Unit 3 NAME

Class Work 10/31/13

3.4 Rutherford

SPARK

1) What 2 things did Thomson use to bend the cathode ray to show it was negatively charged?

2) How do the mass of electrons compare to the mass of the rest of the atom?

3) What is the charge of the atom in Thomson's model?

QUIZ #2

- Element, Symbol, Atomic Number

Review HW 3.1 and 3.2

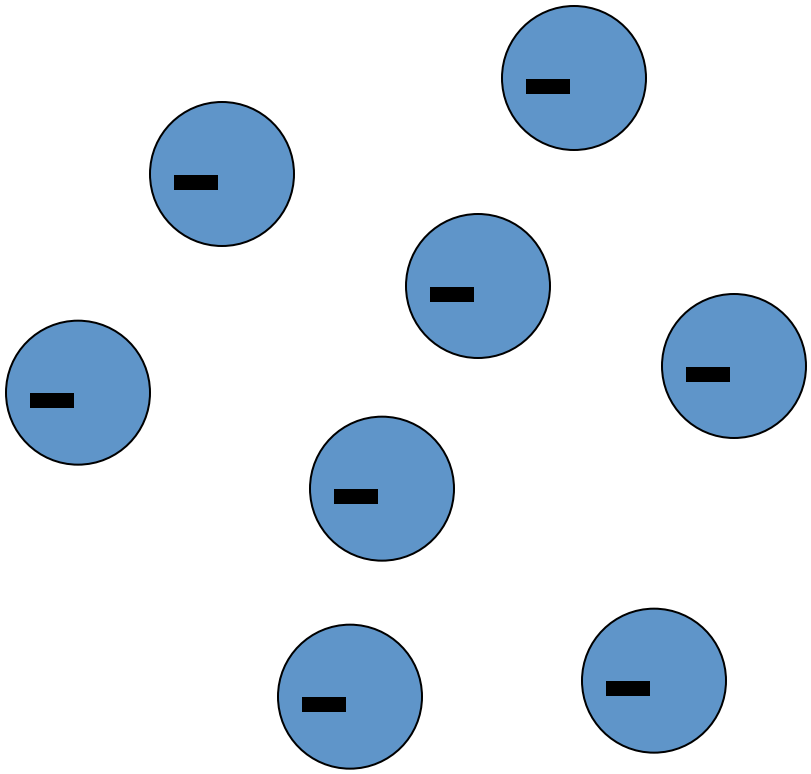
Objective

- SWBAT describe Rutherford's model and relate experimental evidence from Rutherford's gold foil experiment to the development of Thomson's model.

FIND A VIDEO!

