

# Review for Exam 1

## Chapters 1 - 5

- Chapter 1: Lavoisier and the Scientific Method
- Chapter 2: Matter and Energy
  - Representation of matter at various levels:
    - Macroscopic – Objects large enough to see & touch
    - Microscopic – Often need assistance to see (microscopes)
    - Particulate – Use models to describe particles (atoms & molecules)
  - States of Matter:
    - Solid - Fixed Shape & Volume
    - Liquid – Variable Shape with Fixed Volume
    - Gas – Variable Shape & Volume

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- Chapter 2: Matter and Energy (cont.)
  - Physical and Chemical Properties & Changes:
    - Physical Properties – color, density, boiling point, melting point, smell, taste, etc.
    - Physical Changes – changes of state (melting, freezing, boiling, condensation, sublimation) where substance identity is not changed
    - Chemical Change – the identity of a substance is lost and new substance(s) formed
    - Chemical Properties – all possible chemical changes for a substance (oxidation, as an example)

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- Chapter 2: Matter and Energy (cont.)
  - Pure Substances and Mixtures
    - Pure substances are either elements or compounds
      - Compounds can be broken down by chemical means into elements:  $2 \text{H}_2\text{O} (\text{l}) \longrightarrow 2 \text{H}_2 (\text{g}) + \text{O}_2 (\text{g})$
      - Elements cannot be broken down further
      - Law of Definite (or Constant) Composition – Any compound is always made up of elements in the same proportion by mass. (Water always 89% O & 11% H)
    - Mixtures can be homogenous (solutions) or heterogeneous
      - Mixtures can be separated by physical means

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- Chapter 2: Matter and Energy (cont.)
  - Electrical Charge – Two types: “+” and “-”
    - Like charges repel; opposite charges attract
  - Energy in Chemical Reactions
    - Energy released during a chemical reaction: **Exothermic**
      - Reactants  $\longrightarrow$  Products + Energy
    - Energy absorbed during a chemical reaction: **Endothermic**
      - Reactants + Energy  $\longrightarrow$  Products
  - Conservation Laws and Chemical Change
    - Laws of Conservation of Mass and Energy

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- Chapter 3: Measurement and Chemical Calculations
  - Scientific (Exponential) Notation: Expressing very large or very small number with powers of ten.
  - Significant Figures
  - Accuracy and Precision
  - Conversion Factors
  - Temperature
  - Density

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- Chapter 4: Introduction to Gas Laws
  - Properties of Gases
  - Kinetic Molecular Theory of Gases
  - Gas Measurements (Barometer & Manometer)
  - Charles's Law (Volume-Temperature Law)
  - Boyle's Law (Pressure-Volume Law)
  - Combined Gas Law

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- Chapter 5: Atomic Theory: The Nuclear Model of the Atom
  - Dalton's Atomic Theory
  - Atomic Structure and Subatomic Particles
    - Protons
    - Neutrons
    - Electrons (J. J. Thomson & the Cathode Ray Tube)
  - The Nuclear Atom (Rutherford's Gold Foil Experiment)
  - Isotopes, Natural Abundances and Atomic Masses
  - The Periodicity of Elements
  - Symbols of Elements and the Periodic Table