

Name

Exploring Coordination Compounds

Total questions: 15

Worksheet time: 8mins

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Class

Date

- What are the nomenclature rules for naming anionic ligands?
 - Anionic ligands are named by adding '-ate' to the neutral molecule name.
 - Anionic ligands are named by modifying the neutral molecule name, using '-o' endings, and applying prefixes for quantity.
 - Anionic ligands retain the neutral name without modification.
 - Anionic ligands are named using '-ic' endings and no prefixes.
- How do you name a complex ion with a neutral ligand?
 - Combine the metal and ligand names into one word.
 - Use the ligand name first, then the oxidation state of the metal.
 - Name the neutral ligand followed by the metal ion.
 - Name the metal ion followed by the neutral ligand.
- What is the oxidation state of the central metal in $[\text{Cu}(\text{NH}_3)_4]^{2+}$?
 - 0
 - +3
 - +1
 - +2
- What does the coordination number indicate in a complex?
 - The total number of metal ions in the complex.
 - The charge of the central metal ion.
 - The number of ligand atoms bonded to the central metal ion.
 - The spatial arrangement of ligands around the metal ion.

5. Explain the significance of isomerism in coordination compounds.
- a) Isomerism has no effect on the properties of coordination compounds. b) All coordination compounds are identical regardless of isomerism.
- c) Isomerism in coordination compounds is significant as it results in different properties and behaviors, impacting their applications in various fields. d) Isomerism only affects the color of coordination compounds.
6. Provide an example of a bidentate ligand and its complex.
- a) Ethylenediamine (en) and its complex $[\text{Cu}(\text{en})_2]^{2+}$ b) Acetylacetonate (acac) and its complex $[\text{Fe}(\text{acac})_3]$
- c) Water (H_2O) and its complex $[\text{Ag}(\text{H}_2\text{O})_2]^+$ d) Oxalate (ox) and its complex $[\text{Ni}(\text{ox})_2]^{2-}$
7. How do you name the complex ion $[\text{CoCl}_2(\text{NH}_3)_4]^+$?
- a) tetraammine dichlorocobalt(I) b) dichloro tetraammine cobalt(III)
- c) tetraammine dichlorocobalt(II) d) pentaammine dichlorocobalt(I)
8. What is the oxidation state of iron in $[\text{Fe}(\text{CN})_6]^{4-}$?
- a) +3 b) +1
- c) 0 d) +2
9. What is the coordination number of the complex $[\text{Ni}(\text{CO})_4]$?
- a) 6 b) 8
- c) 2 d) 4
10. Describe the difference between geometric and optical isomerism in coordination compounds.
- a) Geometric isomerism involves different spatial arrangements (e.g., cis/trans), while optical isomerism involves non-superimposable mirror images (enantiomers). b) Geometric isomerism is only found in organic compounds, while optical isomerism is exclusive to inorganic compounds.
- c) Geometric isomerism refers to the rotation of bonds, while optical isomerism deals with the color of compounds. d) Geometric isomerism involves only linear arrangements, while optical isomerism involves superimposable images.

11. What is the IUPAC name for the complex $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$?
- a) pentaquachromium(II) b) dihydroxochromium(II)
c) hexaaquachromium(III) d) hexachlorochromium(III)
12. How do you determine the overall charge of a complex ion?
- a) The charge is calculated by subtracting the number of ligands from the metal ion charge. b) The overall charge of a complex ion is the sum of the charges of the central metal ion and its ligands.
c) The charge is determined by the number of ligands only. d) The overall charge is always zero regardless of the metal ion.
13. What is the role of ligands in coordination chemistry?
- a) Ligands increase the temperature of coordination complexes. b) Ligands act as electron pair acceptors from central metal atoms.
c) Ligands are responsible for the oxidation of central metal atoms. d) Ligands serve as electron pair donors to central metal atoms in coordination chemistry.
14. Name a common complex that contains a transition metal and a halide ligand.
- a) NiF_2 b) FeBr_3
c) AgI d) $[\text{CuCl}_4]^{2-}$
15. What is the IUPAC name for the complex $[\text{Ag}(\text{NH}_3)_2]^+$?
- a) diammine silver(I) b) silver diammine
c) ammonia silver(II) d) diamine silver(III)

Answer Keys

1. b) Anionic ligands are named by modifying the neutral molecule name, using '-o' endings, and applying prefixes for quantity.
2. d) Name the metal ion followed by the neutral ligand.
3. d) +2
4. c) The number of ligand atoms bonded to the central metal ion.
5. c) Isomerism in coordination compounds is significant as it results in different properties and behaviors, impacting their applications in various fields.
6. a) Ethylenediamine (en) and its complex $[\text{Cu}(\text{en})_2]^{2+}$
7. a) tetraammine dichlorocobalt(I)
8. d) +2
9. d) 4
10. a) Geometric isomerism involves different spatial arrangements (e.g., cis/trans), while optical isomerism involves non-superimposable mirror images (enantiomers).
11. c) hexaaquachromium(III)
12. b) The overall charge of a complex ion is the sum of the charges of the central metal ion and its ligands.
13. d) Ligands serve as electron pair donors to central metal atoms in coordination chemistry.
14. d) $[\text{CuCl}_4]^{2-}$
15. a) diammine silver(I)

