you expect for the product of the Diels–Alder reaction between (2E,4E)-hexa-2,4-diene and ethylene? What stereochemistry would you expect if (2E,4Z)-hexa-2,4-diene were used instead? **4**

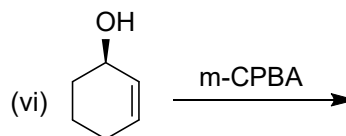
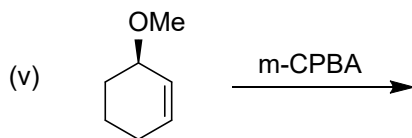
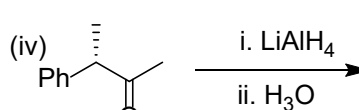
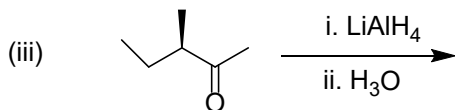
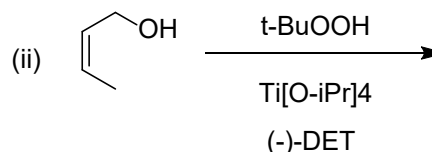
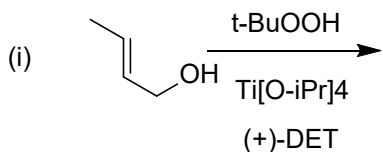
Q 2.(a) Propose a mechanism to account for the fact that heating 1-deuterioindene scrambles the isotope to all three positions on the five-membered ring. **4**



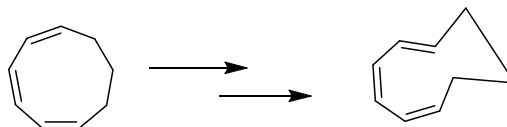
1-Deuterioindene

(b) With the help of symmetry properties of molecular orbitals of butadiene show why its disrotatory conversion to cyclobutene is a thermally forbidden process? Draw and indicate the symmetry properties of molecular orbitals of butadiene and cyclobutene. **6**

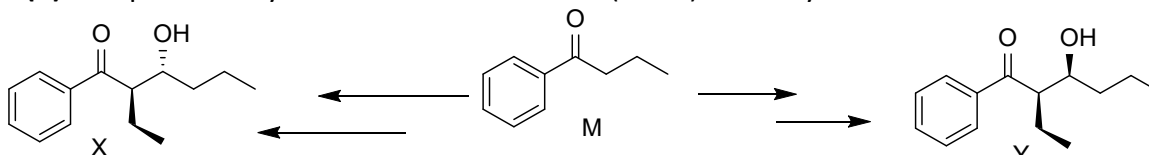
Q3. Predict the major product (with stereochemical structure) for each of the following transformations. **12**



Q 4. (a) Propose a method for achieving the following transformation **4**



(b) Complete the synthesis of diastereomers (X & Y) from aryl ketone M **6**



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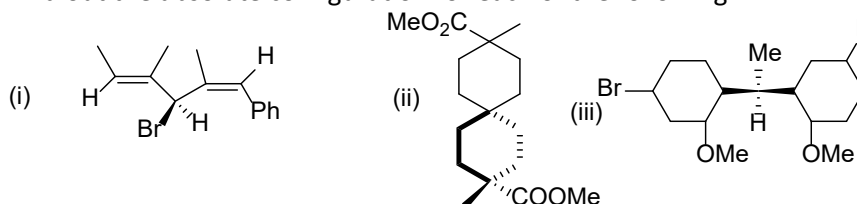
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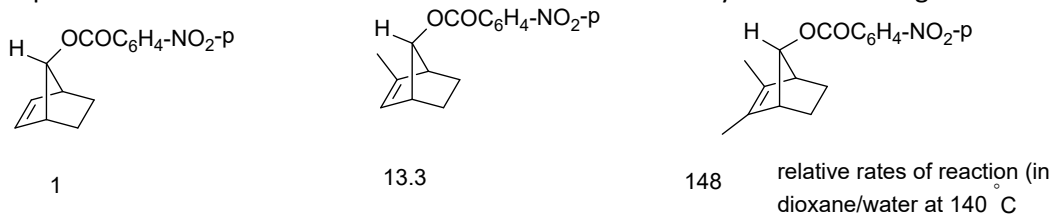
Q1 (a) Find out the absolute configuration for each of the following.

6



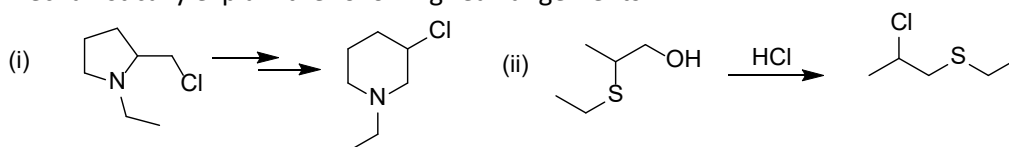
(b) Explain the relative rates observed for the *anti*-7-norbornenyl derivatives as given below.

4



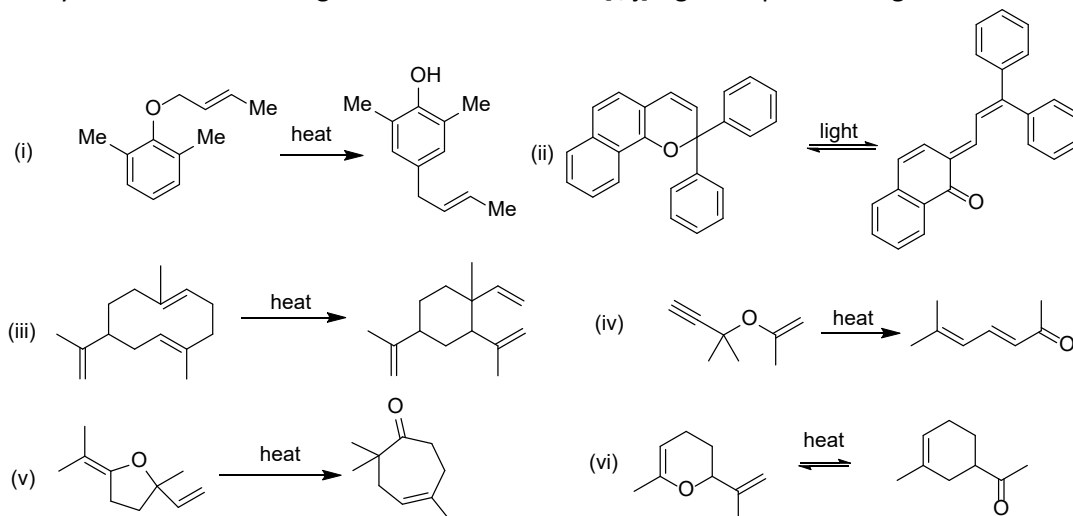
(c) Mechanistically explain the following rearrangements.

6



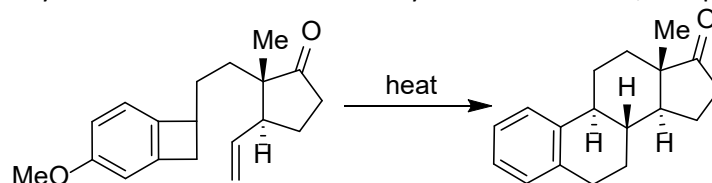
Q 2. Classify each of the following transformations as an [i, j] sigmatropic rearrangement.

12



Q 3. (a) Identify the pericyclic reactions involved in the synthesis of estrone, and propose a mechanism.

6



(b) Identify the product X & Y in the following enantioselective transformation.

6

