Exam II Review

1. Know how to derive the Nernst Equation

2. Know how to properly design an electrochemical cell for a voltammetric or amperometric measurement…proper placement of electrodes and characteristics of the electrodes and electrolyte.

3. Know how to construct a Ag/AgCl reference electrode and understand how it works.

4. Potential step experiments (B&F pp.156-176). Planar diffusion to a macroelectrode, Cottrell equation, steady-state diffusion to a microelectrode, modified Cottrell equation and characteristics of microelectrodes.

5. Potential sweep experiments (B&F pp.226-243). Response for a system under planar diffusion to a macroelectrode, relationships between peak current and scan rate, understand how k^o and α change the shape of cyclic voltammograms, understand how the shapes of the voltammograms change with scan rate for reversible, quasi-reversible and irreversible electron-transfer kinetics, understand how to transition from peak –shaped curves for planar diffusion to steady-state diffusion by either changing the scan rate or the electrode size and geometry.

6. Chemically modified electrodes (B&F pp. 580-598 and pp.603-622). Know about different ways of chemically modifying electrodes and why, know how to perform a chronocoulometric experiment and how to interpret the data to determine the adsorbed molecule surface coverage, know about the voltammetric characteristics of the case where only adsorbed O and R are electroactive (Nernstian), the case where only adsorbed O and R are electroactive (irreversible) and when both dissolved and adsorbed R are electroactive, and understand the nature of a partially blocking electrode and how electron transfer reactions can be used to probe for pin holes and defects.