

# FRANKLIN-SIMPSON HIGH SCHOOL

Course Name: Pre – AP Chemistry Unit Name: Atomic Structure

Days: 10

## Quality Core Objectives:

Unit 9 Atomic Structure	
I.A.1. Scientific Inquiry	c. Collect, organize, and analyze data accurately and use techniques and equipment appropriately
	d. Interpret results and draw conclusions, revising hypotheses as necessary and/or formulating additional questions or explanations
	e. Write and speak effectively to present and explain scientific results, using appropriate terminology and graphics
	f. Safely use laboratory equipment and techniques when conducting scientific investigations
I.A.3. Science in Practice	a. Explain and apply criteria that scientists use to evaluate the validity of scientific claims and theories
	c. Explain the criteria that explanations must meet to be considered scientific (e.g., be consistent with experimental/observational evidence about nature, be open to critique and modification, use ethical reporting methods and procedures)
	d. Explain why all scientific knowledge is subject to change as new evidence becomes available to the scientific community
	e. Use a variety of appropriate sources (e.g., Internet, scientific journals) to retrieve relevant information; cite references properly
	g. Compare the scientific definitions of fact, law, and theory, and give examples of each in chemistry
IV.B.1. Atomic Theory (Dalton), Atomic Structure, and Quantum Theory	a. Describe the importance of models for the study of atomic structure
	b. Describe the crucial contributions of scientists and the critical experiments that led to the development of the modern atomic model
	c. Describe characteristics of a wave, such as wavelength, frequency, energy, and speed
	d. Describe the role of probability in orbital theory
	e. Describe atomic orbitals (s, p, d, f) and their basic shapes
	f. Apply Hund's rule and the Aufbau process to specify the electron configurations of the elements

**Purpose of the Unit:**

The purpose of the unit is to familiarize students with the people and techniques used in discovering the structure and components of the atom. Also, understand the wave and particle nature of electrons as well as their possible configurations within the atom.

**Prerequisites:**

- \* Understanding of law vs. theory vs. fact.
- \* Understanding of the basic subatomic particles in an atom.

**Daily Lesson Guide**

<b>Day</b>	<b>Lesson Content and Objectives</b>	<b>Focus Questions</b>	<b>Critical Thinking (High Yield / Literacy /LTF/etc.)</b>	<b>Engagement</b>	<b>Assessment and/or Accommodations</b>
1	* Intro video from United Streaming: Discovering the Elements I.A.3.c, d, g IV.B.1.a, b, c, d, e, f	* What do I already know about the atom?	* Summarizing and note taking * Advanced organizer * 3-2-1	* ACT Bell ringer * Take pre-test * Watch video/ take notes * Take video quiz	* Evaluate/ correct Pre-test for unit * Evaluate Video Quiz Enrichment: Less guidance in note taking, more independence in practice, more challenging examples in formative
2	* Important people and discoveries in the development of atomic theory I.A.3.d, g IV.B.1.a, b, d	* What makes an explanation scientific and how do they change? * How do we know what an atom looks like?	* Summarizing and note taking * Non-linguistic representation * Analysis/ synthesis * Identifying similarities and differences * Advanced organizer	* ACT Bell ringer * Modeled notes * Create a timeline with people, important experiments, and changing model of the atom. (formative)	* Evaluate Timeline Enrichment: Less guidance in note taking, more independence in practice, more challenging examples in formative

3	<ul style="list-style-type: none"> <li>* Properties (mass, location, charge) of the subatomic particles.</li> <li>* Review finding the number of subatomic particles in an atom.</li> </ul> IV.B.1.a, e	<ul style="list-style-type: none"> <li>* What are the properties of subatomic particles?</li> <li>How do you calculate the number of subatomic particles in a neutral atom?</li> </ul>	<ul style="list-style-type: none"> <li>* Summarizing and note taking</li> <li>* Non-linguistic representation</li> <li>* I Do - We Do – You Do</li> <li>* Identifying similarities and differences between particles</li> </ul>	<ul style="list-style-type: none"> <li>* ACT Bell ringer</li> <li>* Model notes from lecture</li> <li>* p, n, e worksheet (formative)</li> </ul>	<ul style="list-style-type: none"> <li>* Evaluate calculating proton, neutron, electron worksheet and student atom diagram</li> </ul> Enrichment: Less guidance in note taking, more independence in practice, more challenging examples in formative
4	<ul style="list-style-type: none"> <li>* Laboratory: Snackium- Determining Percent Abundance and Average Atomic Mass of Isotopes</li> </ul> I.A.1.c, d, e, f IV.B.2.d	<ul style="list-style-type: none"> <li>* How do you determine % abundance?</li> <li>* How do you experimentally determine average atomic mass of isotopes?</li> </ul>	<ul style="list-style-type: none"> <li>* Synthesis</li> <li>* Application/ Analysis</li> <li>* Identifying similarities and differences</li> <li>* Learning with others</li> <li>* Authenticity</li> <li>* Novelty and Variety</li> <li>* Generating and testing hypotheses</li> </ul>	<ul style="list-style-type: none"> <li>* ACT bell ringer</li> <li>* Conduct lab according to procedures provided (summative)</li> </ul>	<ul style="list-style-type: none"> <li>* Evaluate lab report</li> </ul> Enrichment: Student development of lab procedures with less guidance
5	<ul style="list-style-type: none"> <li>* Dual (wave/ particle) nature of light</li> <li>* <math>c = \text{wavelength} \times \text{frequency}</math></li> </ul> I.A.3.a, d, g IV.B.1.b, c	<ul style="list-style-type: none"> <li>* How can the observed behavior of light be explained?</li> </ul>	<ul style="list-style-type: none"> <li>* Summarizing and note taking</li> <li>* Identifying similarities and differences</li> <li>* I Do - We Do – You Do</li> <li>* Application</li> </ul>	<ul style="list-style-type: none"> <li>* ACT Bell ringer</li> <li>* Modeled notes</li> <li>* Work sample problems together</li> <li>* Sample problems for homework (formative)</li> </ul>	<ul style="list-style-type: none"> <li>* Evaluation of practice problems</li> </ul> Enrichment: Less guidance in note taking, more independence in practice, more challenging examples in formative

