**Chemistry Outline Notes**

***Unit 3: Electrons & Periodicity***

*Corresponds to “Chapter 5: Electrons in Atoms” & “Chapter 6: The Periodic Table & Periodic Law” from textbook.*

### For the Unit:

1. Unit opening page
   1. Name of unit- Electrons & Periodicity
   2. Picture

### Each Week:

* Update your table of contents
* Number your pages
* Write neatly

### Light as a Wave

1. I can evaluate the wave model of EM radiation.
   1. Pg. 136-137, 138-139
      1. Write I can statement
      2. Draw Rutherford’s atomic model. Label parts of model. Describe the model’s shortcomings (at least 2).
      3. Explain what scientists determined about chemical behavior and light.
      4. Define electromagnetic radiation. List an example.
      5. List and describe the 4 wave characteristics (include abbreviations and units in description.)
      6. Explain how the visible spectrum is produced by a prism and white light.
      7. Describe the electromagnetic spectrum.
      8. Explain the relationship between frequency and energy.
      9. Give a real world example of electromagnetic radiation.

### Calculating λ, ν, and E

1. I can explain and calculate wavelength, frequency, and energies of an electromagnetic wave.
   1. Pg.137-138, 140, 142-143
      1. Write I can statement.
      2. Write EM wave relationship equation. Label variables. (Make sure you include what c is equal to.)
      3. Show example of calculating with equation.
      4. Draw a picture showing the relationship between wavelength, frequency, amplitude, and speed. Label picture.
      5. Write the energy equation. Label the variables. (Make sure you include what h is equal to.)
      6. Show example of calculating with equation.

### Light as a Particle

1. I can evaluate the particle model of EM radiation.
   1. Pg. 141-143
      1. Write I can statement.
      2. List the shortcomings of the wave model of electromagnetic radiation.
      3. Describe what a quantum is. Give a real world example or analogy of something that contains a quantum.
      4. Describe the photoelectric effect, and dual nature of light.
      5. Define photon.

**Electron Movement**

1. I can interpret a model of an electron moving between its ground and excited state in terms of absorption or emission spectrum.
   1. Pg. 144-152
      1. Write I can statement
      2. Explain how light is produced.
      3. Describe an atomic emission spectrum. (Include what is unique about atomic emission spectra and how they are created.)
      4. Give a real world example of a use of atomic emission spectra.
      5. Describe Bohr’s model of the atom, including its shortcomings. (You can also draw picture of it.)
      6. Define ground state. Define excited state.
      7. Draw a picture showing how an electron gets from ground state to excited state and vice versa in terms of energy.
      8. Explain the Heisenberg uncertainty principle and what is has to do with electrons inside the atom.

### Atomic Orbitals

1. I can describe each atomic orbital in terms of shape, relative energy, and number of possible electrons.
   1. Pg. 152-155
      1. Write I can statement.
      2. Explain the difference between the quantum model and Bohr’s model.
      3. Describe an atomic orbital. How is an atomic orbital defined?
      4. Define principal quantum number. Include abbreviation.
      5. Finish sentence: “As n increases…”
      6. Describe energy sublevels. List how many sublevels are within each energy level.
      7. List the 4 types of sublevels. Draw pictures of s an p orbitals (Include the difference between x, y, z, and know what they designate.)

### Orbital Diagrams

1. I can draw and interpret orbital diagrams using electron configurations.
   1. Pg. 156-158
      1. Write I can statement
      2. Define electron configuration and ground state electron configuration.
      3. Explain the aufbau principle.
         1. What does each box represent?
         2. What does each arrow represent?
      4. Copy aufbau diagram on post-it note, and place in notes.
      5. Explain what each box below is showing in terms of electrons:

* + 1. Explain the Pauli Exclusion Principle. (Include how many total electrons can be in each orbital as well as maximum # of electron formula.)
    2. Explain Hund’s Rule and why this occurs.
    3. Show how to draw an orbital notation diagram. (include explanation of steps.)

