Early Models Worksheet

1. Present the experimental evidence that led to the Rutherford model.

2. How did Rutherford infer that the nucleus was
   (a) very small (compared to the size of the atom)?
   (b) positively charged?

3. Rutherford's idea that atoms are mostly empty space is retained in all subsequent atomic theories. How can solids then be "solid"? In other words, how can your chair support you? Why doesn't your pencil go right through the atoms that make up your desk?

4. What was the main achievement of the Rutherford model? What was the main problem with this model?

5. State the experimental evidence that was used in the discovery of the neutron. Describe the nature of the neutron.

6. How would observations of a star allow astronomers to obtain the temperature of the star?

7. Liquids and solids, when heated, produce continuous spectra. What kind of spectrum is produced by a heated gas?

8. State the two important experimental observations that established the quantum theory of light.

9. Write a brief description of the photoelectric effect experiment.

10. Distinguish between the terms "quantum" and "photon."
11. State Bohr's solution to the problem with the Rutherford atomic model.

12. When creating his new atomic theory, Bohr used one important new idea (theory) and primarily one important experimental area of study. Identify each of these.

13. What is the empirical distinction between emission and absorption spectra? In general terms, how did Niels Bohr explain each of these spectra?

14. State two or more reasons why Bohr's theory was considered a success. Identify one significant problem with the Bohr theory.

15. Element 118 was reported to have been discovered in 1999. However, as of July 2001 no one, including the original researchers, has been able to replicate the experiments. Using your present knowledge, you can make predictions about this element. Predict the properties of element 118 based on the periodic law and the Bohr theory of the atom.