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M.Sc. (I-Year) (I-Semester) Examination, 2018-19

CHEMISTRY

[Paper : First]

[PPU-M1(CHE)-CC-1]

Time : Three Hours] [Maximum Marks : 70

Note : Attempt **all** Parts as for direction.

PART - A

(Objective Type Questions)

Note : Attempt **all** questions. Each question carries **02** marks. [2x10=20]

1. (i) In triiodide ion (I_3^-) the hybridisation is :

(a) spd^2

(b) sp^3d

(c) sp^3

(d) sp

(ii) Which among the following pairs have same bond energy ?

(a) CN^-, NO^+

(b) CN^-, O_2^-

(c) O_2^-, NO^+

(d) CN^-, CN^-

(iii) The spin only magnetic moment for Cr^{3+} is :

(a) 5.91 BM

(b) 1.73 BM

(c) 3.87 BM

(d) 4.89 BM

(iv) In which of the following configuration the orbital contribution is quenched in octahedral field ?

(a) d^4 (high spin)

(b) d^6 (high spin)

(c) d^7 (high spin)

(d) d^4 (low spin)

(v) The overall stability constant β_3 is related to stepwise stability constant k_1, k_2, k_3 as :

(a) $\beta_3 = \frac{k_1 + k_3}{k_3}$

(b) $\beta_3 = k_1 - k_2 - k_3$

(c) $\beta_3 = k_1 + k_2 + k_3$

(d) $\beta_3 = k_1 . k_2 . k_3$

(vi) Which of the following statement is not true ?

(a) Stable and unstable terms are used as thermodynamic terms.

(b) Inert and labile terms are used as kinetic terms.

(c) The complex having greater stability have central ion with greater positive charge density.

(d) Complexes not permitting exchange of ligands are labile complexes.

(vii) Which of the following bidentate ligand do not form a five membered ring ?

(a) Oxalate ion

(b) Ethylene diamine

(c) Acetyl acetonate ion

(d) Dimethyl glyoximate ion

(viii) The strongest trans-directing ligand among the given examples is :

(a) NO

(b) PR_3

(c) C_2H_4

(d) SCN^-

(ix) $[Mo_{36}O_{112}(H_2O)_{16}]8-$ the largest polymolybdate known. It formed at :

(a) Strongly basic solution (pH=12-14)

(b) Neutral pH(pH=7)

(c) Strong acid solution (pH=1-8)

(d) Weak acidic solution (pH=5-6)

(x) Out of isopolyanions of $Mo^{6+}, Co^{6+}, Cr^{6+}, V^{5+}, Nb^{5+}, Ta^{5+}, Cr^{6+}$ are formed by sharing the corners of CrO_4^{2-} :

(a) Octahedra

(b) Tetrahedra

(c) Polyhedra

(d) None of these

PART - B

(Short Answer Type Questions)

Note : Attempt **any four** questions. Each question carries **05** marks. [4x5=20]

2. Draw Lewis structures for the following molecules and predict the molecular geometry :

(a) AsF_5

(b) $SnBr_4$

(c) XeO_4

(d) TeF_6

(e) ICl_2^+

3. What do you understand by molecular orbital theory ? Draw the MD Energy level diagram of NO_2^-.

4. (a) Discuss spin orbit coupling of same electron.

(b) Why Mn(II) show maximum magnetic character amongst the divalent ion of first transition series ?

5. Discuss factors which affecting the stability of metel complexes.

6. Give with examples different types of substitution reactions that take place in square planar complexes.

PART - C

(Long Answer Type Questions)

Note : Attempt **any three** questions. Each question carries **10** marks. [3x10=30]

7. (a) Discuss Bent's rule and energetic of hybridisation with suitable examples.

(b) Discuss the limitation of crystal field theory (CFT) with examples.

(c) $[Fe(H_2O)]^{2+}$ is paramagnetic whereas $[Fe(CN)_6]^{4-}$ is diamagnetic. Explain on the basis of CFT.

8. (a) Discuss magnetic properties of inner transition elements.

(b) What is quenching of orbital angular moment and what are its consequences on μ_{eff} of transition metal complexes ?

9. Describe the method of determination of formation constant by spectrophotometric technique with suitable examples.

10. Discuss the theories of trans effect. Which theory explains better the trans effect of CO compared to that of pyridine ?

11. Write in detail isopoly and heteropoly acids and salts of M_oxW and also show the structure of isopoly and heteropoly anions.

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