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DepED
DEPARTMENT OF EDUCATION

Learning Activity Sheet for Science

Quarter 2
Lesson
1

Learning Activity Sheet for Science Grade 8
Quarter 2: Lesson 1 of 6 (Week 1)
SY 2025-2026

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LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	2nd Quarter
Lesson No.:	Lesson 1 Subtopic 1	**Date:**	
Lesson Title/ Topic:	Development of the Structure of the Atom		
Name:		**Grade & Section:**	

I. **Activity No.:** Activity #1: The Atom: from Greeks to Dalton (30 mins)

II. **Objective(s):** At the end of the activity, the students are expected to:

a. know who Democritus and John Dalton are;
b. understand Democritus' and John Dalton's idea of the atom; and
c. appreciate their contribution in the realization of the components of matter

III. **Materials Needed:**

- Pen
- Paper
- activity sheet
- drawing materials
- Internet
- cellphone or computer

IV. **Instructions:** Get to know Democritus and John Dalton by reading their profiles provided as a reading material in this section. Compare their ideas of the atom based on the given information. Conduct additional research about these scientists and their description of the atom if necessary. Answer the guide questions and present answers to the class.

Democritus' Profile

Democritus
(~460 - ~370 B.C.E.)

Image Source: https://commons.wikimedia.org/wiki/File:Charles-Antoine_Coypel_-_The_Cheerful_Democritus.jpg

Democritus was born in the Thracian town of Abdera early in the fifth century B.C. He was the son of a rich man who was able to provide him with good education. After his father died, he traveled in the East and studied under various masters. Despite being depicted as a sad old man in n 18th century engraving, he was known as "the laughing philosopher" due to his emphasis on cheerfulness. He is said to have written 72 books with topics ranging from mathematics, biology, literature, astronomy, agriculture, ethics, and poetry, but none of which survived. He is the 1st Philosopher who deduced that 'Milky Way' was the light of stars. His principal contribution to philosophy was his development of the concept of the atom, first proposed by his teacher, Leucippus. His theory was based on deduction and observation rather than experiment.

Democritus' description of an atom (5th Century)

- Everything is made of smallest, invisible and indivisible particles called atoms
- Atoms cannot be destroyed.
- Atoms have existed in motion forever and will remain in motion forever.
- Objects we can see are made of aggregations of linked atoms.

Guide Questions:

1. *Draw a model of the atom based on Democritus' description of the atom.*

2. *Why do you think Democritus' idea of the atom was disregarded? Who influenced this movement?*

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3. *Cite other view/s related to matter which prevailed during the time of Ancient Greeks.*

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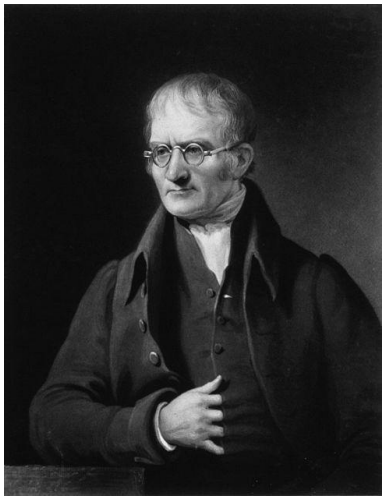
John Dalton's Profile



John Dalton
(1766–1844)

Image Source: https://commons.wikimedia.org/wiki/File:John_Dalton_by_Charles_Turner.jpg

John Dalton is an English chemist, mathematician, and philosopher. He was the son of an English weaver from Eaglesfield in Cumbria. His limited formal education does not limit him due to his innate curiosity and sharp mind. Dalton was criticized for being an uninterested experimented who lacked both the language and the visual impact of his illustrations. He was fond of lawn bowling on Thursday afternoons.

He provided the basic descriptions of atoms and molecules that serve as the foundation of modern chemistry until today. It was this work that made him one of the first two recipients of the Royal Medal, a prestigious award presented annually by the Royal Society for "the most important contributions to the advancement of natural knowledge" in 1826. Aside from the atomic theory, he also formulated several gas laws and gave the first detailed description of color blindness.