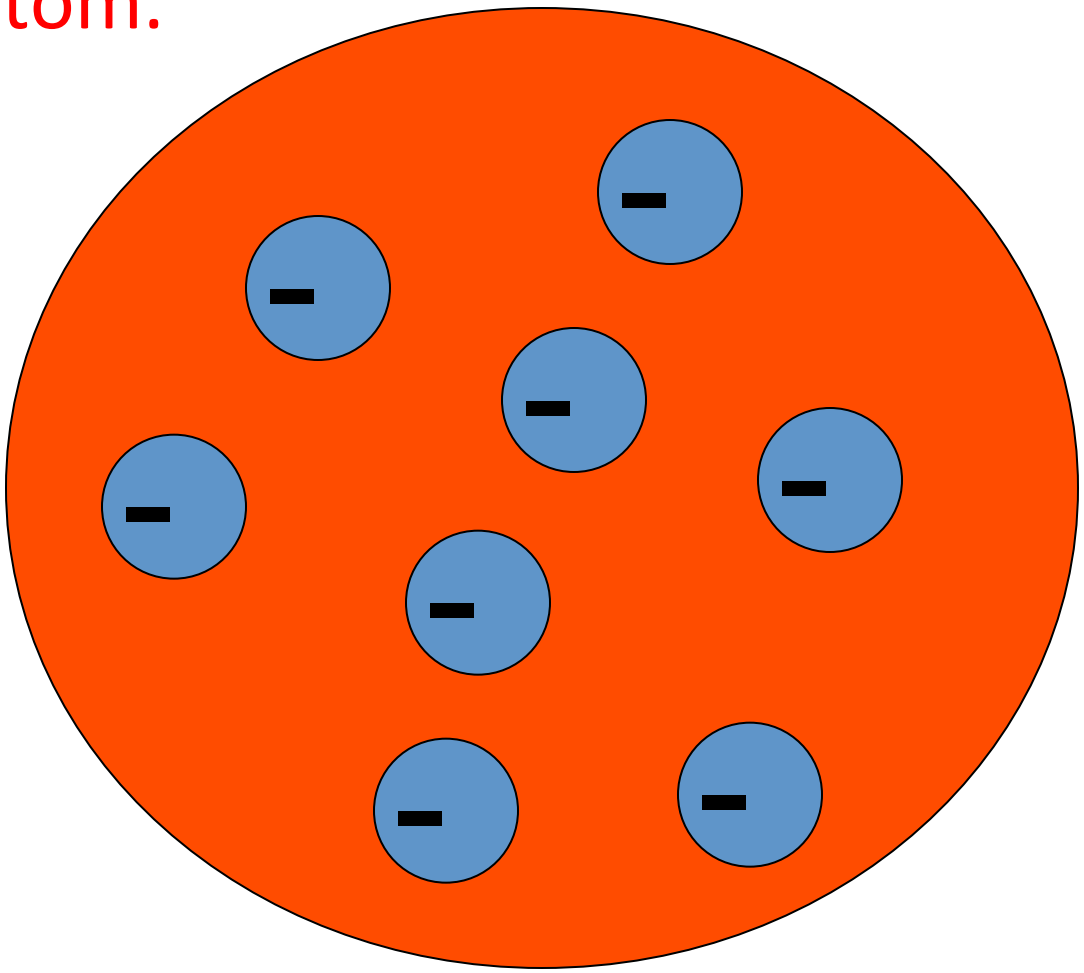
Thomson's Atomic Model

- Atoms contain negatively charged particles, electrons



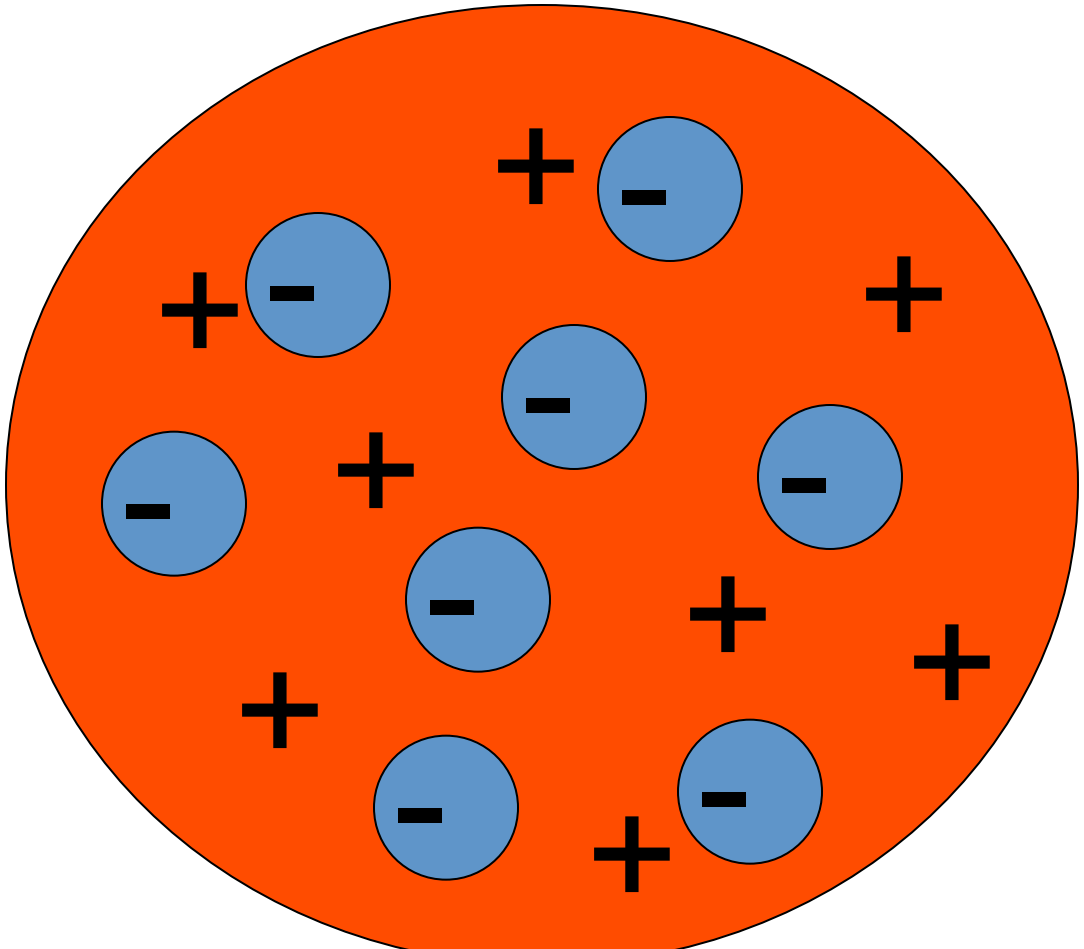
Thomson's Atomic Model

- These electrons are small compared to the rest of the atom.

