Part A: Intro to Coordination Compounds

Fill in the blanks

1. A_____ contains a central metal ion bound to one or more ligands.

2. A _____ is a Lewis base (electron pair donor) that forms a bond with the metal.

3. When a complex ion combines with one or more _____(ions of opposite charge that are not acting as ligands). The resulting neutral compound is called a _____.

4. Ligands that donate only one election pair to the central metal are called _____.

   Provide an example:

5. Ligands that have the ability to donate two pairs of electrons (from two different atoms) to the metal; these are called _____.

   Provide an example:

Part B: Coordination Number

6. What is the coordination number of the central metal ion in $[Fe(H_2O)_4(CN)_2]Cl$?

7. What is the coordination number of the central metal ion in $[Co(C_2O_4)_2(OH)_2]^{3-}$?

8. What is the coordination number of the central metal ion in $[Co(en)_3]^{3+}$?

Part C: Names and Formulas of Coordination Compounds

9. What is the name of the compound having the formula $[Cr(en)_2(NH_3)_2]Cl_2$?

10. What is the name of the compound having the formula $[Fe(CO)_6](NO_3)_3$?

11. What is the name of the compound having the formula $K_3[CoCl_6]$?

12. What is the formula for dibromobis(ethylenediamine)titanium(IV) bromide?

13. What is the formula for potassium diamminetetrachlorovanadate(III)?

Part D: Isomers

14. Match the following formulas to the type of isomers.

$[Fe(NH_3)_5Br]SO_4$ and $[Fe(NH_3)_5SO_4]Br$	Geometric isomers
cis-$[Co(NH_3)_4(H_2O)_2]Cl_2$ and trans-$[Co(NH_3)_4(H_2O)_2]Cl_2$	Coordination isomers
fac-$[Cr(CN)_3(H_2O)_3]$ and mer-$[Cr(CN)_3(H_2O)_3]$	Linkage isomers
$[Cr(H_2O)_5(NO_2)]SO_4$ and $[Cr(H_2O)_5(ONO)]SO_4$	Geometric isomers

15. Draw the structures for the following and determine if there are isomers possible and what type of isomers.

a) Square planar $[Pt(CN)_2Cl_2]^{2-}$

b) $[Fe(CN)_3(H_2O)_3]$

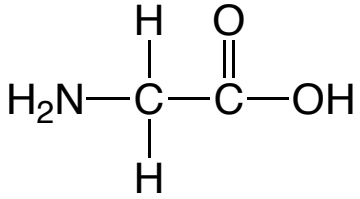
c) $[Cr(H_2O)_5(SCN)]^{+}$

d) $[Ni(en)_3]^{2+}$

e) tetrahedral $[AuF_2Cl_2]^{-}$

f) $[Pt(NH_3)F_5]^{3-}$

16. Here is a tough one but a good biological example. Amino acids, such as glycine (gly), form complexes with the trace metal ions found in the bloodstream. Glycine, whose structure is shown below, acts as a bidentate ligand coordinating with the N atom and the O atom of the OH group (when coordination occurs to the Metal, the H is no longer is attached to the OH, it is deprotonated).



a) Draw the possible isomers of $[Ni(gly)_2]$. This molecule is square planar and there are 2 isomers. Label the type of isomers underneath your drawing.

b) Draw the possible isomers of $[Zn(gly)_2]$. This molecule is tetrahedral and there are 2 optical isomers.

c) Draw the possible isomers of $[Fe(gly)_3]$. Here there are geometric and optical isomers. Label what type of geometric isomers.