Dalton's atomic theory (1807)

- Matter is made up of atoms that are indivisible and indestructible.
- All atoms of an element are identical.
- Atoms of different elements have different weights and different chemical properties.
- Atoms of different elements combine in simple whole numbers to form compounds.
- Atoms cannot be created or destroyed. When a compound decomposes, the atoms are recovered unchanged.

Guide Questions:

1. *Draw a model of the atom based on John Dalton's description of the atom.*

2. *What are the similarities of Democritus and Dalton' view on atoms?*

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3. *How does the description of an atom differ between Dalton and Democritus?*

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LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	2nd Quarter
Lesson No.:	Lesson 1 Subtopic 2	**Date:**	
Lesson Title/ Topic:	Development of the Structure of the Atom		
Name:		**Grade & Section:**	

I. **Activity No.:** Activity #2: The Law of Conservation of Mass (1 hour)

II. **Objective(s):** At the end of the activity, the students are expected to:

a. observe the occurrence of conservation of mass in a chemical reaction.
b. describe observations that suggest a chemical change has occurred;
c. use visual representations in understanding the behavior of atoms;
d. relate the law of conservation of mass to the postulates of Dalton's atomic theory.

III. **Materials Needed:**

- 100 ml Graduated cylinder/ measuring cup
- 250 mL Erlenmeyer flask/plastic bottle
- Analytical balance or weighing scale.
- balloon
- clean piece of paper/watch glass
- spatula
- masking tape
- vinegar
- baking soda
- pen and paper
- calculator

IV. **Instructions:**

A. Law of Conservation of Mass

1. Measure 20 mL of vinegar using a graduated cylinder.
2. Put the vinegar in a 250 mL Erlenmeyer flask.
3. Measure 3.0 g of baking soda using a clean piece of paper or watch glass.
4. Place the baking soda inside the balloon.
5. Connect the mouth of the balloon to the mouth of the Erlenmeyer flask and tape it to make sure no gas could escape. Be careful not to spill the baking soda into the Erlenmeyer flask.
6. Measure the mass of the set up. Record.
7. Flip the balloon to mix the baking soda and vinegar. Observe.
8. Once the mixture settles, measure the mass of the whole set up again.
9. Record.
10. Compare the mass of the set up before and after mixing.
11. Answer the guide questions that follow.

Data Table:

	Before	**After**
Mass of the set-up		

Observation		

Guide Questions:

1. *What kind of change has occurred?*

_____
_____
_____
_____
_____

2. *What evidence/s can support your answer in No. 1?*

_____
_____
_____
_____
_____

3. *Is there a change in mass after the process? If yes, what might have happened to cause such a difference?*

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_____
_____
_____
_____

4. *The representation below shows the atoms involved in the process,*

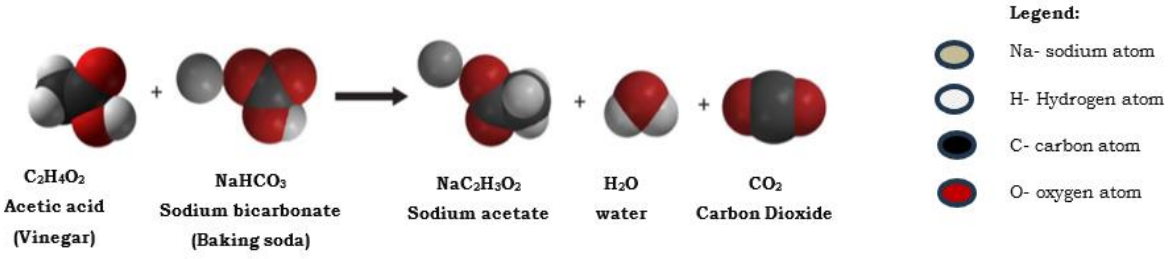

Image Source: https://highschoolenergy.acs.org/how-can-energy-change/exothermic-endothermic-chemical-change.htmll

How can you relate this to postulate 5 of Dalton's atomic theory?