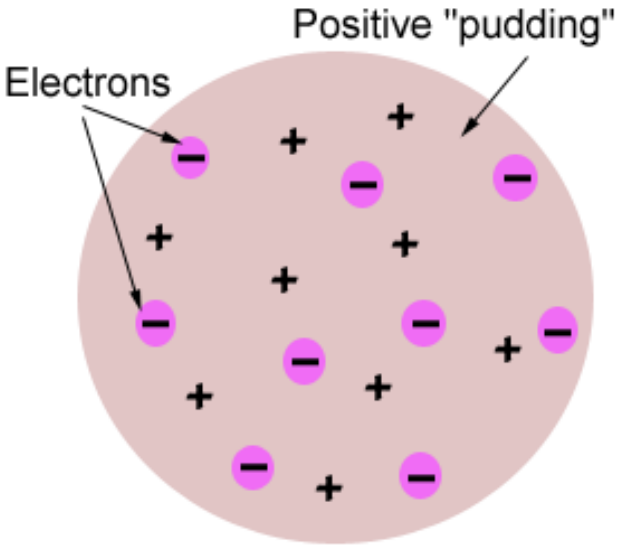


Thomson's Atomic Model

Thomson knew atoms are neutral, so there must be positive particles in the atom to balance the negative charge of the electrons.



Plum Pudding Model



- Plums = electrons
- Pudding = positively charged surrounding

Why did he think “the pudding” was the positively charged?

Why did he think the “pudding” was most of the mass and volume of the atom?

Summary

- Atoms have electrons -> negatively charged
- Atoms are overall neutral ->must have + particles
- Electrons mass is SO small -> much smaller than the overall mass of an atom -> something else in the atom must make up most of mass of the atom
- All elements had the same charge to mass ratio ->all elements have electrons and all electrons are the same

HOMEWORK

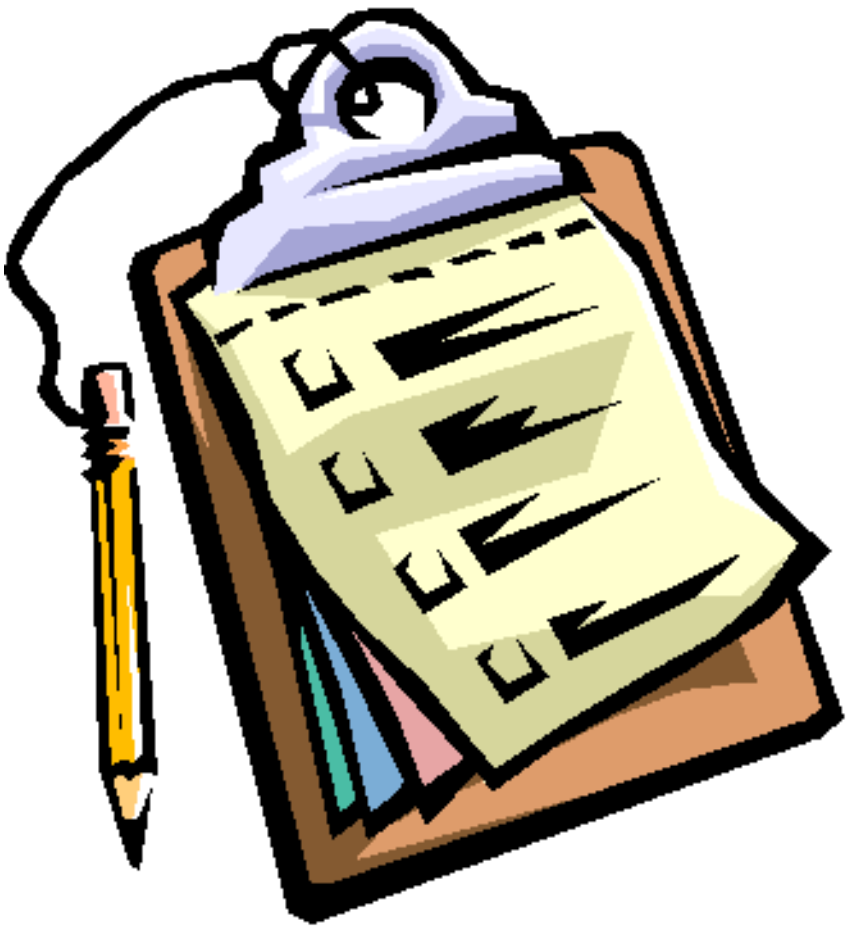
Finish the Thomson HW sheet tonight!

