

CHEMISTRY

HS-PS1-1 Matter and its Interactions

HS-PS1-1: Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

Clarification Statement: Examples of properties that could be predicted from patterns could include reactivity of metals, types of bonds formed, numbers of bonds formed, and reactions with oxygen.

Assessment Boundary: Assessment is limited to main group elements. Assessment does not include quantitative understanding of ionization energy beyond relative trends.

Evidence Statements: [HS-PS1-1](#)

Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p>Developing and Using Models</p> <p>Modeling in 9–12 builds on K–8 and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.</p> <p>Use a model to predict the relationships between systems or between components of a system.</p>	<p>PS1.A: Structure and Properties of Matter</p> <p>Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons.</p> <p>The periodic table orders elements horizontally by the number of protons in the atom’s nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states.</p>	<p>Patterns</p> <p>Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.</p>

Connections to other DCIs in this grade: HS.LS1.C

Articulation of DCIs across grade-bands: MS.PS1.A ; MS.PS1.B

NJSLS- ELA: RST.9-10.7

NJSLS- Math: N/A

5E Model

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Engage Anticipatory Set	<p>Bohr’s Model and Valence Electrons</p> <p>The students explore the atom using the NGSS Practices of Developing and Using Models.</p> <p>http://betterlesson.com/lesson/614383/bohr-s-model-and-valence-electrons</p> <p>Build An Atom</p> <p>This could be used as both an engage and an exploration depending on the task. Ask students to build any atom. Refer to the location of the atom they built. They may draw the atom they build. Write one or more patterns that you observed.</p> <p>http://phet.colorado.edu/sims/html/build-an-atom/latest/build-an-atom_en.html</p>
	<p>Mendeleev Periodic Table Lab</p> <p>http://www.nwasco.k12.or.us/cms/lib04/OR01001464/Centricity/Domain/97/Mendeleev%20Periodic%20Table%20Lab%20Assignment.pdf</p> <p>Exploring the Periodic Table</p> <p>http://betterlesson.com/lesson/629234/exploring-the-periodic-table</p> <p>Flame Test Lab</p> <p>The purpose is to observe the characteristic colors produced by certain metallic ions when vaporized in a flame and then to identify an unknown metallic ion by means of its flame test.</p> <p>http://www.barbertonschools.org/Downloads/flame_test_lab.doc</p> <p>Electron Configuration</p>

<p>Exploration Student Inquiry</p>	<p>The purpose is to observe the characteristic colors produced by certain metallic ions when vaporized in a flame and then to identify an unknown metallic ion by means of its flame test.</p> <p>http://betterlesson.com/lesson/631736/electron-configuration</p> <p><u>Electron Configuration- Part 1</u></p> <p>Students will be able to explain how electrons are located in energy levels and how to determine the number of valence electrons for atoms through completing an inquiry-style paper.</p> <p>http://betterlesson.com/lesson/619481/electron-configuration-part-i</p> <p><u>Electron Configuration- Part 2</u></p> <p>Students will be able to write electron configurations for elements including orbital box diagrams and shorthand notation by taking notes, watching videos, and doing an activity.</p> <p>http://betterlesson.com/lesson/619482/electron-configuration-part-ii</p>
<p>Explanation Concepts and Practices</p>	<p><u>In these lessons</u></p> <p>Teachers Should: Introduce formal labels, definitions, and explanations for concepts, practices, skills or abilities. Students Should: Verbalize conceptual understandings and demonstrate scientific and engineering practices.</p> <p><u>Topics to Be Discussed in Teacher Directed Lessons (Disciplinary Core Ideas):</u></p> <p>PS1.A: Structure and Properties of Matter</p> <p>Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons.</p> <p>The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns.</p> <p>The repeating patterns of this table reflect patterns of outer electron states.</p>
<p>Elaboration Extension Activity</p>	<p><u>Periodic Table Scavenger Hunt</u></p> <p>Students are using the periodic table to determine the number of particles in atoms, as well as the type of element represented.</p> <p>http://betterlesson.com/lesson/629268/periodic-table-scavenger-hunt</p> <p><u>Virtual Investigation</u></p> <p>http://www.mhhe.com/biosci/genbio/virtual_labs/periodic_table/main.html</p> <p><u>Graphing Periodic Trends</u></p> <p>Using the data from this interactive website, students will use Google Sheets or Excel to create graphs showing the periodic trends of Atomic Radii, Ionization Energy, Electronegativity and Electron Affinity vs atomic number using data from the following website. Students can construct explanations for the graphs showing the periodic trends.</p> <p>http://www.ptable.com/#Property/State</p>
<p>Evaluation Assessment Tasks</p>	<p><u>Assessment Task: Mendeleev Lab- Reflection Questions</u></p> <p>Reflection Questions</p>