



Register Number:

DATE:

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27
B.Sc. CHEMISTRY – III SEMESTER

SEMESTER EXAMINATION – OCTOBER 2019

CH 318: CHEMISTRY

Time : 2 ½ h

Max Marks : 70

Instructions: The question paper has 2 printed pages and 3 parts. Wherever reactions are required structures must be given.

Part A

Answer **6 out of 8** questions. Each question carries **2 marks**. (6×2=12)

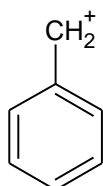
1. Give reason why branching in isomeric alkanes affects the boiling point?
2. What is chirality? Give an example of a chiral molecule.
3. Give two applications for dihydrogen.
4. How does the thermo-stability vary among carbonates of alkali metals?
5. Write the chemical equation for the reaction of sodium peroxide and sodium superoxide with water?
6. What is "inert pair effect"? Explain with a suitable example.
7. Explain why cis-1,2-dichloroethene has a large dipole moment while trans-1,2-dichloroethene has a dipole moment of zero?
8. Mention two methods by which dihydrogen can be produced?

Part B

Answer **8 out of 10** questions. Each question carries **6 marks**. (8×6=48)

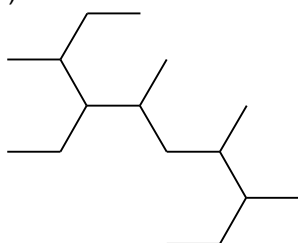
9. a) Explain why cyclohexane is more stable than cyclopropane?
b) Why do the chlorides of alkali earth metals impart colour to the Bunsen flame?
10. a) How does oxygen differ from other members of its group?
b) Write the mathematical expression for the BET equation and explain the terms.
11. a) Mention any three general characteristics of catalytic reactions?
b) Graphically explain how the following affect enzyme catalyzed reactions (i) substrate concentration (ii) temperature
12. How is diborane prepared from BCl₃? Draw its structure and explain the bonding based on valence bond theory?
13. Draw the dash structural formula and bond line formula of at least six constitutional isomers with molecular formula C₄H₁₀O?

14. a) Consider a carbon atom in its ground state, would such an atom offer a satisfactory model for the carbon of methane? If not why not?
 b) Consider a carbon atom in the excited state. Would such an atom offer a satisfactory explanation for the carbon of methane? If not, why not?
15. What does resonance theory state? Draw the resonance structures of benzyl cation, shown below, using curved arrows. Which is the major contributor to the overall structure? Why?

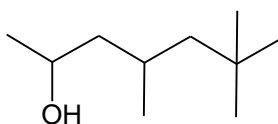


16. Using a potential energy diagram explain the relative stabilities of the conformers that arise due to rotation about the C₂-C₃ bond of butane.
17. What is resolution of a racemic mixture? Explain the chemical method of resolution for a racemic mixture of lactic acid?
18. a) Write the structure for the following molecules (i) 2-*tert*-butyl-4-methylheptane (ii) 4-ethyl-4-fluoro-2-methylheptene (iii) *cis*-1-*sec*-butyl-2-methylcyclopentane
 b) Give the systematic IUPAC name for each of the following:

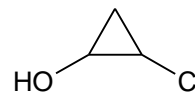
i)



ii)



iii)



Part C

Answer **2 out of 3** questions. Each question carries **5 marks**.

(2×5=10)

19. What is the conjugate base of the following acids (i) CH₄ (ii) CH₃CH₂SH (iii) C₂H₂ (iv) RNH₂. List these conjugate bases in order of decreasing basicity.
20. Write the structure of hex-4-ene-3-ol and write all the stereoisomers possible for the molecule. Give the configuration notation for all the stereoisomers
21. The N₂O molecule is linear and polar.
 a) On the basis of this experimental evidence which arrangement, NNO or NON is correct? Explain your answer.
 b) On the basis of your answer in part a) above, write the Lewis structure of N₂O (including resonance forms).