

Richmond Public Schools
Department of Curriculum and Instruction
Curriculum Pacing and Resource Guide – Unit Plan



Course Title/ Course #: EOC Chemistry/2802 or EOC Pre AP Chemistry/ 2804

Unit Title/ Marking Period # (MP):2

Start day: Day 47

Meetings (Length of Unit): 2 Weeks

Desired Results ~ What will students be learning?

Standards of Learning/ Standards

CH.2d-f, h

CH.2 The student will investigate and understand that the placement of elements on the periodic table is a function of their atomic structure. The periodic table is a tool used for the investigations of

- d) families or groups;
- e) periods;
- f) trends including atomic radii, electronegativity, shielding effect, and ionization energy;
- h) chemical and physical properties;

Essential Understandings/ Big Ideas

The concepts developed in this standard include the following:

- The periodic table is arranged in order of increasing atomic numbers.
- The atomic number of an element is the same as the number of protons. In a neutral atom, the number of electrons is the same as the number of protons. All atoms of an element have the same number of protons.
- The average atomic mass for each element is the weighted average of that element's naturally occurring isotopes.
- The mass number of an element is the sum of the number of protons and neutrons. It is different for each element's isotopes.
- An isotope is an atom that has the same number of protons as another atom of the same element but has a different number of neutrons. Some isotopes are radioactive; many are not.
- Half-life is the length of time required for half of a given sample of a radioactive isotope to decay.
- Electrons have little mass and a negative (-) charge. They are located in electron clouds or probability clouds outside the nucleus.
- Protons have a positive (+) charge. Neutrons have no charge. Protons and neutrons are located in the nucleus of the atom and comprise most of its mass. Quarks are also located in the nucleus of the atom.

The names of groups and periods on the periodic chart are alkali metals, alkaline earth metals, transition metals, halogens, and noble gases.

- Metalloids have properties of metals and nonmetals. They are located between metals and nonmetals on the periodic table. Some are used in semiconductors.
- Periods and groups are named by numbering columns and rows. Horizontal rows called periods have predictable properties based on an increasing number of electrons in the outer energy levels. Vertical columns called groups or families have similar properties because of their similar valence electron configurations.
- The Periodic Law states that when elements are arranged in order of increasing atomic numbers, their physical and chemical properties show a periodic pattern.
- Periodicity is regularly repeating patterns or trends in the chemical and physical properties of the elements arranged in the periodic table.
- Atomic radius is the measure of the distance between radii of two identical atoms of an element. Atomic radius decreases from left to right and increases from top to bottom within given groups.
- Electronegativity is the measure of the attraction of an atom for electrons in a bond. Electronegativity increases from left to right within a period and decreases from top to bottom within a group.
- Shielding effect is constant within a given period and increases within given groups from top to bottom.
- Ionization energy is the energy required to remove the most loosely held electron from a neutral atom. Ionization energies generally increase from left to right and decrease from top to bottom of a given group.
- Matter occurs as elements (pure), compounds (pure), and mixtures,

Key Essential Skills and Knowledge

In order to meet this standard, it is expected that students will:

- distinguish between a group and a period.
- identify key groups, periods, and regions of elements on the periodic table.
- identify and explain trends in the periodic table as they relate to ionization energy, electronegativity, shielding effect, and relative sizes.
- compare an element's reactivity to the reactivity of other elements in the table.
- distinguish between physical and chemical properties of metals and nonmetals.
- differentiate between pure substances and mixtures and between homogeneous and heterogeneous mixtures.

Vocabulary

atomic number	electron configurations	families	shielding effect
half-life	isotopes	mass charge	quantum models
nuclear radii	particle	periods	
physical properties	series	trends	
chemical properties	electronegativity	groups	
historical models	mass	nuclear particles	
oxidation numbers	patterns		