**Electron Configuration**

1. I can write the electron configuration and noble gas configuration of an element.
   1. Pg. 158-159
      1. Write I can statement.
      2. Write an example of an electron configuration and label the meaning of each of the parts.
      3. Show how to write an electron configuration for the element phosphorus.
      4. Describe what a noble gas is and where it is located.
      5. Write an example of a noble gas configuration and label the meaning of each of the parts.
      6. Show how to write a noble gas configuration for Phosphorus.

**Valence Electrons**

1. I can predict the number of valence electrons and draw electron dot structures of the main group elements.
   1. Pg.161
      1. Write I can statement.
      2. Define valence electron.
      3. Label the valence electrons using an electron configuration example.
      4. Define electron-dot structure.
      5. Explain how to draw an electron dot structure.
      6. Show an example of an electron dot structure.

**Periodic Table Development**

1. I can describe the development of the periodic table.
   1. Pg. 174-176
      1. Write I can statement.
      2. Describe the earliest version of the table and who created it.
      3. Describe John Newlands periodic table, including any patterns and shortcomings.
      4. Describe Mendeleev’s periodic table, especially including anything different than Newlands and any shortcomings.
      5. Describe Moseley’s periodic table.
      6. Define periodic law.

**Periodic Table Families**

1. I can predict an element’s properties based on its position on the periodic table.
   1. Pg. 177-181
      1. Write I can statement.
      2. Draw a box from the modern periodic table and label its parts.
      3. Define group. Define period.
      4. Define main-group elements.
      5. Draw a graphic organizer to show the differences between metals, nonmetals, with metalloids in the middle. Include two examples of each, and where they are located.
      6. Complete color coding periodic table organizer using agenda periodic table.

**Periodic Table Blocks**

1. I can relate an element’s position on the periodic table to its electron configuration.
   1. Pg. 182-186
      1. Write I can statement.
      2. Explain the pattern that occurs between group # and # of valence electrons on the periodic table. (Can draw a picture to depict pattern.)
      3. Explain the relationship between chemical properties, valence electron, and group elements. Show an example.
      4. Draw a picture depicting the 4 blocks of the periodic table.
      5. Explain the relationship between the # of columns in a block and the number of electrons that occupy the sublevels.
      6. Show an example of determining the group, period, and block using an element’s electron configuration.

**Periodic Trends**

1. I can evaluate and describe the periodic trends between groups and periods.
   1. Pg. 187-194
      1. Write I can statement.
      2. Define atomic radius for both metals and nonmetals.
      3. Write the trend for atomic radii across a period. Write the trend for atomic radii down a group.
      4. Picture/diagram for atomic radius. (Periodic table with arrows describing trends.)
      5. Choose 2 elements and tell which has a larger atomic radius.
      6. Define ion.
      7. Explain atomic radii size of a positive ion compared to an atom.
      8. Explain atomic radii size of a negative ion compared to an atom.
      9. Choose an element and an ion of that element; tell which has a larger radius in terms of atomic structure.
      10. Define ionization energy.
          1. What do high values mean?
          2. What do low values mean?
      11. Write the trend for ionization energy going across a period/down a group.
      12. Picture/diagram for ionization energy. (Periodic table with arrows describing trend.)
      13. Choose 2 elements; tell which has a larger ionization energy, and explain why in terms of atomic structure.
      14. Describe the octet rule.
      15. Define electronegativity.
      16. Write the trend down a group/across a period.
          1. Which element has the highest electronegativity value?
      17. Picture/diagram for electronegativity. (Periodic table with arrows describing trend.)
      18. Choose 2 elements,; tell which has a larger electronegativity value.
2. **Current Event**
   1. Find a newspaper, magazine, or internet article **from 2013 to the present** about a topic from this unit
   2. Staple/glue/tape your article in your journal.
   3. Write a couple of bullet points explaining the article.
   4. Write a couple bullet points connecting the article to what we learned in class.
3. **End of Unit**
   1. Concept Map
   2. Review the I can statements throughout unit. Check off topics you are comfortable with, and star the ones you need to study more.
   3. Create a colorful, color-coded study guide using already created notes. (Use highlighters, colored pens.)
      1. Review: Light as a wave, calculations, light as a particle, electron movement, atomic orbitals, orbital diagrams, electron configuration, valence electrons, periodic table development, periodic table families, periodic table blocks, and periodic trends.
   4. Review Bell Work Questions.