Bohr Models & the Periodic Table

**Introduction**:

The most important properties of atomic and molecular structure may be illustrated using a Bohr Model. Proposed in the early 1900’s by Danish physicist Niels Bohr, the models are used to illustrate the *probable* location of electrons in atoms. Although this model is not completely correct, it does have many features that are approximately correct and is helpful in understanding the atom. Thus, the Bohr model is a simpler “planetary model” of the atom and is often seen as the symbol for atomic energy.

In the Bohr model, the neutrons and protons occupy the nucleus and the electrons orbit the nucleus like planets around the Sun.

**Pre-Lab Questions**: Answer the following questions on your lab report using complete sentences.

1. What is a Bohr Model, and why is it important?
2. How is the Bohr Model similar to the solar system?
3. Which aspect of the Bohr Model is not completely accurate, based on what we know today about electrons and atoms?

**Purpose**: Create a Bohr Model for an assigned element and work with others to arrange all of the models into a “Periodic Table”.

**Procedure: Part 1 -**

1. Your teacher will assign you a particular element. Once given your element, use the Periodic Table to fill in the information for your element on your lab report.
2. Create your Bohr model in the space provided on your lab report.
3. Draw a Lewis structure for your element depicting the number of valence electrons on your lab report.
4. In your lab report, and using complete sentences, write a brief summary of how you created a Bohr Model of your assigned element.
5. Have your teacher initial your work. Then, move to the next portion of the lab.

**Procedure: Part 2 -**

1. Exchange Bohr Models within your lab group. Arrange your group’s models into your own periodic table. Then, fill in the information on the blank table provided.
2. Get together with another lab group to exchange Bohr Models and fill in more elements on your now partially filled table.

**Analysis / Conclusion:** *Complete the remainder of your lab report in complete sentences.*

Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period\_\_\_\_\_

**Bohr Models & the Periodic Table Lab Report**

**Pre-Lab Questions:**

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Teacher check\_\_\_\_\_\_

**Bohr Model:** *Create your Bohr Model on the attached half sheet provided you. Be sure to fill in all required information.*

**Procedure**: Write the summary of how you created your Bohr Model in the space provided.

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**Data: Periodic Table Section**

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|  |  | Be careful 🡪 |  |  |  |  |  |

**Analysis Questions**: *Answer in complete sentences:*

1. Only one element has a “full” valence shell with less than 8 electrons. What element is that and how many valence electrons does it have?
2. A “full” valence shell usually means 8 electrons and is very stable. How many more electrons does your atom need to have 8 in its outer shell?
3. If your atom needs more than 4 electrons to make 8, it might be easier for it to lose enough electrons to lose the whole outer shell and drop back to the previous shell. How many would your atom have to lose to do this?
4. What criteria did you use to decide where to place your drawing of your atom? (in other words -Why did you arrange the models this way?)
5. What do the Bohr models in the same row (horizontal) have in common?
6. What do the drawings in the same column (vertical) have in common?
7. Pick *one column* and draw the Lewis structure for all 3 or 4 elements in that column. What do you notice about all the Lewis structures in this column?
8. Columns are sometimes referred to as chemical “Families”? Why?

**Conclusion**:

Write a paragraph summary, explaining how you would teach another student to build a Bohr model for element 114.

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Assigned element name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Bohr Model - Element: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Symbol \_\_\_\_\_

Atomic # \_\_\_\_\_

Mass # \_\_\_\_\_

# of protons \_\_\_\_\_

# of electrons \_\_\_\_\_

# of neutrons \_\_\_\_\_

# of valence e’s \_\_\_\_\_

Type of element: Metal, Nonmetal, Metalloid

(circle one)

**Lewis Dot**

Assigned element name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Bohr Model - Element: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Symbol \_\_\_\_\_

Atomic # \_\_\_\_\_

Mass # \_\_\_\_\_

# of protons \_\_\_\_\_

# of electrons \_\_\_\_\_

# of neutrons \_\_\_\_\_

# of valence e’s \_\_\_\_\_

Type of element: Metal, Nonmetal, Metalloid

(circle one)

**Lewis Dot**