Exam 1 Study Guide

September 18, 2022

This is a checklist based on the lecture and textbook materials. It is not expected to be an all encompassing study guide and provides a guideline for your studies.

Chapter 1: Matter and Energy

- Classification - pure substance and mixture
- Different states of matter and its properties - solid, liquid, and gas
- Physical vs chemical changes
- Conservation of Energy
- Conservation of Mass
- Scientific notation e.g. $164.23 = 1.6423 \times 10^2$

  Significant figures

  - What do significant figures imply?
  - Leading, sandwiched, and trailing zeroes
  - Rounding rules for multiplying, division, addtion and substraction
  - Combining multiple steps
- Unit conversion and prefixes
- Scientific method and examples where scientific method is applied

Chapter 2: Atoms, Ions, and the Periodic Table

- Dalton's Atomic Theory
- Law of definite proportions
- What are atoms made of?
- Millikan's oil-drop experiment

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  - Cathode-ray tube experiment
  - Plum Pudding Model
- Isotopes, atomic number, and mass number
- What are ions?
- Mass spectrometer
- Relative atomic mass calculation
- Periodic Table and its classifications

Chapter 3: Chemical Compounds

- Classifying ionic and molecular compounds
- Familiarize with the periodic table symbols and memorize polyatomic ions
- Understand the oxidation states for elements
- Naming rules for ionic and molecular compounds
- Naming acids

Chapter 4: Chemical Composition

- Mass percent composition formula
- The concept of the mol (Avogadro's number)
- Finding molar masses
- Molarity (mol/L)
- Dilutions ($M_1V_1 = M_2V_2$)

Chapter 5: Chemical Reactions and Equations

- Components of chemical reaction - states, reactants, and products
- Balancing chemical equations
- Classes of chemical reactions - decomposition, combination, single- and double-displacement
- Solubility rules for precipitation reactions (recall: experiment 1 - filtration technique)