

Name: _____
KIPP NYC College Prep

Period: _____

Date: _____
General Chemistry**UNIT 2: Atomic Concepts****Lesson 2: The Birth of an Idea**

By the end of today, you will have an answer to:
How has the model of the atom evolved over time?

Do Now:

Hook: November 1, 1952. The [United States](#) detonates the world's first thermonuclear weapon, the hydrogen bomb, on Eniwetok atoll in the Pacific. The test gave the United States a short-lived advantage in the nuclear [arms race](#) with the Soviet Union. Following the successful Soviet detonation of an atomic device in September 1949, the United States accelerated its program to develop the next stage in atomic weaponry, a thermonuclear bomb. Popularly known as the hydrogen bomb, this new weapon was approximately 1,000 times more powerful than conventional nuclear devices.

Based on this piece of writing, why do you think it might be important to have a good model of the atom—an object so small it is impossible to see even with the strongest microscope?

**CATALYST ACTIVITY: IDEAS, MODELS, AND FACES**

Today, we will be learning about the evolution of the models of the atom. We will begin in ancient Greece and continue until we examine the most recent model of the atom.

- Today, we will **read** about the historical discovery of the different models of the atom.
- You will **be able to place each event in historical order and read about the contribution made by each scientist** in order to figure out how the structure of the atom has changed over time.
- After reading each scientific contribution, **you will choose a picture of the atom** that represents the model of the atom suggested by each scientist.
- After we finish the reading, you will **fill out the graphic organizer on the back of this page** and be prepared to share your findings with the class.



“Listening”

530 BC DEMOCRITUS

- Democritus, a Greek philosopher, defines all matter as made up of “atoms” meaning *indivisible*. He argued that if you took the world’s sharpest knife and sliced any object into smaller pieces, you would eventually come upon pieces that were indivisible (no longer able to divide). He argued that all matter was formed from these atoms.
- Which picture card represents this?

“Together”

1808 JOHN DALTON

- Dalton’s Atomic Theory
- John Dalton, an English chemist, formulated a new theory of atoms that states:
 - All atoms are made of atoms
 - Atoms are indestructible and indivisible
 - Atoms of a same element are alike
 - Atoms of different elements are different
 - Compounds are made of two or more elements
- Which picture card represents this model?

Independent Practice:

1897 J.J. THOMPSON

- The Plum Pudding Model (The chocolate chip cookie model)
- J.J. Thompson discovers an object that has a negative electrical charge known as “electrons”. To his surprise, the electron is much smaller and lighter than the smallest atom known (the hydrogen atom). He comes up with this idea that atoms are made up of even smaller and more fundamental things such as electrons. He theorizes that an atom is like “plum pudding” where negatively charged electrons are spread throughout positively charged cloud-like sphere and that together, they make up an atom.
- Which picture card represents this model?

1911 ERNEST RUTHERFORD

- The Rutherford nuclear model
- Ernest Rutherford, a New Zealand physicist, performed an experiment by shooting positively charged particles at a piece of gold foil. To his surprise, most of the positively charged particles went straight through the foil and some of them bounced back. The results of this experiment led to the discovery of the positively-charged nucleus and the finding that electrons surround the nucleus but that overall, the atom was mostly empty space.
- Which picture card represents this model?

1913 NIELS BOHR

- The Bohr model (The planetary model of the atom)
- Niels Bohr, a Danish physicist, suggested that the electrons actually orbit the nucleus of an atom and move around the nucleus in a circular path. Bohr suggested that electrons exist in “energy levels” around a nucleus that electrons move around the nucleus in these energy levels by orbiting around the center much like how the planets orbit around the sun.
- Which picture card represents this model?

1956 ERWIN SCHRODINGER

- The Wave Mechanical Model
- Erwin Schrodinger, an Austrian physicist, suggests that electrons do not exist in “energy levels”, but rather in defined regions of space known as an “orbital” around the nucleus.
- Which picture card represents this model?

Work hard. Be nice.

MODEL NAME	DALTON'S ATOM	PLUM-PUDDING	RUTHERFORD	BOHR	WAVE-MECHANICAL
IMPORTANT FINDINGS					
WHAT WAS WRONG ABOUT THE PREVIOUS THEORY?					
KEY EXPERIMENT					
PICTURE					
KEY WORDS	<ul style="list-style-type: none">• Solid sphere	<ul style="list-style-type: none">• Evenly distributed charges	<ul style="list-style-type: none">• Dense center• Nucleus• Mostly empty space	<ul style="list-style-type: none">• Orbits• Circular paths• Shells	<ul style="list-style-type: none">• Orbitals• High probability regions of electrons

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HW 2.2- Evolution of the Atom

Pd: _____

Date: _____

General Chemistry

10 points

PREPARING FOR TOMORROW:

1. Using your notes from class today, compare and contrast the “plum pudding” model of the atom to Rutherford’s model of the atom. List at list one similarity and one difference.

Direction: Read pages 104-108 and answer the following questions.

2. What is a subatomic particle? (DO NOT write proton, neutron, electron. Please be more specific.)
3. What are the three types of subatomic particles?
4. What two things did Rutherford learn from the gold foil experiment?

CRITICAL THINKING:

5. Are protons, neutrons, and electrons classified as matter? Why or why not?

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General Chemistry

Exit Ticket Quiz 2.2- Evolution of the Atom

2 points

1. Which of these phrases best describes an atom?
 - (1) A positive nucleus surrounded by a hard negative shell
 - (2) A positive nucleus surrounded by a cloud of negative charges
 - (3) A hard sphere with positive particles uniformly embedded
 - (4) A hard sphere with negative particles uniformly embedded
2. Which group of atomic models is listed in historical order from the earliest to the most recent?
 - (1) hard-sphere model, wave-mechanical model, electron-shell model
 - (2) hard-sphere model, electron-shell model, wave-mechanical model
 - (3) electron-shell model, wave-mechanical model, hard-sphere model
 - (4) electron-shell model, hard-sphere model, wave-mechanical model

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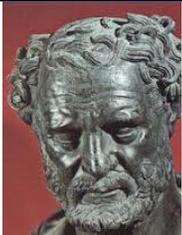
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1911

ERNEST RUTHERFORD

The gold foil experiment

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1956

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