**Teacher:** Amy Schaefer

**Unit:** Organization and Trends of the Periodic Table

**Day:**

**Lesson/Topic:**

**Grade:** 10-12th

**Standards Addressed:** Predict properties of elements using trends of the periodic table (3.2.10.A1). Explain the relationship of an element’s position on the periodic table to its atomic number, ionization energy, electro-negativity, atomic size, and classification of elements (3.2.C.A1).

**Big Idea Addressed:** Understanding organization and trends of the periodic table. Periodic table trends in the properties of atoms allow for the prediction of physical and chemical properties.

**Concepts Addressed:** Chemical periodicity is the basis for the arrangement of the periodic table. Trends in the periodic table can predict the properties and behaviors of elements.

**Competencies Addressed:** Compare and predict properties of elements using their locations on the periodic table. Explain how periodic trends in the properties of atoms allow for the prediction of physical and chemical properties.

**Essential Questions:** How is the periodic table organized?

**Required Materials:** Bunsen burner, a few elements (mostly metals), large periodic table poster, computers with internet, books, poster board, projector, large (blank) periodic table

**Activities:**

*Engage:* Show different chemicals burning or in solution (different chemicals burn different colors). These are properties of chemicals listed on the periodic table. Go on to briefly explain that the periodic table is organized by physical and chemical properties. This leads into the explore part of the lecture.

*Explore:* Ask the class what certain elements in the same columns have in common (fluorine, chlorine, and iodine are all used for cleaning; gold, silver, and copper all have shiny luster, etc.). Are there any other patterns you can find by looking at the periodic table? Depending on the class and timing, split the class into teams and have them list any patterns and observations or knowledge they have about the periodic table. Otherwise as a whole group the class can brainstorm any patterns and share any observations they have about the periodic table.

*Lecture:* The periodic table organizes chemical elements in rows and columns based on similar properties. Dmitri Mendeleev organized the known elements (as of late 1800s) in the periodic table, and we continue to use this organization today. The periodic table can be split into general groups that have similar general properties ( groups such as metals, nonmetals, transition metals, lanthanides and actinides, and metalloids), as well as columns and rows that group elements by even more specific properties (intensive, extensive, physical, and chemical properties). The organization of the periodic table also lends itself to certain trends that can be followed. Understanding the organization of the periodic table and certain trends can tell us a lot about the elements on the periodic table.

*Explain:* Students will research a group on the periodic table. This can be differentiated by what information the student looks for regarding the period they are assigned. Students can look for similarities in uses and appearance (lower level), chemical properties and reactions (middle level), and the reasons for the similarities (advanced), depending on their prior knowledge/skill level. The students will be assigned their group on the periodic table and what information they are looking for before searching for information on their own (or in pairs depending on class size). Then students will find others with their same group and combine their information to make a presentation for the class. As a group the students will present their period to the class (poster, PowerPoint, skit, song, or combination of these).

*Elaborate:* Still in the same groups, have students compare periods to one another going across the periodic table. They should be able to find a few trends as the move from left to right. These should match the trends that were discussed in the lecture. Then each group will share their observations and the (correct) trends will be summarized on a large blank periodic table (draw increasing radii, depict more electronegativity and reactivity, etc.) to give a visual aid.

*Evaluate:* Given a list of unknown elements with a few properties listed, have students try to determine what element it is and place it on the periodic table. First this will be done individually, and after some time the students will collaborate/compare their answers with partners/neighbors. For those students who are inclined/finish early, they can come up with a new element that will fit appropriately on the periodic table and list the properties of the element. This will be a useful tool to give feedback to the students and see how much they understand about the organization and trends of the periodic table.

**Assessment Strategies:**

*Diagnostic:* The explore part of the lecture will be helpful to determine what knowledge students have coming into the lesson. This will allow me to determine where I need to start and how much detail and explanation I need to use.

*Formative:* The elaborate and evaluate parts of the lecture is where formative assessment primary occurs. Depending on their recognition of trends on the periodic table in groups and periods, and their ability to place elements on the periodic table given properties, it will be easy to see how well they understand the lesson.

*Summative:* This material will be part of a unit test at the end of the unit. A short quiz may be used at the end of this lesson because the organization and trends of the periodic table are very important in chemistry.