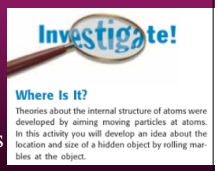
The Atom

Lect 1 Chap 12
Sect 1

Obsertainers:
How do you determine how something is designed, if you can't see in it?

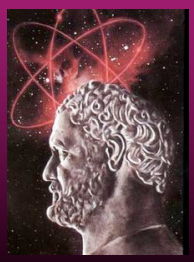
- Lab: Obsertainers: take one
- Draw 3 circles and label:
- Hypothesis, retest, actual
- Complete: you have 3 minutes



Atomic Structure & Its History

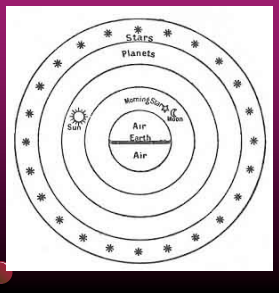
- Much of what we know about **atomic structure** today is the result of **indirect observation** of atoms and the particles of which they are composed.

Atomic Structure & Its History



- The Greek philosopher **Democritus** was the first to propose that matter was composed of atoms,
- and that was over **2,300 years ago**.

Atomic Structure & Its History

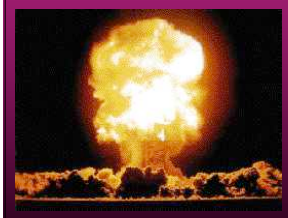


- He believed that atoms were those parts of nature that could not be cut down any further.

Atomic Structure & Its History

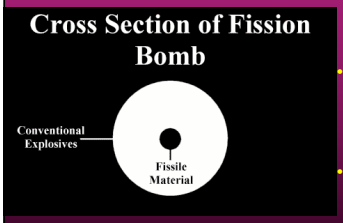
- He was correct in one part: **the forces that hold together the nucleus of an atom**
- are the most powerful in the entire universe making atoms indivisible in all but extremely powerful reactions.

Atomic Structure & Its History



- Those reactions are called **fission**,
- and it is when the nucleus of an atom is **split apart**.
- When this occurs tremendous energy is released.

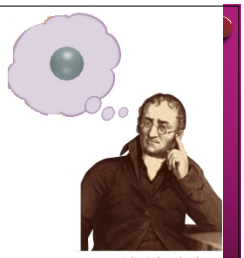
Atomic Structure & Its History



- **Nuclear weapons** are an example of this incredible force.
- Direct observation of atomic structure is all but impossible.
- Scientists have relied on models to represent the structure of atoms.

The Dalton Model: 1803

- English chemist John Dalton developed the first model in 1803.
- He saw them as **indestructible, indivisible and spherical.**
-



John Dalton developed his atomic theory from observations gathered from many experiments.

- All substances are made of atoms. Atoms are small particles that cannot be created, divided, or destroyed.
- Atoms of the same element are exactly alike, and atoms of different elements are different.
- Atoms join with other atoms to make new substances.

The Dalton Model: 1803

- His theories were based on what had been observed in chemical reactions and was widely accepted until the development of the Crooks tube

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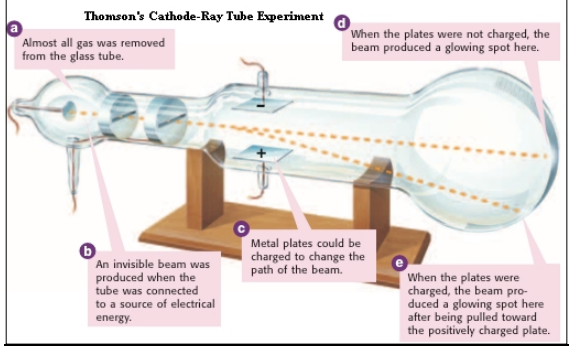
The Crooks Tube

- The **Crooks tube** is the ancestor to **television tubes**.
- English scientist JJ Thompson noticed that a stream of negatively charged particles would flow through the tube no matter what gas was used.
- He theorized that **negatively charged particles** were present in the atoms of all elements.

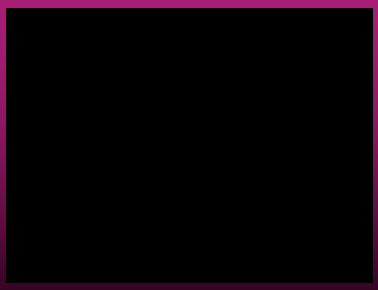
The Crooks Tube

- His final theory was that atoms were made up of **positively and negatively** charged particles evenly distributed and that the atoms was a solid mass.

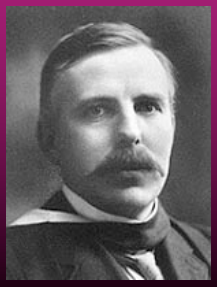
The Crooks Tube



1. Crooks Tube Shown & Explained

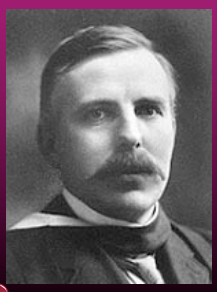


The Rutherford Model: 1909



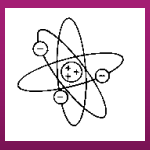
- British physicist Lord Rutherford's experiments in 1909 indicated that atoms were
- **largely empty space**.

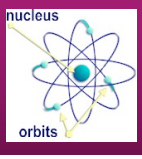
The Rutherford Model: 1909

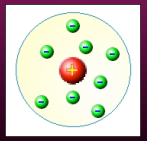


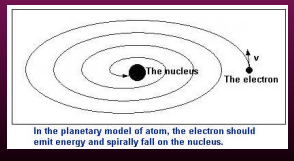
Lord Rutherford (1871-1937) is considered the father of nuclear physics. Indeed, it could be said that Rutherford invented the language to describe the theoretical concepts of the atom and the phenomenon of radioactivity.