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_____
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Note: In case the materials are not available in the school, the students can watch this video:

Wolverton, N. (2021, April 1). Vinegar + baking soda - law of conservation of mass. Retrieved from YouTube.
https://www.youtube.com/watch?v=JryJ5z0sS4w&t=23s

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	2nd Quarter
Lesson No.:	Lesson 1 Subtopic 3	**Date:**	
Lesson Title/ Topic:	Development of the Structure of the Atom		
Name:		**Grade & Section:**	

I. **Activity No.:** Activity #3: The Electrons (1 hour)

II. **Objective(s):** At the end of the activity, the students are expected to:

a. know who J.J. Thomson and Robert Millikan are.
b. understand J.J. Thomson's contribution in the discovery of the electron.
c. understand Robert Millikan's contribution in the determination of the mass and charge of the electron.
d. appreciate their contribution in the development of the atomic model.

III. **Materials Needed:**

- Pen
- activity sheet
- drawing materials
- Paper
- Internet
- cellphone or computer

IV. **Instructions:** Get to know the life and works of J.J. Thomson and Robert Millikan by reading the profile provided as a reading material in this section. Watch the videos about cathode ray tube and Oil drop experiment. Conduct additional research about these scientists and their experiments.

J.J. Thomson's Profile

Joseph John Thomson (1856–1940)

Joseph John Thomson was born in Cheetham Hill, a suburb of Manchester on December 18, 1856. He enrolled at Owens College, Manchester, in 1870, and in 1876 entered Trinity College, Cambridge as a minor scholar. The scholarship was in memory of John Dalton.

He used a cathode ray tube and his knowledge of electromagnetic theory to determine the ratio of electric charge to the mass of an individual electron. The number he came up with was **-1.76×10^8 C/g**, where C stands for coulomb, which is the unit of electric charge.

Image Source:
https://commons.wikimedia.org/wiki/File:J.J._Thomson_LCCN2014715407.jpg

Thomson's model of atomic structure (1899)

- Negatively charged particles are called electrons.
- An electron's mass is equal to 1/1840 that of hydrogen, the lightest atom.
- An electron is 1000 times smaller than hydrogen.
- An atom is neutral, with equal negative and positive charge.
- The electrons are embedded in a sphere of positive charge like plums in a pudding.

Cathode Ray Tube Experiment

The teacher will briefly describe the Cathode Ray Tube **(CRT)** diagram below. Use this diagram as basis for completing the CPEOE table.

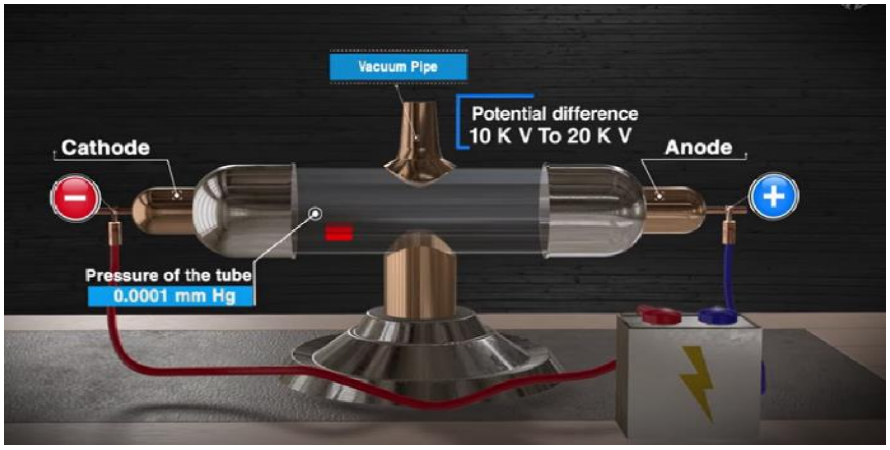
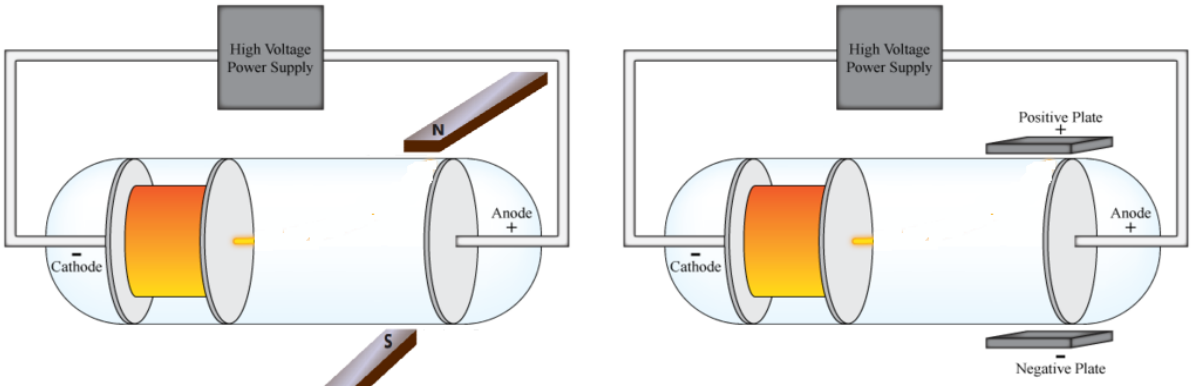


