

Chemistry M3LC/H2LC Weekly Topics –Spring 2015

Version Date: 03/23/15

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Week 1 – Errors and Statistics

Gaussian Distributions, Standard Deviation, Confidence Levels

Week 2 – Spectroscopy, Part 1: Iron Colorimetry

UV-Vis Spectroscopy, Beer's Law, Linear Least Squares Calculations and Error analysis, Calibration Curves

Week 3 – Spectroscopy, Part 2: Fluorescence

Fluorescence Spectroscopy, Standard Addition, Limits of Detection

Week 4 – Acids & Bases: Titrations and Buffers

Acid-Base Equilibria, pH and alpha fractions, monoprotic and diprotic acids, buffers, monoprotic titration curves, diprotic titration curves, ampholytes.

Week 5 – Electrochemistry, Part 1: Measuring Current and Voltage

Batteries, Ohm's Law, Faraday's Law, Nernst Equation

Week 6 – Electrochemistry, Part 2: Potentiometry, Potentiometric Titrations, Solubility

Nernst Equation Calculations, Redox Half-Cell Potentials, Indicator Electrodes, Reference Electrodes, Potentiometric Titrations, Solubility Equilibria

Week 7 – Complexation Reactions

Complexation Equilibria, EDTA Titrations

Weeks 8 and 9 – Seawater Analysis Project: Multiple Measurements on Seawater Samples

- 1) Turbidity Measurement for Sulfate
- 2) Turbidity Measurement for Potassium
- 3) Sulfate Complexometric Colorimetry with Methylthymol Blue
- 4) Magnesium Complexometric Fluorometry with 8-hydroquinoline
- 5) EDTA and EGTA Titrations for Magnesium and Calcium
- 6) AgCl Precipitation Titration for Chloride

Chemistry M3LC/H2LC Weekly Readings – Spring 2015

Fundamentals of Analytical Chemistry, 9th edition, Skoog, West, Holler, & Crouch
Chemical Principles, 6th edition, Atkins, Jones & Laverman

Week	Experiment	Skoog Textbook	Atkins Text
1	Check-In, Glassware Logger Pro Errors and Statistics	Chapter 2, Sections A, B, D, E, I & J Chapter 5, Sections A & B Chapter 6 (all) Chapter 7, Sections A & D Optional Textbook HW: 5-12, 6-7, 6-20, 7-4, 7-5	
2	Colorimetry Experiment: Determination of Fe ²⁺ & Fe ³⁺ with Ferrozine	Chapter 2, Section G Chapter 4, Sections A & B Chapter 8, Section D Chapter 17, Section A1 Chapter 24, Sections A, B, C1 & C2 Chapter 26, Sections A1, A2 and A3 (to the bottom of pg. 729) Optional Textbook HW: 4-31, 8-17, 24-24	17.5–17.12
3	Fluorescence Experiment: Riboflavin Content in a Multivitamin	Chapter 8, Sections E1 & E2 Chapter 24, Section D Chapter 27 (all) Optional Textbook HW: 27-2, 27-6, 27-11	
4	Acids & Bases: Titrations and Buffers	Chapter 9, Sections A2–A5, B4, B6 & C Chapter 13, Sections A, B, E Chapter 14 (all) Optional Textbook HW: 9-26, 9-28	12.1–12.8, 12.11, 12.13, 12.14 & 13.1–13.6
5	Electrochemistry, Part 1: Measuring Current and Voltage	Chapter 18, Sections A, B & C Chapter 19, Sections A, B & C Chapter 22, Section D1 Optional Textbook HW: 18-11, 19-9, 19-10, 22-24	14.1–14.9, 14.11 & 14.12
6	Electrochemistry, Part 2: Nernst Equation, Potentiometric Titrations, Solubility Equilibria	Chapter 9, Section B5 Chapter 17, Section B2 Chapter 21, Sections A, B, C, D1–D5 & G1	
7	Complexation Reactions	Chapter 8, Section D3 (repeat) Chapter 17, Sections A, B1, C & D Chapter 21, Section F3 Chapter 26, Sections A4–A5 Optional Textbook HW: 8-15, 17-17, 17-20b	14.10
8–9	Seawater Analysis Project: Multiple Measurements on Seawater Samples	See list of experiments above and refer to prior sections Optional Textbook HW: 8-14, 4-21	