

1 Chemistry I

- 1.1 Class Setup
 - 1.1.1 Hand Out Syllabus
 - 1.1.2 Discuss Grading/Makeup Assignments
 - 1.1.3 Discuss Behavior
 - 1.1.4 Discuss class needs/requirements
 - 1.1.5 Discuss Items needed for class
 - 1.1.5.1 Notebook
 - 1.1.5.2 Writing instrument
 - 1.1.5.3 Lab Notebook
 - 1.1.5.4 Scientific Calculator
 - 1.1.5.5 Laptop
 - 1.1.6 Discuss Lab Fees
 - 1.1.7 Google Class
 - 1.1.7.1 Setup
 - 1.1.7.2 Student Enrollment
 - 1.1.7.3 Posting assignment
 - 1.1.7.4 Assignments
 - 1.1.7.4.1 Only accepted if absence is excused
 - 1.1.7.4.2 Limited amount of time
 - 1.1.7.5 Exams
 - 1.1.7.5.1 Makeup Exams are different from others
 - 1.1.7.5.2 Only accepted if absence is excused
 - 1.1.7.5.3 Limited amount of time
 - 1.1.7.6 Absences
 - 1.1.7.7 Late submissions
- 1.2 Chapter 1 & 2: Review
 - 1.2.1 Matter and Change
 - 1.2.1.1 Matter and Its Properties
 - 1.2.1.1.1 Basic Building Blocks of Matter
 - 1.2.1.1.1.1 Atom
 - 1.2.1.1.1.1.1 An atom is the smallest unit of an element that maintains the properties of that element.
 - 1.2.1.1.1.2 Element
 - 1.2.1.1.1.2.1 An element is a pure substance made of only one kind of atom. It just usually has a whole bunch of atoms in it.
 - 1.2.1.1.1.3 Molecule
 - 1.2.1.1.1.3.1 A molecule is a group of atoms bonded together, representing the smallest fundamental unit of a chemical compound that can take part in a chemical reaction.
 - 1.2.1.1.1.4 Compound
 - 1.2.1.1.1.4.1 A compound is a substance that is made from the atoms of two or more elements that are chemically bonded
 - 1.2.1.1.1.5 Video 1
 - 1.2.1.1.1.6 Video 2
 - 1.2.1.1.2 Properties and Changes in Matter
 - 1.2.1.1.2.1 Physical Properties and Physical Changes
 - 1.2.1.1.2.1.1 Solids
 - 1.2.1.1.2.1.2 Liquids
 - 1.2.1.1.2.1.3 Gases
 - 1.2.1.1.2.1.4 Plasma

- 1.2.1.1.2.2 Chemical Properties and Chemical Changes
 - 1.2.1.1.2.2.1 Chemical Property
 - 1.2.1.1.2.2.2 Chemical Change
 - 1.2.1.1.2.2.3 Chemical Reaction
 - 1.2.1.1.2.2.3.1 Reactants
 - 1.2.1.1.2.2.3.2 Products
 - 1.2.1.1.2.2.4 Energy and Changes in Matter
- 1.2.1.1.3 Classification of Matter
 - 1.2.1.1.3.1 Mixtures
 - 1.2.1.1.3.1.1 Heterogeneous
 - 1.2.1.1.3.1.2 Homogeneous
 - 1.2.1.1.3.1.3 Solutions
 - 1.2.1.1.3.2 Pure Substances
 - 1.2.1.1.3.2.1 Elements
 - 1.2.1.1.3.2.2 Compounds
- 1.2.1.2 Elements
 - 1.2.1.2.1 Introduction to the Periodic Table
 - 1.2.1.2.1.1 Groups or Families
 - 1.2.1.2.1.2 Periods or Series
 - 1.2.1.2.2 Types of Elements
 - 1.2.1.2.2.1 Metals
 - 1.2.1.2.2.2 Nonmetals
 - 1.2.1.2.2.3 Metalloids
 - 1.2.1.2.2.4 Noble Gases
- 1.2.2 Measurements and Calculations
 - 1.2.2.1 Units of Measurement
 - 1.2.2.1.1 SI Measurement
 - 1.2.2.1.2 SI Base Units
 - 1.2.2.1.2.1 Mass
 - 1.2.2.1.2.1.1 Practice Problems
 - 1.2.2.1.2.2 Length
 - 1.2.2.1.2.2.1 Practice Problems
 - 1.2.2.1.2.3 Volume
 - 1.2.2.1.2.3.1 Practice Problems
 - 1.2.2.1.3 Derived SI Units
 - 1.2.2.1.3.1 Area
 - 1.2.2.1.3.2 Volume
 - 1.2.2.1.3.3 Density
 - 1.2.2.2 Using Scientific Measurement
 - 1.2.2.2.1 Accuracy and Precision
 - 1.2.2.2.2 Significant Figures
 - 1.2.2.2.2.1 Determining the Number of Sig Figs
 - 1.2.2.2.2.1.1 Sig Fig Rules Handout
 - 1.2.2.2.2.1.2 Practice Problems
 - 1.2.2.2.2.2 Rounding
 - 1.2.2.2.2.2.1 Practice Problems
 - 1.2.2.2.2.3 Addition or Subtraction with Sig Figs
 - 1.2.2.2.2.3.1 Practice Problems
 - 1.2.2.2.2.4 Multiplication and Division with Sig Figs

