Unit 4

Chapter 7 Suggested End of Chapter Problems: 7.1-7.10, 7.14, 7.15, 7.19, 7.23, 7.25, 7.27, 7.45, 7.47, 7.49, 7.55, 7.66, 7.67, 7.71, 7.73, 7.75, 7.77, 7.79, 7.81, 7.83, 7.85, 7.87, 7.89, 7.91, 7.93, 7.95, 7.97, 7.99, 7.101, 7.103, 7.105, 7.107, 7.109, 7.111, 7.113, 7.115, 7.117, 7.122, 7.125
Chapter 8 Suggested End of Chapter Problems: 8.1-8.9, 8.13, 8.14, 8.15, 8.16, 8.17, 8.21, 8.25, 8.27, 8.29, 8.31, 8.35, 8.37, 8.44, 8.46, 8.47, 8.49, 8.51, 8.53, 8.55, 8.59, 8.61, 8.63, 8.71, 8.73, 8.77, 8.79, 8.81, 8.85, 8.92, 8.95, 8.97, 8.99, 8.105, 8.106, 8.109, 8.115, 8.117, 8.121, 8.125, 8.127

Electromagnetic spectrum: energy, wavelength, frequency, speed of light, Plank's constant, labeling type of wave (IR, UV, Vis, X-ray, etc.)
Diffraction
Refraction
Absorption
Emission
Continuous spectrum
Line spectrum
Quantum theory
Photoelectric effect
Work function
Bohr model of the atom
Ground state, excited state, electron transition
De Broglie Wavelength
Heisenberg uncertainty principle
Quantum numbers
Quantum theory (electron clouds, sharp, principal, diffuse, & fundamental shapes)Electron configuration and shell theory: shells (n), subshells (l), orbitals (m_l), electronic spin (m_s)
Pauli exclusion principle
Sizes and shapes of atomic orbitals
Degenerate
Hund's Rule
Orbital diagrams
Electron configuration of ions and forming ions from atoms
Electromagnetic radiation: Diamagnetic vs. paramagnetic
Periodic trends of atomic/ionic size, ionization energy for atoms/ions, electron affinity, metallic vs. nonmetallic character, effective nuclear charge
Chemical bonds: ionic, covalent, bond length, bond energy

Lewis Structures: dot structure for H & He valence of 2 and octet valence of 8, counting valence electrons, forming molecules using Lewis structures, central carbon, terminal hydrogen, central atom with lowest electronegativity, lone pairs
Lewis Structures: exceptions to the octet rule, odd electron species, incomplete octets, free radicals, extended valance extended valence for 3rd, 4th, and 5th shell elements (d subshell)
Bonding: bond order, bond strength, bond length type of bond (single, double, triple), organic molecules (e.g. benzene) and bond order of 1.5, resonance/hybrid structures
Bonding: bond energy, periodic trends

Formal charges (number valence electrons in free atom – number lone pair electrons – ½ number bonded electrons): deciding on the best Lewis structure and resonance, charges on atoms in molecules, polyatomic ions
Polarity
Partial charge and calculating partial charge and electrostatic potential map
Electronegativity and types of bonds: covalent, ionic, polar, coordinate covalent bond (single atom contributes both shared electrons in a pair)
Free radicals
Dipole moment (magnitude and direction of charge)

