

D 33394

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Name.....

Reg. No.....

**FIRST SEMESTER M.Sc. DEGREE EXAMINATION  
FEBRUARY 2013**

(CUCSS)

Chemistry

CH 1C 02-INORGANIC CHEMISTRY - I

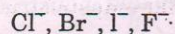
(2010 Admissions)

Time : Three Hours

Maximum : 36 Weightage

**Part A***Answer all questions.**Each question carries 1 weightage.*

1. Arrange the following species in the increasing order of basic strength: Substantiate your answers :



2. How solid superacids are prepared? Mention their uses.
3. Applying Wades rule, classify the following species as *closo* / *nido* / *arachino* structures.
- |                               |  |
|-------------------------------|--|
| (a) $\text{B}_4\text{H}_{10}$ | (b) $\text{C}_2\text{B}_{10}\text{H}_{12}$ |
| (c) $\text{B}_5\text{H}_9$    | (d) $\text{C}_2\text{B}_3\text{H}_5$       |
4. What are *styx* numbers? Explain their significance.
5. Sulphur-nitrogen  $\pi$ -bonded compounds are more stable than their P-N and Si-O analogues
6. How is polythiazyl prepared? Account for its metallic character.
7. How will you account for the abrupt changes in Ellingham diagrams?
8. Distinguish Isopoly anions from Heteropoly anions.
9. Calculate the standard deviation and relative standard deviation for the following set of data :  
35.95, 36.00, 36.04, 36.08 and 36.23.
10. Explain the terms : (a) Students *t*-test ; and (b) Q test.
11. Explain the function of a redox indicator, with a suitable example.
12. Provide example for a ambidentate and a macrocyclic ligand.
13. What is meant by spectrochemical series? Why is it called so?
14. How do the electronic spectra of 3 *d* metal complexes differ from those of 4 *f*-metal complexes?

(14 × 1 = 14 weightage)

**Turn over**



**Section B**

Answer any seven questions.

Each question carries 2 weightage.

15. Discuss the role of HF as a non-aqueous solvent.
16. Explain hydroboration reaction with suitable examples.
17.  $[\text{CoF}_6]^{2-}$  is paramagnetic while  $[\text{Co}(\text{NH}_3)_6]^{2+}$  is diamagnetic, even though both contain  $\text{Co}^{3+}$ . Explain on the basis of valence bond theory.
18. Explain Pourbaux diagrams and discuss their applications.
19. What are the advantages of using organic precipitant in gravimetric analysis?
20. Discuss the factors that affect the stability of metal complexes.
21. Give a brief account of the classification of errors encountered in chemical analysis. How they can be avoided or minimised?
22. Explain Jahn-Teller effect. What is its spectral consequences?
23. How are silicones prepared? Comment on their properties and industrial applications.
24. Which type of indicator can be used in complexometric titrations? What are the essential requirements for such an indicator?

(7 × 2 = 14 weightage)

**Part C**

Answer any two questions.

Each question carries 4 weightage.

25. Explain the HSAB concept of acids and bases. Comment on the chemical consequences of this concept in the study of co-ordination compounds.
26. How B- and N- substituted borazenes prepared? Compare the structure, stability and reactivity of borazene with those of benzene.
27. How stepwise stability constants are related to overall stability constant of metal complexes? Explain the spectroscopic method for determining the stability constant of a metal complex.
28. Construct the MO diagram for Cobalt (III) low-spin octahedral complex with  $\sigma$ -bonding only and discuss the salient features. Discuss the  $\pi$ -bonding effect on the 10 Dq values of octahedral complexes.

(2 × 4 = 8 weightage)