

Analytical Exam

Electroanalytical Chemistry

December 3, 2015

Please answer all of the following questions completely and concisely. Explanations or descriptions should be in the form of complete sentences. **Diagrams must be clearly labeled for full credit.**

- Complete the following:
 - Draw schematic diagram of the three electrode potentiostat. (5 pts.)
 - Explain what is being varied in a cyclic voltammetric experiment and how. (5 pts.)
 - What is measured with cyclic voltammetry? (5 pts.)
 - What basic role does diffusion play in a cyclic voltammetric experiment? (5 pts.)
- A very common (if not the most common) potentiometric measurement involves the pH electrode. Describe the errors that limit pH measurements with standard, combination electrodes with glass membranes? (10 pts.)
- This fall there was a departmental analytical/physical seminar speaker whose work would be characterized as electrochemistry. Who was it? Where was he from? What did he talk about? (10 pts.)
- Describe a pH detection probe that involves encoding (or transducing) pH into differing amounts of current to measure pH. (10 pts.)
- Can electrochemical measurements be useful for the study of surfaces? Why or why not? Provide examples to support your position. (10 pts.)
- Describe contactless conductivity detection for capillary electrophoresis. (10 pts.)
- What is a "reagent free" ion chromatography? What types of electrochemical cells are involved with this method? (10 pts.)
- Answer two of the following: (20 pts.)
 - What analytes are measured by anodic stripping voltammetry? How?
 - What analytes are measured by electrogravimetric analysis? How?
 - Fast-scan cyclic voltammetry is used to measure dopamine in vivo. How?
 - What is a Clark oxygen electrode? How is oxygen measured?