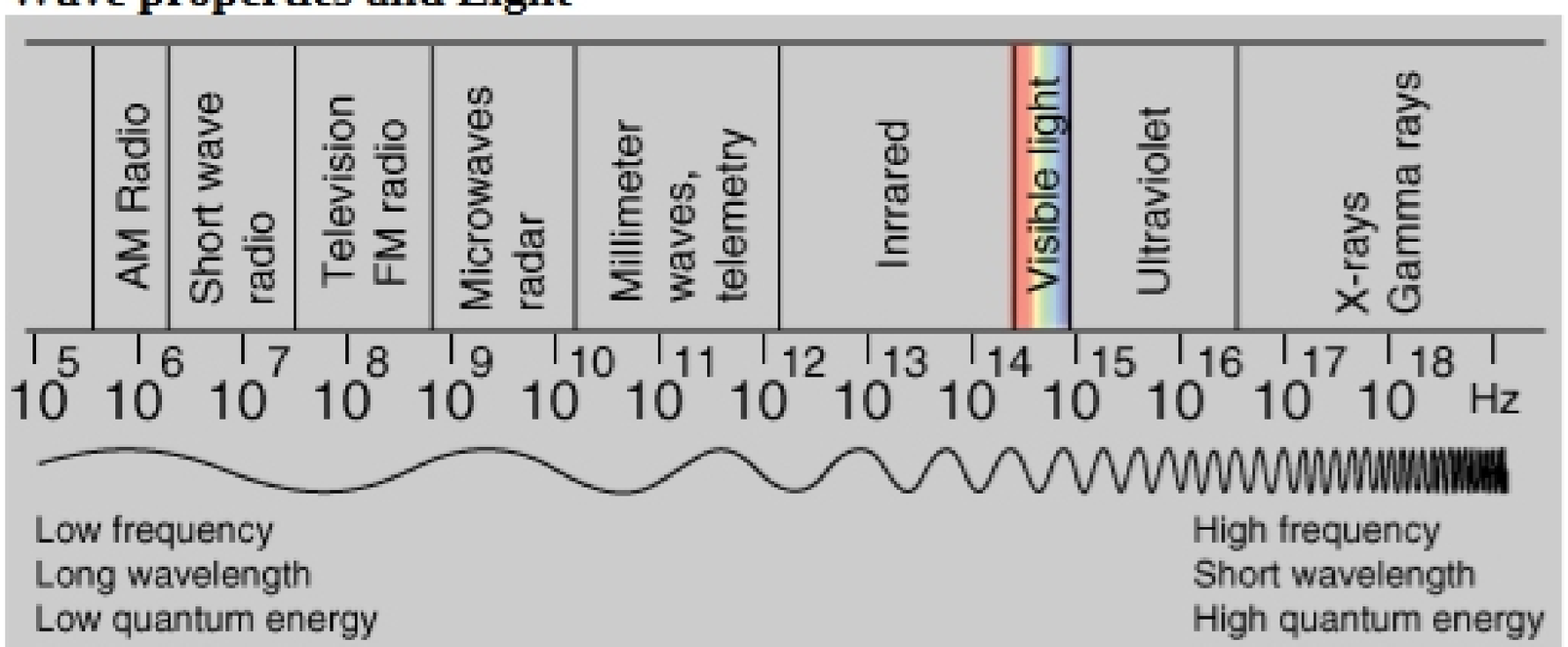
Chapter 7: Electrons in Atoms and Periodic Properties

7.1

Electromagnetic spectrum: a continuous range of radiant energy that includes radio waves, infared radiation, vivible light, ultra violet radiation, x-rays and gamma rays

Electromagnetic radiation: any form of radiant energy in the electromagnetic spectrum
-Light usually refers to the visual spectrum

Wave properties and Light



Radio: 10^{-1} - 10^{4}
Microwave: 10^{-3} - 10^{-1}
Infrared: 10^{-6} - 10^{-4}
Visible Spectrum
Ultraviolet: 10^{-9} - 10^{-7}
X-rays: 10^{-12} - 10^{-9}
Gamma rays: 10^{-15} - 10^{-11}

We interpret different wavelengths of light as **colors (visible light)**.
Red light: ~700 nm (longer wavelength)

Blue light: ~400 nm (shorter wavelength)

* Violet (380-435 nm) (higher energy)
* Blue (435-500 nm)
* Cyan (500-520 nm)
* Green (520-565 nm)
* Yellow (565- 590 nm)
* Orange (590-625 nm)
* Red (625-740 nm) (lower energy)

Because light is energy, each wavelength corresponds to a different amount of energy.

Blue light: shorter wavelength- higher energy

Red light: longer wavelength- lower energy

Wavelength (λ): distance between any two adjacent identical points on the wave.

Frequency (υ): the number of waves that pass a given point per second (or unit time)

Amplitude: wave height (from center line)

$$\lambda\upsilon = c$$

c = speed of light = 3×10^8 m/s

Refraction: bending of light as it passes from one medium to another

Prism

Diffraction: bending of electromagnetic radiation as it passes around an edge of an object or through a narrow opening

Interference: interaction of waves that results in either reinforcing their amplitudes (constructive) or canceling them out (destructive)

Fraunhofer lines: dark lines in otherwise continuous spectrum