

Enrolment No:



Course: CHEM-1007 (Chemistry)

(End Semester Examination Dec 2018)

Programme: B.Sc (H) Physics/Mathematics

Semester: I

Course Name: Atomic structure, bonding, General Organic chemistry & aliphatic hydrocarbons


Time: 03 hrs.

Max. Marks:100

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 on the question paper except your enrolment number
- 3) Attempt all part of a question at one place only
- 4) Internal choice is given for question number 9 and 11 only

Section - A (Attempt all FIVE Questions)

1.	Discuss Enantiomers and Distereomers	[4]	CO1
2.	Assign R and S for the following compound 	[4]	CO1
3.	Define radial distribution function and draw the radial distribution curves for 1S and 2S orbitals?	[4]	CO2
4.	Explain why ionic compounds exhibit usually high melting points.	[4]	CO1
5.	Write down Born-Lande equation and explain the terms in it	[4]	CO1

SECTION-B

(Question No. 6, 7 and 8 are Compulsory); attempt any one from 9A & 9B

6.	Explain the different conformations of butane. How will you account for difference in their relative stability	[10]	CO3
7.	Draw chair and boat conformations of cyclohexane. Which one of the two is more stable and why?	[10]	CO3
8.	Name the series including wavelength of line that occur in the atomic spectra of hydrogen. Indicate the region in the electromagnetic spectrum where these series occurs	[10]	CO2
9.A	i) Explain Saytzeff's and Markovnikov's rule (ii) Define an orbital and draw the shapes of s p d and f orbitals	[6+4]	CO3 CO2
9B	i) Complete the reaction	[6+4]	CO3 CO2

	$\text{H}_3\text{C}-\text{C}\equiv\text{C}-\text{CH}_3 \xrightarrow{\text{Pd-BaSO}_4/\text{H}_2} ?$ $\searrow \text{Birch's Reduction}$ $?$		
ii)	Relate the tendency of atoms to gain or lose electrons to the type of bonding they form		

SECTION - C

(Question No. 10 is Compulsory; Attempt any one from question numbers 11A & 11B)

10.	<p>i) Write the product of following reactions with mechanism</p> $\text{H}_3\text{C}-\text{CH}=\text{CH}_2 \xrightarrow{\text{hot KMnO}_4} ?$ $\text{H}_3\text{C}-\text{C}\equiv\text{C}-\text{CH}_3 \xrightarrow[\text{ii) H}_2\text{O}_2]{\text{i) O}_3} ?$ $\text{H}_3\text{C}-\text{MgI} \xrightarrow{\text{H}_2\text{O}} ?$ $\text{H}_3\text{C}-\text{C}\equiv\text{CH} \xrightarrow{\text{Alkaline KMnO}_4} ?$ <p>(ii) Elaborate the molecular orbital theory for CO molecules using appropriate illustration and also calculate the bond order</p> <p>(iii) Discuss (a) lattice energy (b) polarity of bonds</p>	[8+8+4]	CO3 CO1 CO1
11A.	<p>i) Write the reactions in which carbanion is involved as an intermediate</p> <p>ii) Calculate the first five Bohr radii of a single electron-atom</p> <p>iii) Give the sequence in which the energy levels in an atom are filled with electrons and give electronic configuration for the elements having atomic number 11 and 17</p>	[8+8+4]	CO1 CO2 CO2
11B.	<p>i) Write the reaction in which carbocation is involved as an intermediate</p> <p>ii) Outline a Born-Haber cycle for the formation of an ionic compound by taking example of sodium chloride</p> <p>iii) Explain the paramagnetic character of oxygen with the help of molecular orbital theory</p>	[8+8+4]	CO1 CO2 CO2

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Section - A (Attempt all FIVE Questions)

1.	Explain asymmetric and dissymmetric of compounds	[4]	CO1
2.	Assign E and Z for following compound 	[4]	CO3
3.	What is meant by hybridization and discuss hybridization involved in boron trifluoride	[4]	CO2
4.	What do you mean by dual character of matter and discuss it with De Broglie's equation	[4]	CO1
5.	Mention any four shortcomings of Bohr's theory of atomic structure.	[4]	CO2


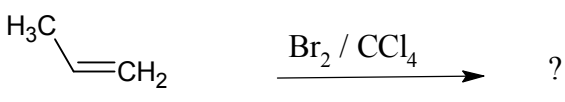
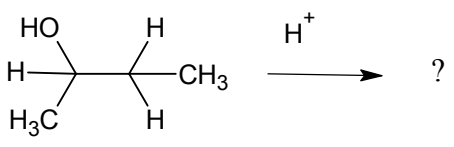
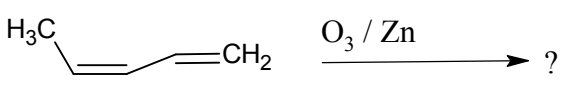
SECTION - B

(Question No. 6, 7 and 8 are Compulsory); attempt any one from 9A & 9B

6.	Draw the different conformations of propane. How will you account for difference in their relative stability	[10]	CO3
7.	Explain pinacole-pinacolone rearrangement with example.	[10]	CO1
8.	Discuss the time dependent Schrodinger's wave equation for hydrogen atom and give its significance in explaining the properties of hydrogen atom	10]	CO2
9A	(i) Draw R and S forms of 2- methyl pent-2-ol	[6+4]	CO1 CO2

	(ii) How does Bohr's theory explain the spectrum of hydrogen atom?		
9B	(i) Mention CIP rule for assigning priority to atoms (ii) State Fajan's rule for forming ionic compounds	[6+4]	CO1 CO1

SECTION - C
(Question No. 10 is Compulsory; Attempt any one from question numbers 11A & 11B)

10.	<p>i) Write the product of following reactions with mechanism</p> <p>  </p> <p>  </p> <p>  </p> <p>  </p> <p>(ii) Draw the resonance and give resonating structure for any one organic compound and any one inorganic compound.</p> <p>(iii) Discuss the significance and limitation of wave functions in explaining the behavior of single electron compounds</p>	[8+8+4]	CO3 CO2 CO2
11A.	<p>i) Describe oxymercuration and demercuration of alkene with example and mechanism</p> <p>(ii) Discuss Heisenberg's uncertainty principle and prove that the uncertainty product is negligible in case of large objects by taking an example</p> <p>(iii) The uncertainty in the position and velocity of a particle are 10^{-10} m and 5.27×10^{-24} m Sec⁻¹ respectively. Calculate the mass of the particle</p>	[8+8+4]	CO3 CO2 CO2
11B.	(i) Explain hydroboration and oxidation reaction in alkene with example and mechanism	[8+8+4]	CO3

(ii) Discuss the important quantum numbers that are used in defining the orbitals and give the shapes of the orbitals

(iii) Write the main features of molecular orbital theory and give its limitations

CO2
CO2