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Name:

Enrolment No:



UPES
End Semester Examination May 2023

Program: M.Sc. Chemistry

Semester: II

Course Name: Organic reagents and spectroscopic analysis of Organic compounds

Max. Marks:100

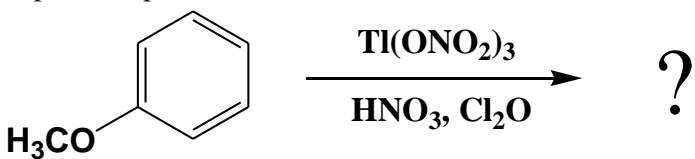
Course code: CHEM7026P

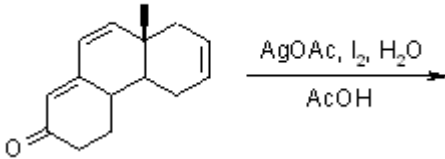
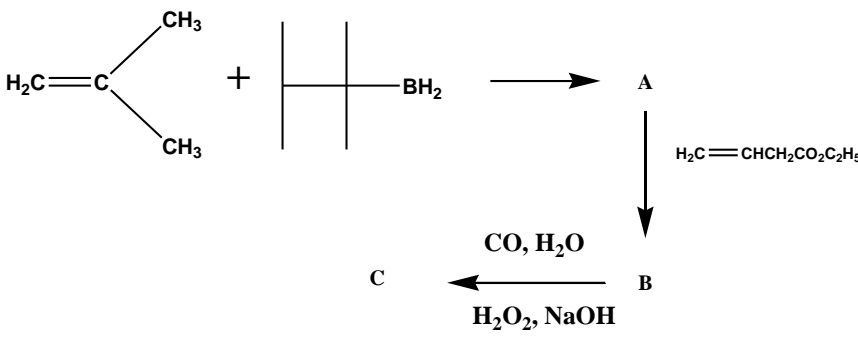
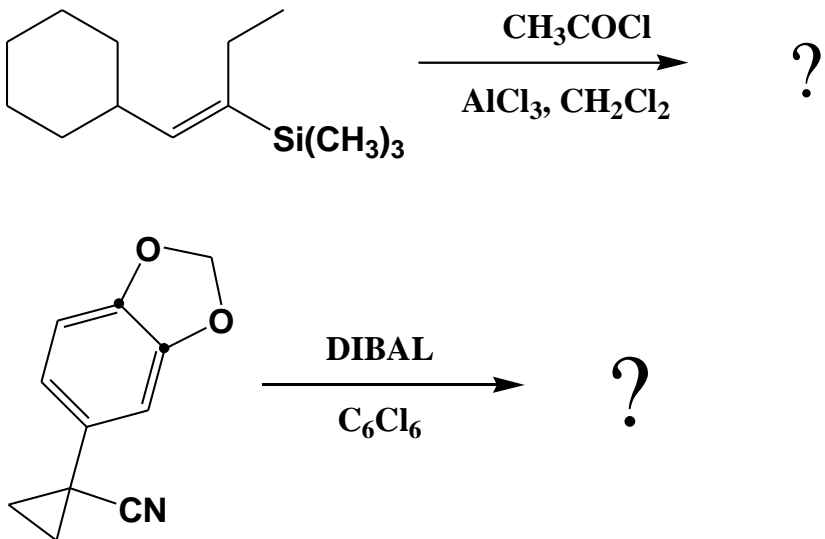
Time: 03 hrs.

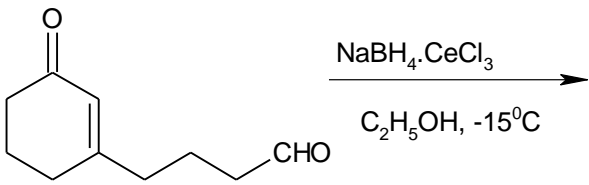
Instructions: Read all the below mentioned instructions carefully and follow them strictly:

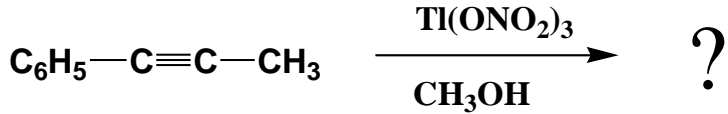
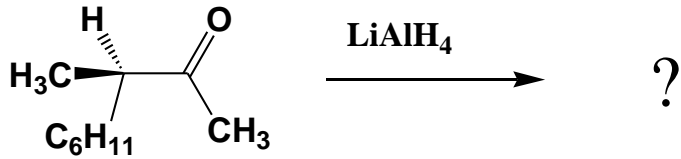
1. Write your enrolment number on the top left of the question paper.
2. Do not write anything else on the question paper except your enrolment number.
3. Attempt all parts of a question in one place only.
4. Internal choice is given for question number 9 of Section B and question number 11 of Section C only.

