

4-4-2016



DOON UNIVERSITY,

DEHRADUN

Mid Semester Examination, Second Semester, 2015-2016

School of Physical Sciences (SoPS)

Integrated M.Sc. 5 Years (Chemistry)

Course: Organic Chemistry-I

Course Code: CYC-151

Time Allowed: 2 Hours

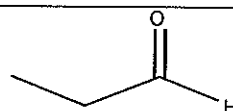
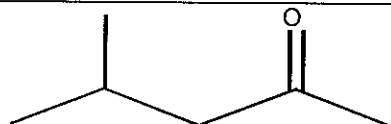
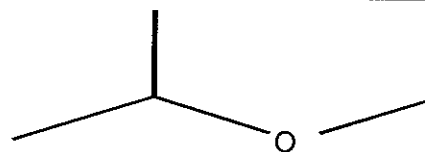
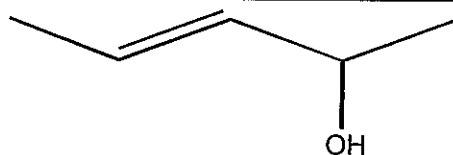
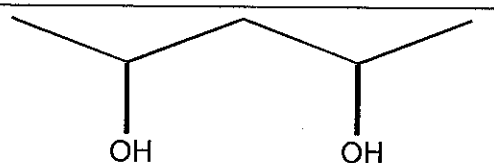
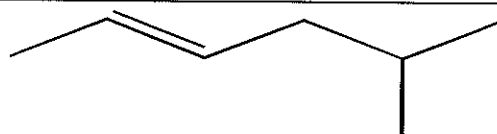
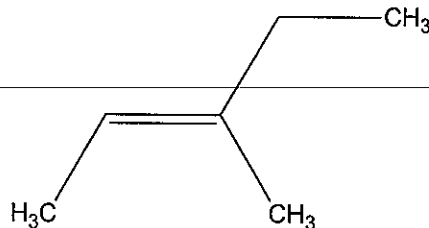
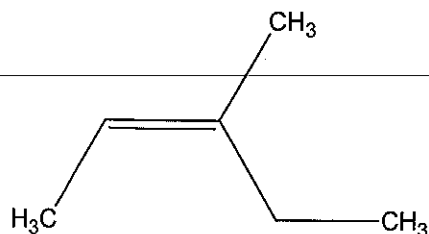
Maximum Marks: 30

Note: Attempt All Questions from Sections A,B,C.

SECTION: A

(Marks: 6)

[1] Write the IUPAC Names of following compounds:

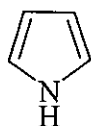
[1] =  $[(1/8) \times 8]$ [2] Select only aromatic compounds from following list and also determine value of  $n$  for every compound.[1] =  $[(1/8) \times 8]$ 

- (i) Cyclohexatriene  
 (iii) Cyclopentadienyl Cation  
 (v) Cyclopentadienyl Anion  
 (vii) Cyclobutadiene

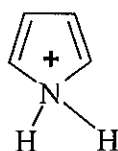
- (ii) Cyclopentadiene  
 (iv) Furan  
 (vi) Cyclooctatetraene  
 (vii) Cyclohexadiene

[3] Out of A and B which is more acidic and why? Explain with chemical reaction?

[(1/2) + (1/2)]



(A)



(B)

[4] Pyrrole and Pyridine: Basicity of which compound is higher and Why? [(1/2) + (1/2)]

[5] Two isomeric compounds **A** and **B** have the molecular formula  $C_3H_7Cl$ . Chlorination of **A** gave a mixture of two dichlorides of formula  $C_3H_6Cl_2$ . Chlorination of **B** gave three different compounds of formula  $C_3H_6Cl_2$  (they may not all be different from the dichlorides from **A**). What are the structural formulae of **A** and **B** and the dichlorides obtained from each?

[(1/2) + (1/2)]

[6] How is bromine in 1,1,1-trichloroethane is useful for determining unsaturation in some organic compound? Explain with chemical reaction?

