

**Date: 24-06-2019**

**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BANGALORE-27**

**B.Sc. CHEMISTRY- VI SEMESTER**

**SPECIAL SUPPLIMENTARY SEMESTER EXAMINATION: JUNE 2019**

**CH- 6115- Inorganic Chemistry**

**Time: 2 ½ hrs** **Maximum marks: 70**

Supplementary candidates only.

**Note: This question paper 3 printed pages and 3 parts.**

Element Sc Ti V Cr Mn Fe Co Ni Cu Zn

At. no. 21 22 23 24 25 26 27 28 29 30

 **PART A**

Answer any **six** questions. (6 x 2= 12)

1. Why do transition elements show variable oxidation states?
2. Write the IUPAC names of the following coordination compounds:
3. [CoCl2(en)2]+ b) [Pt(NH3)4][PtCl4]
4. Lanthanides have a lower tendency to form coordination complexes compared to transition elements. Give reason.
5. Write the chemical composition of Ziegler-Natta catalyst.
6. Give an example each of a pentahapto and trihapto ligand.
7. Write the general valence electronic configuration of lanthanides.
8. Mention two biological functions of cobalt.
9. Construct a Latimer diagram for copper based on the half-cell reactions shown below.



**PART B**

Answer any **eight** questions. (8 x 6= 48)

1. How does crystal field theory account for the fact that [Co(NH3)6]Cl3is diamagnetic whereas K3[CoF6]is paramagnetic, though both the complexes are octahedral?
2. a) Based on Werner’s theory, account for the nonionic nature of the complex CoCl3.3NH3 and explain its geometry.

b) Calculate the EAN of the central metal ion in the following complexes.

i) [Co(SO4)(NH3)5]NO3 ii) [Fe(ox)2(H2O)2] - (3+3)

1. Draw the structures of the stereoisomers of complexes of the following types: i) Ma2b2 and ii) [M(a-a)3]n+.
2. a) Draw the crystal field splitting pattern in a tetrahedral ligand field.
3. Discuss the bulk separation of lanthanides from monazite sand. (3+3)
4. Which complex in each of the following set has higher crystal field splitting? Give reason.
5. [Co(CN)6]3- or [Co(NH3)6]3+
6. [Co(H2O)6]2+ or [Co(H2O)6]3+
7. [Co(NH3)6]3- or [Rh(NH3)6]3+.
8. Show the electron arrangement of i) d5 system in strong and weak octahedral ligand fields and ii) d4 system in a tetrahedral ligand field. Calculate the crystal field stabilization energy in each case.
9. Give the orbital overlap diagram and discuss the bonding in metal carbonyls. What is meant by synergic effect?
10. a) Give one method of preparation of ferrocene and deduce its valence electron count.

b) Discuss the magnetic property of lanthanides. Give the formula used to calculate the magnetic moment. (3+3)

1. Discuss i) the differences in the binding characteristics of haemoglobin and myoglobin towards oxygen and ii) the cooperativity mechanism in the binding of oxygen to haemoglobin.
2. Explain the following steps in the extraction of lithium from lepidolite:i) conversion of ore to lithium chloride by acid treatment method and ii) electrolysis of lithium chloride.

**PART C**

Answer any **two** questions. (2 x 5= 10)

1. Combination of Pt4+, NH3, Cl- and K+ results in the formation of seven octahedral complexes. Write the formulae of i) the complex which shows highest molar conductivity ii) the one which shows *mer-* and *fac-* isomerism (write the structures of these isomers) and iii) the nonionic complex. (Note: It is not required to combine all the ions while writing the formulae of the complexes).
2. a) Which of the following is paramagnetic? Calculate its magnetic moment.

i) [Zn(OH)4]2- tetrahedral ii) [CoF6]3-

1. Match the following complexes with the colours given below: (2+3)

[Ni(H2O)4(en)]2+ violet

[Ni(H2O)2(en)2]2+  blue green

[Ni(en)3]2+ blue

1. Construct Frost diagram for Cl2 from the following Latimer diagram in basic medium:



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**CH- 6115-A-19**