

## History of Chemistry with particular emphasis on Atomic Structure

The history of chemistry and atomic structure goes back quite far into time. It would take WAY too much time to cover it all especially since not all of this history is known. So, we will hit the roots of the history of chemistry and look specifically at the history of atomic structure.

But wait!! I am sure that you are thinking that even cutting it down that much is WAY too much for one person to find out about. Well, you are right. So, for gathering and summarizing all of this information you and your lab partners will research part of the history and then present that part to the whole class. Here are the particulars.

### Part 1 - Report (20 lab points)

Produce a typed report including at least 3 documented references. The report must answer all of the questions found under your particular topic. This report should be BRIEF, yet complete. No more than two pages, double-spaced. Seriously. Just summarize the information.

In addition to the points described under your particular topic, your report will be graded for:

\_\_\_\_\_ (2 points) Grammar and spelling

\_\_\_\_\_ (3 points) Appropriate references correctly cited

Total \_\_\_\_\_ (20) With the points assigned under your topic area.

### Part 2 - Presentation (30 lab points)

Your group will then present your history findings to the class. The presentation must include a demonstration and/or use some props and you must have a Power Point or other electronic media. An appropriate demonstration/prop could be a simplified version of the experiment the scientist did, or a large model of the atom that the scientists hypothesized. The electronic media must contain a summary of the info required in your report. Photos, drawings or diagrams are encouraged. In addition, your group will need to make some sort of interactive project to help your fellow students understand the particulars of your slice of history. This may take the form of a game, play, song, etc. Let your minds go wild.

The presentation will be graded on:

\_\_\_\_\_ (2) Quality of electronic media

\_\_\_\_\_ (5) Quality of props/demonstration/display

\_\_\_\_\_ (3) Quality of the actual presentation (Is the presentation smooth?)

\_\_\_\_\_ (2) All partners are involved in the presentation

\_\_\_\_\_ (5) Presentation completely answers the questions

Total \_\_\_\_\_ (17)

### C. Quiz (30 quiz points)

What would a concept area be without a quiz? Not nearly as much fun! And so your instructor will place you into a new group. This group will take a group quiz on the history of chemistry and atomic structure. Yes, this will be a GROUP quiz. The quiz will include factual information on the presentations that you observe as well as opinion questions on the significance of the individuals and their contributions. You may use any of the

Total \_\_\_\_\_ (30)

## **A. Greek philosophers**

1. Who was Democritus? When did he live and where? Describe his idea of “atomos”. Why didn’t his idea become more widely known or accepted? (2.5 points)
2. Who was Thales? When did he live and where? Describe his idea of the “4 elements” that made up all materials. Why did his idea become very widely known and accepted? (2.5 points)
3. Who was Aristotle? When did he live and where? What does Aristotle have to do with the 4 elements and the idea of atomos? What famous person likely pushed the ideas of Aristotle onto early European civilization? (3 points)
4. Describe 1 additional major contribution that the Greek philosophers made to the formation of science. That is, how did their ideas and philosophy in general contribute to the notion of what “science” is? (2 points)
5. Were the Greeks performing “science” as we know it now? What were the Greeks strengths and weaknesses in the studies that they were performing? (2 points)

## **B. Alchemists**

1. Find the names of 2 alchemists. What did they do that was related to chemistry? When and where did they live? (4 points)
2. Describe the idea of “transmutation”, the “elixir of life”, and the “philosopher’s stone”. Make sure you are using the terms in the ways that the people who lived during the time of alchemy used them. (6 points)
3. Describe 2 major contributions that the alchemists made to the formation of science/chemistry. That is – how did they help to change how people looked at or performed science/experiments? (2 points)
4. Were the alchemists performing “science” as we know it now? What were the alchemists’ strengths and weaknesses in the studies that they were performing? (3 points)

## **C. John Dalton**

1. Find the birth year, and birthplace of this person. (2 points)
2. Describe the major contribution of Dalton to the theory of atomic structure. Be sure to include when and where this contribution was made. (2 points)
3. What are the main points of Dalton’s model of the atom? (4 points)
4. What evidence did Dalton use to justify his atomic theory? Be specific. (4 points)
5. Describe 1 interesting/unusual piece of personal information on this person. (2 points)

### **D. J. J. Thomson and the Plum Pudding model**

1. Find the birth year and birthplace of this J.J. Thomson. (2 points)
2. Describe Thomson's major contribution to the theory of atomic structure. Be sure to include when and where this contribution was made. (2 points)
3. Describe the plum pudding model. Include what subatomic particles were present and the location of those particles in the model. (4 points)
4. What evidence did Thomson use to justify his theory of the atom? (4 points)
5. Describe 1 interesting/unusual piece of personal information on Thomson. (2 points)

### **E. Henri Becquerel, Marie and Pierre Curie, and the alpha, beta, and gamma radiations**

1. Find the birth year and birthplace of these people. (2 points)
2. Describe the major contributions of these people to the theory of atomic structure. Be sure to include when and where these contributions were made. (2 points)
3. Describe the structure, speed, mass, penetrating power, and ionizing ability of alpha, beta, and gamma particles. (2 points)
4. What evidence did these people use to justify their discoveries? (2 points)
5. Why were their discoveries important to figuring out what atoms were like? (2 points)
6. What did their discoveries show about atoms? (2 points)
7. Describe 1 interesting/unusual piece of personal information on each of these people. (2 points)

### **F. Hantaro Nagaoka, Ernest Rutherford and the gold foil experiment**

1. Find the birth year and birthplace of these people. (2 points)
2. Describe the major contributions of these people to the theory of atomic structure. Be sure to include when and where these contributions were made. (2 points)
3. Describe the gold foil experiment. Include what subatomic particles were present and the location of those particles in the model. (4 points)
4. What evidence did Rutherford use to justify his theory of the atom? (4 points)
5. Describe 1 interesting/unusual piece of personal information on each of these people. (2 points)

## G. Niels Bohr

1. Find the birthday, year, and birthplace of this Niels Bohr. (2 points)
2. Describe the major contribution of Bohr to the theory of atomic structure. Be sure to include when and where this contribution was made. (2 points)
3. Describe Bohr's model of the atom. (4 points)
4. What evidence did Bohr use to justify his theory of the atom? (4 points)
5. Describe 1 interesting/unusual piece of personal information on Niels Bohr. (2 points)

## H. James Chadwick, Robert Andrews Millikan and the major subatomic particles

1. Find the birth year and birthplace of these people. (2 points)
2. Describe the major contributions of these people to the theory of atomic structure. Be sure to include when and where these contributions were made. (2 points)
3. Describe the charge, mass, placement in the atom and relative size of the proton, neutron and electron. (2 points)
4. What evidence did these people use to justify their discoveries? (2 points)
5. Why were their discoveries important to figuring out what atoms were like? (2 points)
6. What did their discoveries show about atoms? (2 points)
7. Describe 1 interesting/unusual piece of personal information on each of these people. (2 points)

## Additional information each group will be responsible for knowing:

- For **protons, neutrons, and electrons**:
  - What are they?
  - Where can they be found?
  - How do you determine how many of them?
  - What does the atomic number represent?
  - What does the atomic mass represent?
- What are isotopes?
- What are valence electrons and why are they important?
- How do you determine how many valence electrons an atom has?
- What is an ion?
- What is a cation?
- What is an anion?