

## Unit 3 Outline/ Study Guide - Electron Configuration and Periodic Trends

### Essential Skills/ State Standards:

- Students know how to relate the position of an element in the periodic table to its quantum electron configuration and to its reactivity with other elements in the table.
- Students know how to use the periodic table to identify **metals, semimetals, nonmetals, halogens, alkali metals, alkaline earth metals, and transition metals.**
- Students know how to use the periodic table to identify the following trends: **ionization energy, electronegativity, and the relative sizes of ions and atoms** (this includes knowing the following terms: ionization energy, electronegativity, cation, and anion.)

### Vocabulary:

<ul style="list-style-type: none"> <li>Electromagnetic radiation</li> <li>Electromagnetic spectrum</li> <li>Excited state</li> <li>Ground state</li> <li>Spectral lines</li> <li>Energy levels</li> </ul>	<ul style="list-style-type: none"> <li>Wavelength</li> <li>Periodic table</li> <li>Group</li> <li>Period</li> <li>Metals</li> <li>Alkali metals</li> <li>Alkaline earth metals</li> </ul>	<ul style="list-style-type: none"> <li>Transition metals</li> <li>Lanthanide</li> <li>Actinide</li> <li>Semi-conductors</li> <li>Non-metals</li> <li>Halogens</li> <li>Noble gases</li> <li>Ionization energy</li> </ul>	<ul style="list-style-type: none"> <li>Electronegativity</li> <li>Atomic radii</li> <li>Ion (anions/ cations)</li> <li>Ionic size</li> <li>Electron configuration</li> <li>S, p, d, &amp; f orbitals</li> <li>Valence electrons</li> <li>Octet rule</li> </ul>
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### Homework Problems:

<i>Topic</i>	<i>Read:</i>	<i>Problems</i>
1. Electromagnetic waves	p. 91 - 97	Section Review 4-1 p. 97 #1-5
2. The Periodic Table	p. 20 - 24 p. 123 - 127	Section Reviews 1-3 & 5-1 p. 24 #3-4 p. 127 #2-4
3. Electron configurations	p. 105 - 116	Chp 4 Review p. 119-120 #27-30 & 37
4. E. Config. & the Periodic Table	p. 128-139	Chp 5 Review p. 155-156 #4, 8, 9, 11-14
5. Periodic Trends	p. 140 - 154	Chp 5 Review p. 156 #17-19a & b, 22-24, 26

### Study Guide -(use your notes and worksheets for a more complete review)

- Identify/ label the following things on the periodic table:

- |   |                          |
|---|--------------------------|
| a. metals   | b. alkali metals         |
| c. metalloids (semi-metals)   | d. alkaline earth metals |
| e. transition metals  | f. halogens              |
| g. nonmetals  | h. noble gases           |
| i. Periods  | j. Groups/<br>families   |
| k. Identify groups/columns that have the following # of valence electrons:<br><b>1, 2, 3, 4, 5, 6, 7, 8</b> |                          |

- Why do the elements in the groups (columns) behave so similar to each other even if they have great differences in their number of protons?
- What is the connection between the following terms: **octet rule, valence electrons, and ions?**

4. a) List the elements that are exceptions to the **octet rule** b) Why don't these atoms achieve the octet rule?
5. Identify as **Isotope** or **Ion**:
- a. has different number of neutrons
- b. atoms have gained or lost electrons
- c. shown by putting a +/- sign next to an element (ex: Ca<sup>+2</sup>)
- d. shown by putting the mass in hyphen notation (ex: C- 14)
6. a. Which electrons have more energy, electrons on energy level 3 or 5?
- b. Based on your lab experience, how does an electron become excited?
- c. When do you see the unique light pattern for each element?

7.

	O <sup>-2</sup>	Mg <sup>+2</sup>
a. <b>Cation</b> or <b>anion</b> ? How do you know?		
b. Did they <b>gain</b> or <b>lose</b> electrons? How do you know?		
c. Which atom is <b>larger</b> or <b>smaller</b> in size? How do you know?		

8. Noble Gas Config.	# valence electrons	period	block	Group number	Ion it will form	Element name
[Ne]3s <sup>2</sup> 3p <sup>5</sup>					Cl <sup>-1</sup>	
[Xe]6s <sup>2</sup> 4f <sup>14</sup> 5d <sup>10</sup> 6p <sup>3</sup>						Br
						K
						Po

9. How many valence electrons does each of the following elements have? **How do you know?**
- a. noble gases=      b. alkali metals=      c. halogens=      d. alkali earth metals=
10. Explain the following terms in your own words & give an example of 2 elements that are extreme examples of each term:
- a. **Ionization energy** (def & 2 ex's from the 4 corners):
- b. **Electronegativity** (def & 2 ex's from the 4 corners):
- c. **Atomic radius** (def & 2 ex's from the 4 corners):
11. Identify the largest to smallest atoms based on atomic radius.
- a. Ti, P, Cs, Ne      b. Li, O, Cu, K
- largest:      smallest:      largest:      smallest:
12. Identify the elements that have the highest & lowest ionization energy.
- a. Na, Cl, Mg, P      b. K, Na, Rb, Li
- highest:      lowest:      highest:      lowest:
13. Identify the most & least electronegative elements.
- a. Na, Ne, O, Al      b. Ca, Cu, F, Ar
- most:      least:      most:      least: