

HW08 - Inorganic Chemistry

Started: Mar 22 at 10:56am

Quiz Instructions

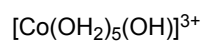
Homework 08

Inorganic Chemistry

Question 1

4 pts

What is the oxidation state of the metal in the following complex?



☐ +4

☐ +5

☐ +3

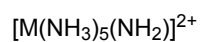
☐ +2

☐ 0

Question 2

4 pts

The following complex has a valence count of 17 e⁻. What is the identity of the metal, M?



Take care to note the charge on each of the ligands. Draw Lewis dot structures of ligands whenever you are unsure of their charge or structure!

☐ Fe

☐ Mn

☐ Co

☐ Cr

☐ Ni

Question 3

4 pts

Consider the following observations:

1. NiCl_2 readily dissolves in water to give a green solution. It dissolves more slowly in ethanol to give a blue solution. It is insoluble in hexane (C_6H_{14}).
2. When the water solution, assumed to be in the form $[\text{Ni}(\text{OH}_2)_6]^{2+}$, is treated with ethanol, no color change is observed. However, when the ethanol solution is treated with water, the color of the solution quickly becomes lighter.
3. When a small quantity of KCN is added to either the ethanol or water solution, the solution rapidly turns a deep blue color.

Based on these observations, which is the correct order of these ligands in terms of highest to lowest (decreasing) Lewis basicity?

☐ KCN - H_2O - ethanol - hexane

☐ ethanol - KCN - H_2O - hexane

☐ ethanol - hexane - KCN - H_2O

☐ hexane - ethanol - H_2O - KCN

☐ KCN - ethanol - hexane - H_2O

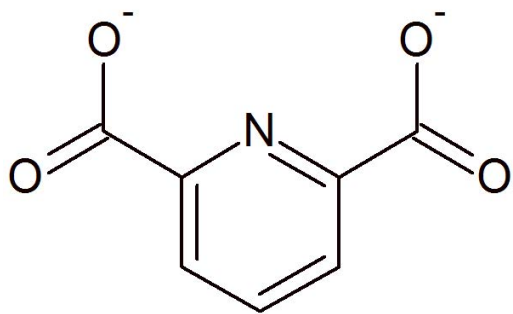
☐ H_2O - KCN - ethanol - hexane

☐ H_2O - KCN - hexane - ethanol

Question 4

5 pts

What is the denticity, charge, and number of electrons donated by the following ligand (L):



L

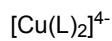
- ☐ Tridentate / -2 / 6 e⁻
- ☐ Hexadentate / 0 / 12 e⁻
- ☐ Monodentate / -1 / 2 e⁻
- ☐ Bidentate / -2 / 4 e⁻
- ☐ Monodentate / -2 / 2 e⁻
- ☐ Tridentate / 0 / 6 e⁻
- ☐ Tridentate / +2 / 6 e⁻
- ☐ Bidentate / +2 / 4 e⁻
- ☐ Bidentate / 0 / 4 e⁻

Question 5

4 pts

An excess of ligand 'L' from question #4 was reacted with $[\text{Cu}(\text{OH}_2)_6]^{2+}$ in water. What is the most likely product from this reaction?

- ☐ $[\text{Cu}(\text{L})_2]^{2-}$
- ☐ $[\text{Cu}(\text{L})]^{2-}$
- ☐ $[\text{Cu}(\text{L})]$
- ☐ No reaction.
- ☐ $[\text{Cu}(\text{L})_2]^{2+}$
- ☐

**Question 6****5 pts**

How many different possible structures (isomers) are there for the complex $[\text{Mn}(\text{OH}_2)_3(\text{NH}_3)_3]^{3+}$?

☐ two☐ one☐ three☐ four☐ five☐ six**Question 7****4 pts**

How many unpaired electrons are there in the complex $[\text{Co}(\text{OH}_2)_4(\text{OH})_2]^+$?

☐ 4☐ 2☐ 0 (diamagnetic)☐ 1☐ 3☐ 5

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