Thomson News Flash!

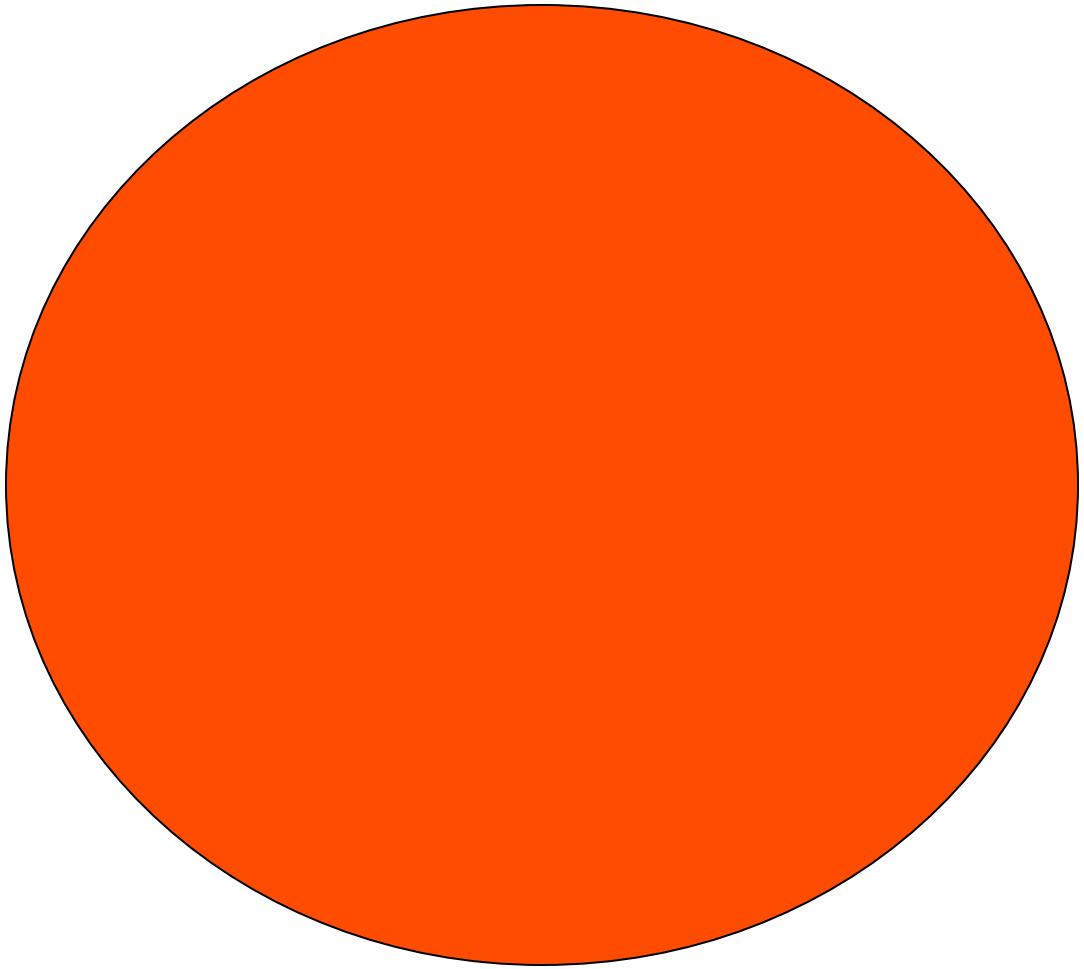
- Take 10 minutes to complete the Thomson Quick Write on a sheet of new loose leaf.

