

CHEMISTRY Paper-XXII

(Organic Chemistry-B)

Time Allowed : Three Hours

Maximum Marks : 22

Note : Attempt five questions in all including Q. No. 1 which is compulsory and taking at least one question from each Unit I-IV.

1. (a) Silicones contain

Fill the blank selecting correct answer below :

- (i) Only Si-O-Si bonds
 - (ii) Only Si-C bonds
 - (iii) Two Si-O-Si bonds and two Si-C bonds
 - (iv) Three Si-O-Si bonds and one Si-C bonds. 1
- (b) There are two set of cations and anions (Ca^{+2} , Hg^{+2} , and F^- and CN^-) in solution. Using HSAB principle, write the best combination salts will form from the ions. 1
- (c) Write the correct base strength order of these amines (NH_3 , $(\text{CH}_3)_2\text{NH}$, and $(\text{CH}_3)_3\text{N}$) in both gas phase and aqueous solution phase: 1
- (d) Crystal field symbol for the ground state of $[\text{Mn}(\text{CN}_6)]^{4-}$ is :
- (i) ${}^2T_{2g}$
 - (ii) ${}^1T_{1g}$
 - (iii) 5E_g
 - (iv) ${}^6A_{1g}$ 1

- (e) Which of the following ion is expected to show $\mu_{s.o.}$ close to 2.84 B.M.
- | | | |
|-----------------|----------------|---|
| (i) V^{3+} | (ii) Mn^{3+} | |
| (iii) Fe^{2+} | (iv) Cu^{2+} | 1 |
- (f) Find the suitable configuration of the following, which will not have orbital contribution in tetrahedral geometry ?
- | | | |
|-------------|------------|---|
| (i) d^2 | (ii) d^4 | |
| (iii) d^8 | (iv) d^9 | 1 |

UNIT-I

2. Discuss various classification of Silicones with two important preparations. 4
3. What are triphosphazenes ? Explain the nature of bonding in triphosphazenes with suitable examples. 4

UNIT-II

4. Hydrogen fluoride (HF) acts as an acid in anhydrous sulfuric acid and as a base in liquid ammonia. Explain the above fact with suitable explanation. 4
5. Pyridine forms a weaker complex with SF_6 than with SF_4 . Explain the difference. 4

UNIT-III

6. $[CoCl_4]^{2-}$ is a blue colour complex, while $[Co(H_2O)_4Cl_2]$ is a pink. Write the complete Orgel diagram from both the complexes and explain the cause of colour variation among them. 4
7. Discuss different types of selection rule applicable for $d-d$ transitions, taking comparison of tetrahedral and octahedral complex as a case study. 4

UNIT-IV

8. The complex $[NiCl_4]^{2-}$ is paramagnetic having two unpaired electrons while $[(Ni(CN)_4]^{2-}$ is diamagnetic. Explain these above facts and predict the structures of the two complexes. 4
9. What is orbital contribution of magnetic moments ? Explain how it helps in predicting the structure of $3d$ -metal complexes. 4