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B.A./B.Sc. (General) Vth Semester (0005) Examination

0451

CHEMISTRY

(Same for B.Sc. Microbiology and Foodd Technogy))-A

Paper : XVII Inorganic Chemistry-A

Time : 3 Hours] **[Maximum Marks : 22**

Note :- Attempt *five* questions in all, selecting *one* question from each Unit and Unit V is compulsory. All questions carry equal marks.

Unit-I

4 each

1. (a) What are the limitations of Valence Bond Theory ? How does crystal field theory differ from valence bond theory ?

   (b) Discuss the factors affecting the magnitude of Cystal field splitting, Δ_0.

2. (a) Explain crystal field splitting in tetrahedral complexes. How will you account for the nonexistence of these complexes with low spin ?

(b) Calculate crystal field splitting energy for the following :

(i) d^4- High spin (octahedral)

(ii) d^5- Strong field (octahedral)

(iii) d^6- Tetrahedral

(iv) d^9- Tetrahedral

Unit-II

4 each

3. (a) Explain in detail the mechanism of substitution reactions in square planer complexes,

(b) How chelation increases the stability of metal complexes ? Also explain, how the number and size of chelate rings contribute to its stability.

4. (a) What is Trans Effect ? Explain the theories for it.

(b) What is Log ? How is it related to the stability of metal complexes ? Explain with examples.

Unit-III

4 each

5. (a) What are metal olefin complexes ? Discuss method of preparation and bonding in these complexes.

(b) Discuss the different types of organomettalic compounds with examples.

6. (a) How does infra-red spectroscopy help in explaining bonding and geometries of metal carbonyls ?

(b) Define Homogeneous hydrogenation reaction. Give mechanism of homogeneous hydrogenation of alkenes with Willkinson's Catalyst.

Unit-IV

4 each

7. (a) Discuss the structures of Myoglobin and Haemoglobin. Also explain the role played by these compounds in biological systems.

(b) What is Na^+ - K^+ Pump ? Explain in detai! the biological roles of Na and K ions.

8. (a) What is Nitrogen Fixation ? Discuss briefly Biological and Abiological Nitrogen Fixation.

(b) Oxygen acts as π-acceptor legand in its interaction with Home, what happen when CO interacts with Heme in place of oxygen ?

Unit-V

9. Compulsory Question :

(a) Calculate CFSE of $[NiCl_4]^{2-}$.

(b) Define stepwise and overall stability constants.

(c) Why subscript 'g' is not used in Tetrahedral complexes ?

(d) How stretching frequency of terminal CO differ from that of bridged CO ?

(e) Name three essential trace elements.

(f) What is Bohr Effect ? 1x6=6