CHAPTER 17
ELECTROCHEMISTRY

We will spend three lecture days on this chapter.

- Day 1. Sections 1 – 2: We will spend three lecture days on this chapter. During the first class meeting we will review oxidation and reduction. We will introduce balancing redox equations in acidic media. To round out the first lecture, we will learn about galvanic cells.
- Day 2. Sections 3 – 8: For the second lecture, we will learn about standard reduction potentials and the Nernst equation. We will tie the cell potential to ΔG and ΔG^o.
- Day 3. Sections 12 – 14: The third day we will discuss electrolytic cells.

Section 4.9
❏ Review Section 4.9 from Chapter 4.
Balance redox reactions by the oxidation-number method in acid or base.
❏ Do problems 4.19 – 4.21; do problem 4.82 – 4.88 even and then 4.90 (a – c)

Section 17.1
❏ Sketch a galvanic cell, identifying the anode and cathode half-reactions, the sign of each electrode, and the direction of electron and ion flow.
❏ Write balanced chemical equations for reactions occurring in a galvanic cell.
❏ Do Problem 1 at the end of the section,

Section 17.2
❏ Write and interpret shorthand notations for galvanic cells.
❏ Do Problems 2 – 4 at the end of the section and problems 26 and 28. Do problems 36, 38, 40, 42, 44, and 46

Section 17.3
❏ Interconvert cell potential and free-energy change for a reaction.
❏ Do Problem 5 at the end of the section

Section 17.4
❏ Use a table of standard reduction potentials to calculate standard cell potentials.
❏ Do Problem 6 at the end of the section.

Section 17.5
❏ Use a table of standard reduction potentials to rank substances in order of increasing oxidizing strength or reducing strength and to determine whether a reaction is spontaneous.
❏ Do Problems 7 – 9 at the end of the section. Do problems 48 – 66, even.

Section 17.6
❏ Use the Nernst equation to calculate cell potentials for reactions occurring under nonstandard-state conditions.
❏ Do Problem 10, 11.

Section 17.7
❏ From a measured cell potential for a reaction involving hydrogen ion and a reference cell potential, calculate the pH of the solution.
❏ Do Problem 12, 72 – 80.

Section 17.8
❏ Calculate equilibrium constants from standard cell potentials and vice versa.
❏ Do Problems 13 and 14 and problems 82 – 88.

"They're harmless when they're alone, but get a bunch of them together with a research grant and watch out."

Read Sections 17.9 – 17.11.
❏ Write balanced chemical equations for reactions occurring in common batteries.
❏ Compare fuel cells and batteries.
❏ Calculate standard potentials for fuel cells.
❏ Write balanced equations for the reactions that occur when iron rusts in the presence of Mg and in the absence of Mg.

Section 17.12 ❑ Describe half-cell and overall reactions occurring in electrolytic processes.
❑ Do Problem 19 and 20 (For Problem 20, instead of using the three salts listed, use (a) NaF and (b) LiBr. Do problem 30.

Section 17.13 ❑ Sketch electrochemical cells used in commercial applications of electrolysis.

Section 17.14 ❑ Perform electrolytic cell calculations interconverting current and time, charge, moles of electrons, and moles (or grams) of product.
❑ Do Problems 22 and 23, and problems 98 – 108, even.