- 1.2.2.2.4.1 Practice Problems
 - 1.2.2.2.3 Scientific Notation
 - 1.2.2.2.3.1 Practice Problems
- 1.2.3 Review 1/2
- 1.2.4 Exam 1/2
- 1.3 Chapter 3: Atoms the Building Blocks of Matter
 - 1.3.1 The Atom: From Philosophical Idea to Scientific Theory
 - 1.3.1.1 Foundations of Atomic Theory
 - 1.3.1.2 Dalton's Atomic Theory
 - 1.3.1.3 Modern Atomic Theory
 - 1.3.2 The Structure of the Atom
 - 1.3.2.1 Discovery of the Electron
 - 1.3.2.1.1 Cathode Rays and electrons
 - 1.3.2.1.2 Charge and Mass of the Electron
 - 1.3.2.2 Discovery of the Atomic Nucleus
 - 1.3.2.3 Composition of the Atomic Nucleus
 - 1.3.2.3.1 Protons
 - 1.3.2.3.2 Neutrons
 - 1.3.3 Counting Atoms
 - 1.3.3.1 Atomic Number
 - 1.3.3.2 Isotopes
 - 1.3.3.3 Mass Number
 - 1.3.3.4 Relative Atomic Masses
 - 1.3.3.5 Average Atomic Masses of Elements
 - 1.3.3.5.1 Calculating Average Atomic Mass
 - 1.3.3.6 Relating Mass to Numbers of Atoms
 - 1.3.3.6.1 The Mole
 - 1.3.3.6.2 Avogadro's Number
 - 1.3.3.6.3 Molar Mass
 - 1.3.3.6.4 Gram/Mole Conversions
 - 1.3.3.6.5 Conversions with Avogadro's Number
 - 1.3.4 Review 3
 - 1.3.5 Exam 3
- 1.4 Chapter 4: Arrangement of Electrons in Atoms
 - 1.4.1 The Development of a New Atomic Model
 - 1.4.1.1 Properties of Light
 - 1.4.1.1.1 The Wave Description of Light
 - 1.4.1.2 The Photoelectric Effect
 - 1.4.1.2.1 The Particle Description of Light
 - 1.4.1.3 The Hydrogen Atom Line Emission Spectrum
 - 1.4.1.4 Bohr Model of the Hydrogen Atom
 - 1.4.2 The Quantum Model of the Atom
 - 1.4.2.1 Electrons as Waves
 - 1.4.2.2 The Heisenberg Uncertainty Principle
 - 1.4.2.3 The Schrodinger Wave Equation
 - 1.4.2.4 Atomic Orbitals
 - 1.4.2.4.1 s-Orbitals
 - 1.4.2.4.2 p-Orbitals
 - 1.4.2.4.3 d-Orbitals

