



# Introduction, Rutherford Experiment

Course on Atomic Structure for Class XI

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akhilesh • Lesson 1 • Aug 23, 2021

# Atomic structure : →

This chapter mainly deals with structure of atom.

Dalton atomic theory (1808)

J.J. Thomson →  $e^-$  (1896)

→ Thomson atomic model (1898)

Rutherford model

(1911)

Bohr Model

(1915)

Schrodinger Model

(1925)

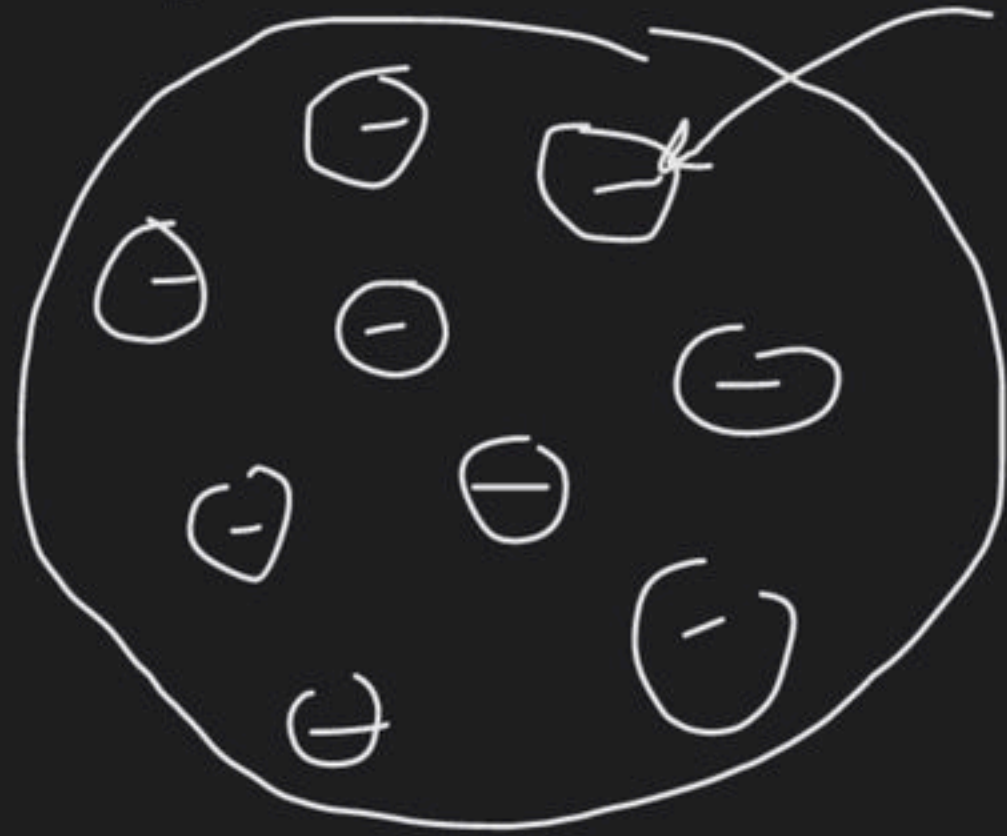
Planck quantum

(1876)