6	<ul style="list-style-type: none"> <li>* Photoelectric effect</li> <li>* Absorbance and emission spectrums</li> <li>* Contributions of Bohr, Schrodinger, and deBroglie</li> <li>* <math>E = h \times \text{frequency}</math></li> </ul> I.A.3.a, d, g IV.B.1.b, c	<ul style="list-style-type: none"> <li>* What is the photoelectric effect and how can it be used to explain the behavior of light?</li> </ul>	<ul style="list-style-type: none"> <li>* Summarizing and note taking</li> <li>* Identifying similarities and differences</li> <li>* Applications</li> <li>* I Do - We Do – You Do for practice problems</li> </ul>	<ul style="list-style-type: none"> <li>* ACT Bell ringer</li> <li>* Modeled notes</li> <li>* Work sample problems (formative)</li> <li>* Article on how fireworks work</li> </ul>	<ul style="list-style-type: none"> <li>* Evaluation of practice problems</li> <li>* Evaluate students' comprehension of article</li> </ul> Enrichment: Less guidance in note taking, more independence in practice, more challenging examples in formative
7	Laboratory: Determining the Identity of Unknown Ions with Flame Tests I.A.1.c, d, e, f IV.B.1.c	<ul style="list-style-type: none"> <li>* How can flame tests be used to identify metal ions?</li> </ul>	<ul style="list-style-type: none"> <li>* Synthesis</li> <li>* Application/ Analysis</li> <li>* Identifying similarities and differences</li> <li>* Learning with others</li> <li>* Authenticity</li> <li>* Novelty and Variety</li> <li>* Generating and testing hypotheses</li> </ul>	<ul style="list-style-type: none"> <li>* ACT bell ringer</li> <li>* Conduct lab according to procedures provided (summative)</li> </ul>	<ul style="list-style-type: none"> <li>* Evaluation of lab report</li> </ul> Enrichment: Student development of lab procedures with less guidance
8	<ul style="list-style-type: none"> <li>* Writing electron configurations</li> <li>* Valence electrons and drawing Lewis structures</li> </ul> IV.B.1.d, e, f	<ul style="list-style-type: none"> <li>* How are electrons arranged in an atom?</li> <li>* What are valence electrons and how do you represent them?</li> </ul>	<ul style="list-style-type: none"> <li>* Summarizing and note taking</li> <li>* Non-linguistic representation</li> <li>* Application</li> <li>* I Do - We Do – You Do</li> </ul>	<ul style="list-style-type: none"> <li>* ACT Bell ringer</li> <li>* Modeled notes</li> <li>* Work sample problems together(formative)</li> </ul>	<ul style="list-style-type: none"> <li>* Evaluation of sample problems</li> </ul> Enrichment: Less guidance in note taking, more independence in practice, more challenging examples in formative
9	<ul style="list-style-type: none"> <li>* Review</li> </ul> I.A.1.c, d, e, f I.A.3.a, c, d, e, g IV.B.1.a, b, c, d, e, f IV.B.2c, d	<ul style="list-style-type: none"> <li>* How can I be prepared for the Unit Exam?</li> </ul>	<ul style="list-style-type: none"> <li>* Use clickers to test students' knowledge and use immediate feedback to readdress last minute misconceptions.</li> </ul>	<ul style="list-style-type: none"> <li>* ACT bell ringer</li> <li>* Use clickers to review with exam like questions (summative)</li> </ul>	<ul style="list-style-type: none"> <li>* Students participate in review.</li> </ul> Enrichment: Less time to solve problems and limited use of aides

10	<ul style="list-style-type: none"> <li>* Exam</li> <li>I.A.1.c, d, e, f</li> <li>I.A.3.a, c, d, e, g</li> <li>IV.B.1.a, b, c, d, e, f</li> <li>IV.B.2c, d</li> </ul>	<ul style="list-style-type: none"> <li>* Can I demonstrate my knowledge on the exam?</li> </ul>	<ul style="list-style-type: none"> <li>* Evaluation</li> <li>* Analysis</li> <li>* Application</li> <li>* Synthesis</li> </ul>	<ul style="list-style-type: none"> <li>* ACT bell ringer</li> <li>* Students take exam (summative)</li> </ul>	<ul style="list-style-type: none"> <li>* Evaluate exam.</li> <li>Enrichment: No use of supports with exemption of periodic table, periodic table only has element symbols, not names</li> </ul>
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