Agenda:

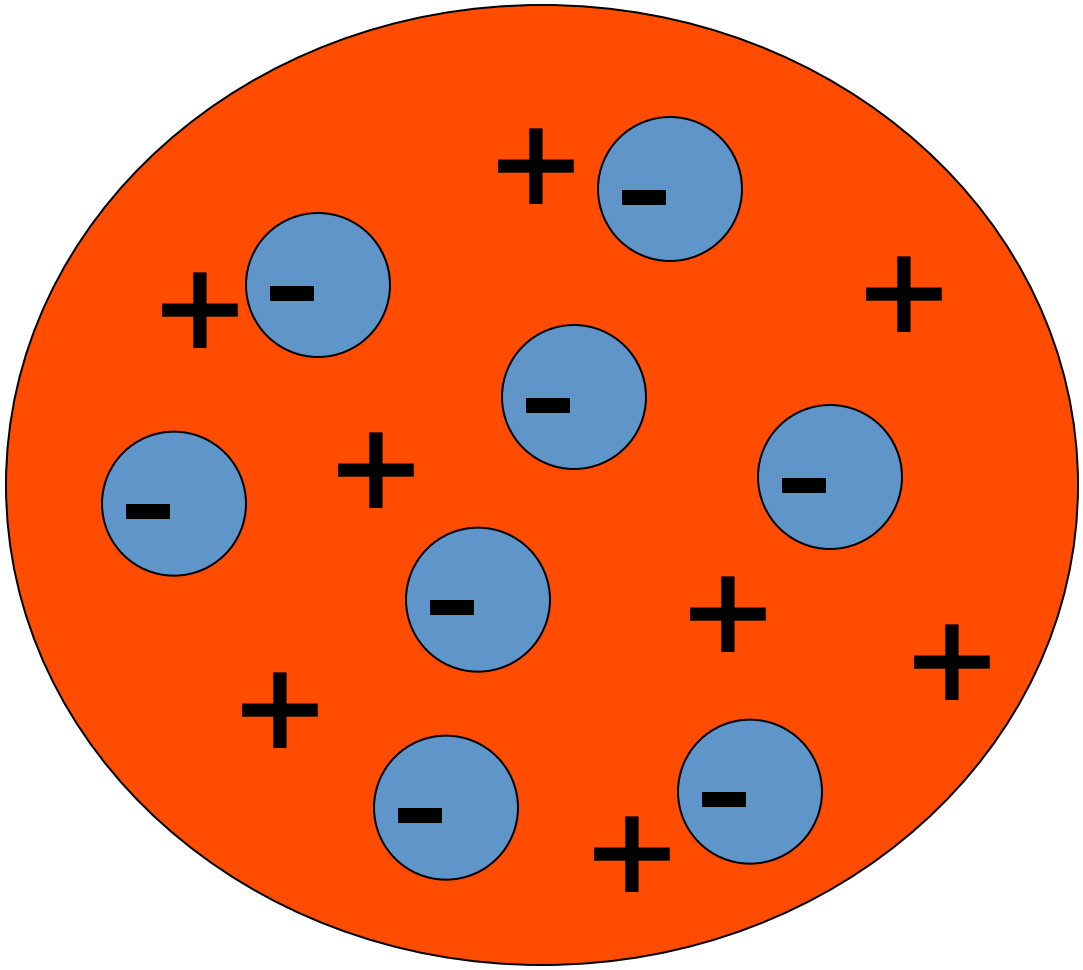
- SPARK
- Objective
- Notes
- Practice
- Homework