Image Source: https://www.youtube.com/watch?v=vXOeehVTcRA



Modified from: https://www.ck12.org/flexi/chemistry/cathode-ray-tube/what-did-the-cathode-ray-tube-experiment-demonstrate/

Imagine when the stated **Conditions** are applied in the CRT. Discuss these with your group then fill in the **Predict** part and provide a brief explanation in the **Explain** column.

Conditions	PREDICT	EXPLAIN	OBSERVE	EXPLAIN
What will be the direction of the ray coming from the cathode?				

What will happen to the cathode ray when the magnets are moved closer to the tube				
What will happen when an electric field is applied across the cathode ray tube				

Watch the video “Cathode Ray Tube” to visualize the characteristics of a cathode ray. Then, fill up the **Observe** part of the CPEOE table.
Video: https://www.youtube.com/watch?v=vXOeehVTcRA

Conditions	**PREDICT**	**EXPLAIN**	**OBSERVE**	**EXPLAIN**
What will be the direction of the ray coming from the cathode?				
What will happen to the cathode ray when the magnets are moved closer to the tube				
What will happen when an electric field is applied across the cathode ray tube				

Discuss within your group how these observations can be explained. Write your explanation in the **Explain** part of the CPEOE table.

Conditions	**PREDICT**	**EXPLAIN**	**OBSERVE**	**EXPLAIN**
What will be the direction of the ray coming from the cathode?				
What will happen to the cathode ray when the magnets are moved closer to the tube				

What will happen when an electric field is applied across the cathode ray tube				

1. Based on the characteristics of the cathode ray you observed from the video and the findings of J.J. Thomson in his own cathode ray tube experiment, draw a model of the atom.

2. What are the other characteristics of the cathode ray tube based on the video that are not included in the CPEOE table? What do these characteristics say about the electrons?

_____
_____
_____
_____
_____

Robert Millikan's Profile

Robert Andrews Millikan (1868–1953)

Robert Andrews Millikan was born in Morrison, Illinois. Aside from being a tennis player, he was also fond of playing golf. He received a Nobel Prize in Physics in 1923 for determining the charge of the electron.

Observations of Millikan (1913)

- The fundamental unit of charge is **-1.60×10^{-19} Coulombs**.
- The mass of the electron is **9.10×10^{-28} g**, an exceedingly small mass.

Image Source:
https://commons.wikimedia.org/wiki/File:Millikan.jpg

Millikan's Oil Drop Experiment

Watch the Millikan Oil Drop Experiment Animation Video and Answer the guide questions below. Video: https://www.youtube.com/watch?v=UFiPWv03f6g

Guide Questions:

1. *What is the purpose of Millikan's oil drop experiment?*

_____
_____
_____
_____
_____

2. *Draw the experimental set up used by Robert Millikan.*

3. *What are the observations made by Millikan?*

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_____
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_____

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	2nd Quarter
Lesson No.:	Lesson 1 Subtopic 4	**Date:**	
Lesson Title/ Topic:	Development of the Structure of the Atom		
Name:		**Grade & Section:**	

