SHIVAJI COLLEGE
(University Of Delhi)
Internal Assessment
BSc (H) Chemistry Sem IV

Paper Name: Inorganic Chemistry-IV
Maximum Marks: **24**
Date of Test: 18.04.2024
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Attempt all questions.

1. Write the formulae of the following complexes **(2)**

a. Tetramethylammoniumheptaiodidozirconate(IV)

b. Barium terafluoridobromate(III)

c. Dimminebis(triethylarsine)palladium(II)perchlorate

d. μ-imido-μ-superoxidotetrakis(ethylenediamine)dicobalt(III)nitrate

2. Name the following compound according to IUPAC system of nomenclature **(2)**

a. $[ReH_3\{P(C_6H_5)_3\}]$
b. $[Cr(en)_3][FeCl_4]_3$
c. $[Pt(S_2O_3)_2NH_3(CH_3NH_2)]$
d. $K_3[Cl_3TlCl_3TlCl_3]$

3. Name the type of isomerism in following **(2)**

a. $[Co(NH_3)_6][Cr(C_2O_4)_3]$ and $[Cr(NH_3)_6][Co(C_2O_4)_3]$

b. $[Co(en)(pn)(NO_2)_2]^+$ and $[Co(en)(tn)(NO_2)_2]^+$

4. Which of the following coordiantion compounds would exhibit optical isomerism. **(1)**
a. trans-dicyanobis (ethylenediamine) chromium (III) chloride
b. tris-(ethylenediamine) cobalt (III) bromide
c. pentaamminenitrocobalt (III) iodide
d. diamminedichloroplatinum (II)

5. The octahedral complex which shows both facial and meridional isomers is. **(1)**
a. Triglycinatocobalt(III).
b. Tris(ethylenediamine)cobalt(III)
c. Dichlorodiglycinatocobalt(III)
d. Trioxalatocobaltate(III)

6. In coordination compound $[Co(en)_2Cl_2]Cl$ which statement is false. **(1)**

a. Cationic octahedral complex.
b. Show ionic Isomerism
c. Show geometrical Isomerism
d. Show optical Isomerism

7. The pair of complex compounds $[Cr(H_2O)_6Cl_3]$ and $[Cr(H_2O)_5Cl]Cl_2H_2O$ are an example of. **(1)**

a. Linkage isomerism
b. Ionisation isomerism
c. Coordination isomerism
d. Hydrate isomerism

8. The number of possible isomers for $[Co(en)_2Cl_2]$ is (where en = ethylenediamine). **(1)**

a. 2
b. 3
c. 4 .
d. 5

9. What are the distribution of six d-electrons in Co^{3+} ion in t_{2g} and e_g orbitals of the complex ion pair viz $[CoF_6]^{3-}$ and $[Co(NH_3)_6]^{3+}$ **(1)**

a. $t_{2g}^4\ eg^2$ and $t_{2g}^4\ eg^2$
b. $t_{2g}^4\ eg^2$ and $t_{2g}^5\ eg^1$
c. $t_{2g}^6 eg^0$ and $t_{2g}^4\ eg^2$
d. $t_{2g}^4\ eg^2$ and $t_{2g}^6 eg^0$

10. The CFSE for a high-spin d^4 octahedral complex is: **(1)**

a. $-0.6\Delta oct$
b. $-1.8\Delta oct$
c. $-1.6\Delta oct$
d. $-1.2\Delta oct.$

11. For which pair of complexes is the order of values is correct? **(1)**

a. $[Rh(NH_3)_6]^{3+} > [Co(NH_3)_6]^{3+} > [Ni(NH_3)_6]^{2+} > [Co(NH_3)_6]^{2+}$
b. $[Co(NH_3)_6]^{3+} > [Rh(NH_3)_6]^{3+} > [Ni(NH_3)_6]^{2+} > [Co(NH_3)_6]^{2+}$
c. $[Rh(NH_3)_6]^{3+} > [Ni(NH_3)_6]^{2+} > [Co(NH_3)_6]^{3+} > [Co(NH_3)_6]^{2+}$
d. $[Rh(NH_3)_6]^{3+} > [Co(NH_3)_6]^{3+} >> [Co(NH_3)_6]^{2+} > [Ni(NH_3)_6]^{2+}$

12. Which of the following correctly places the ligands in their order in the spectrochemical series? **(1)**

a. $Br^- < Cl^- < NH_3 < H_2O$
b. $I^- < Br^- < H_2O < [OH]^-$
c. $F^- < Cl^- < H_2O < NH_3$
d. $I^- < Cl^- < H_2O <$ en

13. What are the denticity and negative charges on ethylene diamine tetraacetate ion (EDTA)? **(1)**
    a. 2, 4.
    b. 4, 2
    c. 6, 2
    d. 6, 4

14. Which of the following are correct. **(1)**
    a. CH_3NH_2, NH_2OH, CS are neutral ligands
    b. CO, H_2O, pyridine, N_2H_4 are neutral ligands
    c. CS, NO, N_3^-, SCN^- are anionic ligands
    d. Ethylenediamine, bipyridyl, Oxalato are bidentate ligands.
    (i) (d)
    (ii) (a), (b), (d)
    (iii) (c), (a)
    (iv) All of the above

15. Which of the following square planar complex shows cis-trans isomerism? **(1)**
    a. $[Pt(NH_3)Cl_3]^-$
    b. $[Pt(NH_3)_2Cl_2]$
    c. $[Ni(CN)_4]^{2-}$
    d. $[RhCl(PPh_3)_3]$

16. For $[Cr(H_2O)_6]^{2+}$, the mean pairing energy P = 23,500 cm^{-1} and Δ_0 =13900cm^{-1}. CFSE for high spin and low spin states are : **(1)**
    a. 8,340 cm^{-1} and 22,240 cm^{-1}
    b. 8,340 cm^{-1} and 12,60 cm^{-1}
    c. 22,240 cm^{-1} and 8,340 cm^{-1}
    d. 12,60 cm^{-1} and 8,340 cm^{-}

17. Which of the following is not a chelating ligand? **(1)**
    a. Thiosulphato
    b. Oxalato
    c. Glycinato
    d. Ethylenediamine

18. The IUPAC nomenclature of $Na[PCl_6]$ is…….. **(1)**
19. The NO_2^- ligand can form……isomers. **(1)**
20. The complex $[Mg(EDTA)]^{2-}$ is a…….complex. **(1)**
21. Chirality is the essential condition for …….. **(1)**