Dalton’s Atomic Model



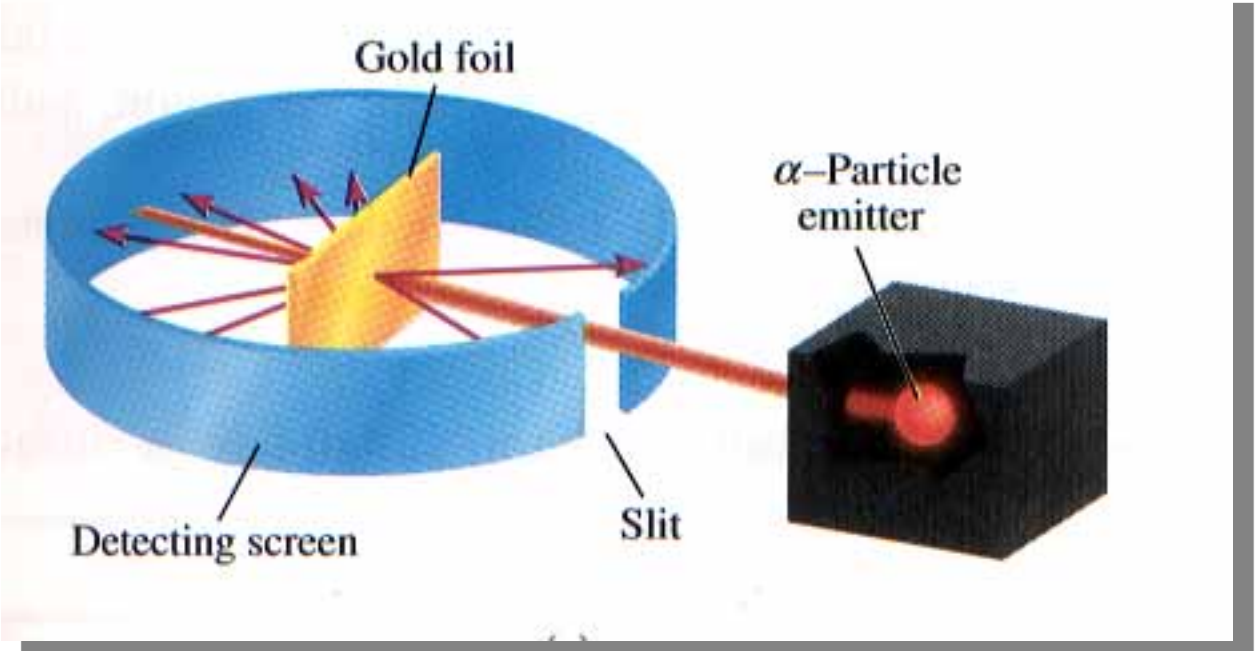
Thomson’s Atomic Model



Black Box Demo

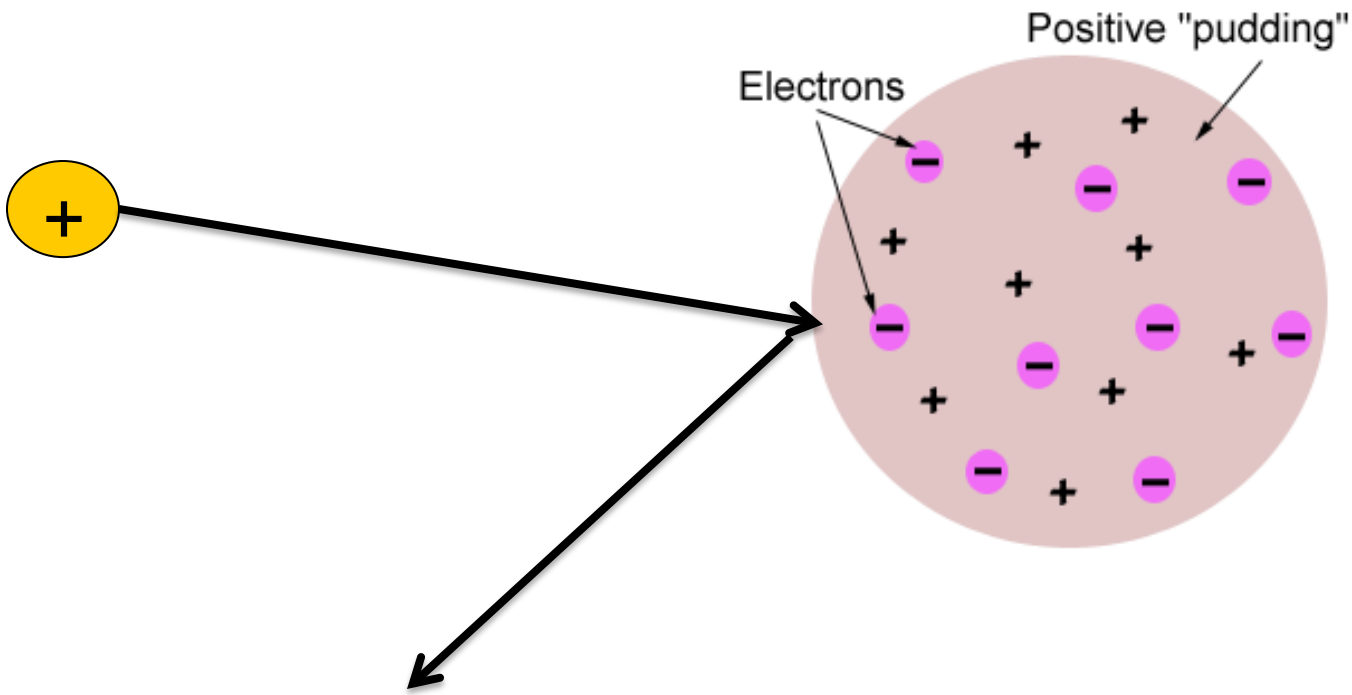
Rutherford's Gold Foil Experiment

- Alpha (α) particles are positively charged particles
- Particles were fired at a thin sheet of gold foil
- Particle hits on the detecting screen (film) were recorded

