

4. Fill in the gaps in the sentences below:

a. The complex ion $[\text{Co}(\text{en})_3]^{3+}$ is named _____(ethylenediamine)cobalt(III).

b. The suffix "-ate" is used when the metal complex is an _____, and the Latin name of the metal is often used.

5. True or False:

a. In the complex ion $[\text{Fe}(\text{CN})_6]^{4-}$, the iron is in the +3 oxidation state.

b. True or False:

The ligand ethylenediamine requires the prefix "bis" when naming complexes with more than one of these ligands.

6. Match the ligand to its correct name in complexes:

ligand
H_2O
Cl^-
CO
NH_3

name
Chloro
Carbonyl
Ammine
Aqua

7. The formula $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$ is an example of a cis-trans isomer. Name the cis-isomer of this complex.

8. Explain the steps required to name the complex ion $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$, including identifying the oxidation state and ligand type.

9. Given the structure of $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]\text{Cl}$, answer the following:

a. What is the name of this complex?

b. Is this complex cationic or anionic?

Answers

1. What is the name of the complex ion $[\text{Co}(\text{NH}_3)_5\text{Cl}]^{2+}$?

Answer: Pentamminechlorocobalt(III)

b. What is the name of the ligand NH_3 in coordination complexes?

Answer: Ammine

2. Which rule determines the order of naming ligands in a metal complex?

A. Oxidation state order

B. Alphabetical order (ignoring Greek prefixes)

C. Ionic charge order

D. Number of ligands present

Answer: B. Alphabetical order (ignoring Greek prefixes)

3. What is the correct name of the compound $\text{K}_4[\text{Fe}(\text{CN})_6]$?

A. Potassium hexacyanoferrate(III)

B. Potassium hexacyanoferrate(II)

C. Tetrapotassium hexacyanoferrate(II)

D. Hexacyanoiron(II) tetrapotassium

Answer: B. Potassium hexacyanoferrate(II)

4. Fill in the gaps in the sentences below:

a. The complex ion $[\text{Co}(\text{en})_3]^{3+}$ is named _____(ethylenediamine)cobalt(III).

Answer: Tris

b. The suffix "-ate" is used when the metal complex is an _____, and the Latin name of the metal is often used.

Answer: Anion

5. True or False:

a. In the complex ion $[\text{Fe}(\text{CN})_6]^{4-}$, the iron is in the +3 oxidation state.

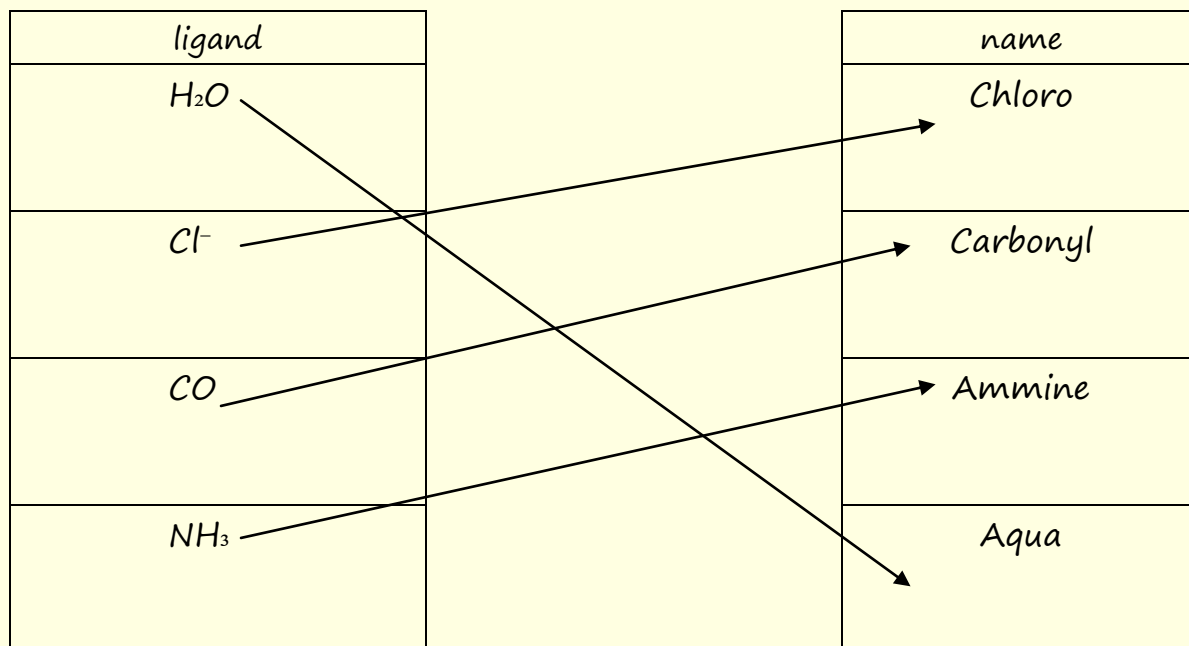
Answer: False (It is in the +2 oxidation state.)

b. True or False:

The ligand ethylenediamine requires the prefix "bis" when naming complexes with more than one of these ligands.

Answer: True

6. Match the ligand to its correct name in complexes:



7. The formula $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$ is an example of a cis-trans isomer. Name the cis-isomer of this complex.

Answer: Cis-diamminedichloroplatinum(II)

8. Explain the steps required to name the complex ion $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$, including identifying the oxidation state and ligand type.

Answer:

Identify the ligand: Oxalate ($\text{C}_2\text{O}_4^{2-}$) is a bidentate ligand.

Determine the oxidation state of cobalt: Each oxalate ligand contributes a 2^- charge, so the total ligand charge is 6^- . The complex ion has a 3^- charge, so the cobalt must be in the $+3$ oxidation state.

Name the complex: Tris(oxalato)cobaltate(III).

9. Given the structure of $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]\text{Cl}$, answer the following:

a. What is the name of this complex?

b. Is this complex cationic or anionic?

Answer:

a. Tetraaquadichlorochromium(III) chloride

b. Cationic