



Chemistry - Unit 3 - Structure of the Atom and Nomenclature

Unit Focus

In Unit 3, students explore the Periodic Table and its versatility as the organizing framework for understanding the fundamentals of chemical behavior. Students explore groups on the Periodic Table as well as distinguishing characteristics and chemical properties. Students then take a deeper dive into their understanding of subatomic particles, the relationship between the particles and their relevance to atomic mass and isotopes. The last unit focuses on a study of chemical nomenclature, the highly structured process of writing names and formulas of ionic compounds, molecular compounds and organic compounds. The unit concludes with a student designed project where chemical nomenclature, compound classification, chemical formulas, their respective ratios and compound functionality are applied to everyday household items.

Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer	
<p>Next Generation Science <i>High School Physical Sciences: 9 - 12</i></p> <ul style="list-style-type: none"> 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. <i>HS-PS1-1</i> Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials. <i>HS-PS2-6</i> <p>Next Generation Science Standards (DCI) <i>Science: 10</i></p> <ul style="list-style-type: none"> The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms. <i>PS1.9.A2</i> <p><i>Science: 11</i></p> <ul style="list-style-type: none"> Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons. <i>PS1.9.A1</i> 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 	<p><i>Students will be able to independently use their learning to...</i> T1 Analyze qualitative and quantitative data to interpret patterns, draw conclusions, and/or make predictions. T2 Communicate effectively based on purpose, task, and audience to promote collective understanding and/or recommend actions.</p>	
	Meaning	
	Understanding(s)	Essential Question(s)
	<p><i>Students will understand that...</i> U1 The organization of elements in the periodic table based on atomic structure facilitates predictions about their characteristics. U2 Matter of any type can be subdivided into particles that are too small to see. U3 Atoms are comprised of subatomic particles held together by fundamental forces and their quantity and arrangement determines the atom's properties, identity, and behavior.</p>	<p><i>Students will keep considering...</i> Q1 How can the periodic table be used to understand or classify matter? Q2 How can we use models to represent structure of matter? Q3 How do particles combine to form the variety of matter one observes? Q4 How can one explain the structure, properties, and interactions of matter?</p>
	Acquisition of Knowledge and Skill	
	Knowledge	Skill(s)
	<p><i>Students will know...</i> K1 That correct formulas and names of ionic compounds, molecular compounds, and organic compounds can be determined by the structure of nomenclature.</p>	<p><i>Students will be skilled at...</i> S1 Apply understanding of atomic structure to nomenclature.</p>

Stage 1: Desired Results - Key Understandings

<p>of this table reflect patterns of outer electron states. <i>PSI.9.A3</i></p> <p>Madison Public Schools Profile of a Graduate</p> <p>Idea Generation: Studying a problem, need or model (mentor text, political piece, documents, art work, etc.) to consider limitations and imagine new solutions/transformations. (POG.2.1)</p> <p>Product Creation: Effectively use a medium to communicate important information. (POG.3.2)</p>	<p>K2 Ionic compounds are made of cations and anions.</p> <p>K3 Outer level electrons are transferred from metals to nonmetals, in the formation of ionic compounds.</p> <p>K4 Valence electrons are shared between atoms of nonmetals and/or metalloids, in molecular compounds.</p> <p>K5 Atoms of transition metals tend to form more than one charge, and therefor the Stock system is used in their name.</p> <p>K6 Organic compounds are made of carbon and hydrogen.</p> <p>K7 Vocabulary: atom, molecule, ion, formula unit, salt, ionic compound, molecular compound, organic compound, polyatomic ion, valence electron, metal, nonmetal, transition metal, metalloid, isotope, atomic mass, noble gases, halides, alkalis, alkalines</p>	<p>S2 Using the Periodic Table, classify a compound as molecular, and provide its correct name.</p> <p>S3 Apply rules of nomenclature to write chemical names and formulas for ions, and ionic compounds.</p> <p>S4 Analyze a common chemical compound and classify as ionic, molecular, or organic.</p>
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