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AY—11—2018

FACULTY OF SCIENCE

M.Sc. (First Year) (First Semester) EXAMINATION

MARCH/APRIL, 2018

(CBCS Pattern)

CHEMISTRY

Paper CH-411

(Inorganic Chemistry-I)

(Monday, 9-4-2018)

Time : 10.00 a.m. to 1.00 p.m.

Time—Three Hours

Maximum Marks—75

N.B. :— (i) Attempt All questions.

(ii) Use of calculator is allowed.

(iii) Figures to the right indicate full marks.

(iv) Solve MCQ ones only.

1. Solve any *three* out of five : 15

(a) Explain lability and inertness on the basis of VBT.

(b) Explain outer sphere mechanism of electron transfer reactions with suitable examples.

(c) What is Ferrocene ? Give its preparation methods.

(d) Explain oxidative addition reaction with suitable example.

(e) Calculate the number of microstates for p^3 and d^6 configurations.

2. Solve any *three* out of five : 15

(a) Explain anation reaction with suitable examples.

(b) Find the ground state term for $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ ion. Comment upon the colour of this complex ion.

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- (c) Explain in detail the types of electronic transitions.
- (d) Determine term symbol for states where $L = 1$ and $S = \frac{1}{2}$.
- (e) What is acid hydrolysis ? Explain effect of solvation on the rate of acid hydrolysis.
3. (a) How will you prepare metal clusters by : 8
- (i) Thermal expulsion of CO from metal carbonyls.
- (ii) Condensation method.

Or

Explain the following properties of ferrocene :

- (i) Aromatic character
- (ii) Mannich reaction
- (iii) Vilsmeier reaction
- (iv) Carboxylation.
- (b) Draw and explain Tanabe-Sugano diagram for V^{3+} ion. 7

Or

Calculate magnetic moment of the following complex ions :

- (i) $[\text{Fe}(\text{CN})_5(\text{NO}^+)]^{2-}$
- (ii) $[\text{CrF}_6]^{3-}$
4. (a) What is SN^1CB mechanism ? Give the evidences in favour of SN^1CB mechanism. 8

Or

Give the characteristics of electron transfer reactions occurring through inner sphere mechanism.

- (b) What are the different modes of bonding of CO found in polynuclear metal carbonyls ? How is IR spectroscopy useful to illustrate the structure of metal carbonyls ? 7

Or

What is a correlation diagram ? Explain it for d^1 and d^9 system in octahedral and tetrahedral ligand fields.

5. (A) Select the correct alternative from the following : 5

(i) Ground state term of d^5 configuration is :

- (a) 6S
- (b) 4F
- (c) 2D
- (d) 3P

(ii) In CO ligand

- (a) π -back bonding is strong
- (b) π -back bonding is weak
- (c) Odd electron is present
- (d) None lone pair is present

(iii) Ferrocene is molecule.

- (a) Paramagnetic and aromatic
- (b) Diamagnetic
- (c) Ferromagnetic
- (d) Diamagnetic and aromatic

(iv) The complexes which does not allow exchange of ligand called

- (a) Labile complexes
- (b) Inert complexes
- (c) Both (a) and (b)
- (d) None of the above

P.T.O.

- (v) SN¹ mechanism is
- (a) Associative mechanism
 - (b) Dissociative mechanism
 - (c) Conjugated acid-base mechanism
 - (d) Bimolecular reaction
- (B) Write short notes on (any *two*) : 10
- (i) Laporte selection rule
 - (ii) Complementary electron transfer reactions
 - (iii) Spin cross over.