CHEM 109
Introduction to Chemistry
Fall 2011

Study Topics for Exam 3

Lecture 11: The Fundamental Laws of Chemistry
- Law of Conservation of Mass
  - Lavoisier's Statement
    - Examples
- Law of Definite Composition
  - Analytical Chemistry
  - Proust's Analysis of Copper Carbonate
    - Statement of the Law
  - Berthollet's Objections
    - Inexact Analyses, Alloys, Variable Compounds
  - Mass Percentage Element in a Compound
    - Berzellius's Experiments

Lecture 12: The Law of Multiple Proportions
- Statement of Dalton's Lae
- Oxides of Carbon
  - Illustration of the Law of Multiple Proportions
  - Atomic Interpretation
    - Atoms
- Dalton's Atomic Theory
  - Basic Postulates
  - Current Theory?
  - Rule of Greatest Simplicity
  - Atomic Symbols
- Example - Chlorides of Iron
  - Chemical Formulas
- Example - Water and Hydrogen Peroxide
  - Chemical Formulas
    - Water = HO

Lecture 13: Establishing Chemical Formulas
- Review of Water Data
- Law of Combining Volumes
  - Gay-Lusaac's Law
  - Equal Volumes - Equal "Particles" Hypoothesis
- Interpretation
  - Compounds formed from Atoms
  - Example - Water
  - Avogadro / Canizzario Solution to Chemical Formula Problem
    - Chemical Formula for Water

- Chemical Formulas
  - Chemical Formulas of the Elements
  - Atomic Masses
    - Dalton's H based Scale
      - Results for H, C, O
    - Current C based Scale
      - Results for H, C, O

Lecture 14: Subatomic Particles

- Electric Charging
  - Resinous and Vitrious Electric Fluids
  - Franklin's One Fluid Theory
    - Plus, Minus Charge
- Coulomb's Measurement of Electric Force
- Thomson's Experiment
  - Crooke's Tubes
  - Cathode Rays
    - Maltese Cross Experiment
    - Deflection Using Capacitor and Magnet
      - Mass/Charge Ratio
        - Thomson's Results
  - Discovery of the Electron
- Millikan's Experiment
  - Jeff's Milli-Can Experiment
  - Video of Millikan's Experiment
    - Millikan's Results
      - Charge of the Electron
- Other Subatomic Particles
  - Proton and Neutron
    - Charge and Mass
  - Relative Charge and Mass
    - Electron, Proton, Neutron

Lecture 15: Structure of the Atom

- Atomic Numbers
  - Mosely and the Proton
- Electrons in the Atom
  - Ion Formation
    - Cations and Anions
    - Charge of an Ion
- Isotopes
  - Mass Spectrometer
    - Mass Spectra
  - Mass Number
  - Atomic Weight
    - Percentage Abundance

Rutherford Experiment

Very Heavy Nuclei