

Ex/SC/CHEM/PG/CORE/TH/XIV-O/2023(S)
M. Sc. CHEMISTRY (SPECIAL SUPPLEMENTARY)
EXAMINATION, 2023
(4th Semester)
PAPER: XIV-O
[ORGANIC CHEMISTRY SPECIAL]

Time : Two Hours

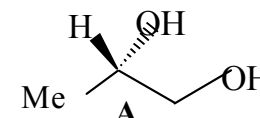
Full Marks : 40

(20 marks for each Unit)

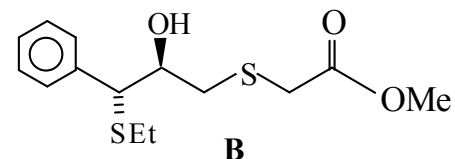
Use a separate answer script for each Unit.

UNIT – O-4141

1. a) Design the synthesis of the compound **A** starting from a suitable and easily available enantiopure chiral compound applying Chiron approach. 4



- b) Delineate the asymmetric synthesis of the following compound **B** using Sharpless asymmetric epoxidation as one of the steps (only show the steps with reagents, no mechanism is needed). 4

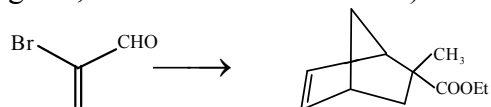


- c) Describe the asymmetric synthesis of *l*-menthol as developed by Prof. R. Noyori. Highlight the stereochemical feature of the cyclization step. 4

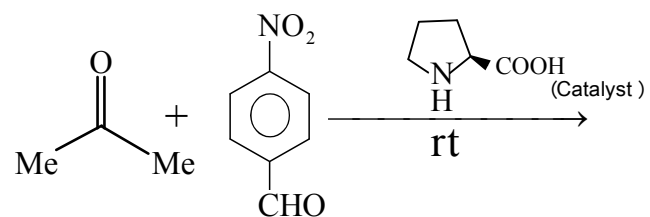
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[2]

- d) Suggest the steps for the following enantioselective transformation (only mention the steps with reagents, no mechanism is needed). 3

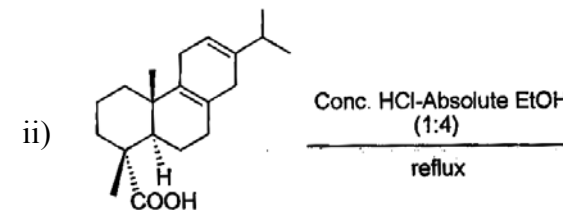


- e) Draw the organocatalytic cycle of the following reaction and rationally predict the major product with the assignment of the absolute configuration of the Stereocentre.

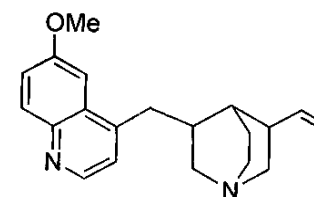


3+2

[5]

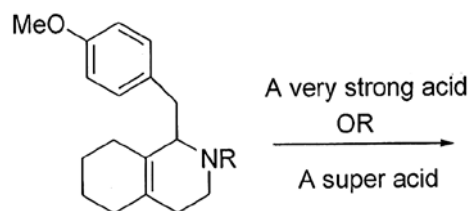


- g) Predict the total number of possible stereoisomers of the following structure with proper justification. 1

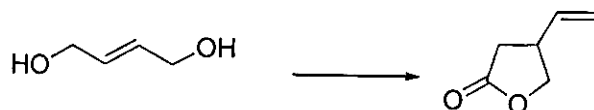


[4]

- c) Draw the structures of all stereoisomeric products formed when a mixture of *p*-benzoquinone and methyl vinylacrylate is heated in benzene. Propose suitable mechanistic and stereochemical interpretations for the formation of each stereoisomeric product. 3
- d) Mechanistically explain formation of plausible product(s) of the following reaction. Comment on feasibility of any side reaction. 2

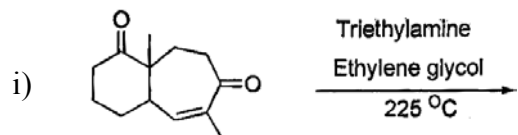


- e) Identify the reagents required to carry out the following transformation. Propose the mechanism. 2



- f) Draw structures of products of the following reactions. Suggest proper mechanistic and stereochemical explanations for their formations.

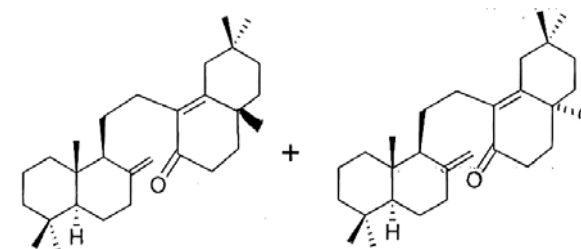
1½ + 1½



[3]

UNIT – O-4142

2. a) Predict the product(s) of each step when the following mixture of two epimeric compounds is subjected to below mentioned sequence of reactions. Highlight the mechanism and stereochemical control involved in step-I and step-III. 5

Step I: Li in liq NH₃

Step II: MeLi

Step III: AcOH saturated with HCl gas

- b) i) What happens when (*E*)-ethyl 4-hydroxy-2-methylbut-2-enoate and 3-hydroxy-2-pyrone are heated together at 90°C in benzene in presence of phenylboronic acid? Give mechanistic explanation emphasising on the role of phenylboronic acid. 2½
- ii) What happens when the product(s) formed in the above mentioned reaction is (are) treated with excess 2,2-dimethyl-1,3-propanediol at 25°C? Mechanistically explain. 1½

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