- 1.4.2.4.4 f-Orbitals
- 1.4.3 Electron Configurations
 - 1.4.3.1 Rules Governing Electron Configurations
 - 1.4.3.2 Representing Electron Configurations
 - 1.4.3.2.1 Orbital Notation
 - 1.4.3.2.2 Electron Configuration Notation
 - 1.4.3.3 Elements of the Second Period
 - 1.4.3.4 Elements of the Third Period
 - 1.4.3.4.1 Noble Gas Notation
 - 1.4.3.5 Elements of the Fourth Period
 - 1.4.3.6 Elements of the Fifth Period
 - 1.4.3.7 Elements of the Sixth and Seventh Periods
- 1.4.4 Review 4
- 1.4.5 Exam 4
- 1.5 Chapter 5: The Periodic Law
 - 1.5.1 History of the Periodic Table
 - 1.5.1.1 Mendeleev and Chemical Periodicity
 - 1.5.1.2 Moseley and the Periodic Law
 - 1.5.1.3 The Modern Periodic Table
 - 1.5.1.3.1 The Noble Gases
 - 1.5.1.3.2 The Lanthanides
 - 1.5.1.3.3 The Actinides
 - 1.5.1.3.4 Periodicity
 - 1.5.2 Electron Configuration and the Periodic Table
 - 1.5.2.1 Periods and Blocks of the Periodic Table
 - 1.5.2.1.1 The s-Block Elements: Groups 1 and 2
 - 1.5.2.1.2 Hydrogen and Helium
 - 1.5.2.1.3 The p-Block Elements Groups 13-18
 - 1.5.2.1.4 The d-Block Elements: Groups 3-12
 - 1.5.2.1.5 The f-Block Elements: Lanthanides and Actinides
 - 1.5.3 Electron Configuration and Periodic Properties
 - 1.5.3.1 Atomic Radii
 - 1.5.3.1.1 Period Trends
 - 1.5.3.1.2 Group Trends
 - 1.5.3.2 Ionization Energy
 - 1.5.3.2.1 Period Trends
 - 1.5.3.2.2 Group Trends
 - 1.5.3.2.3 Removing Electrons from Positive Ions
 - 1.5.3.3 Electron Affinity
 - 1.5.3.3.1 Period Trends
 - 1.5.3.3.2 Group Trends
 - 1.5.3.3.3 Adding Electrons to Negative Ions
 - 1.5.3.4 Ionic Radii
 - 1.5.3.4.1 Period Trends
 - 1.5.3.4.2 Group Trends
 - 1.5.3.5 Valence Electrons
 - 1.5.3.6 Electronegativity
 - 1.5.3.6.1 Period Trends
 - 1.5.3.6.2 Group Trends

- 1.5.3.7 Periodic Properties of the d- and f-Block Elements
 - 1.5.3.7.1 Atomic Radii
 - 1.5.3.7.2 Ionization Energy
 - 1.5.3.7.3 Ion Formation and Ionic Radii
 - 1.5.3.7.4 Electronegativity
- 1.5.4 Review 5
- 1.5.5 Exam 5
- 1.6 Chapter 6: Chemical Bonding
 - 1.6.1 Introduction to Chemical Bonding
 - 1.6.1.1 Types of Chemical Bonding
 - 1.6.1.1.1 Ionic or Covalent
 - 1.6.2 Covalent Bonding and Molecular Compounds
 - 1.6.2.1 Formation of a Covalent Bond
 - 1.6.2.2 Characteristics of the Covalent Bond
 - 1.6.2.3 The Octet Rule
 - 1.6.2.3.1 Exceptions to the Octet Rule
 - 1.6.2.4 Electron Dot Notation
 - 1.6.2.5 Lewis Structures
 - 1.6.2.6 Multiple Covalent Bonds
 - 1.6.2.7 Resonance Structures
 - 1.6.2.8 Covalent Network Bonding
 - 1.6.3 Ionic Bonding and Ionic Compounds
 - 1.6.3.1 Formation of Ionic Compounds
 - 1.6.3.1.1 Characteristics of Ionic Bonding
 - 1.6.3.2 A Comparison of Ionic and Molecular Compounds
 - 1.6.3.3 Polyatomic Ions
 - 1.6.4 Metallic Bonding
 - 1.6.4.1 The Metallic Bond Model
 - 1.6.4.1.1 Metallic Properties
 - 1.6.4.1.2 Metallic Bond Strength
 - 1.6.5 Molecular Geometry
 - 1.6.5.1 VSEPR Theory
 - 1.6.5.1.1 VSEPR and Unshared Electron Pairs
 - 1.6.5.2 Hybridization
 - 1.6.5.3 Intermolecular Forces
 - 1.6.5.3.1 Molecular Polarity and Dipole-Dipole Forces
 - 1.6.5.3.2 Hydrogen Bonding
 - 1.6.5.3.3 London Dispersion Forces
 - 1.6.6 Review 6
 - 1.6.7 Exam 6
- 1.7 Chapter 7: Chemical Formulas and Chemical Compounds
 - 1.7.1 Chemical Names and Formulas
 - 1.7.1.1 Significance of a Chemical Formula
 - 1.7.1.2 Monatomic Ions
 - 1.7.1.2.1 Naming Monatomic Ions
 - 1.7.1.3 Binary Ionic Compounds
 - 1.7.1.4 Naming Binary Ionic Compounds
 - 1.7.1.4.1 The Stock System of Nomenclature
 - 1.7.1.4.2 Compounds Containing Polyatomic Ions