[(1/2) + (1/2)]

**SECTION: B**

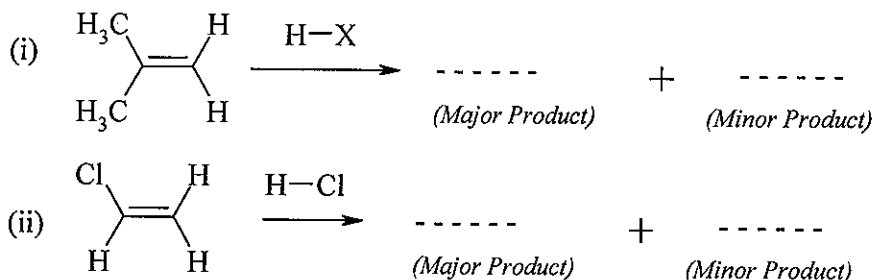
(Marks: 12)

[1] Arrange the following in the increasing order of stability and also explain the reason in detail

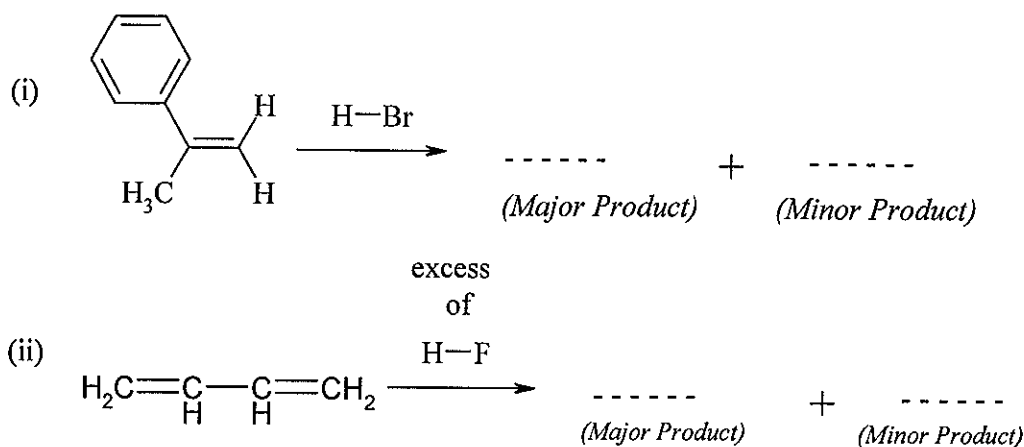
(i) Methyl free radical, ethyl free radical, *isopropyl* free radical, *tert*-butyl free radical [1]

(ii) Methyl cation, ethyl cation, *isopropyl* cation, *tert*-butyl cation [1]

[2] Explain the formation of the major product in the following reaction with mechanism with the structure of intermediate species. Also write resonance forms wherever possible. [1+1]



[3] Explain the formation of the major product and minor product in the following reaction with the structure of intermediate species. Also write resonance st. wherever possible. [1+1]

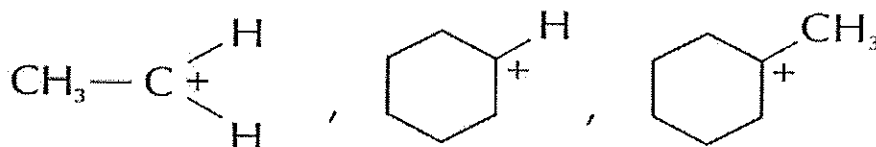


[4] Write the different isomeric forms of  $C_5H_{11}^+$  carbocations. Which one is the most stable form and Why? [(1/2) + (1) + (1/2)]

[5] Both alkanes and alkenes undergo halogenation. The halogenation of alkanes is a free radical substitution reaction while the reaction of alkenes with halogens is an electrophilic addition reaction. Can you tell two differences between the products formed by the two different types of halogenation? [1+1]

[6] (a) What chemical tests would you use to distinguish between two unlabelled bottles containing hexane and *hex-1-ene* respectively? [(1/2) + (1/2)]

(b) Arrange the following carbocations in increasing order of stability. Explain your answer briefly. [1]



**SECTION: C**

*(Marks: 12)*

[1] (a) Write the mechanism of bromination, nitration and sulphonation of benzene. Also write resonance structures wherever required. [1+1+1]

(b) Diphenylmethane is formed upon reaction of Benzene and an unknown compound in presence of  $AlCl_3$ . What is the name of the reaction? What is the unknown compound? Write the complete reaction? Also write all the steps of the mechanism of reaction. [1]

(c) Triphenylmethane is formed upon reaction of Benzene and an unknown compound in presence of  $AlCl_3$ . What is the name of the reaction? What is the unknown compound? Write the complete reaction with all the steps? Also write complete mechanism of reaction. [1]

(d) 1,2-Diphenylethane is formed upon reaction of Benzene and an unknown compound in presence of  $AlCl_3$ . What is the name of the reaction? What is the unknown compound? Write the complete reaction with all the steps? Also write complete mechanism of reaction. [1]

[2] Why is it said that free radical substitution reaction of alkanes is a chain reaction? Which of the steps is the first step of the mechanism? Write down only chemical reactions involved in three different steps of radical substitution reaction between chlorine and methane? Which is rate determining step? [1+1+ 4]