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Ex/FTBE/Chem/T/112/2017(S)

BACHELOR OF ENGINEERING IN FOOD TECHNOLOGY AND BIOCHEMICAL ENGINEERING EXAMINATION,

1st Year, 1st Semester 2017 (Supplementary Exam)

INORGANIC AND ANALYTICAL CHEMISTRY

Time: 3 hrs **Full Marks: 100**

Answer **Question no.1** and any five from the rest 2 X 10 = 20

1(a) Give an example of bidentate and hexadentate ligand.

(b) Why bleaching powder is useful as disinfectant.

(c) What is-Na-K ATPase?

(d) What are the bond angles present in CO_2 and H_2O?

(e) Define lattice energy?

(f) State Arrhenius definition of acids and bases with examples.

(g) Write the metal present in Hb.

(h) What is the Co-ordination no. of $[CoCl_4]^{2-}$, and $[Fe(CN)_6]^{4-}$ each of the following?

(i) Draw all the possible isomers of $[Pt(NH_3)_2Cl_2]$ complex.

(j) Draw the shapes of various d-orbitals.

(k) What is covalent bond?

2. (a) State the important postulates of Werner theory of Co-ordination compound

b) What is ligand. Give an example of monodentate and chelate ligand.

c) Draw energy level diagrams and indicate the occupancy of the orbital in the following complexes: d^6 octahedral low spin and high spin

(e) Discuss Lewis concepts of acids and bases with examples. State merits of this theory.

(f) Write down the difference between double salt and complex salt with example.

4+2+2+4+4

3. (a) What are Hemoglobin and Myoglobin?

(b)What is thalassemia? What are the remedies for this disease?

(c)What are oxygenated and de-oxygenated hemoglobin?

(d) Describe halogen tablet. 4+3+3+3+3

4. (a) Draw the MO diagram of O_2 and compare the bond length, magnetic properties of O_2, O_2^+ and O_2^-

(b) Write the Fajan's Rule for the formation of ionic bonding

(c) What is Born-Haber cycle? What are the differences between ionic bond and covalent bond 6+4+2+4

5.(a) Discuss the shapes of the following molecules using VSEPR model

CO_2, CH_4, NH_3, SO_2, BF_3

(b) Why CO_2 is non polar?

(c) What is ionic potential? What is VSEPR theory? 10+2+2+2

6. (a) Arrange the following in the increasing order of their acidity with suitable explanation

i) CH_4, NH_3, H_2O and HF

ii) HF, HCl, HBr and HI

(b) Discuss the different factors which influence the magnitude of 10 Dq.

(c) Explain with reason:

$[Ni(NH_3)_6]^{2+}$ is octahedral but $[Ni(CN)_4]^{2-}$ is square planar

(d) Classify the following as Lewis acids and bases with reason

Ag^+, NH_3, BF_3, Zn^{2+}. 2+2+4+4+4

7.(a) Define hard and soft acids and bases with examples

(b) What are the basic assumptions adopted in crystal field theory

(c) Give IUPAC nomenclature of the following

$[Co(NH_3)_6]^{3+}$

[Pt (en) $(NH_3)_2(NO_2)Cl$]

$K_3[FeF_6]$

$[Cr(H_2O)_6SO_4]$

(d) According to Werner theory explain with examples Primary Valency and Secondary Valency

4+4+4+4

8. (a) What is meant by a coordinate covalent bond?

(b) What are the similarities and differences between atomic orbitals and molecular orbitals?

(c) What is radius ratio? How is it useful?

(d) What is the difference between paramagnetic and diamagnetic compounds? Calculate the magnetic moment value of [Fe $(CN)_6^{3-}$]

(e) Describe the bonding in $Ni(NH_3)_6^{2+}$ by valence bond theory

1+4+3+4+4