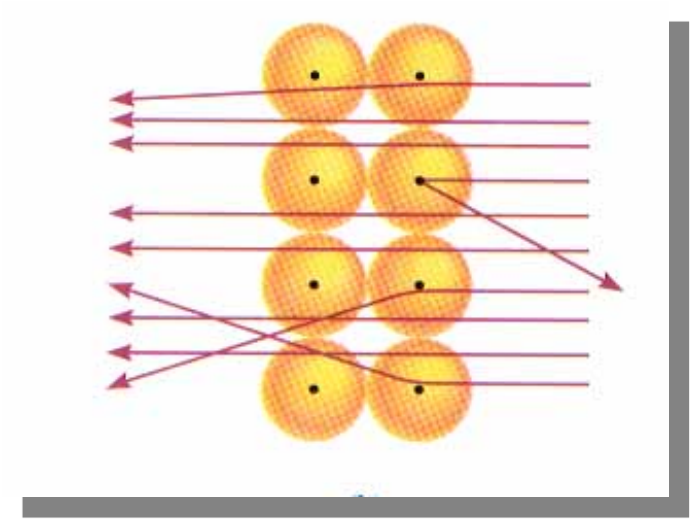


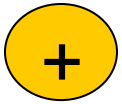
Rutherford's Gold Foil Experiment

- What did Rutherford expect to happen?



Rutherford's Gold Foil Experiment

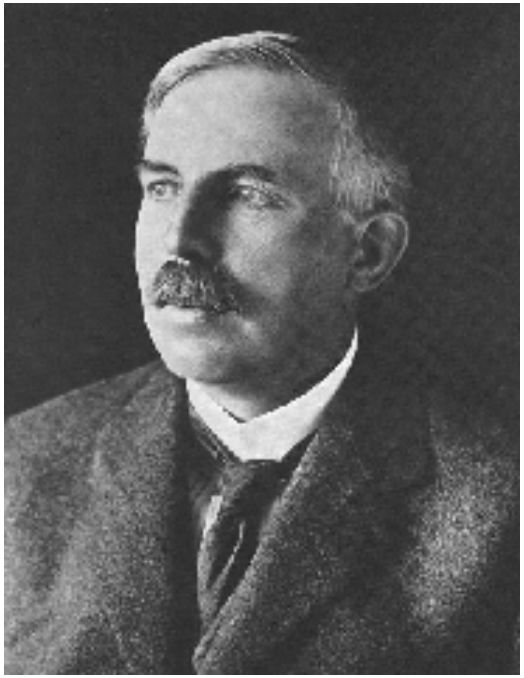




Rutherford's Findings

Results

- Most of the particles passed right through the foil
- A few particles were slightly deflected
- VERY FEW were greatly deflected



Rutherford's Findings

Conclusion:

- ❑ Most of the atom is empty space
- ❑ The atom has a nucleus
- ❑ The nucleus is small

Inferences:

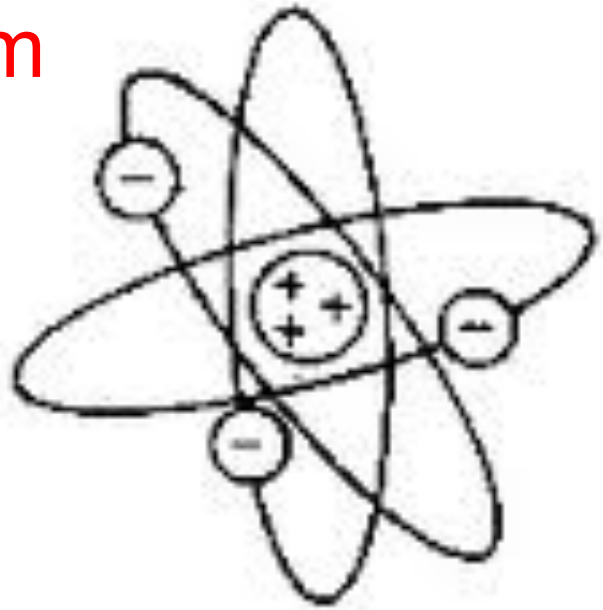
- ❑ The nucleus is dense (all mass is in the nucleus because electrons have a small mass)
- ❑ The nucleus is positively charged (the atom has to be neutral)

Rutherford's Atomic Model

Nuclear atom –

•Nucleus – the central core of an atom composed of protons and neutrons.

