PHYSICAL SCIENCE

Formative Assessment - 4

Experiments / Lab activities / Activities and Projects

VIII and IX Classes

(2025 - 2026)

Visit: srini science mind

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8th CLASS

Lab Activities

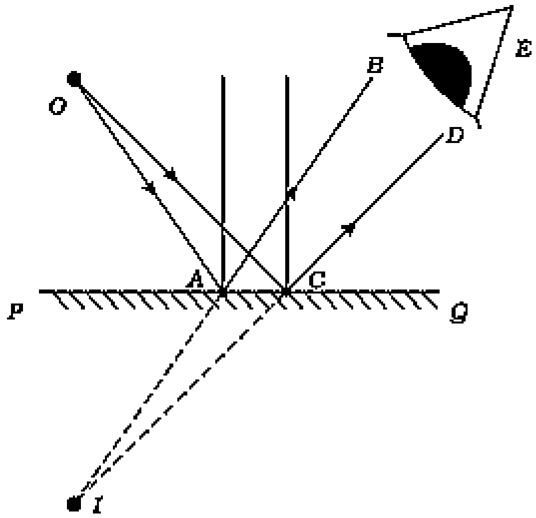
Lab Activity - 1

Aim: To prove that plane mirror forms virtual image.

Materials required: Source of light, Plane mirror, Scale, Pencil

Procedure:

1. A source of light O is placed in front of a plane mirror PQ. Two rays OA and OC are incident on it.
2. Draw normals to the surface of the mirror PQ, at the points A and C.
3. Then draw the reflected rays at the points A and C.
4. Call the reflected rays AB and CD, respectively.
5. Extend them backwards.
6. If they meet, mark this point as I. For a viewer's eye at E, do the reflected rays appear to come from the point I.
7. Since the reflected rays do not actually meet at I, but only appear to do so, we say that a virtual image of the point O is formed at I.
8. This image cannot be obtained on a screen.



Conclusion: A plane mirror always forms a virtual image and cannot be obtained on a screen.

Lab Activity - 2

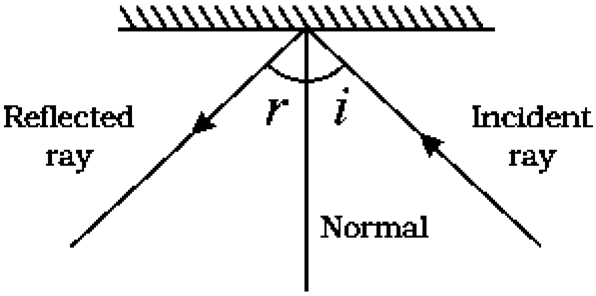
Aim: Prove that the incident ray, the normal at the point of incidence and the reflected ray all lie in the same plane.

Materials required: White sheet of paper, drawing board, Table, Comb, Torch light, Strip of plane mirror.

Procedure: 1. Fix a white sheet of paper on a table or drawing board.

2. Take a comb and cover all the gaps except one gap in the middle using black paper.
3. Keep the comb upright (perpendicular) on the white paper.
4. Switch on a torch and pass its light through the open gap of the comb.
5. Adjust the torch and comb slightly until you see a thin ray of light moving along the paper.
6. Keep the torch and comb steady. Place a plane mirror in the path of the light ray.
7. Observe that the light ray changes its direction after striking the mirror.
8. The ray falling on the mirror is called the incident ray and the ray coming back from the mirror is called the reflected ray.
9. Draw the position of the mirror, the incident ray, and the reflected ray on the paper.
10. At the point where the ray strikes the mirror, draw a line perpendicular (90°) to the mirror.

11. This perpendicular line is called the normal to the reflecting surface.



Conclusion: The incident ray, the normal at the point of incidence and the reflected ray all lie in the same plane.

