**ST. JOSEPH'S COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)**

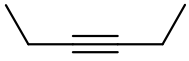
**ST. JOSEPH'S COLLEGE ROAD, CUDDALORE – 607001**

**CH101T – ORGANIC CHEMISTRY – I (SEMESTER-I)**

**UNIT I** **PART A**

1. The hybridization involved in the formation of acetylene is

   a) sp b) $sp^2$ c) $sp^3$ d) $sp^3d$

2. The IUPAC name of  is

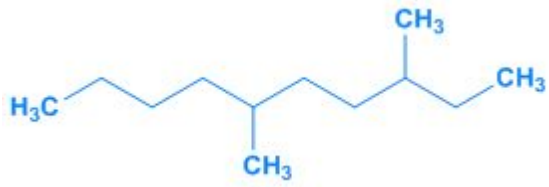
1. 3-hexene b) 4-hexene c) 3-hexyne d) 4-hexyne
3. -------- is the type of hybridization involved in ethylene
4. Bond length of C-H in methane is --------
5. Homolytic dissociation of a bond results in the formation of

   a) cation b) anion c) free radicals d) neutral molecules

6. Name the compound whose structure is shown below.


   a) 2-methylpent-3-yne b) 2,2-dimethylbut-2-yne c) 1,4-dimethylpent-3yne d) 4-methylpent-2-yne

7. Name the compound whose structure is shown below.




   a) 2-ethyl-5-methylnonane b) 3,6-dimethyldecane c) 6-butyl-3-methylheptane d) 5,8-dimethyldecane

8. The IUPAC name of the compound $CH_3$-CH(Cl)-$CH_2$-$CH_3$ is ---------
9. Draw the structure for the ethanol molecule ----------
10. The IUPAC name of the compound $CH_3$-CO-$CH_2$-CH($CH_3$)-$CH_3$ is ----------
11. How many sigma bonds are present in ethane and ethylene molecules? ----------
12. The amount of energy consumed or liberated when a bond is broken or formed is called ------a) length b) bond order c) bond strength d) bond energy.

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**PART-B**

1. Explain the hybridization of sp,$sp^2$ and $sp^3$ ?
2. Explain inductive and resonance effect ?
3. Explain hyperconjucation and steric effect ?
4. What is carbocation and explain reactivity and stability of carbocation ?
5. Give stability order of carbanions and carbenes ?
6. Differenciate homolytic and heterolytic cleavage ?
7. Calculate the bond angle for cyclopropane, cyclobutane and cyclopentane ?
8. Chlorination of n-butane gives 2-chlorobutane and 1-chlorobutane. Calculate % of 2-chlorobutane and 1-chlorobutane?
9. Explan the hybridization involved in the formation of Methane ?
10. Arrange the following molecules in the order of their basic Strength and give the reason.
    i) $NH_3$ ii) $CH_3NH_2$ iii) $(CH_3)_2NH$ iv) $(CH_3)_3N$
11. Define hyperconjucation and explain with an example ?
12. Arrange the carbocations in decreasing order of stability and justify the order?
13. Write the structures of the following compounds.
    i) 2-Butanone ii) Butanal iii) 3-chloro pentane iv) Nitrobenzene
14. Give the reason for acidic nature of Phenol?
15. Compare the basic strengths of Ammonia and Aniline ?
16. Write the resonance structures of Carbondioxide ?
17. Write a note on Homolysis and Heterolysis of Covalent bonds ?

