

# ORGANIC CHEMISTRY QUESTION BANK FOR BSC 1<sup>st</sup> YEAR STUDENTS

## Short answer type (2 - 4 marks each)

- 1) Explain why branched chain alkane have lower boiling point than corresponding n-alkane?
- 2) Write a note on poly-merisation of ethyne & propyne?
- 3) Give the classification of dienes.
- 4) Explain why sulpho-nation of benzene is a reversible process?
- 5) Write a note on oxymercuration - reduction.
- 6) Give the reaction between ethanol & bleaching powder.
- 7) The dipole moment of nitro benzene ( $=3.95 D$ ) is higher than nitromethane( $=3.60D$ ) although both have same polar group. Explain.
- 8) Explain poly halogen compounds.
- 9) Write the difference between configuration & conformations?
- 10) Draw the structures for all possible cyclic compounds for  $C_4H_6$ .
- 11) What is chirality?
- 12) In structure  $RCH=CHR$ , what happens to the relative stability of trans & cis isomers as the size of alkyl group increases?
- 13) Depict all important conformations of butane by Newman projections. Which one shall be most stable?
- 14) Discuss the mechanism of reaction of  $CH_2=CH_2$  with  $OsO_4$ .
- 15) Give reason to explain C—N bond length in amide is shorter as compared to amines.
- 16) Explain aromaticity.
- 17) How is 1,3 -butadiene industrially prepared? Write structural formula of isoprene.
- 18) Why peroxide effect is observed in case of HBr and not with HF, HCl, & HI ?

- 19) Explain how does the state of hybridization affect the bond angle.
- 20) Write an explanatory note on clathrates.
- 21) Explain E/Z system of nomenclature in asymmetrical oxime.
- 22) Assign reason, though having two asymmetric carbon atoms, tartaric acid has got only two optically active forms.
- 23) Give two methods of formation of cycloalkanes.
- 24) Draw energy profile diagram for  $S_N1$  and  $S_N2$  reactions.
- 25) Giving examples explain activating & deactivating groups.
- 26) Outline the anomalous properties of 1,3-butadiene in comparison to isolated. Discuss.
- 27) Account for unusual stability of allyl free radical.
- 28) Write a brief note on inductive effect.
- 29) Depict axial & equatorial bonds in cyclohexane's chair conformation.
- 30) Give mechanism of nitration of benzene.
- 31) Draw structure of standards for D & L configuration.
- 32) Write a note on acidic nature of acetylene.
- 33) Discuss mechanism of  $E2$  reactions.
- 34) Cyclopentadienyl anion has aromatic character. Explain.
- 35) How will you synthesize 2-butanone from ethyne?
- 36) Discuss Corey House reaction.
- 37) Explain reason for following order of reactivity in  $S_N$  reaction: Allyl halide > Alkyl halide > Vinyl halide
- 38) Give two method of formation of cycloalkanes.
- 39) Write structure and IUPAC name of all the mono chloro derivatives of n-butane & iso-butane.
- 40) How will you synthesize 2- butanone from ethyne?
- 41) Give two method of generation of carbenes.

- 42) Explain van der Waals' interaction.
- 43) Distinguish between enantiomers & diastereomers with suitable examples.
- 44) Write an account of hyperconjugation.
- 45) How many conformations of butane are possible? Write a note on their relative stability.
- 46) Prepare 2-methyl pentane from 2-bromopropane.
- 47) Give orbital structure of cyclopropane.
- 48) Complete the reaction giving mechanism:  $C_6H_5-CH=CH-CH_3 + HBr \rightarrow ?$
- 49) Acetylene is acidic. Why?
- 50) Write all stereoisomers of tartaric acid & predict their optical activity.
- 51) Formic acid is stronger than acetic acid. Explain.
- 52) Cyclobutadiene is a conjugated alkene but it is not aromatic. Explain.
- 53) Write a brief note on ortho / para ratio.
- 54) Explain  $S_N2$  mechanism of aliphatic nucleophilic substitution.

**Long answer type (5 - 10 marks each)**

- 1) Discuss the mechanism of following reaction with benzene:
- Nitration
  - Sulphonation
  - Friedel-Craft acylation
  - Halogenation
  - alkylation
- 2) Write notes on following:
- Hyperconjugation
  - Hydrogen Bonding
  - Benzyne Substitution
- 3) Discuss:
- Relative & absolute configuration

- b. Birch reduction
  - c. Newmann & Sawhorse formula
  - d. Markownikoff's rule
- 4) (a) Discuss elements of symmetry with suitable examples
- (b) What is optical resolution?
- 5) Discuss :
- a. stereochemistry of E2 reaction
  - b. Elements of symmetry
  - c. Electromeric effect
  - d. E/Z system
- 6) (a) Toluene react with chlorine under different conditions to give different products. Explain with reaction.
- (b) Explain Sn2 mechanism in alkyl halides.
- 7) (a) Saytzeff Rule & Hoffmann Elimination
- (b) Give synthesis & use of DDT & BHC.
- 8) How will you bring out following conversions:
- a. Benzene → Acetophenone
  - b. Acetylene → Ethylidene dibromide
  - c. Bromobenzene → Biphenyl
  - d. Ethanol → Chloroform
  - e. Sodium propanoate → Ethane
  - f. Chloroform → Formic Acid
  - g. Methyl Chloride → Acetic acid
  - h. Calcium adipate → cyclopentane

- 9) Explain:
- Axial & equatorial bond
  - Charge transfer complex
  - Sawhorse formula
- 10) (a) Draw the configuration & specify R & S enantiomers of 2-chloropentane.  
(b) Discuss the stability of cycloalkanes according to Bayer's strain theory.
- 11) (a) Give five examples of addition reaction in alkenes with mechanism.  
(b) Describe singlet & triplet carbene.
- 12) (a) Discuss aromaticity  
(b) How will you synthesize following compound from benzene:
- 13) Vinyl benzene, Isopropyl benzene, Benzoic acid, bromobenzene, benzene hexachloride.
- 14) Explain:
- Alcohol is water soluble but alkane is insoluble.
  - Halogens when present in benzene is deactivating but in o- & p- directing toward electrophilic substitution.
  - Acetic acid is stronger than propanoic acid.
- 15) Illustrating mechanism, discuss 5 examples of electrophilic addition reaction in alkenes.
- 16) (a) Describe orientation of double bond in Hoffman elimination of quaternary ammonium compounds.  
(b) Explain the preparation & important properties of biphenyl.
- 17) (a) Explain Bayer's strain theory. What are its limitations?  
(b) Draw conformations of cyclohexane & name the bonds.
- 18) Discuss:
- (a) Sequence Rule      (b) Huckel Rule      (c) Geometrical isomerism in oximes

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**Email Us:** [fullonstudy.info@gmail.com](mailto:fullonstudy.info@gmail.com)

**WhatsApp Us:** [+91 6396910465](https://wa.me/916396910465)

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