Assessment Evidence ~ What is evidence of mastery? What did the students master & what are they missing?			
Assessment/ Evidence			
<p>Evidence of Mastery: Students will display mastery by consistently scoring at a "C" or above range on all assessments. Success and mastery will also be shown by increasing scores from the beginning of the unit to the end of the unit. Overall mastery of the content and successful learning of the Targeted Objectives will be measured by assessing the Lab Journal for the Periodic Trends Virtual Lab and the final unit assessment. Mastery will result in score 90 out of 100 points on the periodic trends virtual Lab Rubric and the final assessment scores at or above "C".</p> <p>Other Assessment Methods</p> <ul style="list-style-type: none">• Group Discussions• Student Reports• Teacher-Created IA Test/Quiz• Writing Assignment <p>Possible Learning Gaps:</p> <ol style="list-style-type: none">1. The Periodic Table in its present form is the way the elements have always been categorized2. There is only one way to categorize the elements, consensus was easily achieved3. Science and its methods provide absolute truth rather than being tentative and evolving4. All that is to be known is known regarding atoms and elements5. Science is procedural more than creative			
Learning Plan ~ What are the strategies and activities you plan to use			
Learning Experiences/ Best Practice			
<ul style="list-style-type: none">• Quiz students on the periodic table, focusing on group and series names by general recognition and by locating elements within a group and/or period.• Have students create an enlarged two-dimensional model of the periodic table, color coded with the following periodic trends: atomic numbers, masses (rounded), symbols, alkali metals, alkaline earth metals, transition metals, lanthanide series, actinide series, other metals, nonmetals, noble gases, metalloids, and halogens.• Use an enlarged periodic table and clay spheres or construction paper circles to show the increase in size of atoms (atomic radius). Mount these going down groups 1, 2, and 17. Show the decreasing size by mounting these across periods 2 and 3.• Invite a chemist to discuss the relevance of the periodic table to his/her work.• Have stations for each element with examples when applicable, and have students use the computer to find application for each. Have students find three compounds in which the elements are found.• Have students create a graphic organizer, using a blank periodic table on which they draw arrows to label how each periodic trend changes. <p>Periodic Table Activities PT WKS Periodic Table Basics 1 (pdf) Periodic Table Basics 2(pdf) Worksheet: Periodic Table Trends Worksheet: Periodic Table Trends Key Periodic Trends</p>			

[Graphing Periodic Trends](#)

POGIL Activities

[Periodicity of Elements](#)

Labs

[Creepy Metals](#) - To determine the tensile strength and creep in three common metals.

[A Copper Cycle](#) – Using copper nitrate, learn about the many properties of the mineral copper.

[Can the Mettle of Metal be Improved?](#) - To determine the effects of annealing, quenching, and tempering on metals, using bobbi pins, hair clip, single strand steel wire.

Technology Integrations

- Have students complete [The Periodic Table Challenge](#) to test whether they know the elements by position in the periodic table. Here they see a blank table and must type in the element symbols in the correct places. This site gives hints to help students remember/guess each element.
- [Periodic Trends Virtual Lab](#)
- [How is an atom's structure related to its position on the periodic table?](#)
- **Virtual Periodic Tables**
 - [Dynamic Periodic Table](#)
 - [Periodic Table – Royal Society of Chemistry](#)
 - [Elements and Periodic Table](#)
 - [WebElements Periodic Table of the Elements](#)

Resources

VDOE Periodic Table

[Mr. Christopherson's Website](#)

VDOE Lesson Plans

[Atomic Structure: Periodic Table](#) (PDF) / ([Word](#)

Power Points

[Periodic Tables](#)

[Element Classes](#)

[Periodic Trends](#)

[Periodic Trends](#)

Videos

[Periodic Table](#)

[Periods & Groups](#)

[Alkali Metals](#)

[Alkine Earth Metals](#)

[Halogens](#)

[Noble Gases](#)

Cross Curricular Connection

English: Journalists often write about "scientific proof" and some scientists talk about it, but in fact, the concept of proof — real, absolute proof — is not particularly scientific. Science is based on the principle that any idea, no matter how widely accepted today, could be overturned tomorrow if the evidence warranted it. Science accepts or rejects ideas based on the evidence; it does not prove or disprove them. To learn more about this, visit our page describing how science aims to build knowledge.

Math: Calculating mean, median & mode.

Real World: Use everyday ideas to introduce the terms and promote discussion:

– Accuracy and precision are required to succeed at darts and archery.

– A cookery book must contain recipes that are repeatable and reproducible, otherwise no one would want to buy it.