**UNIT II** **PART A**

1. Acid treatment of alcohols give
   a) Aldehydes b) Ketones c) Alkanes d) Alkenes
2. Wurtz reaction is a _____
   a. C – C bond forming reaction b. C – C bond breaking reaction c. aromatic electrophilic substitution d. oxidation reaction.
3. Klobe's electrolysis for the synthesis of alkanes involve_____

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a. Ionic mechanism b. Free radical mechanism c. Both ionic and free radical mechanism

4. What are the products if methyl bromide and ethyl bromide react with sodium in dry ether?

   a) Ethane b. Ethane and propane c. Butane d. Propane, ethane and butane

5. $CH_3Cl + C_3H_7Cl + 2Na \dashrightarrow ?$

6. Sulphonation of alkane is governed by _____

   a. Free radical substitution b. Nucleophilic substitution c. Electrophilic substitution

7. Hexane when heated at 500°C gives lower alkanes and alkenes. This reaction is known as _____

   a. Isomerisation b. Aromatization c. Pyrolysis d. Catalytic reforming

8. Nitration of alkane is governed by _____

   a. Electrophilic substitution b. Nucleophilic substitution c. Free radical substitution

9. Wurtz reaction is a C-C bond forming reaction (True/False)

10. Which of the following metals is used as a catalyst in the catalytic hydrogenation of both alkenes and alkynes?

    a) Palladium b) Iron c) Magnesium d) Copper

11. Cyclohexanol can be converted into cyclohexene by heating with _____

12. Cyclopropane reacts with HBr to give _____

13. The general molecular formula for cyclo alkane is _____

14. The angle strain is _____ in the case of cyclopropane..

**PART-B**

1. Complete the following reactions.

   i) $CH_3CH{=}CH_2 + H_2 \xrightarrow{Ni} ?$

   ii) $CH_3Br + H_2O \longrightarrow ? + ?$

   iii) $CH_4 + Cl_2 \xrightarrow{light} ?$

   iv)  $+ Cl_2 \longrightarrow ?$

2. Explain Kolbe's reaction with mechanism ?

3. Write any five physical properties of alkanes ?

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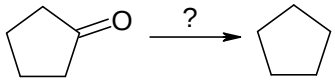
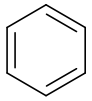
4. Complete the following reactions.

v) n-Hexane $\xrightarrow[\triangle]{AlCl_3/HCl}$ ?

vi) $CH_4 + O_2 \xrightarrow{MoO_3}$ ?

vii) 


viiii)  + $H_2$ $\xrightarrow{Ni\ /\ heat}$

5. Explain the formation of ethylene from carbon and hydrogen atoms?
6. Explain nitration of alkane with mechanism ?
7. Discuss any three chemical properties of alkanes with suitable examples ?
8. Explain the Bayer's strain theory ?
9. Predict the product of the following reaction and give mechanism

$CH_3MgBr + H_2O \longrightarrow$ ?

10. Explain Wurtz reaction with mechanism ?
11. Complete the following equations:

i) $C_2H_5Br + 2Na + Br\text{-}CH_3$ -------→ ? + ? + ?

ii) $CH_2{=}CH_2 + H_2$ ---Ni (250ºC)-----→ ?

iii) ? + ? ----------Δ-(ethanol)------→ cyclopropane + NaBr

iv) Benzene + $3H_2$ -----Ni/ 200ºC-----→ ?

v) $C_2H_5MgBr + H_2O$ --------→ ?

12. Explain the preparation of cyclohexane by Dieckmann's method ?
13. Explain chlorination of alkane with mechanism?
14. What is catalytic cracking

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**UNIT III** **PART A**

1. Thermodynamically controlled addition of hydrogen bromide to a conjugated diene is

   a) 1,2-addition b)1,3-addition c)1,4-addition d) 1,1-addition

2. The products expected from dehydrohalogenation of 4-bromo-2-methylpentane are _____.
3. The structural formula of 2,4,4-trimethyl-2-pentene is _____.
4. Draw the geometric isomers of 2-methyl-2-butene----------
5. The number of allylic hydrogens present in propene is

   a) 1 b) 2 c) 3 d)4

6. How long is the C=C double bond in ethane_____
7. What is the hybridization of the C-atom in ethane?
8. Peroxide catalyzed hydrobromination of 1-pentene gives _____
9. Which of the following is not an electophile?