- 1.7.1.5 Naming Binary Molecular Compounds
- 1.7.1.6 Covalent Network Compounds
- 1.7.1.7 Acids and Salts
- 1.7.2 Oxidation Numbers
 - 1.7.2.1 Assigning Oxidation Numbers
 - 1.7.2.2 Using Oxidation Numbers for Formulas and Names
- 1.7.3 Using Chemical Formulas
 - 1.7.3.1 Formula Masses
 - 1.7.3.2 Molar Masses
 - 1.7.3.3 Molar Mass as a Conversion Factor
 - 1.7.3.4 Percentage Composition
- 1.7.4 Determining Chemical Formulas
 - 1.7.4.1 Calculation of Empirical Formulas
 - 1.7.4.2 Calculation of Molecular Formulas
- 1.7.5 Review 7
- 1.7.6 Exam 7
- 1.8 Chapter 8: Chemical Equations and Chemical Reactions
 - 1.8.1 Describing Chemical Reactions
 - 1.8.1.1 Indications of a Chemical Reaction
 - 1.8.1.2 Characteristics of Chemical Equations
 - 1.8.1.2.1 Word and Formula Equations
 - 1.8.1.2.2 Additional Symbols Used in Chemical Equations
 - 1.8.1.3 Significance of a Chemical Equation
 - 1.8.1.4 Balancing Chemical Equations
 - 1.8.1.5 Balancing Chemical Equations Practice 1
 - 1.8.1.6 Balancing Chemical Equations Practice 2
 - 1.8.1.7 Balancing Chemical Equations Practice 3
 - 1.8.2 Types of Chemical Reactions
 - 1.8.2.1 Synthesis Reactions
 - 1.8.2.1.1 Reactions of Elements with Oxygen and Sulfur
 - 1.8.2.1.2 Reactions of Metals with Halogens
 - 1.8.2.1.3 Synthesis Reactions with Oxides
 - 1.8.2.2 Decomposition Reactions
 - 1.8.2.2.1 Decomposition of Binary Compounds
 - 1.8.2.2.2 Decomposition of Metal Carbonates
 - 1.8.2.2.3 Decomposition of Metal Hydroxides
 - 1.8.2.2.4 Decomposition of Metal Chlorates
 - 1.8.2.2.5 Decomposition of Acids
 - 1.8.2.3 Single-Replacement Reactions
 - 1.8.2.3.1 Replacement of a Metal in a Compound by Another Metal
 - 1.8.2.3.2 Replacement of Hydrogen in Water by a Metal
 - 1.8.2.3.3 Replacement of Hydrogen in an Acid by a Metal
 - 1.8.2.3.4 Replacement of Halogens
 - 1.8.2.4 Double-Replacement Reactions
 - 1.8.2.4.1 Formation of a Precipitate
 - 1.8.2.4.2 Formation of a Gas
 - 1.8.2.4.3 Formation of Water
 - 1.8.2.5 Combustion Reactions
 - 1.8.3 Activity Series of the Elements

- └─ 1.8.4 Review 8
- └─ 1.8.5 Exam 8
- └─ 1.9 Chapter 9: Stoichiometry
 - └─ 1.9.1 Introduction to Stoichiometry
 - └─ 1.9.1.1 Reaction-Stoichiometry Problems
 - └─ 1.9.1.1.1 Mole Ratio
 - └─ 1.9.1.1.2 Molar Mass
 - └─ 1.9.2 Ideal Stoichiometric Calculations
 - └─ 1.9.2.1 Conversions of Quantities in Moles
 - └─ 1.9.2.2 Conversions of Amounts in Moles to Mass
 - └─ 1.9.2.3 Conversions of Mass to Amounts in Moles
 - └─ 1.9.2.4 Mass-Mass Calculations
 - └─ 1.9.3 Limiting Reactants and Percent Yield
 - └─ 1.9.3.1 Percent Yield
 - └─ 1.9.4 Stoichiometry Practice 1
 - └─ 1.9.5 Review 8/Final #1
 - └─ 1.9.6 Review 8/Final #2
 - └─ 1.9.7 Exam 8/Final

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