


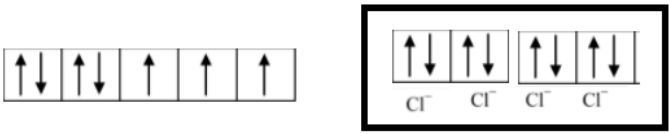
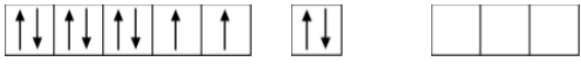


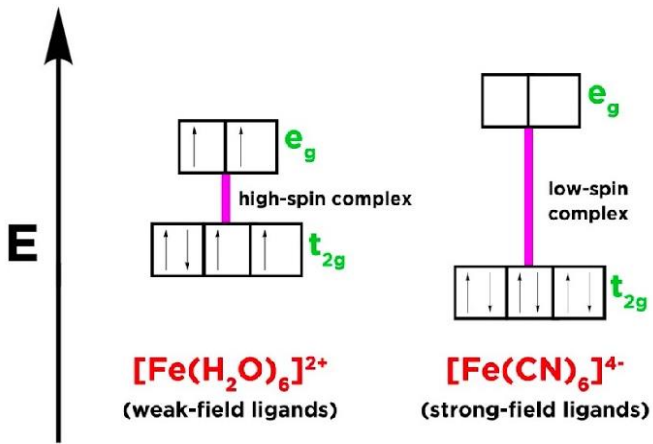
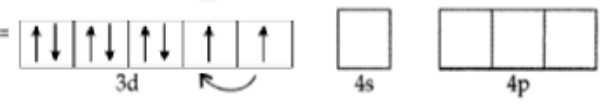

	INDIAN SCHOOL AL WADI AL KABIR	
Class: XII	Department: SCIENCE 2021 - 22 SUBJECT :CHEMISTRY	Date of submission: 27.02.2022
Worksheet No: 13 WS WITH ANS.	Chapter: 9 – Coordination Compounds	Note: A4 FILE FORMAT
NAME OF THE STUDENT	CLASS & SEC:	ROLL NO.

Q. No.	Questions and Answers	Marks
1.	<p>Name the following complex compounds or ions.</p> <ol style="list-style-type: none"> [Al (H₂O)₆] Br₃ Hexaaquaaluminum (III) bromide [Cr (NH₃)₆] Cl₃ Hexaamminechromium (III) chloride K₃ [FeF₆] Potassium hexafluoroferrate (III) [Zn (OH)₄]⁻² Tetrahydroxozincate (II) ion [Co (H₂O)₄Cl₂] Cl Tetraaquadichlorocobalt (III) chloride [Cu (NH₃)₄]⁺² Tetraamminecopper (II) ion K₂ [SnCl₆] Potassium hexachlorostannate (IV) [Pt (NH₃)₄Cl₂] [PtCl₆] Tetraamminedichloroplatinum (IV) hexachloroplatinate (IV) 	1 each
2.	<p>Write the formula for each of the following complex compounds or ions.</p> <ol style="list-style-type: none"> Hexaamminecobalt (III) chloride [Co (NH₃)₆] Cl₃ Diamminetetra bromoplatinum (VI) bromide [Pt (NH₃)₂ Br₄] Br₂ Tetraaquacadmium (II) nitrate [Cd (H₂O)₄] (NO₃)₂ Diamminesilver (I) ion [Ag (NH₃)₂]⁺ Sodium tetracyanocuprate (I) Na₃[Cu (CN)₄] Silver hexacyanoferrate (II) Ag₄[Fe (CN)₆] Tetraammineoxalatonickel (II) [Ni (NH₃)₄ C₂O₄] 	1 each

3.	<p>Identify the denticity of the ligands given below:</p> <p>aqua H_2O monodentate ammine NH_3 monodentate benzene C_6H_6 monodentate</p> <p>carbonyl CO monodentate nitrosyl NO monodentate</p> <p>methylamine CH_3NH_2 monodentate dimethylamine $(CH_3)_2NH_2$ monodentate trimethylamine $N(CH_3)_3$ monodentate</p> <p>ethylenediamine or en $H_2NCH_2CH_2NH_2$ bidentate diethylenediamine or dien $NH(CH_2CH_2NH_2)_2$ tridentate triethylenetetraamine or trien $N(CH_2CH_2NH_2)_3$ tetradentate</p> <p>Pyridine or py C_5H_5N monodentate trimethylphosphine (PMe3) $P(CH_3)_3$ monodentate</p>	1 each																												
4.	<p>Identify the geometry of the given complexes:</p> <table border="1" data-bbox="326 1014 1252 1717"> <thead> <tr> <th>CN</th> <th>Geometry</th> <th>Hybridization</th> <th>Example</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>Linear</td> <td>sp</td> <td>$[Ag(NH_3)_2]^+$</td> </tr> <tr> <td>4</td> <td>Tetrahedral</td> <td>sp^3</td> <td>$[Cd(NH_3)_4]^{2+}$</td> </tr> <tr> <td>4</td> <td>square planar</td> <td>sp^2d</td> <td>$[Cu(OH_2)_4]^{2+}$</td> </tr> <tr> <td>5</td> <td>trigonal bipyramid</td> <td>sp^3d</td> <td>$Fe(CO)_5$</td> </tr> <tr> <td>5</td> <td>Square pyramidal</td> <td>sp^2d^2</td> <td>$[MnCl_5]^{3-}$</td> </tr> <tr> <td>6</td> <td>Octahedral</td> <td>sp^3d^2</td> <td>$[Fe(CN)_6]^{4-}$</td> </tr> </tbody> </table>	CN	Geometry	Hybridization	Example	2	Linear	sp	$[Ag(NH_3)_2]^+$	4	Tetrahedral	sp^3	$[Cd(NH_3)_4]^{2+}$	4	square planar	sp^2d	$[Cu(OH_2)_4]^{2+}$	5	trigonal bipyramid	sp^3d	$Fe(CO)_5$	5	Square pyramidal	sp^2d^2	$[MnCl_5]^{3-}$	6	Octahedral	sp^3d^2	$[Fe(CN)_6]^{4-}$	1 each
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5.	<p>Show the: Formation of $[\text{CoCl}_4]^{2-}$</p> <p style="text-align: center;">3d 4s 4p</p> <p>Co atom in the ground state</p>  <p>Co^{2+} ion</p>  <p>Formation of $[\text{CoCl}_4]^{2-}$</p>  <p style="text-align: center;">sp^3 hybridization</p>	2 each
6.	<p>Show the : Formation of $[\text{Ni}(\text{CO})_4]$:</p> <p style="text-align: center;">3d 4s 4p</p> <p>Atomic orbitals of Ni in (Z=28) ground state</p>  <p>Hybridized sp^3 orbitals of Ni</p>  <p>Formation of $[\text{Ni}(\text{CO})_4]$</p>  <p style="text-align: center;">FOUR ELECTRON PAIRS DONATED BY FOUR CO MOLECULES</p> <p style="text-align: center;">sp^3 HYBRIDIZATION</p>	2 each

