RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. THIRD SEMESTER EXAMINATION, MARCH 2022

SECOND YEAR [BATCH 2020-23]

Date : 09/03/2022 **CHEMISTRY (GENERAL)**

Time : 11 am – 1 pm **Paper : III** Full Marks : 50

Group - A

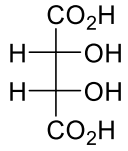
Answer **any four** questions of the following: [4×5]

1. a) Write short note on : [2×2]

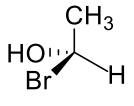
   i) Alternative axis of symmetry (Sn)

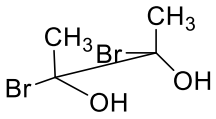
   ii) Diastereomers

   b) Complete the R/S nomenclature for each chiral center of the following molecule: [1]



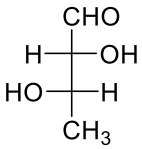
2. a) Represent the following molecules in Fischer projection : [2]



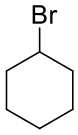


   b) Explain E/Z nomenclature with example of each. [2]

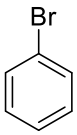
   c) Identify the following molecule as D/L nomenclature: [1]



3. a) Which of the following should undergo faster substitution reaction and why? [2]



and



   b) Explain Saytzeff and Haffmann elimination reaction with example. [3]

4. a) What is WhelandIntermediate?

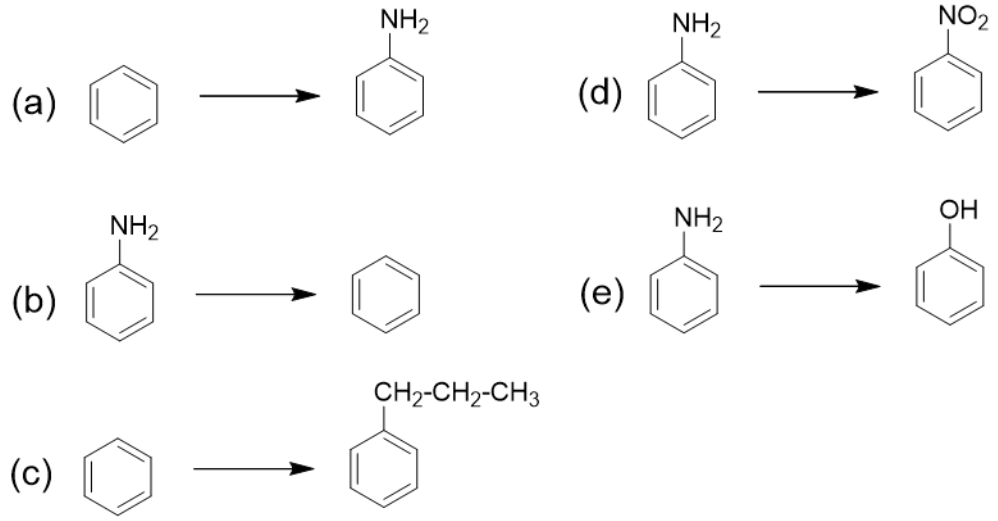
   b) Explain why primary kinetic isotopic effect is not observed for nitration reaction of benzene?

   c) State the reason why sulphonation reaction on benzene is reversible. [1+2+2]

5. a) Explain why halogens (Cl or Br) are electron withdrawing group but ortho-para directing?

   b) Compare the rate of chlorination reaction of toluene, anisole, nitrobenzene and aniline. [3+2]

6. Carry out the following conversions. Write down the steps and respective reagents on that step.[1+1+1+1+1]



Group - B

Answer **any six** questions of the following: [6×5]

7. a) Melting point of NaCl is higher than $AlCl_3$. Explain.

   b) What is radius ratio? How can it help to predict the structure of an ionic crystal? [2+(1+2)]

8. a) What is lattice energy? Mention the factors on which it depends.

   b) Comment on the geometry and dipole moment of I_3^-. [(1+2)+2]

9. a) Predict the geometry for $XeOF_4$ with the help of VSEPR theory.

   b) Among LiCl and CsCl, which one should have greater lattice enthalpy and why?

   c) Why table salt is soluble in water but insoluble in petrol? [2+2+1]

10. a) What is the coordination number of Ce^{4+} in the compound $[Ce(NO_3)_6]^{2-}$ and denticity of the ligand?

    b) Among 1M aqueous solution of $[Co(NH_3)_5Cl]Cl_2$ and $[Co(NH_3)_4Cl_2]Cl$ - which have the greater magnitude of depression of freezing point?

    c) What would be the oxidation state of Pt in complex cation and complex anion in the complex $[Pt(NH_3)_4Cl_2]$ $[PtCl_4]$ [2+1+2]

11. a) What is macrocyclic effect? Name one macrocyclic complex found in green plant.

    b) What is ambidentate ligands? Explain with example.

    c) Predict the IUPAC nomenclature of the following compounds:

    i) $K_3[Al(C_2O_4)_3]$

    ii) $[Cr(NH_3)_6][CoF_6]$ [2+1+2]

12. a) Predict the bond order and magnetic behaviour of C_2 molecule according to molecular orbital theory

b) Predict the structure of the following compounds from their IUPAC nomenclature:

i) trans-bis-(2-aminoethanethiolato) nickel(II)

ii) chlorobis (ethylenediamine) nitritocobalt(III) chloride [3+2]

13. a) Silanes are much more reactive than the corresponding alkanes- Why?

b) Nitrogen can exist as N_2 while phosphorus exists in the form of tetra-atomic state- explain.

c) What is pyrosilicates? Give example with constituent atom ratio. [2+2+1]

14. a) Draw the three conformational isomers of hydrazine.

b) Explain why ICl_7does not exist while IF_7 exists. [3+2]

15. a) Describe the structure and preparation of B_2H_6

b) What is known as inorganic benzene? How does it prepare from B_2H_6? [3+(1+1)]

16. a) Trimethyl amine and trisilyl amine reacts differently with HCl- explain why?

b) Why Pb^{2+} is more stable? Explain with electronic configuration. [3+2]

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