

Unit-II Exam Outline

- I. Atomic structure
 - A. History and different atomic theories and models
 - 1. Dalton; 2. Thomson; 3. Millikan; 4. Rutherford;
 - 5. Bohr; and 6. quantum mechanical
 - B. Subatomic particles
 - 1. Protons, neutrons, and electrons in an atom or ion
 - 2. Respective charges and relative masses
 - C. Belt of stability
 - D. Nuclear equations: alpha and beta emissions
 - E. Four basic forces in nature
- II. Electrons
 - A. Radiant energy and quantum theory
 - 1. Electromagnetic spectrum
 - 2. Relationships between wavelength, frequency, and radiant energy
 - 3. How this all relates to atomic structure and electrons—think photons
 - 4. (CP only) Calculating radiant energy, wavelength, and/or frequency using the speed of light and Planck's constant
 - B. Orbital shapes (*s*, *p*, and *d*)—per Schrödinger equation
 - C. Orbital diagrams and electron configurations
 - 1. Principal energy levels, sublevels, and orbitals
 - 2. Aufbau principle, Pauli exclusion principle, and Hund's rule
 - 3. Identifying elements from e-configurations, and v.v.
 - 4. Determining unpaired electrons and valence electrons
- III. Periodic table
 - A. Classification of elements
 - 1. Metals, nonmetals, and metalloids (semimetals)
 - 2. *s*, *p*, *d*, and *f* blocks
 - 3. Groups (families): numbers and names
 - 4. Representative elements
 - 5. (CP only) Lanthanides, actinides, and transuranium elements
 - 6. (CP only) Naming transactinides using temporary system
 - B. Periodic trends
 - 1. Atomic and ionic radii, ionization energy, and electronegativity, AND why
 - 2. Interpreting graphs of periodic trends
 - 3. Relative reactivity of elements and ions
- IV. Labs
 - A. 1s electron distribution
 - B. Flame tests
 - C. Trends in a group
 - D. Model for half-lives (using pennies)