Chemistry Second Marking Period Review Sheet

Fall, Mr. Wicks

Chapter 5: Electrons in Atoms

- I can give the parts of the electromagnetic spectrum in order of increasing wavelength:
  Gamma rays, X-rays, ultraviolet (UV) rays, visible light, infrared (IR), microwaves, radio waves
- I can relate electromagnetic spectrum concepts like wavelength (λ), frequency (ν), and amplitude to water waves.
- I can perform calculations using $c = \lambda\nu$ where c = 3.00×10^8 m/s = speed of light.
- I can describe the Bohr model of the atom, its limitations, and how the model accounts for the emission line spectra of excited atoms.
- I can give the name, symbol, and orbital property for each quantum number as shown in Table 1.

Table 1: The Quantum Numbers

Quantum Number	***Symbol***	***Orbital Property***
Shell quantum #:	n	Orbital size
Subshell quantum #:	ℓ	Orbital shape
Magnetic quantum #:	m_ℓ	Orbital orientation
Spin quantum #:	m_s	Spin pairing of electrons in orbitals

- I can describe subshell (sublevel) labels and corresponding orbital shapes. See Table 2.

Table 2: Additional Information about the Subshell Quantum Number, ℓ

Subshell	***Orbital Shape***	***# of Orbitals***	***# of Electrons***
s	Sphere	1	2
p	Dumbbell	3	6
d	Four-leaf clover	5	10
f	Two four-leaf clovers	7	14

- I can determine the number of orbitals in a particular shell (n^2) or subshell (see table above).
- I can determine the number of electrons in a particular shell ($2n^2$), subshell (see table above), and orbital (2 electrons).
- I can apply the Heisenberg uncertainty principle: "It is impossible to determine both the position and the momentum of an electron at the same time."
- I can apply the Pauli exclusion principle: "No two electrons in the same atom can have the same set of four quantum numbers."
- I understand that electrons are assigned to the subshells of an atom in order of increasing subshell energy.
- I can use the Aufbau principle to help write electron configurations for atoms of particular elements.
- I can apply Hund's rule: "Electrons occupy all the orbitals of a given subshell singly before electron pairing begin."
- I can write orbital box diagrams and give the number of unpaired electrons.

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Chapter 6: The Periodic Table

- I can explain Mendeleev's and Moseley's contributions to the shape of the modern periodic table.
- I can identify the alkali metals, alkaline earth metals, transition metals, halogens, noble gases, lanthanides, and actinides on the periodic table.
- I can distinguish between the metals, nonmetals, and metalloids (or semimetals).
- I can identify the s-block, p-block, d-block, and f-block elements on the periodic table.
- I can use the periodic table as a guide to determine electron configurations for atoms and ions of particular elements.
- I can express electron configurations using noble gas notation.
- I can determine the number of protons and electrons for ions of various elements.
- I can explain the term "isoelectronic" and how it applies to different ions having the same number of electrons.
- I can predict how properties of atoms like atomic radius, ionization energy (IE), electron affinity (EA), and electronegativity change within a group or across a period of the periodic table. See Table 3.
- I can predict how atomic radius changes when atoms form ions. In general, when neutral atoms form cations, they decrease in size; when neutral atoms form anions, they increase in size.

Table 3: Atomic Properties having Periodic Table Trends

Property	***Description***
1. Atomic Radius:	Radius is one-half the distance between identical nuclei that are bonded together.
2. First Ionization Energy (IE):	The energy required to ***remove*** one electron from a neutral atom, A, of a particular element. $A + \text{energy} \rightarrow A^{+} + e^{-}$
3. Electron Affinity (EA):	The energy released when a neutral atom, A, for a particular element ***gains*** an electron. $A + e^{-} \rightarrow A^{-} + \text{energy}$
4. Electronegativity:	The ability of an atom in a molecule to attract electrons to itself.