I. **Activity No.:** Activity #4: The Center of the Atom (30 mins)

II. **Objective(s):** At the end of the activity, the students are expected to:

a. know who Ernest Rutherford and James Chadwick are.

b. learn their contributions in the understanding of the structure of the atom; and

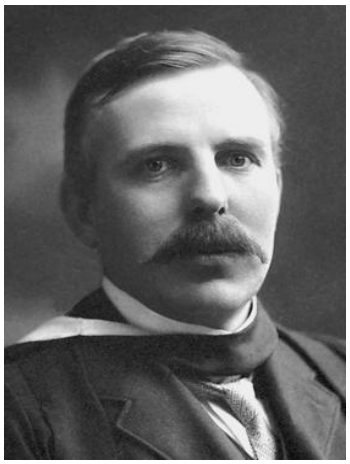
c. appreciate his contribution in the development of the modern atomic model.

III. **Materials Needed:**

- Pen
- Paper
- activity sheet
- drawing materials
- Internet
- cellphone or computer

IV. **Instructions:** Get to know the life and works of Rutherford and Chadwick by reading the copy of their profile provided by the teacher. You may conduct additional research about them and their contributions to the development of

V. the structure of the atom. Watch the video "Rutherford's Alpha Scattering Experiment" and "Discovery of Neutron". Answer the guide questions.



Ernest Rutherford (1871–1937)

Image Source: https://commons.wikimedia.org/wiki/File:Ernest_Rutherford_(Nobel).jpg

Ernest Rutherford's Profile

Ernest Rutherford was born in Nelson, New Zealand. In 1894, he received a scholarship enabling him to work as a research student at the Cavendish Laboratory in Trinity College, Cambridge under J.J. Thomson. In 1910, his investigations into the scattering of alpha rays and the nature of the inner structure of the atom which caused such scattering led to the postulation of his concept of the "nucleus", his greatest contribution to physics. According to him practically the whole mass of the atom and at the same time all positive charge of the atom is concentrated in a minute space at the center. Rutherford's chief recreations were golf and motoring.

Image Source:

Rutherford's Model of the Atom (1910)

- All the positive charge and most of the mass of the atom are concentrated the nucleus.
- The nucleus is about 10,000 times smaller than the atom.
- Most of the volume of the atom is occupied by the electrons outside the nucleus.
- Electrons move around the nucleus like planets orbiting the sun.

Watch the video "Rutherford's Alpha Scattering Experiment."
https://www.youtube.com/watch?v=kHaR2rsFNhg

Guide Questions:

1. *What observations did Rutherford make in his experiment?*

_____
_____
_____
_____
_____

2. *What do his observations tell us about the structure of the atom?*

_____
_____
_____
_____
_____

3. *Draw an illustration of an atom based on the description of Ernest Rutherford.*

James Chadwick's Profile

James Chadwick (1891-1974)

Image Source: https://commons.wikimedia.org/wiki/File:James_Chadwick.jpg

James Chadwick (1891-1974) was born in Cheshire, England. He gained his M.Sc. degree in 1913 after working on various radioactivity problems under Rutherford in the Physical Laboratory in Manchester. His hobbies include gardening and fishing.

The atom was thought to consist of a positively charged nucleus surrounded by negatively charged electrons until 1932. In 1932, James Chadwick used beryllium atoms and bombarded with alpha particles. There was a radiation that was unknown. According to Chadwick's interpretation, the radiation was made up of particles that had the mass of a proton (**1.674927211 x 10^{-24} g**) and a neutral electrical charge. This particle became known as the neutron.

Characteristics of a Neutron

- The neutron has a mass of **1.67262 x 10^{-24} g**
- The neutron has **no charge**.
- The neutron can be found inside the nucleus.

Watch the Video "Discovery of Neutron" https://www.youtube.com/watch?v=c8PeUNSVKo0

Guide Questions:

1. *What are the characteristics of a neutron?*

_____

_____

_____

_____

_____

2. What is the significance of the discovery of a neutron in the understanding of the atomic structure?