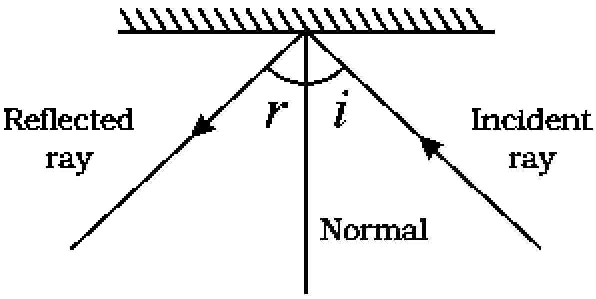
Lab Activity - 3

Aim: Prove that the angle of incidence is always equal to the angle of reflection.

Materials required: White sheet of paper, drawing board, Table, Comb, Torch light, Strip of plane mirror.

Procedure: 1. Fix a white sheet of paper on a table or drawing board.

2. Take a comb and cover all the gaps except one gap in the middle using black paper.
3. Keep the comb upright (perpendicular) on the white paper.
4. Switch on a torch and pass its light through the open gap of the comb.
5. Adjust the torch and comb slightly until you see a thin ray of light moving along the paper.
6. Keep the torch and comb steady. Place a plane mirror in the path of the light ray.
7. Observe that the light ray changes its direction after striking the mirror.
8. The ray falling on the mirror is called the incident ray and the ray coming back from the mirror is called the reflected ray.
9. Draw the position of the mirror, the incident ray, and the reflected ray on the paper.
10. At the point where the ray strikes the mirror, draw a line perpendicular (90°) to the mirror.
11. This perpendicular line is called the normal to the reflecting surface.



12. The angle between the normal and incident ray is called the angle of incidence.
13. The angle between the normal and the reflected ray is known as the angle of reflection.
14. Measure the angle of incidence and the angle of reflection. Repeat the activity several times by changing the angle of incidence.
15. Enter the data in Table.

S.No	Angle of incidence(∟i)	Angle of reflection(∟r)
1	25^0	25^0
2	30^0	30^0
3	35^0	35^0
4	40^0	40^0
5	45^0	45^0

Conclusion: Angle of incidence is equal is angle of reflection in each case. i.e ∟i = ∟r

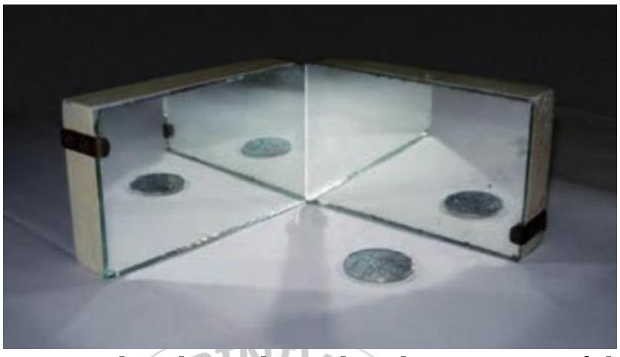
Lab Activity - 4

Aim: To observe the number of images formed when a coin is placed between two plane mirrors kept at right angles (90°) to each other.

Materials required: Two plane mirrors, One coin, A table or flat surface

Procedure:

1. Take **two plane mirrors** and place them on a table.
2. Arrange the mirrors so that they are **at right angles (90°)** to each other and their **edges touch**.
3. Place a **coin** between the two mirrors near the point where the mirrors meet.
4. Look into the mirrors carefully from the front.
5. Observe the **images of the coin** formed due to reflections from both mirrors.
6. Count the **number of images** seen.



Conclusion: When two plane mirrors are placed at right angles, three images of the coin are formed. This happens due to multiple reflections, where light rays reflect repeatedly between the two mirrors.

Lab Activity - 5

Aim: To show the presence of a blind spot in the human eye.

