



ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27
B.Sc. Chemistry - III SEMESTER
SEMESTER EXAMINATION: OCTOBER 2021
(Examination conducted in January-March 2022)

CH 318 - CHEMISTRY

Time- 2 ½ hrs

Max Marks-70

This question paper contains 2 printed pages and three parts

PART-A

Answer any **SIX** of the following questions

6x2=12

1. Why does hydrogen have a unique position in the periodic table?
2. Draw the orbital overlap picture of acetylene.
3. Give the general formula and draw the structure of a basic pyrosilicate unit.
4. Caesium metals lose electrons when exposed to light. Explain this behaviour.
5. Compare the solubility of methanol and butanol in water? Hydrogen bonding, no of carbon atoms.
6. Draw a labelled diagram of potential energy vs reaction coordinate that shows the effect of a catalyst on the activation energy.
7. What are fullerenes?
8. How will you differentiate alkenes and alkynes using IR spectra?

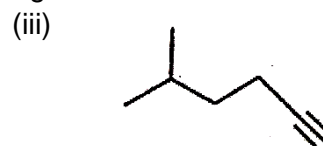
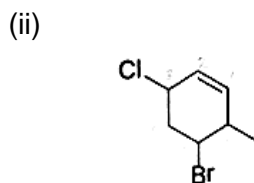
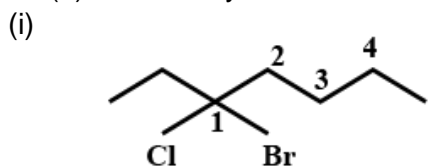
PART-B

Answer any **EIGHT** of the following questions

8x6=48

9. (a). Explain why the solubility of group II hydroxides increase from Be to Ba while the solubility of their sulphates decreases from Be to Ba.
(b) Draw the structure of (a) $\text{Cl}_2\text{C}=\text{CCl}_2$ and (b) CHCl_3 and indicate which of the compounds have a net dipole moment? (3+3)
10. (a) Draw the two chair conformations of methyl cyclohexane. Give reasons to explain which conformation is more stable.
(b) What is diagonal relationship? Give three points where Li resembles Mg. (3+3)
11. (a) Why does oxygen behave differently from the rest of the elements in the group. List two properties that show the anomalous behaviour of oxygen.
(b) Draw and discuss the structure of diborane. (3+3)
12. What is a racemic mixture? Explain the chemical method of resolution of a racemic mixture of a carboxylic acid using chiral amines? (6)
- 13 a) What are interstitial metal hydrides? Give an example.
(b) Mention any four general characteristics of a catalyst. (2+4)
14. (a) How are Boron Nitrides prepared? Discuss the structure of Boron Nitride compared to graphite.
(b) Draw the structure of 2,3 Dibromo pentane and identify the enantiomers and diastereomers? (3+3)

15.(a) Give the systematic IUPAC name for each of the following



(b) Write the structure of the following molecules

(i) 4-Methyl-3-penten-2-ol (ii) Ethenylcyclopropane (iii) 4,4-Dimethyl-1-pentyne (3+3)

16. Draw the dash structural formula and bond line formula for at least six constitutional isomers with molecular formula $C_5H_{12}O$ (6)

17. (a) Using a potential energy diagram explain the relative stabilities of the conformers that arise due to rotation about the C_2-C_3 bond of butane (6)

18. (a) write the mathematical expression for the BET equation and explain the terms.

(b) Write resonance structures of $CH_2 = CH-CHO$. Indicate relative stability of the contributing structure. (3+3)

PART-C

Answer any **TWO** of the following questions

2x5=10

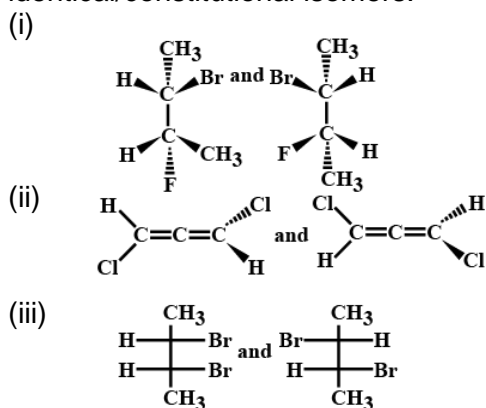
19. (a) (i) Draw the resonance structures of N_2O in the Lewis dot form. which is the most stable structure. Why?

(ii) Draw the structures of H_3PO_3 and H_3PO_4 . (3+2)

20.(a) What is the conjugate base of the following acids?

(i) $C_5H_5SO_3H$, (ii) ROH , (iii) CF_3COOH , (iv) CH_3CH_3 . Arrange the bases in the order of Increasing basicity (5)

21. (a) Identify the relationship between the following pair of enantiomers / diastereomers/ identical/constitutional isomers.



(b) Draw R and S enantiomers of 3-chloro-1-pentene. (3+2)