**Quiz 9**

# Directions: Answer each of the following questions. Be sure to use complete sentences where appropriate. For full credit be sure to show all of your work. Where appropriate answers should be boxed for clarity, written to the correct number of significant figures, and, include the proper units.

1. Two different coordination compounds containing one cobalt(III) ion, five ammonia molecules, one bromide ion, and one sulfate ion exist. The dark violet form (A) gives a precipitate upon addition of aqueous barium chloride. No reaction is seen upon addition of aqueous barium chloride to the violet-red form (B). Suggest formula for these two compounds, name them, and write a chemical equation for the reaction of (A) with aqueous barium chloride (6 points).
2. [Co(NH3)5Br]SO4 pentaamminebromocobalt(III) sulfate
3. [Co(NH3)5SO4]Br pentaamminesulfatocobalt(III) bromide

[Co(NH3)5Br]SO4 (aq) + BaCl2 (aq) → [Co(NH3)5Br]Cl2 (aq) + BaSO4 (s)

1. For the high-spin complex, Mn(NH3)4Cl2, identify the following (8 points).
	1. The oxidation number of the manganese. \_\_+2\_\_\_\_\_\_\_
	2. The coordination number for manganese. \_\_6\_\_\_\_\_\_\_\_\_
	3. The coordination geometry for manganese. \_octahedral\_\_\_\_\_\_\_\_
	4. The number of unpaired electrons per metal atom. \_\_\_5\_\_\_\_\_\_\_\_
	5. Whether the complex is diamagnetic or paramagnetic. \_\_\_\_paramagnetic\_\_\_
	6. Draw the geometric isomers.

cis-tetraamminedichloromanganese(II) trans-tetraamminedichloromanganese(II)



1. The octahedral crystal field splitting energy ∆o of Co(phen)33+ is 5.21 × 10-19 J/ion. What is the color of a solution of this complex ion (6 points)?

$$∆\_{o}=\frac{hc}{λ}⇒λ=\frac{hc}{∆\_{o}}=\frac{\left(6.626×10^{-34} J s\right)\left(3.00×10^{8} \frac{m}{s}\right)}{5.21×10^{-19}\frac{J}{ion}}×\frac{1 nm }{10^{-9} m}=382 nm$$

Colorless or faint yellow