Materials required: A sheet of paper, Pencil or pen

Procedure:

1. On a sheet of paper, draw a cross (✖) and a round mark (●).
2. Keep the round mark to the right side of the cross.
3. Maintain a distance of about 6–8 cm between the two marks.
4. Hold the paper at arm's length in front of your eyes.
5. Close your left eye and look continuously at the cross with your right eye.
6. Slowly move the paper towards your eye, keeping your eye fixed on the cross.
7. Observe carefully what happens to the round mark.
8. Now close your right eye and look at the round mark with your left eye.
9. Again, slowly move the paper towards your eye and observe what happens to the cross.

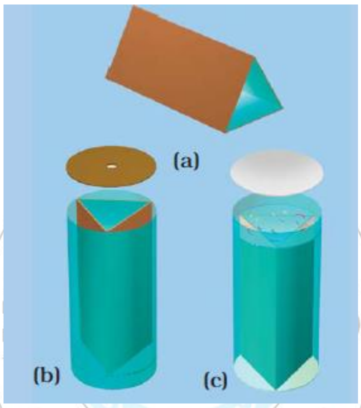
Conclusion: At a certain position, either the round mark or the cross disappears. This shows that there is a blind spot on the retina where the optic nerve leaves the eye. Light falling on this point cannot send signals to the brain, so the image is not seen.

Model Making Projects

Project – 1

Title of the Project: Making of Kaleidoscope
Materials required: Three rectangular mirror, Cardboard, Transparent plastic sheet.
Making of Kaleidoscope:

1. Take three rectangular mirror strips, each about 15 cm long and 4 cm wide.
2. Join the mirrors to form a triangular prism, with the reflecting surfaces facing inward.
3. Place this mirror arrangement inside a circular cardboard tube or a tube made from thick chart paper.
4. Ensure that the tube is slightly longer than the mirror strips.
5. Close one end of the tube with a cardboard disc having a small hole at the centre to look through.
6. Paste a transparent plastic sheet under the cardboard disc to make it strong.
7. At the other end, fix a circular plane glass plate touching the mirrors.
8. Place small pieces of coloured glass or broken coloured bangles on this glass plate.
9. Close this end with a ground glass plate, leaving some space so that the coloured pieces can move freely.



Working of a Kaleidoscope:

1. Light entering the kaleidoscope gets reflected repeatedly by the three mirrors.
2. The coloured glass pieces reflect light and produce multiple reflections.
3. When the tube is rotated, the coloured pieces change their positions.
4. Due to multiple reflections, beautiful symmetrical patterns are formed.
5. Each rotation gives a new and attractive design.

Conclusion: Our Kaleidoscope is ready. A kaleidoscope works on the principle of multiple reflection of light.

Project – 2

Title of the Project: Demonstration of rainbow with simple model
Materials required: Plane mirror, Bowl, Water, White sheet
Making:

1. Take a plane mirror of suitable size.
2. Place the mirror inside a bowl.
3. Fill the bowl with clean water.
4. Keep this arrangement near a window so that sunlight falls directly on the mirror.
5. Adjust the position of the bowl carefully so that the reflected light falls on a wall.
6. If the wall is not white, fix a white sheet of paper on it.

Working:

1. When white sunlight falls on the mirror kept in water, it gets reflected and refracted.
2. The water and mirror together act like a prism.
3. Due to this, white light splits into seven different colours.
4. These colours are seen clearly on the wall or white paper.

5. This process of splitting white light into different colours is called dispersion of light.

Conclusion:
A rainbow is formed due to the dispersion of white light into seven colours (VIBGYOR). The mirror and water together help in producing this effect, similar to a prism.

