



INDIAN SCHOOL DARSAIT
DEPARTMENT OF CHEMISTRY



Subject: Chemistry		Topic : Coordination Compounds		Date of Worksheet: 5.12.2018	
Resource Person: SREEKALA M		Date of Submission: _____			
Name of the Student: _____		Class & Division: XII		Roll Number: _____	
1.	Write the IUPAC name of the following: i) $[\text{CoCl}_2(\text{en})_2]\text{Cl}$ ii) $[\text{Pt}(\text{NH}_3)_3(\text{NO})\text{Cl}_2]\text{Br}_2$			1	
2.	Give an example of coordination isomerism.			1	
3.	Write the coordination number and oxidation state of Platinum in the complex $[\text{Pt}(\text{en})_2\text{Cl}_2]$			1	
4.	Among Octahedral and Tetrahedral crystal fields, in which case the magnitude of crystal splitting is larger?			1	
5.	Give one example of coordination compounds useful in i) biological process ii) extraction of metals.			1	
6.	Why is CO a stronger ligand than Cl^- ?			1	
7.	Why does a tetrahedral complex of the type $[\text{MA}_2\text{B}_2]$ not show geometrical isomerism.			1	
8.	Write the formula for i) Pentaamminenitrito- O-cobalt(III) ii) Sodium (ethylenediaminetetraacetate)chromate(II)			2	
9.	Draw the structures of isomers, if any, and write the names of the following complexes .i) $[\text{Cr}(\text{NH}_3)_4\text{Cl}_2]^+$ ii) $[\text{Co}(\text{en})_3]^{3+}$			2	
10.	Discuss the nature of bonding in metal carbonyls.				
11.	Describe the state of hybridization , the shape and the magnetic behavior of the following complexes: i) $[\text{Cr}(\text{H}_2\text{O})_2(\text{C}_2\text{O}_4)_2]^-$ ii) $[\text{Co}(\text{NH}_3)_2(\text{en})_2]^{3+}$			2	
12.	A coordination compound has the formula $\text{CrCl}_3 \cdot 4\text{H}_2\text{O}$ precipitates silver chloride when treated with AgNO_3 . The molar conductance of its solution corresponds to a total of two ions. Write the structure and IUPAC name of the complex compound.			2	
13.	Explain the following terms: i) Crystal field splitting in an octahedral field. ii) Spectrochemical series iii) Linkage isomerism iv) an outer orbital complex. v) A bidentate ligand vi) Denticity of a ligand vii) Crystal field splitting energy.			1 mark each	

14.	On the basis of CFT explain why Co(III) forms paramagnetic octahedral complex with weak ligands whereas it forms diamagnetic octahedral complex with strong ligands.	2
15.	Give the name, stereochemistry and the magnetic behavior of the following complexes. i) $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$ ii) $\text{K}_2[\text{Ni}(\text{CN})_4]$	2
16.	a) State the hybridisation and magnetic behavior of $[\text{Cr}(\text{CO})_6]$ b) What are the factors affecting crystal field splitting energy? c) Which of the following is more stable and why? $\text{K}_4[\text{Fe}(\text{CN})_6]$ or $\text{K}_3[\text{Fe}(\text{CN})_6]$	3
17.	Draw a sketch to show the splitting of d-orbitals in an octahedral crystal field. State how the magnitudes of Δ_0 and P decide the actual configurations of the d-orbitals in an octahedral crystal field for a d^6 ion.	3
18.	Write the formula of the following coordination compound Iron(III) hexacyanoferrate(II) What type of isomerism is exhibited by the complex $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{SO}_4$? Write the hybridization and number of unpaired electrons in the complex $[\text{CoF}_6]^{3-}$	3
19.	a) Give the IUPAC name of $[\text{CrCl}_2(\text{H}_2\text{O})_4]\text{Cl}$ b) Give the number of unpaired electrons in the following complex ions. $[\text{FeF}_6]^{4-}$ and $[\text{Fe}(\text{CN})_6]^{4-}$ c) Name the isomerism exhibited by the following pair of coordination compounds. $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$ and $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Br}$ Give one chemical test to distinguish between these two compounds.	3
20.	a) Give the electronic configuration of the d orbitals of Ti in $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ ion in an octahedral crystal field. b) Why is this complex coloured? Explain on the basis of distribution of electrons in the d orbitals. c) How does the colour change on heating $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ ion?	3
21.	$\text{CoSO}_4\text{Cl}\cdot 5\text{NH}_3$ exists in two isomeric forms A and B. Isomer A reacts with AgNO_3 to give a white precipitate, but does not react with BaCl_2 . Isomer B gives a white precipitate with BaCl_2 but does not react with AgNO_3 . Answer the following questions. i) Identify A and B and write their structural formulae. ii) Name the type of isomerism involved. iii) Give the IUPAC name of A and B.	3
22.	Write the types of isomerism exhibited by the following complexes. i) $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{SO}_4$ ii) $[\text{Co}(\text{en})_3]^{3+}$ iii) $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$ ii)	3
23.	Describe the limitations of valence bond theory and Crystal Field theory.	3
24.	Compare the following complexes with respect to their molecular shape and magnetic behavior: i) $[\text{Cr}(\text{NH}_3)_6]^{3+}$ ii) $[\text{Fe}(\text{CN})_6]^{4-}$ iii) $[\text{Ni}(\text{Cl})_4]^{2-}$	3

25.	Three geometrical isomers are possible for $[\text{Co}(\text{en})(\text{H}_2\text{O})_2(\text{NH}_3)_2]^{3+}$. Draw molecular structures of these three isomers and indicate which one of them is chiral.	3
26.	For the complex $[\text{Fe}(\text{en})_2\text{Cl}_2]\text{Cl}$, identify the following i) Oxidation number of iron ii) Hybrid orbitals and shape of the complex iii) Magnetic behavior of the complex iv) number of its geometrical isomers v) Name of the complex.	3
25.	a) A metal ion M^{n+} having d^4 valence electronic configuration combines with three didentate ligands to form a complex compound. Assuming $\Delta_0 > P$. i) Draw the diagram showing d-orbital splitting during the complex formation. ii) Write the electronic configuration of the valence electrons of the metal M^{n+} ion in terms of t_{2g} and e_g . iii) What type of hybridization will M^{n+} ion have?	3