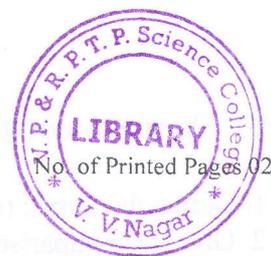


Seat No.: .....

[66]  
Eng.

SARDAR PATEL UNIVERSITY  
B. Sc. (SEMESTER-V) EXAMINATION

Subject: Inorganic Chemistry (US05CCHE22)



Date: 26-12-2020

Time: 2:00 P.M. To 4:00 P.M.

Day: Saturday

Total Marks: 70

Q:1 Answer the following multiple-choice questions. [10]

1. According to crystal field theory, the nature of metal-ligand bond is \_\_\_\_\_.  
(a) covalent (b) coordinate (c) purely electrostatic (d) all of these
2. The value of crystal field splitting energy is \_\_\_\_\_ than pairing energy when low spin octahedral complexes are formed.  
(a) less (b) greater (c) equal (d) none of these
3. The number of unpaired electrons present in  $[\text{Co}(\text{NH}_3)_6]^{3+}$  is \_\_\_\_\_.  
(a) 0 (b) 1 (c) 2 (d) 3
4. Infinite fold axis of symmetry is present in which type of molecule?  
(a) Octahedral (b) Tetrahedral (c) Linear (d) Pyramidal
5. How many two-fold axes of rotation are present in a  $\text{BCl}_3$  molecule?  
(a) 1 (b) 2 (c) 3 (d) 4
6. In  $\text{S}_\text{N}1$  reaction of octahedral complexes what is the shape of the intermediate?  
(a) Square pyramidal (b) Trigonal bipyramidal  
(c) Pentagonal bipyramidal (d) (a) & (b) both are possible
7.  $\text{S}_\text{N}2$  is known as ..... mechanism.  
(a) association (b) dissociation (c) both (a) & (b) (d) none of these
8. The complexes in which the ligand substitution is slow are called ..... complexes.  
(a) inert (b) parallel (c) labile (d) octahedral
9. In boron nitride, the B-N distances are equal to \_\_\_\_\_.  
(a) 1.40 Å (b) 1.45 Å (c) 1.54 Å (d) 1.50 Å
10. How many isomers of  $\text{S}_5(\text{NH})_3$  is possible?  
(a) 2 (b) 3 (c) 4 (d) 5

Q:2 Fill in the blanks selecting the appropriate option given in the bracket: [08]

1.  $C_2 \times \sigma_h = \text{_____}$  (i / E)
2. If the value of  $n = 1$  then rotation angle is \_\_\_\_\_ degree. (360 / 180)
3. The value of CFSE for  $d^8$  ion in weak ligand field is \_\_\_\_\_. (-12 Dq / -12 Dq + 3P)
4.  $[\text{C}_6\text{F}_6]^{3-}$  is \_\_\_\_\_ in nature. (Paramagnetic / Diamagnetic)
5.  $\text{CFAE} = \text{CFSE of intermediate} - \text{.....}$  (CFSE of ligand / CFSE of reacting complex)
6. .... is called overall stability constants. ( $\beta / \lambda$ )
7. In the structure of  $[\text{NPCl}_2]_3$ , P-atoms are \_\_\_\_\_ hybrid orbits. ( $sp^3 / sp^2$ )
8.  $\text{S}_4\text{N}_4$  is insoluble in \_\_\_\_\_. ( $\text{CCl}_4 / \text{H}_2\text{O}$ )

[1]

(P.T.O.)

**Q:3 Short Answer Questions (Attempt Any Ten):**

[20]

1. Define the terms: (a) Symmetry operation (b) Principal axis of rotation
2. Give the comparison between  $\sigma_v$  and  $\sigma_h$ .
3. Identify symmetry elements of Pyridine molecule and detect the point group.
4. Tetrahedral complexes are generally high spin. Explain.
5. Give any two limitations of crystal field theory.
6. What are the factors affecting the magnitude of  $\Delta_o$ ? Give their name only.
7. What is chelate effect?
8. Mention factors affecting the stability of complexes depends on nature of central metal ion.
9. What is macrocyclic effect?
10. Give the preparation of dimethyl silicon oil.
11. Give the uses of phosphonitrilic halides.
12. Write the general properties of inorganic polymers.



**Q:4 Long Answer Questions (Attempt Any Four):**

[32]

1. Prove with proper examples: (i)  $S_n^{2n} = E$ , for  $n = \text{odd numbers}$   
(ii)  $S_n^n = E$ , for  $n = \text{even numbers}$
2. Write a note on  $D_n$  and  $D_{nh}$  point group.
3. Discuss crystal field splitting of  $d$ -orbital in octahedral complexes, with proper diagram.
4. Discuss energy level diagram of  $[\text{Co}(\text{NH}_3)_6]^{3+}$  ion with proper diagram.
5. Discuss the stability constant and composition of a complex experimentally using Spectrophotometric method.
6. What is Acid Hydrolysis? Discuss the octahedral complexes in which the inert ligand is a  $\pi$ - donor.
7. Give the preparation, properties and structure of Tetrasulphur tetranitride,  $\text{S}_4\text{N}_4$ .
8. Give the preparation, properties and structure of Boron nitride.

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