SECTION - A
(Attempt all FIVE Questions)

1.	Discuss the fragmentation in Phenol and Benzaldehyde in mass spectroscopy.	[4]	CO2
2.	Explain the product with a suitable mechanism: 	[4]	CO1
3.	The mass spectrum of an organic compound shows peaks at m/e values 100, 43(100%), 57, 85, 71, 41 and 29. Determine the structure and confirm it by showing the various fragmentations.	[4]	CO2
4.	Predict the product with the mechanism:	[4]	CO1

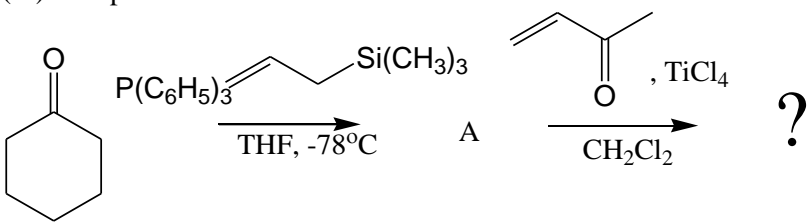
			
5.	<p>Discuss product with the mechanism:</p> 	[4]	CO1
SECTION - B (Question No. 6, 7 and 8 are Compulsory; attempt any one from question no 9)			
6.	<p>Give mechanism of the following reactions:</p> 	[6+4]	CO1
7.	<p>(i) How can the number and position of CMR signals help in the identification of four isomeric alkyl halide (C₄H₉Cl)?</p> <p>(ii) Explain why: NMR spectrum of benzene is observed at lower field whereas that of acetylene is observed at a higher field strength.</p>	[4+6]	CO1 CO2

8.	<p>(i) Give a mechanism and suggest the possible product of the following reaction:</p>  <p>(ii) Sketch the expected PMR spectra of the following compounds taking TMS as the standard reference:</p> <p>a) Propyl chloride (b) 1,2 dibromo propane (c) 4-chloro Hexane-2-one</p>	[5+5]	CO1 CO3
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9.	<p>(i) A compound with molecular mass 158 absorbs in the ultraviolet region at 225 nm ϵ_{\max}. 50. In infra-red spectrum, absorption bands are formed at 3077 cm^{-1}, 1828 cm^{-1}, 1757 cm^{-1} and 1457 cm^{-1}. In NMR, two signals are observed at δ 2.70 septet ($J=6.7$ cps, 6.4 squares) and δ 1.20 doublet ($J=6.7$ cps, 37.2 squares). Deduce the structure of the compound.</p> <p>(ii) Complete the following reaction with mechanism:</p>  <p style="text-align: center;">OR</p> <p>(i) An organic compound with molecular weight 130 shows bands in infra-red spectrum at 3082-2860 cm^{-1}, 1825 cm^{-1}, 1755 cm^{-1} and 1455 cm^{-1}. The signals in NMR spectrum are δ 1.3 triplet (7.3 squares, $J=7.1$ cps) and quartet δ 2.2 (4.9 squares, $J=7.1$ cps). Assign the structure.</p> <p>(ii) Complete the following reaction with mechanism:</p> 	[5+5]	CO3 CO1
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SECTION - C
(Question No. 10 is Compulsory; Attempt any one from question no. 11)

10.	<p>(i) A volatile compound with molecular mass 130 contains 73.85% carbon and 13.5 % hydrogen. The compound is transparent above 210 nm in ultraviolet region. In its infra-red region, bands are formed at 2960-2851 cm^{-1}, 1342 cm^{-1} and 1075 cm^{-1}. Only one singlet at 1.05 δ is formed in its NMR spectrum. Find the structural formula of the compound.</p> <p>(ii) Explain with example Nuclear overhauser effect.</p>		
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	<p>(iii) Complete the reaction with mechanism:</p>  <p>The reaction scheme shows cyclohexanone reacting with $\text{P}(\text{C}_6\text{H}_5)_3$ in THF at -78°C to form intermediate A. Intermediate A then reacts with methyl vinyl ketone in the presence of TiCl_4 in CH_2Cl_2 to form an unknown product, indicated by a question mark.</p>	[8+4+8]	CO3 CO2 CO1
11.	<p>(i) Explain HETCOR with example.</p> <p>(ii) Discuss hydride transfer reducing agent with example.</p> <p>(iii) Elaborate the application of mass spectroscopy.</p> <p style="text-align: center;">OR</p> <p>(i) An organic compound with molecular mass 120 absorbs in ultraviolet spectrum at 268 nm ϵ_{max} 480. In infra-red spectrum, medium absorption bands are formed at (i) $3067\text{-}2907\text{ cm}^{-1}$ (ii) 1608 cm^{-1} and 1473 cm^{-1}. In NMR signals are $6.79\ \delta$ Singlet (10.4 squares) and $2.26\ \delta$ singlet (31.0 squares). Deduce the structure.</p> <p>(ii) What is alkenyl and alkynyl silane? Give its application in organic chemistry.</p> <p>(iii) Explain McLafferty rearrangement with example.</p>	[8+8+4]	CO3 CO1 CO2