**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. An old iron beam was coated with an unknown metal. There is a crack on the coating and it is observed that the iron is rusting at the fracture. The beam is in a structure that experiences high stress, resulting in frequent fractures to the coating (2 points).

Au3+ (aq) + 3 e- → Au (s) +1.50 V

Fe3+ (aq) + 3 e- → Fe (s) -0.04 V

Sn2+ (aq) + 2 e- → Sn (s) -0.14 V

Al3+ (aq) + 3 e- → Al (s) -1.66 V

* 1. What was the old metal coating likely made of? \_\_\_\_\_tin\_\_\_\_\_
	2. What metal would you use to repair the fractures to avoid further corrosion? \_\_Aluminum\_\_\_\_\_\_
1. Galvanized nails are iron nails that have been plated with zinc to prevent rusting. The relevant reaction is

Zn2+ (aq) + 2 e- → Zn (s)

For a large batch of nails, a manufacturer needs to plate a total zinc mass of 2.40 kg on the surface to get adequate coverage (10 points).

1. How many coulombs of charge are needed to produce 2.40 kg of solid zinc?

$$2.40 kg Zn×\frac{1000 g Zn}{1 kg Zn}×\frac{1 mol Zn}{65.38 g Zn}×\frac{2 mol e^{-}}{1 mol Zn}×\frac{96485 C}{1 mol e^{-}}=7.08×10^{6} C$$

1. With a power supply able to produce 125 A of current how long in hours must the nails stay in the electrolysis chamber (1 A = 1 C/s)?

$$7.08×10^{6} C×\frac{1 A s}{1 C}×\frac{1}{125 A}×\frac{1 min}{60 s}×\frac{1 hr}{60 min}=15.7 hr$$

1. Write the correct formula for the following compounds (8 points):
	1. Hexaaquanickel(II) chloride \_\_\_\_[Ni(H2O)6]Cl2\_\_\_\_\_\_\_\_\_\_\_
	2. Pentacarbonylchloromanganese(I) \_\_\_\_[Mn(CO)5Cl]
	3. Ammonium diaquatetrabromovanadate(III) \_\_\_\_\_NH4[V(H2O)2Br4]\_\_\_\_
	4. Tris(ethylenediamine)cobalt(III) trioxalatoferrate(III) [Co(en)3][Fe(C2O4)3] or [Co(en)3][Fe(ox)3]
2. For the high-spin complex, Mn(NH3)4Cl2, identify the following (3 points).
	1. The oxidation number of the manganese. \_\_+2\_\_\_\_\_\_\_
	2. The coordination number for manganese. \_\_6\_\_\_\_\_\_\_\_\_
	3. The coordination geometry for manganese. \_octahedral\_\_\_\_\_\_\_\_