

Unit 2 – Atomic Structure

STUDY GUIDE

Chapter 4 – Atomic Structure

Chapter 25 – Nuclear Chemistry (nuclear decay from 25.1 and half-life from 25.2)

Chapter 5 – Electrons in Atoms

Chapter 6 – The Periodic Table

Vocabulary

- Atom
- Atomic Mass
- Atomic Number
- Isotopes
- Mass Number
- Proton
- Neutron
- Electron
- Alpha decay
- Beta decay
- Gamma decay
- Half-life
- Wavelength
- Amplitude
- Frequency
- Ground state
- Excited state
- Photons
- Atomic orbitals (s, p, d, f)
- Energy levels (n=)
- Electron configuration
- Orbital notation
- Aufbau principle
- Pauli exclusion principle
- Hund's rule
- Anion
- Cation
- Atomic Radius
- Ionization Energy
- Electronegativity
- Density

Equations

$$s = \lambda f$$

$$s = 3.00 \times 10^8 \text{ m/s}$$

$$\Delta E = hf$$

$$h = 6.626 \times 10^{-34} \text{ J*s}$$

$$\# \text{ neutrons} = \text{mass \#} - \text{atomic \#}$$

$$\text{average} = (\% \text{ abundance} * \text{mass number}) + \text{other atomic mass isotopes}$$

$$AR = AI * (1/2)^n$$

$$D = M/V$$

Core Concepts

- Atomic Models – Scientists & experiments used to construct modern atomic structure
- 3 types of subatomic particles
- Finding the number protons, neutrons & electrons in an atom using atomic number and mass number
- Isotopes of atoms
- Calculating average atomic mass of an element
- Law of Conservation of Mass
- Three types of nuclear radiation include alpha, beta and gamma radiation
- What is half-life?
- Energy levels (n=) contain sublevels (s, p, d, f) which contain electrons. Know the number of electrons that all of the sublevels contain.
- Information on Table 5.1 of textbook (Chapter 5)
- 3 rules for filling electrons (Aufbau principle, Pauli exclusion principle, Hund's rule)
- Writing electron configurations (long & shorthand)
- Electron configuration exceptions (Cr and Cu families)
- Writing orbital notation
- Light is a wave or a particle
- What happens to electrons that gain energy?
- How wavelength and frequency of light are related
- Major parts of the electromagnetic spectrum
- $s = \lambda f$
- $\Delta E = h f$
- How did Mendeleev organize the Periodic Table of Elements?
- What are the 3 broad classes of elements?
- Groups/family names on the periodic table
- Information displayed in a Periodic Table
- How elements are classified based on electron configuration
 - Noble gases and representative elements (alkali, alkaline earth, halogens, etc.)
- Octet Rule
- Lewis dot structures
- Ion charges and electron configurations for ions
- Trends of the periodic table (atomic radius, ionization energy, ion size, electronegativity)
- Density (from Chapter 3)