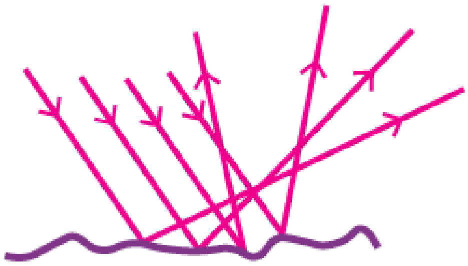
Project – 3

Title of the Project: Model making of reflection of light from an irregular (rough) surface and to understand diffused reflection by drawing reflected rays from different points.
Materials required: White sheet of paper**,** Pencil and ruler**,** Rough / irregular surface, Torch
Making:

1. Fix a white sheet of paper on a drawing board or table.
2. Draw a rough, uneven line on the paper to represent an irregular reflecting surface.
3. Draw parallel incident rays falling on different points of the rough surface.
4. At each point of incidence, draw a normal line perpendicular to the surface
5. From each point, draw the reflected ray according to the law of reflection.

Working:

1. When parallel rays of light fall on an irregular surface, they strike the surface at different angles.
2. Due to different orientations of the surface at each point, the normals are different.
3. As a result, the reflected rays go in different directions.
4. This spreading of reflected light in many directions is called diffused (irregular) reflection.
5. Even though light spreads out, each ray still follows the laws of reflection.



Diffuse reflection from rough surfaces

Conclusion:

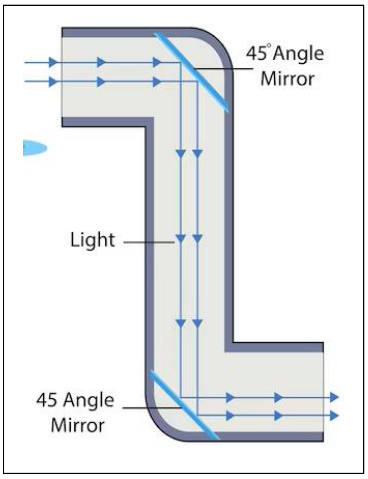
1. Reflection from an irregular surface produces diffused reflection.
2. The reflected rays do not remain parallel but scatter in many directions.
3. Diffused reflection helps us see objects from all directions and does not form a clear image**.**

Project – 4

Title of the Project: To demonstrate **multiple reflection of light** using a **periscope model**.
Materials required: Rectangular cardboard box, 2 Plane mirrors (same size), Tape, Cutter, Scale**,** Pencil / marker, Colour paper.
Making:

1. Take a **rectangular cardboard box**.
2. Cut **two square holes**:

3. One hole near the **top** (to allow light to enter)
4. One hole near the **bottom** (to see through)
5. Inside the box, fix **two plane mirrors**:
6. **Top mirror** at **45° angle**, **Bottom mirror** at **45° angle.**
7. Both mirrors should face each other properly.
8. Make sure the mirrors are fixed firmly using **tape**.
9. Close the box properly.
10. Decorate the periscope using **colour paper, drawings**.



Working:

1. Light from the object enters through the **top hole**.
2. It strikes the **first mirror** placed at **45°** and gets reflected downward.
3. Then the light strikes the **second mirror** at **45°** and reflects into the **eye**.
4. Thus, the object becomes visible even if it is **not directly in front of the eye**.
5. **Path of light: Object → Top hole → Mirror 1 → Mirror 2 → Eye**

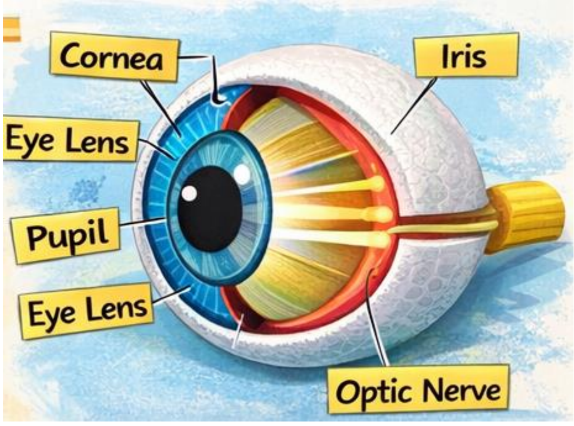
Conclusion:

1. A periscope works on the principle of **multiple reflection**.
2. It helps us to see objects **not directly visible**, such as over walls or obstacles.