The Rutherford Model: 1909

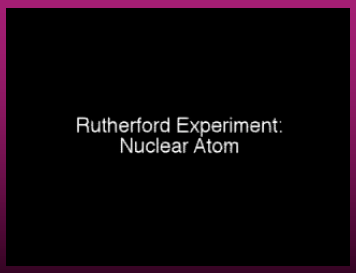




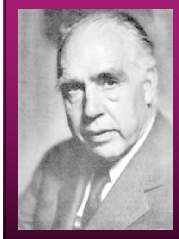




2. The Rutherford Model

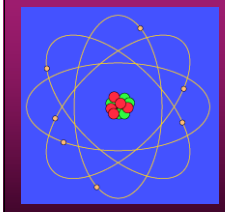


The Bohr Model



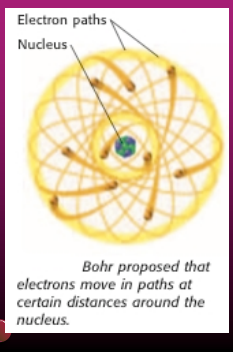
- Danish scientist Neils Bohr developed a model of the atoms that proposed certain **definite orbits** in which **electrons traveled.**
- Bohr proposed **7 different levels**, or distances that occur around the nucleus.

The Bohr Model



- **The greater the radius of the level, the greater the energy** of the electrons at that level.

The Bohr Model

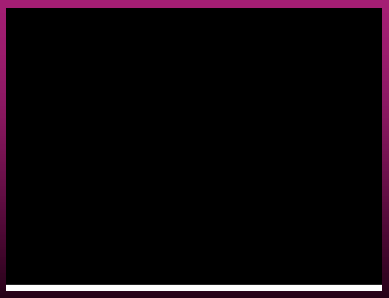


Bohr proposed that electrons move in paths at certain distances around the nucleus.

- His models suggested that in an atom's normal state, all electrons are in the lowest energy levels, and because of this cannot move to a lower level.
- The **atom is stable** and said to be at its **ground level** state.

3. The Bohr Model

Put notes at the bottom of the page- 3 bullet points



The Excited State

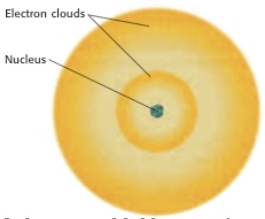
- If energy is added to the atom by heat or electrical energy,
- the absorbed energy can cause one or more of the electrons within the atom to move to a **higher energy level.**
- When this happens the atoms are said to be in an **excited state.**

The Excited State

- The atom at the **excited state is unstable** and makes efforts to return to **ground level state**.
- As the electrons return to this level **they release energy**.
- The energy given off exactly equals the amount absorbed when the electrons moved to the higher energy levels.

The Modern Model of the Atom

This is the drawing for your Little Bk Cover. Be sure to label



In the current model of the atom, regions of the atom called electron clouds are the most likely places to find electrons.

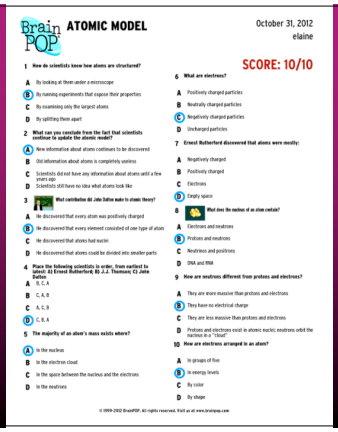
Charge Cloud Model:

- this shows electrons as being part of a diffused cloud of varying densities .
- (Be sure to include labeling of electrons in the electron cloud and protons & neutrons in the nucleus)

Brainpops: Atomic Models

- Brainpops

Brainpop quiz
How did you do?



Brain POP

ATOMIC MODEL

October 31, 2012
elaine

SCORE: 10/10

1 How do scientists know how atoms are structured?
A By looking at them under a microscope
(B) By running experiments that expose their properties
C By examining only the largest atoms
D By splitting them apart

2 What can you conclude from the fact that scientists continue to update the atomic model?
(A) New information about atoms continues to be discovered
B Old information about atoms is completely useless
C Scientists did not have any information about atoms until a few years ago
D Scientists still have no idea what atoms look like

3 What contribution did John Dalton make to atomic theory?
A He discovered that every atom was positively charged
(B) He discovered that every element consisted of one type of atom
C He discovered that atoms had nuclei
D He discovered that atoms could be divided into smaller parts

4 Place the following scientists in order, from earliest to latest: (J.J. Thomson, E) John Dalton
A B, C, A
B C, A, B
C A, C, B
(D) C, B, A

5 The majority of an atom's mass exists where?
(A) In the nucleus
B In the electron cloud
C In the space between the nucleus and the electrons
D In the neutrons

6 What are electrons?
A Positively charged particles
B Neutrally charged particles
(C) Negatively charged particles
D Uncharged particles

7 Ernest Rutherford discovered that atoms were mostly:
A Negatively charged
B Positively charged
C Electrons
(D) Empty space

8 What does the nucleus of an atom contain?
A Electrons and neutrons
(B) Protons and neutrons
C Neutrinos and positrons
D DNA and RNA

9 How are neutrons different from protons and electrons?
A They are more massive than protons and electrons
(B) They have no electrical charge
C They are less massive than protons and electrons
D Protons and electrons exist in atomic nuclei; neutrons orbit the nucleus in a "cloud"

10 How are electrons arranged in an atom?
A In groups of five
(B) In energy levels
C By color
D By shape

4. A Musical Review