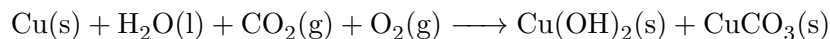


Name: \_\_\_\_\_

Date: \_\_\_\_\_

[2 pt] 1. What is the same about "rust, tarnish, and patina"?

[4 pt] 2. Copper in moist air slowly acquires a dull green coating or "patina", due to the formation of a 1:1 mixture of Copper (II) hydroxide and Copper (II) carbonate. The coating is appreciated on roof tops because it water insoluble and produces a distinctly pretty color. Determine the oxidation number for all elements. Which element is oxidized? Which element is reduced?



[4 pt] 3. What are 4 ways to protect, prevent or slow down rusting? For each briefly describe how it protects, prevents or slows down rusting.

(a)

(b)

(c)

(d)

[2 pt] 4. What is cathodic protection? Which of the following metals Zn, Ni, Al, Sn is capable of offering such protection to an iron pipe? Explain. 4. \_\_\_\_\_

[2 pt] 5. The standard oxidation potential for the reaction  $\text{Cr(s)} \longrightarrow \text{Cr}^{+3} + 3\text{e}^-$  is 0.74 V. Despite the large positive oxidation potential, chromium is used as a protective coating on steel (Fe) automobile bumpers. Why doesn't the chromium corrode?

CHE 112 - Homework - Ch 16e

- [6 pt] 6. If a molten mixture of  $\text{CaCl}_2$  and  $\text{LiF}$  is electrolyzed:
- (a) List all possible reactions at the cathode:
  
  
  
  
  
  
  
  - (b) List all possible reactions at the anode:
  
  
  
  
  
  
  
  - (c) Write the 1/2 reactions and net reaction for the cell:
  
  
  
  
  
  
  
  - (d) Calculate  $E_{cell}^o$  for the reactions
  
  
  
  
  
  
  
  - (e) Sketch a picture of the electrolytic cell.
- [3 pt] 7. Why would the products produced in an electrolytic cell containing molten  $\text{KCl}$  and a cell containing aqueous  $\text{KCl}$  differ?
- [4 pt] 8. How many grams of silver will be obtained when an aqueous silver nitrate solution is electrolyzed for 20.0 minutes with a constant current of 2.40 A? 8. \_\_\_\_\_
- [4 pt] 9. A constant current of 100.0 A is passed through an electrolytic cell having an impure copper anode and a pure copper cathode, and uses aqueous  $\text{CuSO}_4$  as an electrolyte. How many kilograms of copper are refined by transfer from the anode to the cathode in a 24.0 hour period? 9. \_\_\_\_\_
- [4 pt] 10. What constant current in Amps is required to produce aluminum by the Hall-Heroult process at a rate of 40.0 kg/hour? 10. \_\_\_\_\_