Project – 5

Title of the Project: To show the structure and working of the human eye using a simple 3D model.
Materials required: Clay, Plastic convex lens, Black paper (for pupil), Coloured papers / sketch pen, Fevicol, Cutter, Marker pen,
Making:

1. Take a thermocol ball and cut it into two halves carefully.
2. Use one half to make the eye structure.
3. Make a small circular opening in front and fix the convex lens as the eye lens.
4. Paste a black paper circle in front of the lens to represent the pupil.
5. Around the pupil, draw a coloured ring to show the iris.
6. Inside the eye, mark a layer at the back to represent the retina.
7. Make a small extension at the back using paper/clay to show the optic nerve.
8. Label the parts neatly: Cornea, Iris, Pupil, Eye Lens, Retina, Optic Nerve.



Working:

1. Light rays from an object enter the eye through the cornea and pupil.
2. The eye lens (convex lens) bends the light rays and focuses them on the retina.
3. The retina forms a real and inverted image.
4. The retina converts the image into electrical signals.
5. These signals travel through the optic nerve to the brain.
6. The brain interprets the signals, and we see the object correctly.

Conclusion: The eye lens forms an image on the retina. The brain helps us understand and see the image clearly.

9th CLASS

Lab Activities

Lab Activity – 1

Aim: To show that rubbing two objects together produces electric charge and the charged object can attract light objects due to static electricity.

Materials required:

SET - A	SET - B
Plastic comb	Glass rod
Dry hair	Silk cloth
Small pieces of paper	Inflated balloon

Procedure: SET - A

1. Take a dry plastic comb.
2. Comb dry hair for about 20–30 seconds.
3. Place small pieces of paper on a table.
4. Bring the comb near the paper pieces without touching them.
5. Observe what happens.

Procedure: SET – B

1. Take a glass rod.
2. Rub the glass rod with a silk cloth for 20–30 seconds.
3. Bring the rubbed glass rod near an inflated balloon.
4. Observe the movement of the balloon.

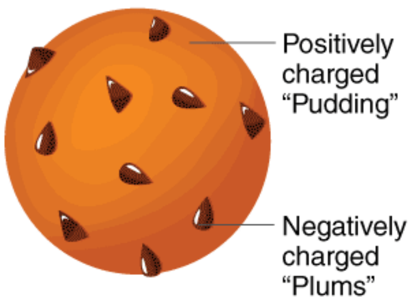
Conclusion: The paper pieces get attracted and may stick to the comb. The balloon is attracted towards the glass rod.

Lab Activity – 2

Aim: Understanding Thomson's Atomic Model (Plum Pudding Model).

Materials required: Balloon, Paper clips, Small balloons or pom-poms, Tape or glue, Markers.

Procedure:



Prepare the Model: i. Inflate a balloon to represent the atom.

ii. Attach small pieces of paper clips to the balloon using tape, which will represent electrons (negative charges).

iii. Attach small balloons or pom-poms on the surface of the balloon to symbolize the positive charge of the atom (the "pudding").

iv. Label the 'electrons' with a "-" sign.

v. Label the 'positive charge' with a "+" sign.

Conclusion: This activity demonstrates Thomson's Plum Pudding Model, where the atom is a positive sphere with embedded electrons. Although this model was later replaced, it was a key step in the development of atomic theory.

Lab Activity - 3

Aim: To calculate the number of protons, neutrons, and electrons in an atom using its Atomic Number (Z) and Mass Number (A).

Materials required: Notebook, Pencil / pen, Periodic table

Procedure:

1. Choose an element and note its Atomic Number (Z) and Mass Number (A).
2. Find the number of protons using:
3. Protons = Atomic Number (Z)
4. Find the number of electrons (for a neutral atom).
5. Electrons = Atomic Number (Z)
6. Find the number of neutrons using:
7. Neutrons = Mass Number (A) – Atomic Number (Z)
8. Write the final values clearly in a table.

