

Chemistry 2C: Assignment 6 KEY

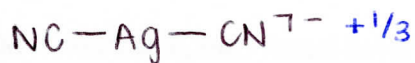
1. 6 points

(a) Linear Ag^+ with CN^- ligands

Name: dicyanoargentate(I) $+1/3$

Formula: $[\text{Ag}(\text{CN})_2]^-$ $+1/3$

Structure:



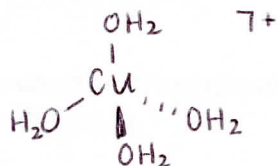
} 1 point (same for each part)

(b) Tetrahedral Cu^+ with H_2O ligands

Name: tetraaquacopper(I) OR tetraaquocopper(I)

Formula: $[\text{Cu}(\text{H}_2\text{O})_4]^+$

Structure:

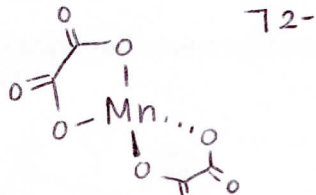


(c) Tetrahedral Mn^{2+} with oxalate ligands

Name: bis(oxalato)manganate(II)

Formula: $[\text{Mn}(\text{C}_2\text{O}_4)_2]^{2-}$

Structure:

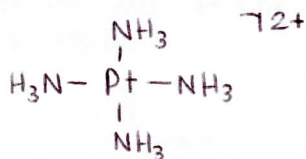


(d) Square planar Pt^{2+} with NH_3 ligands

Name: tetraammineplatinum(II)

Formula: $[\text{Pt}(\text{NH}_3)_4]^{2+}$

Structure:

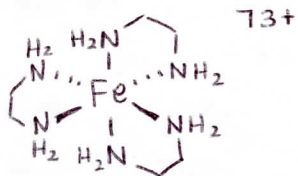


(e) Octahedral Fe^{3+} with ethylenediamine ligands

Name: tris(ethylenediamine)iron(III)

Formula: $[\text{Fe}(\text{en})_3]^{3+}$

Structure:

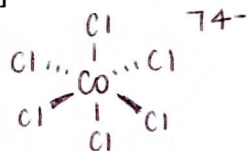


(f) Octahedral Co^{2+} with Cl^- ligands

Name: hexachlorocobaltate(II)

Formula: $[\text{Co}(\text{Cl})_6]^{4-}$

Structure:

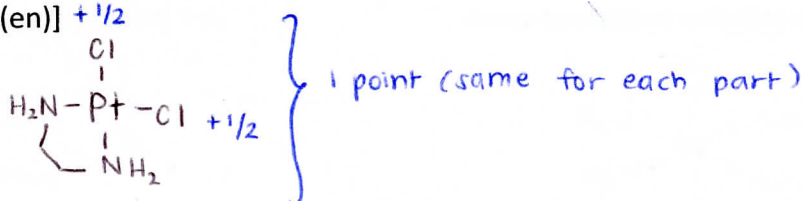


2. 6 points — OK if neutral ligands listed before anionic

(a) *cis*-dichloroethylenediamineplatinum(II)

Formula: $[\text{PtCl}_2(\text{en})]^{+1/2}$

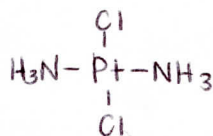
Structure:



(b) *trans*-diamminedichloroplatinum(II)

Formula: $[\text{PtCl}_2(\text{NH}_3)_2]$

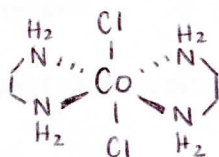
Structure:



(c) *trans*-dichlorobis(ethylenediamine)cobalt(II)

Formula: $[\text{CoCl}_2(\text{en})_2]$

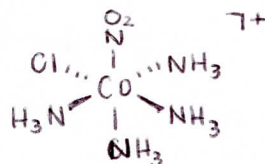
Structure:



(d) *cis*-tetraamminechloronitrocobalt(III)

Formula: $[\text{CoCl}(\text{NO}_2)(\text{NH}_3)_4]^+$

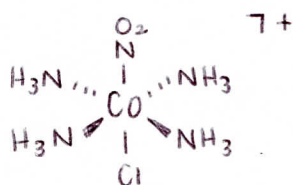
Structure:



(e) *trans*-tetraamminechloronitrocobalt(III)

Formula: $[\text{CoCl}(\text{NO}_2)(\text{NH}_3)_4]^+$

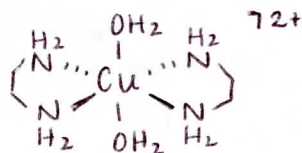
Structure:



(f) *trans*-diaquobis(ethylenediamine)copper(II)

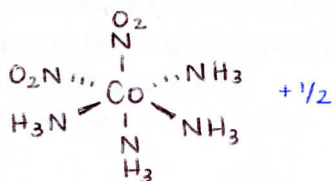
Formula: $[\text{Cu}(\text{H}_2\text{O})_2(\text{en})_2]^{2+}$

Structure:

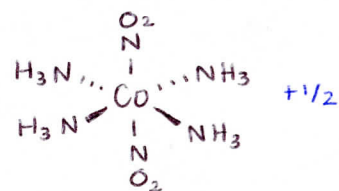


3. 4 points

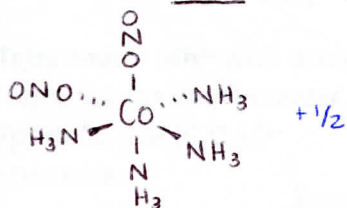
cis-tetramminedinitrocolbalt(II) $+1/2$



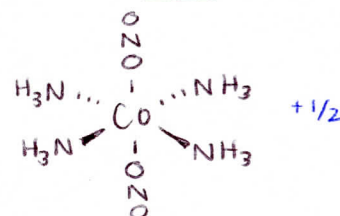
trans-tetramminedinitrocolbalt(II) $+1/2$



cis-tetramminedinitritocolbalt(II) $+1/2$



trans-tetramminedinitritocolbalt(II) $+1/2$

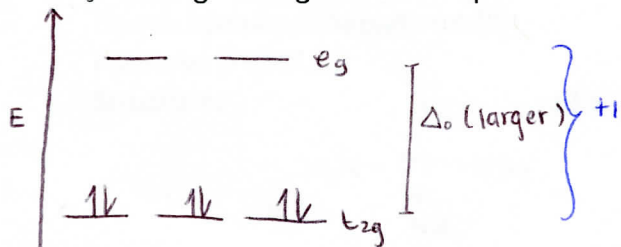


4. 4 points

$[\text{Co}(\text{NH}_3)_6]^{3+}$ — diamagnetic

$\text{Co}^{3+} = 3d^6$

$\text{NH}_3 =$ strong field ligand \rightarrow low spin



$[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ — paramagnetic

$\text{Fe}^{2+} = 3d^6$

$\text{H}_2\text{O} =$ weak field ligand \rightarrow high spin

