SEAT No._____ No. of printed pages: 03

[62]

SARDAR PATEL UNIVERSITY

M.Sc. (SEMESTER – IV) EXAMINATION-2018

Thursday, 19th April 2018, 2:00 pm to 5:00 pm

INORGANIC CHEMISTRY: PS04ECHE02

(Reaction Mechanism & Bioinorganic Chemistry)

Note: Figures to the right indicate full marks. **Total Marks: 70**

Q. 1. Answer the following: **8**

1. The value of ΔE_a for d^3 week field (high spin) tetrahedral intermediate is

   (a) 5.34 Dq (b) 3.56 Dq (c) -5.34 Dq (d) 8.01 Dq

2. In a ligand substitution reaction of a trigonal bipyramidal complex, an intermediate with octahedral geometry is formed. Hence, the mechanism of substitution must be _____.

   (a) Associative (c) $I_{associative}$

   (b) Dissociative (d) $I_{dissociative}$

3. Find out the correct pair of isomerization isomers:

   (a) $[Co(NH_3)_5Br]SO_4$ *vs* $[Co(H_2O)_5Br]SO_4$ (c) $[Co(NH_3)_5Cl]SO_4$ *vs* $[Co(NH_3)_5Br]SO_4$

   (b) $[Co(NH_3)_5Br]SO_4$ *vs* $[Co(NH_3)_5SO_4]$ Br (d) $[Co(NH_3)_5Br]SO_4$ *vs* $[Ni(NH_3)_5SO_4]$ Br

4. The burning of magnesium wire resulting in the formation of MgO can be correctly described as _____ reaction.

   (a) association (c) addition

   (b) reduction (d) atom transfer

5. In all ferroporphyrin-protein complex of iron atom has _____structure of chemical type _____hybridization.

   (a) Octahedral, d^2sp^3 (c) Tetrahedral, sp^3

   (b) Square pyramidal, sp^3d^2 (d) Octahedral, sp^3d^2

6. An intracellular calcium protein does not belong to the Calmodulin super family is _____.

   (a) Calpin (c) Protein Kinase C

   (b) Annexins (d) Calmodulin

(P.T.O.)

7. B12 coenzyme has _____ in place of cyanide bound to cobalt in vitamin B12.

(a) 5'-Deoxyadenosine (c) Ethyl

(b) Methyl (d) 5'-Deoxyguanosine

8. During the oxidation of galactose, the oxidation state of copper ion in galactose oxidase changes between _____ and _____.

(a) Cu^{II}, Cu (c) Cu, Cu^{I}

(b) Cu^{I}, Cu^{II} (d) Cu^{II}, Cu^{I}

Q. 2. Answer any **SEVEN** of the following: **14**

1. Explain how the metal and ligand related factors decide the preference for a mechanism.
2. Briefly explain Polarization Theory of Trans Effect with suitable examples/illustrations.
3. Differentiate labile-inert and stable-unstable complexes with suitable examples.
4. Write the two essential requirements for the operation of an inner-sphere electron transfer mechanism.
5. Explain the mechanism of carboxy peptidase A.
6. Discuss the blue copper proteins.
7. Draw the structure of the active site in rubredoxin (Fe-S protein) and explain the basic difference between Rubredoxins and Ferredoxins.
8. What is antibiotic? Explain β-lactam antibiotic (Penicillin).
9. Explain the binding of *cis*-platin to DNA.

Q. 3. A. Discuss the factors affecting the stability of the complex of a metal ion. 6

B. Discuss in detail about the stereochemistry of substitution reactions of octahedral Fe(III) complexes. 6

OR

B. Write a short note on the nature of substitution reaction. 6

Q. 4. A. Explain the racemization of *cis*$[Co(en)_2Cl_2]^+$ complex by intermolecular mechanism. 6

B. Answer the following 6

1. Discuss reactions on coordinated ligands.
2. Explain the Pt(II)-catalyzed two electron transfer reaction.

OR

B. Answer the following 6

1. Explain the stereospecific reaction in $M(L\text{-}L)_3$ type complexes.
2. Explain the isomerization reaction in $K[Cr(C_2O_4)_2(H_2O)_2]$.

Q. 5. A. Discuss biological role of elements in living system. 6

B. Briefly discuss extracellular Ca^{2+} binding proteins. 6

OR

B. Answer the following 6

1. Discuss the structural features of hemoglobin and their role in biological system.
2. Give the detail mechanism of working of carbonic anhydrase.

Q. 6. A. Draw and explain the catalytic cycle involved in the oxidation of a hydrocarbon at the active site of cytochrome P_{450} oxidase. 6

B. Write a note on the Co-enzyme B12. 6

OR

B. Answer the following: 6

1. Write a note on the gold compounds used as medicine.
2. What is Bohr Effect? Draw oxygen dissociation curves for Mb & Hb at partial pressure of oxygen pO_2.

———X———

****