S.No	Atom	Atomic Number (Z)	Mass Number (A)	No.of Protons	No. of Electrons	No.of Neutrons
1	Carbon	6	12	6	6	6
2	Oxygen	8	16	8	8	8
3	Sodium	11	23	11	11	12
4	Chlorine	17	35	17	17	18

Conclusion: By using Atomic Number and Mass Number, we can easily calculate the number of protons, electrons, and neutrons in an atom. This activity helps us understand the basic structure of atoms and how atomic particles are related to each other.

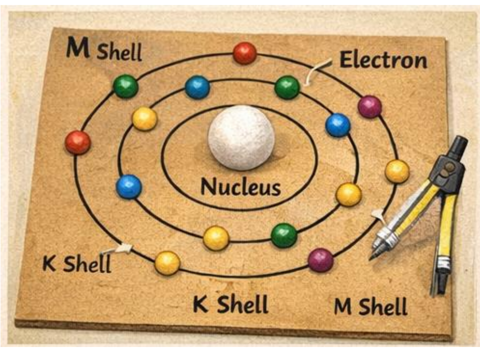
Lab Activity – 4

Aim: To make a simple model of Bohr's Atomic Model and understand that electrons revolve around the nucleus in fixed shells (energy levels).

Materials required: Cardboard, Coloured paper, 1 thermocol ball / clay ball (for nucleus), Small beads / buttons (for electrons), Thread /compass (to draw circles), Tape, Scissors, Marker pen

Procedure:

1. Take a **cardboard/chart paper** as the base.
2. Fix a **thermocol/clay ball** at the center and label it as **Nucleus**.
3. Draw **2–3 circular rings** around the nucleus using a compass.
4. Label them as **K shell, L shell, M shell**.
5. Paste small **beads/buttons** on the rings as **electrons**.
6. Example: Put **2 electrons in K shell** and **8 electrons in L shell** (if needed).
7. Label all parts neatly: **Nucleus, Electron, K shell, L shell, M shell**.



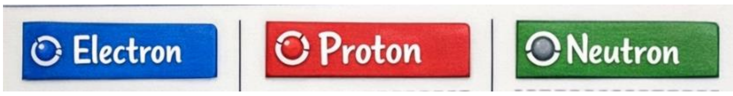
Conclusion: In Bohr's Atomic Model, electrons move around the nucleus in fixed circular paths called shells/energy levels**.** Electrons do not move randomly; they stay in definite shells. Each shell has a fixed capacity for electrons (K = 2, L = 8, M = 18…).

Model Making Projects

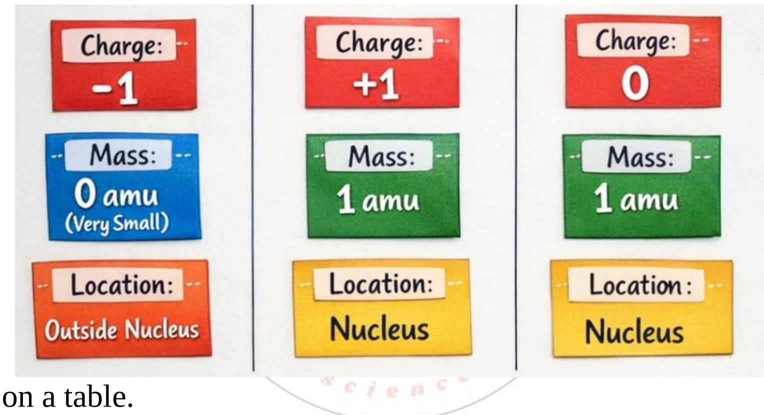
Project – 1

Title of the Project: To identify and learn the properties of subatomic particles—electron, proton, and neutron—such as their charge, mass, and location in the atom.
Materials required: Flash cards / chart paper, Sketch pens / marker, Scissors and glue.
Making:

