Final Review

Chem 321

Upcoming Tests

04/23 **4th Unit Test**
(Chapter 14-16)

Graded test will be available to pick up outside Rm 200 (Chemistry building) on April 27;

Keys to be posted at the website by April 27

04/30 **3:45-6:45 PM**
Comprehensive Final Examination
(Chapter 1-16, except 2, 5 and 13)

Graded test will be available to pick up outside Rm 200 (Chemistry building) on May 4;
Grade available at Leo-online by May 4

Steps

- Well study all problems in the tests
- Well study all examples that we discussed in the class (lecture notes and slides)
- Well study all related examples in textbook
- Well study all assigned problems (homework)

Unit Tests

- Unit Test-1: Chapters 1, 3, 4
- Unit Test-2: Chapters 6-9
- Unit Test-3: Chapters 10-12
- Unit Test-4: Chapters 14-16

Keys to the Tests

http://www.odu.edu/sci/xu/chem321/answers.htm

Unit Test-1: Chapters 1, 3, 4

Summary-Chapter 1

- ✓ Course Overview:
- ✓Classification of Analysis :
- ✓Units:
- ✓Molecular Weight:
- ✓Mole:
- ✓Concentrations:
- ✓Stoichiometric Calculations:
- ✓Preparation of Solution:

Summary-Chapter 3

✓**Mean:**

✓**Median:**

✓**Accuracy:**

✓**Precision:**

✓**Errors:**

Absolute and Relative Errors

- Systematic or determinate errors
- Random or indeterminate errors
- Gross errors or blunders

Summary-Chapter 3

- ✓Absolute standard deviation or standard deviation
- ✓Relative standard deviation
- ✓Standard deviation of the mean (s_m)
- ✓Pooled standard deviation
- ✓Coefficient of variation
- ✓Variance (s^2)
- ✓Spread or range
- ✓ Significant Figures

Summary-Chapter 4

- ✓ Confidence Limit (CL)
- ✓ Confidence Interval (CI)
- ✓ Confidence Level
- ✓ Q-test
- ✓ T-test (extra credit)
- ✓ F-test (extra credit)

Unit Test-2: Chapters 6-9

Summary-Chapter 6

- ✓ **Acids and Bases: concepts and strength of Acids and Bases**
- ✓ **Equilibrium-constant expression**
- ✓ **Types of Equilibrium constants**
- ✓ **P-functions**
- ✓ **Common-ion effect**
- ✓ **Calculation of equilibrium constants and concentrations (e.g.)**
  - ✓ Ion-product constant for water
  - ✓ Solubility-product constants
  - ✓ Acid and Base Dissociation Constants

Summary-Chapter 7

- ✓ Molarity
  - ✓ Preparation of solution
  - ✓ Dilution
  - ✓ Titration
- ✓ Analytical Molarity
- ✓ Equilibrium or Species Molarity
- ✓ Percent concentration
- ✓ P-value
- ✓ Density & specific gravity
- ✓ Understand concepts: titrimetry, equivalence point, end point, primary standard, secondary standard, standardization.

Summary-Chapter 7

- ✓ **Titration Curves**
  - ✓ **Titration Curves for a single Anion**
  - ✓ Titration Curves for Mixtures Anion
- ✓ End Points for Argentometric Titration
  - ✓ Chemical Indicators
  - ✓ Methods
- ✓ Applications
  - ✓ Standard $AgNO_3$ Solution

Summary-Chapter 8A

- ✓ Ionic Strength
- ✓ Activity Coefficient
- ✓ Activity
- ✓ Types of thermodynamics Equilibrium constants
- ✓ Related calculation and definition

Summary-Chapter 8B

- ✓ Concepts of equilibrium
- ✓ Equilibrium concentration of every **species (e.g., ions, solubility) in the solution**
- ✓ *Equilibrium-constant* expressions
- ✓ *Mass (concentration)-balance* equations
- ✓ A single *charge-balance* equation
- ✓ **Calculation of Solubility by the Systematic Method**

  Metal Hydroxides

  Formation of Complex Ion

  Separation of ions

Summary-Chapter 9

- ✓ How to select standard solutions and indicators for neutralization titrations
- ✓ Theory of Indicator Behavior
- ✓ Titration Curves
  - ✓ Theories: Plots and shapes of plots
  - ✓ Parameters: pH, Volume of titrants, equivalence point
  - ✓ Calculations: Ka, pH, indicator choices, half-neutralized point
  - ✓ Effects: Concentration, reaction, composition, temperature, equilibrium constants
  - ✓ The titration of a strong acid with a strong base
  - ✓ The titration of a week acid with a strong base
  - ✓ The titration of a strong base with a strong acid
  - ✓ The titration of a week base with a strong acid

- ✓ Buffer solutions:
  - ✓ Definition and properties (e.g., buffer capacity)
  - ✓ Calculation of pH of the buffer solution
  - ✓ Applications

Unit Test-3: Chapters 10-12

Summary-Chapters 10-11

- ✓ Derive titration curves of complex acid-base system
  - ✓ Mixtures of strong and weak acids or bases
  - ✓ Polyfunctional acids and bases
  - ✓ Buffer solution involving polyprotic acids
  - ✓ Amphiprotic salts (e.g., $NaHCO_3$)

- ✓ General Expression for α values

Summary-Chapter 12

- ✓ Basic concepts & terms
  - Coordination number
  - Ligand and chelate
  - Unidentate, bidentate, tridentate…
  - Formation constant
  - Conditional formation constants: K'_{MY}, K''_{MY}
- ✓ Equilibrium Calculations for Complex-formation titration
  - ✓ Derive EDTA titration curves
  - ✓ Calculation of related concentrations
  - ✓ Effect of other complexing agents
  - ✓ Theory and Calculation of Indicators for EDTA titration
- ✓ Titration Methods employing EDTA
  - Direct titration
  - Back-titration

Unit Test-4: Chapters 14-16

Summary-Chapters 14-16

- ✓ Basic concepts and terms:
  - Oxidation and reduction agents and reactions
  - Anode, cathode, electrode
  - Half-cell reactions, electrode potential
  - Galvanic and electrolytic cells
  - Chemical reversible and irreversible reactions
  - Schematic representation of cells
  - Thermodynamic potential of electrochemical cells
  - SHE, standard potential, formal standard potential
  - Indicator and factors of titration curves

- ✓ Calculations
  - Electrode potential (Nernst Equation)
  - Thermodynamic potentials of electrochemical cell
  - K_{eq}
  - Titration Curves

Final Exam: 200 points

Help Sessions & Office Hours

- This Wed (April 18): Class Hour: 5:45-7 PM
  OCNPS 200

- Next Friday (April 27): 2-3 PM
  Alfriend Chemistry Building 201
  Outside my Office

Any Questions???

Study Really Hard!!!

Good-luck to you!!

---Dr. Nancy Xu

The End!