7.	<p>Compare the two complexes based on CFT:</p>  <p>[Fe(H₂O)₆]²⁺ (weak-field ligands)</p> <p>[Fe(CN)₆]⁴⁻ (strong-field ligands)</p>	1 each
8.	<p>Give IUPAC name of [Ni(NH₃)₃NO₃]Cl.</p> <p>IUPAC name : Triamminenitratonickel (III) chloride</p>	1 each
9.	<p>Give two examples of ligands which form coordination compounds useful in analytical chemistry.</p> <p>(i) EDTA (Ethylene diamine tetra-acetic acid)</p> <p>(ii) Dimethyl glyoxime (DMG)</p>	1 each
10.	<p>Which of the following is more stable complex and why?</p> <p>[Co(NH₃)₆]³⁺ and [Co(en)₃]³⁺</p> <p>[Co(en)₃]³⁺ is more stable complex than [Co(NH₃)₆]³⁺ because of chelate effect.</p>	1 each
11.	<p>List down the properties of :</p> <p>[Ni(CN)₄]²⁻</p> <p>Ni²⁺ orbitals = </p> <p>dsp² hybridised orbitals of Ni²⁺ = </p> <p>Containing 4 pairs of electrons from 4 CN molecules</p> <p>Shape : Square planar Hybridisation : dsp² Magnetic behaviour : Diamagnetic (no unpaired electrons)</p>	

12.	<p>What are the factors affecting the stability of the complexes?</p> <p>Factors affecting the stability of a complex ion</p> <p>(i) Nature of metal ion : Greater the charge and smaller the size of the ion, more is its charge density and greater will be stability of the complex.</p> <p>(ii) Nature of ligand : More the basicity of ligand, more is its tendency to donate electron pair and therefore, more is the stability of the complex.</p>	1 each
13.	<p>When a coordination compound $\text{CoCl}_3 \cdot 6\text{NH}_3$ is mixed with AgNO_3, 3 moles of AgCl are precipitated per mole of the compound.</p> <p>Write</p> <p>(i) Structural formula of the complex</p> <p>(ii) IUPAC name of the complex .</p> <p>(i) Complex so formed is: $\text{CoCl}_3 \cdot 6\text{NH}_3 + \text{AgNO}_3 \rightarrow [\text{Co}(\text{NH}_3)_6]\text{Cl}_3$</p> <p>(ii) IUPAC name of complex is: Hexaamminecobalt (III) chloride</p>	1 each
14.	<p>Using IUPAC norms write the formulae for the following:</p> <p>(a) Potassium trioxalatoaluminate (III)</p> <p>(b) Dichloridobis(ethane-1, 2-diamine) cobalt (III) ion</p> <p>(a) $\text{K}_3[\text{Al}(\text{C}_2\text{O}_4)_3]$</p> <p>(b) $[\text{Co}(\text{Cl})_2(\text{en})_2]^+$</p>	1 each
15.	<p>For the complex $[\text{Fe}(\text{en})_2\text{Cl}_2], Cl, (en = ethylene diamine), identify$</p> <p>(i) the oxidation number of iron,</p> <p>(ii) the hybrid orbitals and the shape of the complex,</p> <p>(i) $[\text{Fe}(\text{en})_2\text{Cl}_2] \text{Cl}$ or $x + 0 + 2(-1) + (-1) = 0$ $x + (-3) = 0$ or $x = +3$ \therefore Oxidation number of iron, $x = +3$</p> <p>(ii) The complex has two bidentate ligands and two monodentate ligands. Therefore, the coordination number is 6 and hybridization will be d^2sp^3 and shape will be octahedral.</p>	1 each
16	<p>Explain the following terms giving a suitable example in each case :</p> <p>(i) Ambidentate ligand</p> <p>(ii) Denticity of a ligand</p> <p>(iii) Crystal field splitting in an octahedral field (All India 2011)</p> <p>(i) Ambidentate ligand: The monodentate ligands with more than one coordinating</p>	