1. Prepare three flash cards with the names:



2. Prepare property cards separately with the following words:



3. Spread all cards on a table.
4. Match each particle with its correct: **Charge**, **Mass**, **Location**
5. Check answers and write the final matching in a table.
6. Correct Matching

Subatomic particles	Charge	Mass	Location
Electron	-1	0 amu	Outside nucleus
Proton:	+ 1	1 amu	Nucleus
Neutron	0	1 amu	Nucleus

Conclusion: By matching the flash cards, we clearly understand that an atom is made up of electrons, protons, and neutrons. This activity helps us learn their charge, mass, and position, which explains the basic structure of an atom.

Project – 2

Title of the Project: To **make a static atomic model** showing the **electronic configuration (K, L, M, N shells)** of the **first eighteen elements (Hydrogen to Argon)**.
Materials required: Chart paper / cardboard sheet, Pencil, scale, eraser, Sketch pens / colour pens, Compass (to draw circles), beads / coloured paper dots (for electrons), Fevicol, Marker pen.
Making:

1. Take a **chart paper/cardboard** and write the title:**"Electronic Configuration of First 18 Elements"**

2. Draw **4 concentric circles** and label them as: **K, L, M, N shells**
3. Prepare a list of **elements from Hydrogen (1) to Argon (18)**.
4. For each element, arrange electrons in shells using the rule:
   K shell = maximum 2 electrons
   L shell = maximum 8 electrons
   M shell = maximum 8 electrons (for first 18 elements)
5. Paste/mark electrons (beads/dots) on the shells according to configuration:
   Example: **Oxygen (8) → 2, 6**
   Sodium (11) → 2, 8, 1
   Argon (18) → 2, 8, 8
6. Write the **element name, symbol, atomic number and configuration** beside each model.
7. Repeat the same for all 18 elements neatly on the chart.

Conclusion:

1. The electronic configuration of the first 18 elements can be shown using **shells K, L, and M**.
2. Electrons fill shells in a fixed order: **K → L → M → N**.
3. Valency depends on the number of electrons in the outermost shell.
4. This model helps to understand atomic structure and electron distribution clearly.

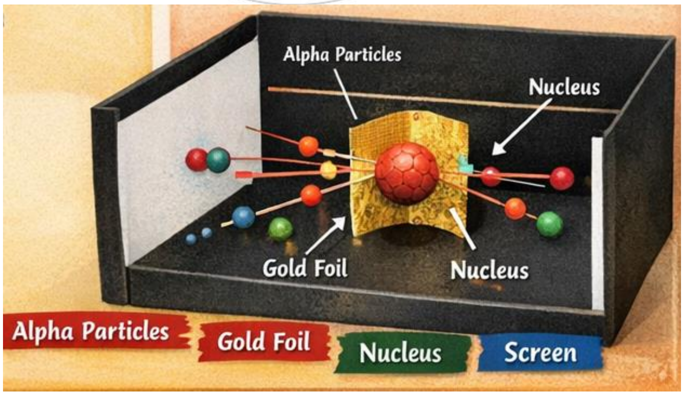
Project – 3

Title of the Project: Rutherford's Alpha Particle Scattering Experiment (Gold Foil Model)

Materials required: Shoe box, Black paper, Aluminium foil (as gold foil), Straw, Small marbles / small beads (as alpha particles), Small clay ball / thermocol ball (as nucleus), White paper (as screen), Glue, Cutter, Marker pen

Making:

1. Take a shoe box and keep it open from the top.
2. Make a small hole on one side of the box.
3. Fix a straw in the hole (this makes a straight path).
4. Fix a small piece of aluminium foil in the middle of the box (this is the gold foil).
5. Place a small clay/thermocol ball behind the foil at the center (this is the nucleus).
6. Paste white paper on the inside walls of the box (this is the screen).
7. Write labels: **Alpha particles, Gold foil, Nucleus, Screen**.



