Krug Chemistry – Deep Run Daily Planning Guide

Date of Lesson: Q1 Day 15 – History of Atomic Theory

Topic /Big Questions: (Question Stems & Question Creation Chart)

- **How has the model of the atom changed over time?**
- **What merits and limitations did each model have?**
- **How can the properties of an atom explain the nature of matter?**

State SOL	Unpacking the Standards (Video explanation shown at 3:18)
CH1	CH.1 The student will demonstrate an understanding of scientific and engineering practices by f) obtaining, evaluating, and communicating information
CH 2	CH2 The student will investigate and understand that elements have properties based on their atomic structure. The periodic table is an organizational tool for elements based on these properties. e) historical and quantum models. Atoms are the basic building blocks of all matter. The properties of an atom are based on the number and arrangement of its parts.

Visible Learning (For the three items with asterisks*, think from a student perspective. Use simple language)

***What am I learning today?** The model of the atom has been revised over many centuries as new discoveries and technology has improved. We continue to learn new aspects of atomic theory every day.

***Why is it important?** Understanding the properties of atomic structure explains the arrangement of the elements on the periodic table and the trends in their physical and chemical properties.

***How will I know I've learned it?** I will identify the different models of the atom and understand that each consecutive model was different than the one before. I will identify the limitations for each model.

Differentiation strategies:

Whiteboard Activity – History of Atom Jigsaw Activity

PhET Simulation – Rutherford Scattering

Bohr – Discrete Orbital Worksheet

Bohr Model Worksheet

Flame Test Lab

Accommodations and/or modifications are being met for students with IEP's/504's.

Access to all materials on Schoology, frequent checks for understanding; CER activity in small groups;

Daily Plan/Sequence of Instruction:

Teacher will explain that the concept of atomic structure has been revised over the past 2000 years as new discoveries and technology allowed scientists to better understand the atom. Teacher will assign atomic theory scientists to each group. Student groups will complete the following and present their findings on their whiteboard:

Claim: What did your group's scientist think matter was made of?
Evidence: What experiment or research did he do to prove this?
Reasoning: Why did he think this proved his atomic model?
Update: How was this new model different than before? Sketch before and after images.

Teacher will demonstration PhET Simulation called "Rutherford's Scattering".
https://phet.colorado.edu/sims/html/rutherford-scattering/latest/rutherford-scattering_en.html

Students will work in groups or with partners to complete the **Bohr Discrete Orbital Worksheet**. Teacher will show YouTube video called "Line Spectra Animation (Hydrogen Gas)" - https://www.youtube.com/watch?v=JqKXCiXGz1U Teacher will set up Flame Test Demo Station. Students can rotate through station while they work on their worksheets.

Teacher will demonstrate how the periods (rows) on the periodic table represent orbitals. The squares (element boxes) on each row represent the number of electrons allowed in each orbital. Students will complete the **Bohr Model Worksheet**. Teacher will demonstrate how to fill in Fluorine, Chlorine, and Bromine. Teacher will explain how this model of the atom is limited because the 3rd energy level of the atom overlaps the 4th energy level. It does not match the layout of the periodic table. The periodic table shows 8 electrons on the third row and 18 on the 4th row. But the Bohr Model expects 18 on 3rd row and 32 on 4th row. This discrepancy can only be explained by the Quantum model.

Assessments (List all formative/summative assessments used to check for understanding during this lesson. Summative assessments may occur during a different class period.):

History of the Atom Jigsaw and Flame Test Lab (formative)

Bohr Model Worksheet and Discrete Orbital Worksheet (summative)

After assessing today's lesson are you and your students comfortable moving forward with your next objective?

Yes - students actively participated in jigsaw activity and completed Bohr Model worksheets

No, remediation required to proceed – teacher will contact parents if students are off task and do not complete work

Teacher reflection:

Set a 10 minute timer for white boards. Double check info and drawings before allowing students to present to the class. If they have the wrong information, show students how to access the History of the Atom PowerPoint. As them what technology was available in that time period? How did their scientist know what they knew about the atom?

For the Bohr Discrete Orbital Worksheet, show them how to calculate the following lines: 1, 7, 12, and 15. Then on the back, explain how the jumps work. Draw 7 to 6, 7 to 5, 7 to 4, etc. Stop at 6 to 4. Just enough that they get the concept. Then go through the next three columns showing students how the energy changes match lines 12, 7, and 1 and how this relates to IR, Vis, and UV light. The rest is for homework!!!!