

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86  
(For candidates admitted during the academic year 2011 – 12 & thereafter)

SUBJECT CODE: 11CH/PC/SI14

M.Sc. DEGREE EXAMINATION, NOVEMBER 2014  
BRANCH IV- CHEMISTRY  
FIRST SEMESTER

REG.NO .....

COURSE : MAJOR CORE

PAPER : STRUCTURAL INORGANIC CHEMISTRY

TIME : 30 MINUTES

MAX.MARKS : 20

Section – A

ANSWER ON THE QUESTION PAPER ITSELF.

Answer all the Questions:

(20 x 1 =20 marks)

I. Choose the correct answer:

- Metal which does not form stable carbonyls  
a) Ni                                      b) Pd                                      c) Pt                                      d) Cr
- Structure of ferrocene in gas phase is  
a) eclipsed                                      b) staggered                                      c) axial                                      d) skew
- Number of carbon atoms through which an organic ligand is attached with a metal atom is called  
a) co-ordination number      b) isoelectronic      c) hapticity                                      d) atomicity
- Whose isopoly anions are not shared by edges of  $MO_6$  octahedra  
a)  $V^{5+}$                                       b)  $Nb^{5+}$                                       c)  $Cr^{6+}$                                       d)  $W^{6+}$

II. Fill in the blanks:

- Conversion of ferrocene into its carboxy aldehyde is known as \_\_\_\_\_ reaction.
- Synergic effect is achieved by \_\_\_\_\_.
- \_\_\_\_\_ is used as catalyst in oxo process.
- In isopoly anions, terminal oxygens are strongly bonded to  $M$  through \_\_\_\_\_ orbitals.

III. State whether True or False:

- Semiconductors are used in fabrication of transistors as  $n - p$  junctions.
- Zeise's salt contains ethylene as one of the ligand.
- Wilkinson's catalyst is used in oxo process.
- Boron compounds are Lewis acids.

**IV. Match the following:**

- |                 |                   |
|-----------------|-------------------|
| 13. $MgAl_2O_4$ | a) Perovskite     |
| 14. $FeTiO_3$   | b) Inverse spinel |
| 15. $CaTiO_3$   | c) Spinel         |
| 16. $TiO_2$     | d) Ilemenite      |
|                 | e) Rutile         |

**V. Answer in a line or two:**

17. Write the structure of vascas' complex.
18. What is 18 electron rule?
19. What is the catalyst used in cyclo oligomerization?
20. What are zeolites? Mention their use.

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TIME : 2½ HOURS

MAX.MARKS : 80

SECTION –B

Answer any five questions:

(5 x 8 = 40 marks)

1. a) Estimate the mole fractions of Schottky defects in  $NaCl$  with formation energy 2 eV at 1000 K. (4)  
b) Calculate the side of the  $CsBr$  unit cell which has bcc lattice (density: 4.498  $g/cm^3$ ,  $K = 1.38 \times 10^{23}$  J/K,  $1eV = 1.602 \times 10^{-19}$  J. (4)
2. a) Explain Meissner effect. (4)  
b) Distinguish spinels from inverse spinels. (4)
3. a) Explain the classification of organo metallic compounds. (4)  
b) Distinguish neutron diffraction and electron diffraction. (4)
4. Describe the nature of bonding in metal carbonyls.
5. Explain the mechanism of oxo process.
6. Write notes on carboranes and phosphazines. (4+4)
7. Explain the classification and structure of silicates with examples.

SECTION –C

Answer any two questions:

(2 x 20 = 40 marks)

8. a) Discuss the band theory of metals. (10)  
b) Explain the structure of zinc blend. (5)  
c) Explain the structure of dinitrogen complexes. (5)
9. a) How will you determine the structure of  $NaCl$  ? (10)  
b) Discuss the M.O treatment of ferrocene. (10)
10. a) Explain the role of catalyst in (i) Monsanto acetic acid process.  
(ii) Hydrogenation of olefin. (5+5)  
b) Discuss the structures of iso and hetero poly acids of Mo. (10)

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