

Department of chemistry

Inorganic chemistry – IV

PCH806T

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I M.Sc., CHEMISTRY

UNIT-I

3 Marks

1. How the molecular orbital's are formed?
2. What are the limitation of crystal field theory?
3. What type of bonding in crystal field theory?
4. What type of bonding in molecular orbital theory?
5. What are the characteristics of MOT?
6. What are the evidence of metal-ligand covalent bond.
7. Write the spectrochemical series.
8. Write the Mulliken symbol S,P,d orbitals.
9. Draw possible combination of atomic orbitals to form Bond.
10. Draw the possible combination of atomic orbitals to form π bond.
11. Why CN is strong ligand?
12. Why F⁻ is weak ligand?
13. Draw orbitals diagram for CN and F ligand?
14. What are the condition for combination atomic orbitals with example.
15. Draw the orbital diagram for Co ligand.
16. What is Jahn-Teller effect.
17. Write the possible symmetry arrangement of t_{2g} and e_g orbitals.
18. What are the π acceptor ligand?
19. What are the ligand which is σ -donor and π acceptor.
20. Write about the oxidation states of lanthanides
21. Write about the oxidation states of actinides
22. Write the electronic configurations of Gd, Ln, La.
23. What is lanthanide contraction
24. Write the nuclear and non-nuclear applications of Lanthanides and actinides.

UNIT –II

1. What is Nephelauxetic effect?
2. What are B and β parameters? Write the significance of these parameters.
3. Find out the number of microstates for p¹ system.
4. Find out the number of microstates for d¹ system.
5. Find out the number of microstates for d¹ system.
6. Find out the number of microstates for d² system.
7. Find out the number of microstates for d³ system.
8. Find out the number of microstates for d⁵ system.

UNIT-III

1. What is nano science & Nanotechnology.
2. Write the types of preparation methods for nanomaterials.
3. Write about microware synthesis.
4. Write the basic concepts of nanoscience and nanotechnology.
5. What is quantum dot with diagram.
6. What is quantum wire with diagram.
7. What is quantum well with diagram.
8. What are the properties of nano materials.
9. Explain about carbon nanotubes.
10. What are the application of carbon nanotubes.

UNIT – IV

1. Write about the structure of Haemoglobin
2. Write about the structure of myoglobin
3. What is the role of haemoglobin in the biological system?
4. What is the role of myoglobin in the biological system?
5. What are heme proteins?
6. Draw the structure of hemeerythrin.
7. Draw the structure of hemocyanin
8. Define nitrogen fixation
9. What are metalloproteins?
10. Write about molybdenum nitrogenase

UNIT-V

1. What are the modes of Radioactive decay.
2. What is orbital election capture.
3. Write about Nuclear Isomerism.
4. Write about Internal conversion.
5. What is Q- value.
6. What is threshold energy.
7. What is cross section Nuclear Reaction.
8. Nuclear fission.
9. Nuclear fusion.
10. What is thermo nuclear Reaction.
11. Write about high energy Nuclear Reaction.

UNIT-I 5 Marks

1. Explain Mo energy level diagram of sigma bonding in octahedral complex.
2. Explain Mo energy level diagram of Pi bonding in octahedral complex.
3. Explain and draw Mo concepts of octahedral and tetrahedral complexes.
4. Explain the Jahn-Teller effect from d^1 to d^{10} system.
5. Explain the evidence of the metal-ligand Bonding.
6. Compare 3d and 4f block elements
7. Discuss the basic nature of lanthanides
8. Write about the magnetic properties of lanthanides and actinides
9. Explain the spectral properties of lanthanides
10. Discuss the coordination number of lanthanides

UNIT – II

1. Explain the Orgel diagram for d^1, d^9, d^2, d^8 octahedral system.
2. Explain the Orgel diagram for d^1, d^9, d^2, d^8 tetrahedral system.
3. Explain the Orgel diagram for d^3, d^7, d^4, d^6 octahedral system.
4. Explain the Orgel diagram for d^3, d^7, d^4, d^6 tetrahedral system.
5. Draw Sugano-Tanabe diagram for d^2 system
6. Explain LMCT spectra with suitable example
7. Explain MLCT spectra with suitable examples

UNIT-III

1. Write Briefly about Biomedical application of nanotechnology.
2. Explain the preparatory methods.
 - i) Chemical methods, ii) thermolips iii) pulsed laser method.
3. Explain the principle and Instrumentation of SEM.
4. Explain the principle and Instrumentation of TEM.
5. Explain the principle and Instrumentation of AFM.

UNIT – IV

1. Explain the structural features of hemoglobin and myoglobin
2. Explain the structural features of hemerythrin and hemocyanin
3. Explain the structural features of iron sulphur proteins
4. Explain the structural features of cytochromes
5. Explain the nitrogen cycle PS-I PS-II

UNIT-V

1. Explain the G.M counters.
2. Explain the scintillation and Cherenkov counters.
3. Differentiate photonuclear and thermo nuclear reaction.
4. Detection and determination of activity by i) cloud chamber ii) Nuclear emulsion iii) Bubble chamber.

