

**CARMEL COLLEGE OF ARTS, SCIENCE & COMMERCE FOR WOMEN,  
SEMESTER END EXAMINATION, AUGUST 2020**

**Semester: VI**

**Inorganic Chemistry - CHC109**

**Total marks: 30      Date: 05/08/2020      Duration: 2 Hours      No. of Pages: 02**

**Instructions:** 1. Upload your answers as one PDF file. The file should be named as follows

**Name of student roll number inorganic chemistry.**

2. Upload the paper in the google class room or Email to [thirdyearchemistry@gmail.com](mailto:thirdyearchemistry@gmail.com)
3. Mobile No. to contact: 9823806686.

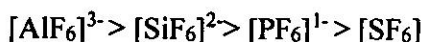
**Q.1 Answer any FIVE of the following**

**(2\*5= 10 Marks)**

i) Formulate the following complexes

- a) Potassium pentachloro (phenyl) Antimonate (V)
- b) ( $\eta^4$ -butadiene) tricarbonyl iron
- c) Potassium carbonyl pentacyano ferrate (II)
- d) Bis (tetracarbonyl Cobalt)

ii) Decide the lability or inertness of the following order. Give your reason for the same



iii) Determine the ground terms for low and high spin  $d^7$  configuration.

iv) In your opinion, does the concentration of ligand affect the stability of complexes?

v) Give any two examples and explain metal to ligand charge transfer spectra.

vi) What happens when (give equations and name the product)

- a) Silver chloride reacts with potassium nitrate in liquid ammonia
- b) Sodium hydride is dissolved in liquid ammonia

vii) Complete the following equations



viii) How many symmetry operations will a  $C_5$  axis generate. List all these symmetry operations.

**Q.2. Answer any FOUR of the following**

**(5\*4= 20 Marks)**

i) Give a suitable equation to show

- a) Increase in chelation leads to an increase in entropy.

- b) Iron pentacarbonyl undergoing hydrolysis
  - c) Acylation reaction of Ferrocene
  - d) Resemblance of Ferrocene to phenol
  - e) Synthesis of a heteronuclear metal carbonyl
- (ii) With suitable examples and on the basis of Prof. Taube's classification comment upon the inertness and lability of complexes.
- (iii) Find the term symbol for the ground state of the following
- a)  $\text{Cu}^{2+}$
  - b)  $\text{Co}$
  - c)  $\text{Fe}^{2+}$

Calculate the EAN value for the following complexes

- a)  $[\text{Mn}(\pi\text{-C}_3\text{H}_5)(\text{CO})_4]$
- b)  $[\text{Co}(\pi\text{-C}_5\text{H}_5)(\text{CO})_2]$

- (iv) Draw the Orgel energy level diagram and the electronic absorption spectrum of crystal field origin for a  $d^8$  configuration of a metal ion under an octahedral ligand environment in an aqueous solution. Give a suitable example.
- (v) Considering ammonia as a solvent, answer the following questions
- (a) Give the chemical equation for the autoionization of pure solvent
  - (b) What will happen if acetic acid is dissolve in liquid ammonia, which ions will form? Give appropriate equations.
  - (c) Describe what will happen when metallic sodium is dissolved in liquid ammonia.

Identify the conjugate acid-base pairs in each of the following reactions.



- (vi) Define an inversion centre. How many symmetry operations will an inversion centre generate? Which of the following molecules will possesses an inversion centre?
- a)  $\text{PCl}_5$
  - b)  $\text{SF}_6$
  - c)  $\text{CH}_4$

List all the symmetry elements of the ammonia molecules and hence obtain its point group.

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