

Subject:Chemistry Grade Level: 10 Unit Title: Electromagnetic Spectrum and Quantum Theory New 2009 objectives in red	Time frame Needed for Completion: 5 Days Grading Period: 1st 9wks
<p>Big Idea/Theme: Analyze the Bohr Model, spectrum, emission, and absorption of E/M energy. Also, quantum numbers, electron configuration, and quantum theory.</p> <p>Understandings: Students will be able to</p> <ul style="list-style-type: none"> Analyze diagrams related to the Bohr model of the hydrogen atom and indicate that: <ul style="list-style-type: none"> an electron circles the nucleus only in fixed energy ranges called orbits (energy levels) an electron can move from one orbit to another by either gaining or losing energy the lowest energy level is that closest to the nucleus Understand that energy exist in discrete units called quanta (photons) Describe an “excited” atom above its ground state by the addition of energy, resulting in the electron moving to a higher energy level Know that when the electron returns to its ground state, energy is released as electromagnetic radiation Recognize the historical contribution of the Bohr model to our modern atomic theory and realize the limitations of the model Describe the wave/particle duality of electrons Articulate that this electromagnetic radiation is given off as a photon(s). This photon represents the physical difference between ground state and excited state. Use the “Bohr Model for Hydrogen Atom” and “Electromagnetic Spectrum” diagrams from the Reference Tables to relate color, frequency, and wavelength of the light emitted to the energy of the photon. Understand the inverse relationship between wavelength and frequency, and the direct relationship between energy and frequency. Write electron configurations, including noble gas abbreviations (no exceptions to the general rules). Included here are extended arrangements showing electrons in orbitals. Identify s, p, d, and f blocks on Periodic Table. Identify an element based on its electron configuration. (Students should be able to identify elements which follow the general rules, not necessarily those which are exceptions.) Determine the number of valence electrons from electron configurations. Predict the number of electrons lost or gained and the oxidation number based on the electron configuration of an atom. 	
<p>Essential Questions:</p> <ol style="list-style-type: none"> Why do metal ions produce different colors of light when exposed to a flame? How do you describe emission and absorption in the Bohr model? How are electron configurations and orbital notations written for different elements? How are electron configurations and orbital notations written for different elements? How can the periodic table be used to predict electron 	<p>Curriculum Goals/Objectives (to be assessed at the end of the unit/quarter)</p> <p>Chm.1.1.2 Analyze an atom in terms of the location of electrons</p> <p>Analyze diagrams related to the Bohr model of the hydrogen atom in terms of allowed, discrete energy levels in the emission spectrum.</p> <ul style="list-style-type: none"> Describe the electron cloud of the atom in terms of a probability model. Relate the electron configurations of atoms to the Bohr and electron cloud models

<p>configurations?</p> <p>6. How are quantum numbers assigned to electrons in a given element?</p>	<p>Chm.1.1.3 Explain the emission of E/M radiation in spectral form in terms of the Bohr Model</p> <ul style="list-style-type: none"> Analyze diagrams related to the Bohr model of the hydrogen atom in terms of allowed, discrete energy levels in the emission spectrum. Describe the electron cloud of the atom in terms of a probability model. Relate the electron configurations of atoms to the Bohr and electron cloud models <p>Chm.1.3.1 Classify the components of a periodic table(Period, group, metal, metalloid, nonmetal, transition).</p> <p><i>Groups</i></p> <p>Identify groups as vertical columns on the periodic table.</p> <ul style="list-style-type: none"> Know that main group elements in the same group have similar properties, the same number of valence electrons, and the same oxidation number. Summarize that reactivity increases as you go down within a group for metals and decreases for nonmetals. <p><i>Periods</i></p> <ul style="list-style-type: none"> Identify periods as horizontal rows on the periodic table. <p><i>Metals/Nonmetals/Metalloids</i></p> <ul style="list-style-type: none"> Identify regions of the periodic table where metals, nonmetals, and metalloids are located. <p>Chm.1.3.3 Infer the atomic size, reactivity, electronegativity, and ionization energy of an element from its position on the Periodic Table.</p>
<ul style="list-style-type: none"> Essential Skills/Vocabulary: <p>Analyze the Bohr model in terms of electron energies in the hydrogen atom.</p> <ul style="list-style-type: none"> The spectrum of electromagnetic energy. Emission and absorption of electromagnetic energy as electrons change energy levels. Analyze periodic trends in chemical properties and use the periodic table to predict properties of elements. Know electron configuration and energy levels. Apply quantum numbers to electron configurations. 	<p>Assessment Tasks: http://www.ncpublicschools.org/docs/curriculum/science/units/high/chemistry/unit3.doc</p> <ol style="list-style-type: none"> major test, quizzes, homework Identification of Metals: Flame Tests Bohr Model and Electromagnetic Spectrum Practice Hog Hilton Electron Configuration worksheet