Working:

1. Drop small marbles/beads through the straw into the box.
2. Observe the movement: Most marbles go straight (no change), Some marbles change direction a little, Very few marbles bounce back when they hit the nucleus ball.

Conclusion:

1. **Most of the atom is empty space** (most particles passed straight).
2. **The nucleus is very small and heavy** (few particles bounced back).
3. **Positive charge is in the center** (some particles got deflected).

Project – 4

Title of the Project: Comparison of Thomson's, Rutherford's and Bohr's atomic Models.

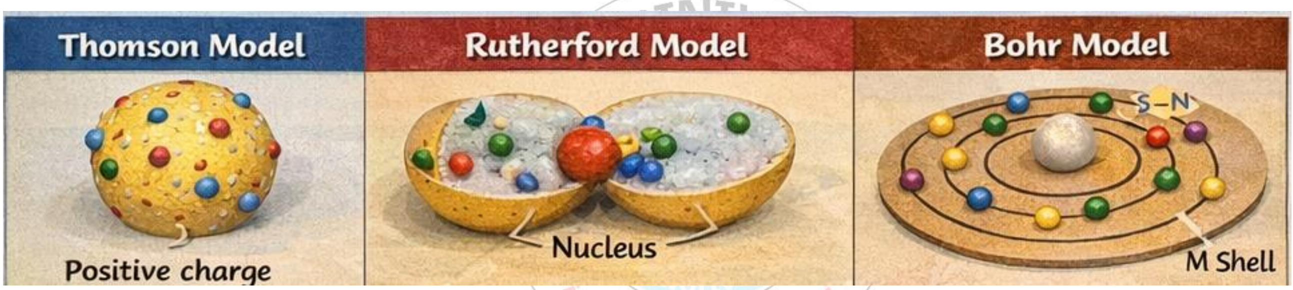
Materials required: Cardboard, 3 thermocol balls/ clay balls) **(same size)**, Small beads / buttons (electrons) Red paper / sketch pen (positive charge), Thread / wire (to make rings), Tape, Cutter, Marker pens

Making:

A) Thomson's Atomic Model (Plum Pudding Model)
1. Take **1 thermocol ball**.
2. Colour it lightly / mark it as **positive sphere**.
3. Paste **small beads** all over the ball surface.
4. Label: **Positive charge + embedded electrons**.

B) Rutherford's Atomic Model (Nuclear Model)
1. Take **2nd thermocol ball** and cut it into **two halves**.
2. Fix a **small clay ball** at the center (nucleus).
3. Paste a few **beads** around it (electrons) with some space.
4. Close the halves or keep it open to show inside.
5. Label: **Nucleus at centre, electrons around, empty space**.

C) Bohr's Atomic Model (Shell Model)
1. Take **3rd thermocol ball** or make on cardboard base.
2. Fix a small ball at the center as **nucleus**.
3. Draw **2–3 circular rings** around nucleus (K, L, M shells).
4. Paste electrons (beads) on the rings.
5. Label: **Fixed shells (energy levels)**.



Working:

Thomson Model	Rutherford Model	Bohr Model
Atom is a positive sphere	Atom has a small, heavy, positive nucleus	Electrons revolve in fixed shells (K, L, M...)
Electrons are embedded inside it	Electrons revolve around nucleus	Electrons do not move randomly
No nucleus concept	Most of the atom is empty space	Each shell has a fixed electron capacity (K=2, L=8...)

Conclusion:
1. **Thomson** explained the presence of electrons but **did not explain nucleus**.
2. **Rutherford** discovered the **nucleus** and proved atom is mostly **empty space**, but could not explain stable electron paths.
3. **Bohr** improved Rutherford's model by giving **fixed energy levels (shells)**, explaining **stable atoms** and electron arrangement.

Note: It is not necessary to draw diagrams related to draw diagrams related to the project.

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