   a) $H_2C=CH_2$ b) $H^+$ c) $AlCl_3$ d) $CH_3CH^+CH_3$

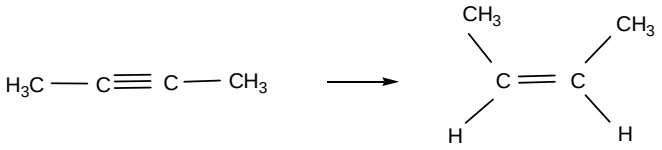
10. What products is formed in the treatment of cyclopentene with bromine water?

    a) trans-2-bromocyclopentanol b) cis-2-bromocyclopentanol c) cis-3-bromocyclopentanol

    d) trans-3-bromocyclopentanol

**PART-B**

1. Explain saytzef rule with an example?
2. Write the reaction of propyne with excess of bromine with the products of the reaction ?
3. Give Ozonolysis of ethylene and its mechanism ?
4. Explain Markovnikov rule with an example?
5. How will you do the following conversion?




6. Give any four methods of preparation of alkene ?
7. Give hydroxylation with $KMnO_4$ and its mechanism?
8. Explain hydroboration of alkene with example
9. Describe the structure and bonding in alkenes
10. Explain E1 reaction with mechanism.

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**UNIT IV** **PART A**

1. The shape of acetylene is ----------

   a) Square planar b) Tetrahedral c) Planar d) Linear

2. The bond angle in a triple bonded carbon of an alkyne is

   a) 109 ° b) 105 ° c) 120 ° d) 180 °

3. Diels –Alder reaction is a / an

   a) Cyclo addition b) Elimination c) Substitution d) Rearrangement

4. 1- Pentyne when heated with alc.KOH gives the major product_____

5. Addition of acetylene to acetone in the presence of alkali is known as _____

6. R-C≡C-H + $CH_3COOH$ + $Hg^{2+}$ → ?

7. R-C≡C-R' + Na + $NH_3$ → ?

8. Hydroboration oxidation of 2-butyne with $BH_3$-$H_2O_2$ and alkali gives_____

9. Thermodynamically controlled addition of hydrogen bromide to a conjugated diene is

   a) 1,2-addition b)1,3-addition c)1,4-addition d) 1,1-addition

10. The adduct given by the reaction between 1,3-butadiene and fumaric acid will be _____

11. Electron withdrawing substituent in dienophile in Diels-Alder reaction _____

**PART-B**

1. Give any four methods of preparation of alkyne?
2. Explain hydrogenation of alkyne with mechanism?
3. Explain hydrohalogenation of alkyne with mechanism?
4. Explain hydration of alkyne with $HgSO_4$?
5. Give Ozonolysis of alkyne and its mechanism?
6. Give addition of halogen acid with diene and its mechanism?
7. Give addition of halogen with diene and its mechanism?
8. Write polymerization of diene
9. Explain diels-alder reaction with mechanism?
10. Define isolated double bonds, conjugated double bonds and cumulated double bonds

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**UNIT V** **PART A**

1. Geometrical isomerism is possible only_____
2. Geometrical isomerism exhibit _____
3. Draw the geometric isomers of 2-methyl-2-butene----------
4. Compounds belongs to the same or different classes but have same molecular formula are called _____
5. Compounds having same sequence of covalent bonds but differ in relative position of the atoms or groups in space are called _____
6. A pair of stereoisomers which are not mirror images of each other are called _____

**PART-B**

1. Write the structures of
   i) E- 1 – chloro-2- bromoprop-1-ene
   ii) Z-1-chloro-2-methylbut-1-ene
2. What are the geometrical isomers possible in 1,4- dimethylcyclohexane and which is the more stable conformation ?
3. Explain Syn and Anti notation?
4. Define conformational analysis
5. What are conformers? Describe the different conformation of n-butane with energy diagrams.