<p>Materials Required: (http://www.ncpublicschools.org/docs/curriculum/science/units/high/chemistry/unit3.doc)</p>	
Identification of Metals: Flame Tests	<p>Q-tips (non-plastic) swabs soaked in each of the following solutions:</p> <ul style="list-style-type: none"> ○ Sodium nitrate, NaNO_3 ○ Potassium nitrate, KNO_3 ○ Calcium nitrate, $\text{Ca}(\text{NO}_3)_2$ ○ Strontium nitrate, $\text{Sr}(\text{NO}_3)_2$ ○ Lithium nitrate, LiNO_3 ○ Copper (II) nitrate, $\text{Cu}(\text{NO}_3)_2$ ○ Barium nitrate, $\text{Ba}(\text{NO}_3)_2$ <p>Meker/Bunsen burner Cobalt-blue glass Safety goggles Crucible tongs Beaker of water</p>

	21 st Century Skills	Activity
	Communication Skills	
	Conveying thought or opinions effectively	<ul style="list-style-type: none"> ▪ Identification of Metals ▪ Hog Hilton
	When presenting information, distinguishing between relevant and irrelevant information	
	Explaining a concept to others	<ul style="list-style-type: none"> ▪ Identification of Metals ▪ Hog Hilton ▪ Looking for Connections ▪ Bohr Model and

		Electromagnetic Spectrum Practice
	Interviewing others or being interviewed	
	Computer Knowledge	
	Using word-processing and database programs	
	Developing visual aides for presentations	
	Using a computer for communication	
	Learning new software programs	
	Employability Skills	
	Assuming responsibility for own learning	<ul style="list-style-type: none"> ▪ Identification of Metals ▪ Hog Hilton ▪ Looking for Connections
	Persisting until job is completed	All activities
	Working independently	WiZARD Test Items
	Developing career interest/goals	
	Responding to criticism or questions	
	Information-retrieval Skills	
	Searching for information via the computer	
	Searching for print information	
	Searching for information using community members	
	Language Skills - Reading	
	Following written directions	<p>Most of the activities can be presented as opportunities for students to follow written directions. The teacher will have to work with most students to develop this skill over time. The following activities are well suited to developing skills in following directions:</p> <ul style="list-style-type: none"> ▪ Identification of Metals ▪ Hog Hilton ▪ Looking for Connections ▪ Bohr Model and Electromagnetic Spectrum

		Practice
	Identifying cause and effect relationships	
	Summarizing main points after reading	
	Locating and choosing appropriate reference materials	
	Reading for personal learning	
	Language Skill - Writing	
	Using language accurately	
	Organizing and relating ideas when writing	<ul style="list-style-type: none"> ▪ Identification of Metals
	Proofing and Editing	All activities
	Synthesizing information from several sources	
	Documenting sources	
	Developing an outline	
	Writing to persuade or justify a position	
	Creating memos, letters, other forms of correspondence	
	Teamwork	
	Taking initiative	
	Working on a team	<ul style="list-style-type: none"> ▪ Identification of Metals ▪ Hog Hilton
	Thinking/Problem-Solving Skills	
	Identifying key problems or questions	
	Evaluating results	<ul style="list-style-type: none"> ▪ Identification of Metals ▪ Hog Hilton ▪ Looking for Connections ▪ Bohr Model and Electromagnetic Spectrum Practice
	Developing strategies to address problems	
	Developing an action plan or timeline	

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