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4.7-110

Which of the following will not form coordination complexes?

- | | | | |
|-----|--------------------|-----|---------------|
| (a) | CN^- | (b) | CO |
| (c) | CO_3^{2-} | (d) | CH_4 |

4.7-121

Which of the following is a monodentate ligand?

- (a) CO_3^{2-}
- (b) $\text{H}_2\text{N}-\text{CH}_2-\text{CH}_2-\text{NH}_2$
- (c) CH_3COO^-
- (d) $\text{H}_2\text{N}-\text{CH}_2-\text{COO}^-$

4.7-122

Which of the following is a bidentate ligand?

- (a) $\text{H}_2\text{N}-\text{CH}_3$
- (b) $\text{C}_5\text{H}_5\text{N}$
- (c) SCN^-
- (d) $\text{H}_2\text{N}-\text{CH}_2-\text{COO}^-$

4.7-210

What is the coordination number of the metal in $[\text{Co}(\text{NH}_3)_6]\text{SO}_4$?

- (a) 2 (b) 4 (c) 6 (d) 8

In $\text{Ni}(\text{en})_2\text{Cl}_2$?

In $\text{K}_3[\text{Cr}(\text{C}_2\text{O}_4)_3]$?

4.7-220

How many moles of AgCl should be precipitated if excess AgNO₃ is added to 100.0 mL of a 0.0240 M solution of dichlorobis(ethyldiamine)cobalt(III) chloride?

(a) 0.0012

(b) 0.0024

(c) 0.0048

(d) 0.0072

4.7-230

A compound has the empirical formula $\text{CoCl}_3 \cdot 5\text{NH}_3$. Upon mixing with excess AgNO_3 solution 2 mol AgCl precipitates per mole of the compound. No NH_4^+ is produced upon addition of excess sulfuric acid. The conductance of the solution indicates 3 ions formed per mole. The coordination number of the metal in this compound is

- (a) 2 (b) 4 (c) 6 (d) 8

4.7-240

Equimolar solutions are prepared of the following complexes. Which solution has the highest freezing point?

- (a) $[\text{Fe}(\text{NH}_3)\text{Cl}_3]$
- (b) $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$
- (c) $\text{K}_4[\text{Fe}(\text{CN})_6]$
- (d) $\text{Na}_2[\text{PtCl}_6]$

4.7-410

How many isomers (geometric and optical) are there for the square-planar complex dichloro(ethylenediamine)platinum(II) ?

- (a) 1 (b) 2 (c) 3 (d) 4

4.7-411

How many isomers (geometric and optical) are there for the octahedral complex diamminedicarbonatocobaltate(III) ?

- (a) 1 (b) 2 (c) 3 (d) 4

4.7-412

How many isomers (geometric and optical) are there for the octahedral complex tribromotripyridineplatinum(IV) ?

- (a) 1 (b) 2 (c) 3 (d) 4

4.7-510

When a d^8 transition metal ion forms a complex, the number of valence electrons that must go in non-bonding or anti-bonding MO's

- (a) = 4
- (b) = 8
- (c) = 10
- (d) depends on the geometry of the complex

4.7-520

In which complex are metal *d* orbitals needed for forming bonding and antibonding MO's?

- (a) linear
- (b) trigonal planar
- (c) tetrahedral
- (d) octahedral

4.7-530

How many nonbonding MO's are there in an octahedral complex ?

- (a) 3 (b) 4 (c) 5 (d) 6

4.7-541

For which complex geometry do the energies of the nonbonding orbitals have the relationship $d_{z^2} > d_{xz}, d_{yz} > d_{x^2-y^2}, d_{xy}$

- (a) linear
- (b) trigonal planar
- (c) tetrahedral
- (d) octahedral

4.7-542

For which complex geometry do the energies of the nonbonding orbitals have the relationship $d_{z^2}, d_{x^2-y^2} < d_{xy}, d_{xz}, d_{yz}$

- (a) linear
- (b) trigonal planar
- (c) tetrahedral
- (d) octahedral

4.7-550

Which of the following will have electrons in antibonding MO's even if the ligand field splitting is large?

- (a) a d^6 metal ion in an octahedral complex
- (b) a d^8 metal ion in an octahedral complex
- (c) a d^6 metal ion in a tetrahedral complex
- (d) a d^8 metal ion in a tetrahedral complex

4.7-560

Which of the following types of metal ions can have a low spin tetrahedral complex but cannot have a low spin octahedral complex ?

- (a) d^1 (b) d^2 (c) d^3 (d) d^4

4.7-570

Which of the following is paramagnetic even when the ligand field splitting is large?

- (a) a d^4 metal ion in an octahedral complex
- (b) a d^6 metal ion in an octahedral complex
- (c) a d^4 metal ion in a tetrahedral complex
- (d) a d^{10} metal ion in a tetrahedral complex

The number of unpaired electrons is

- (a) 1
- (b) 2
- (c) 3
- (d) 4

4.7-580

The Fe^{2+} ion in the oxygen transport protein hemoglobin is octahedrally coordinated with dioxygen or water at the sixth site. Oxygen is the stronger ligand. When oxygen binds in the lungs, the number of unpaired electrons changes from

- (a) 1 (b) 2 (c) 3 (d) 4

to

- (a) 0 (b) 1 (c) 2 (d) 3

4.7-590

Which of the following can benefit from the extra stability that accompanies a half-filled energy level?

- (a) a d^2 metal ion in an octahedral complex
- (b) a d^8 metal ion in an octahedral complex
- (c) a d^3 metal ion in a tetrahedral complex
- (d) a d^6 metal ion in a tetrahedral complex