•Electrons are distributed around the nucleus in the EMPTY SPACE, which is most of the volume of the atom



Movie Time

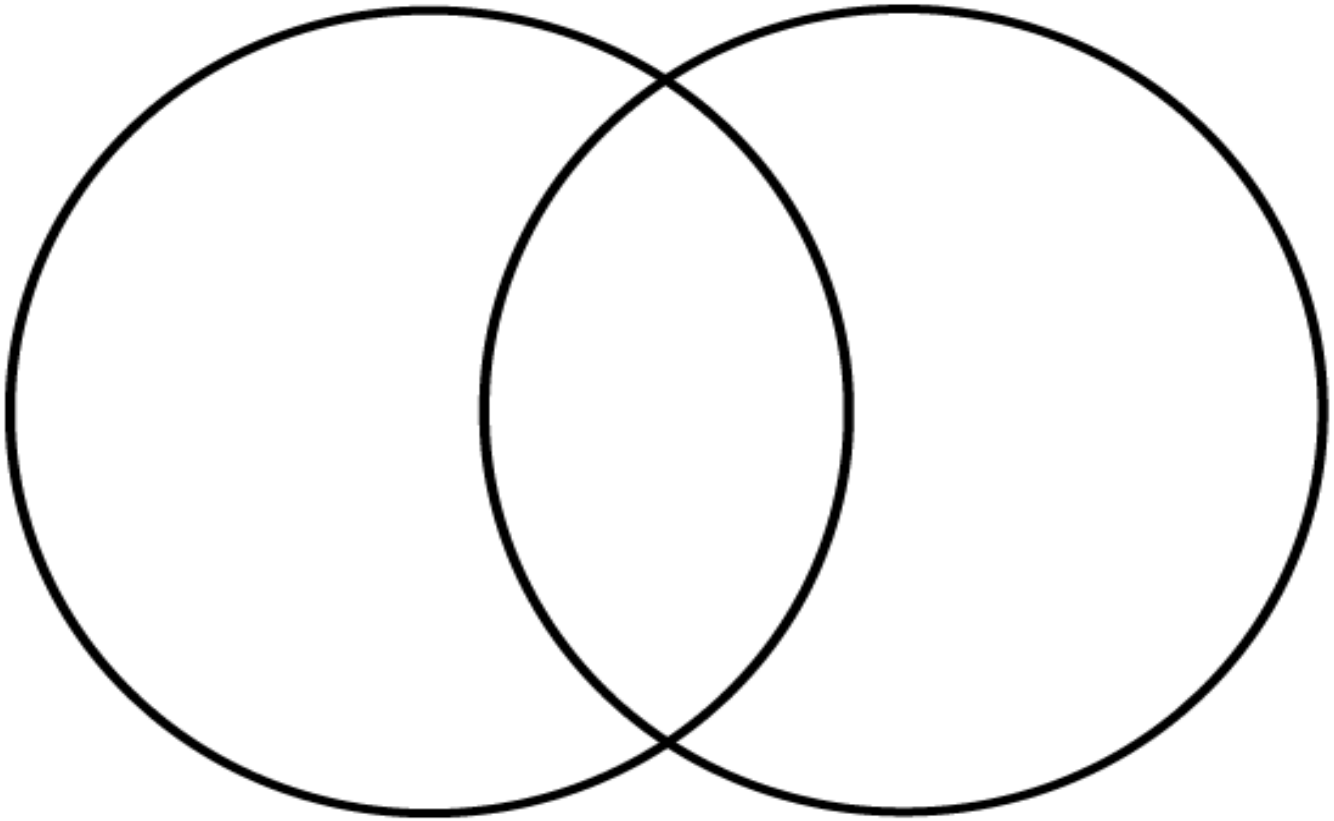
- http://www.mhhe.com/physsci/chemistry/essentialchemistry/flash/ruther14.swf

Atomic Particles

Particle	Charge	Mass (amu)	Location
Electron	-1	0	Electron cloud
Proton	+1	1	Nucleus
Neutron	0	1	Nucleus

Venn Diagram

Thomson Rutherford



Writing Assignment

- Based on the latest experiments by Rutherford, we can no longer continue to accept Thomson's "plum pudding" model of the atom. We now know that the atom, in addition to containing negatively charged subatomic particles, electrons, also contains a densely packed_____. This is located in the _____ of the atom and is _____ charged. The evidence Rutherford has for this claim is sound. First of all,

CRITICAL THINKING

- Our knowledge of science is ever growing and changing. Please explain the importance of experiments in our understanding of the modern model of the atom. Then explain why you believe that scientific “facts” that appear in the news are continually changing and why what we “know” today will probably be proven incorrectly in the future.

Binder Quiz!

- Last 5 minutes of class

HOMEWORK

Finish 3.3 Thomson HW

Complete 3.4 Rutherford HW