

# The Black Box Lab

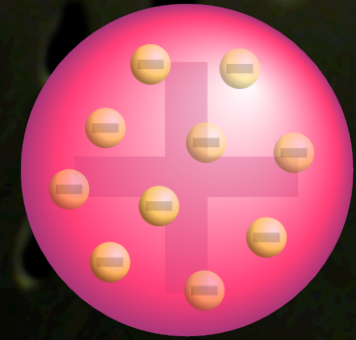
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# Atomic Models

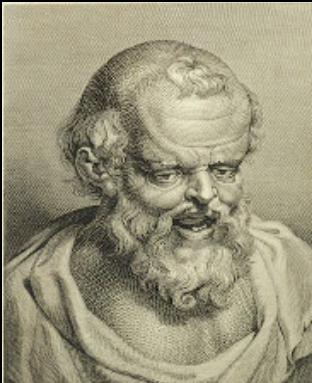
1897



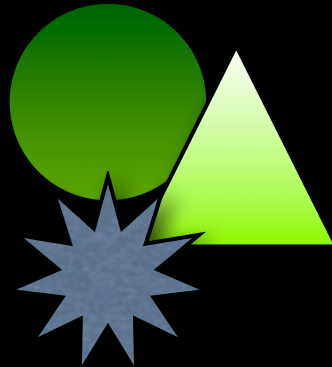
JJ Thomson



400BC



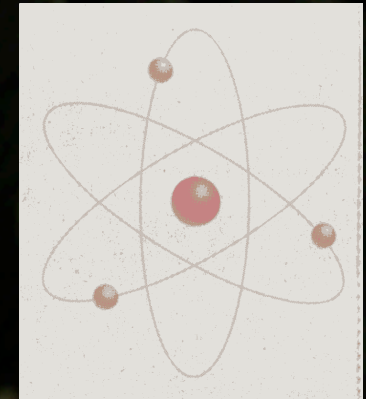
Democritus



1907



Rutherford



1809



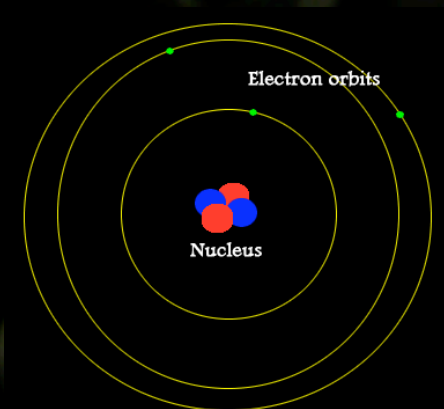
Dalton



1911



Bohr



How did scientists come up with models of the atom without ever having seen one?

The answer: using **indirect evidence**

Indirect evidence is *evidence that is gathered indirectly without having seen the object being investigated.*

*Gathering indirect evidence allows a person to make inferences.*



An inference is a logical judgment based on circumstantial evidence.

What inferences can you make from these two photos?



You didn't see the mail delivered or the trash men come but you can infer that both have taken place. You just used indirect evidence to come up with your inferences.

In this lab you will use indirect evidence to make inferences about items in a black box.

You will then use these inferences to construct a model of the items in the box.

*Title:* The Black Box Lab

*Purpose:* To use indirect evidence to investigate properties of items in a black box. This exercise will help the student understand how scientists developed atomic models without having ever seen an atom.

*Materials:* 10 black boxes with one or more items enclosed in them.

## *Procedure:*

- 1) Go to your lab station and run tests on the black box. Record on data table. Test include shaking, tilting, rotating...
- 2) From these make inferences on the object(s) in the box.
- 3) Include the following in 3 inferences in your model:
  - a) shapes - sphere, cylinder, square, irregular...
  - b) number of items - either 1, 2, 3, 4, or between 5 and 10, or more than 10.
  - c) size - less than a mm or between a mm and a cm or between 1-5 cm or larger than 5 cm
- 4) Develop a model of what is in the box.
- 5) Rotate through all 10 stations, recording your data.

*Data:*

| Lab # | Tests | Inferences | Model |
|-------|-------|------------|-------|
| 1     |       |            |       |
| 2     |       |            |       |
| 3     |       |            |       |
| 4     |       |            |       |
| 5     |       |            |       |
| 6     |       |            |       |
| 7     |       |            |       |
| 8     |       |            |       |
| 9     |       |            |       |
| 10    |       |            |       |



## *Conclusion:*

Answer this question with a minimum of one paragraph:

*How is this experiment similar to what scientists in the past did to develop their model of the atom?*

## Lab Requirements:

1. Final Draft in ink or typed.
2. Original Draft stapled on back of Final Draft.
3. Due tomorrow.