

Instrumental Analysis Practice Exam and Study Guide Electrochemistry

This is a practice exam and study guide only. Do not rely on these being the questions asked on the exam nor is this study guide comprehensive.

1. Consider the cell



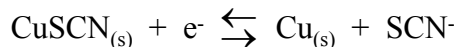
Calculate the theoretical cell potential using molar concentrations. As written, is the cell galvanic or electrolytic? (Note: Cell shorthand notation is written from anode to cathode.)

2. The cell in question 4 uses an electrode of the first kind and an inert electrode. Identify the electrodes by their type and give a short description of why each is identified as it is.

3. Calculate the theoretical cell potential for the cell



4. Calculate the thermodynamic half-cell potential for the reaction



$$K_{sp} (\text{CuSCN}) = 4.8 \times 10^{-15}$$

5. A 4.00 mmol quantity of MCl_2 (where M is a metal) was dissolved 100.0 mL of 1.00 M ammonia. The potential measured (vs. the saturated calomel electrode, SCE = 0.244 V) at a wire composed of metal M for the ammoniacal solution of M^{2+} was -0.328 V. The thermodynamic reduction potential, E° , for M^{2+} to the metal is 0.392 V. Calculate the formation constant, K_f , of $\text{M}(\text{NH}_3)_4^{2+}$.
6. Describe, with pictures and words, how the glass pH indicating electrode works.
7. At very high pH (>11), the glass electrode often no longer responds to the concentration (activity) of hydrogen ion but, rather, becomes sensitive to sodium ion. Explain this observation.