

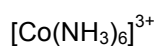
Part A: Terminology

Definitions

1. What is a Coordination Complex? _____
2. What is bonding interaction between the metal and the ligands? _____
3. What is diamagnetic? _____
4. What is paramagnetic? _____
5. What is high spin and low spin? _____

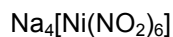
Part B: Coordination Compounds and Number of Unpaired Electrons

6. Given the chemical formula below answer the following questions.



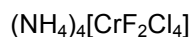
- a) Draw the coordination complex.
- b) Give the name of the coordination complex.
- c) What is the coordination number of Co?
- d) Draw the d-orbital splitting diagram and determine how many unpaired electrons are present on the cobalt ion.
- e) Is this complex diamagnetic or paramagnetic?

7. Given the chemical formula below answer the following questions.



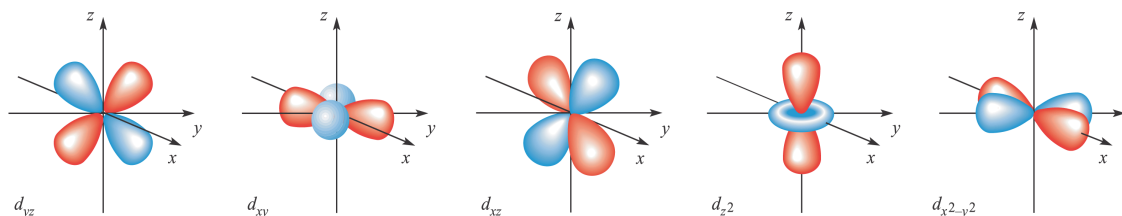
- Draw the coordination compound.
- Give the name of the complex compound.
- What is the coordination number of Ni?
- Draw the d-orbital splitting diagram and determine how many unpaired electrons are present on the nickel ion. Is this complex diamagnetic or paramagnetic?
- Are isomers possible? What type?

8. Given the chemical formula below answer the following questions.



- Draw the coordination compound.
- Give the name of the coordination compound.
- What is the coordination number of Cr?
- Draw the d-orbital splitting diagram and determine how many unpaired electrons are present on the chromium ion. Is this complex diamagnetic or paramagnetic?
- Are there geometric isomers possible?

9. Here are some tough ones. Shown below are the d orbitals. Notice the z-axis is pointing up.



a) Draw the crystal field splitting diagram (and label the d-orbitals) for a tetrahedral complex such as $[\text{Ni}(\text{Cl})_4]^{2-}$.

b) Draw the crystal field splitting diagram (and label the d-orbitals) for a square planar complex such as $[\text{Ni}(\text{CN})_4]^{2-}$.

c) Based on the crystal field diagrams, is there a way you could tell them a part?