1905



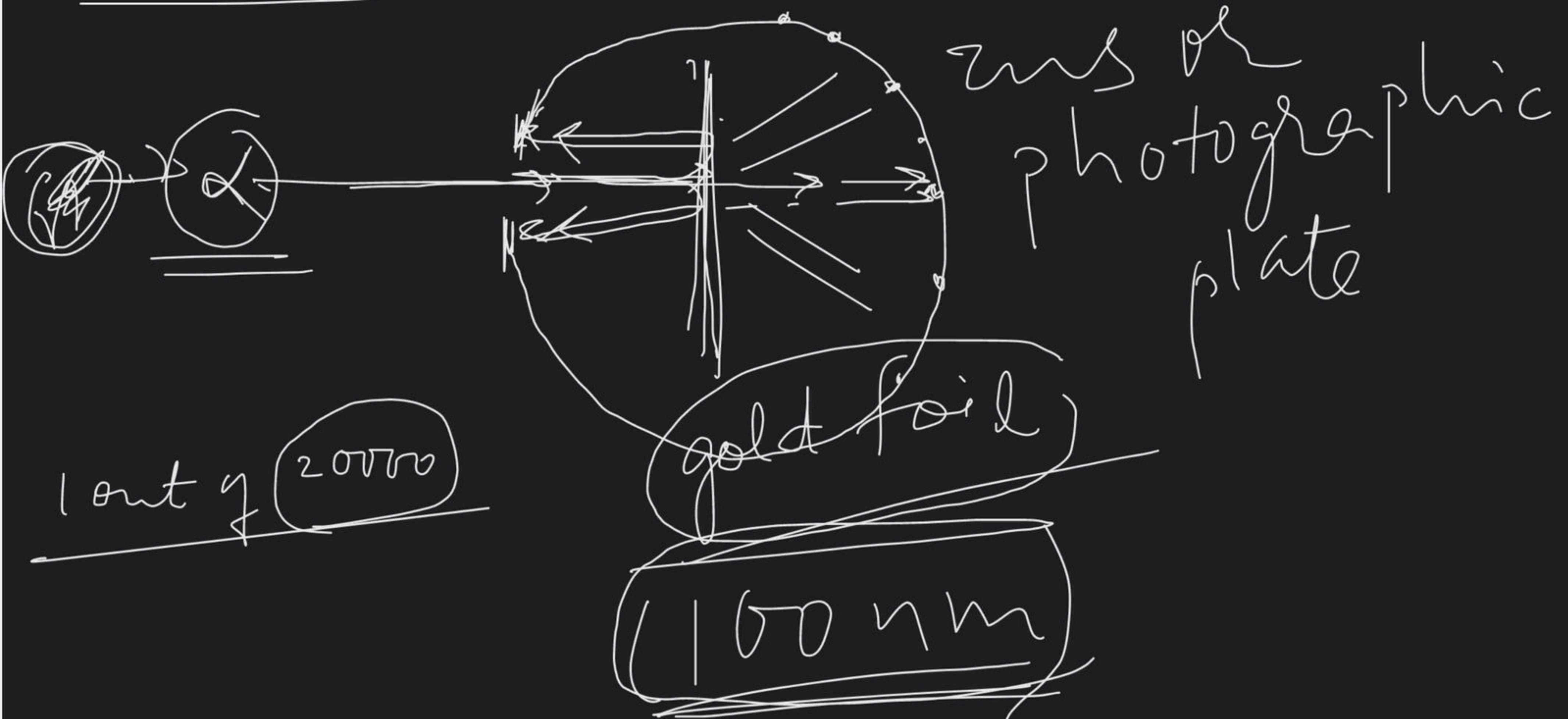
Thomson atomic model (plum-pudding model  
or  
Water melon model)  
(1898)



In this model +ive charge  
is distributed throughout the  
sphere and -ive charge  
is embedded to make  
whole atom electrically  
neutral.



# Rutherford nuclear model $\rightarrow$



(a) experimental results →  
conclusion  
(b) Rutherford nuclear atomic model  
(c)  
→



# observation

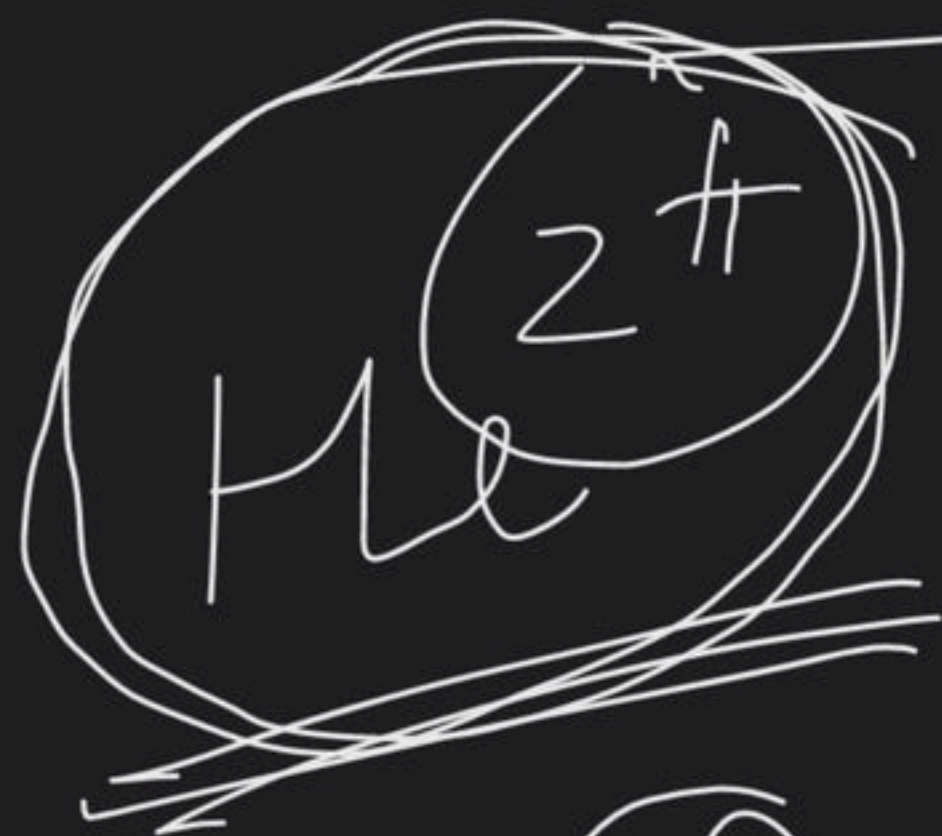
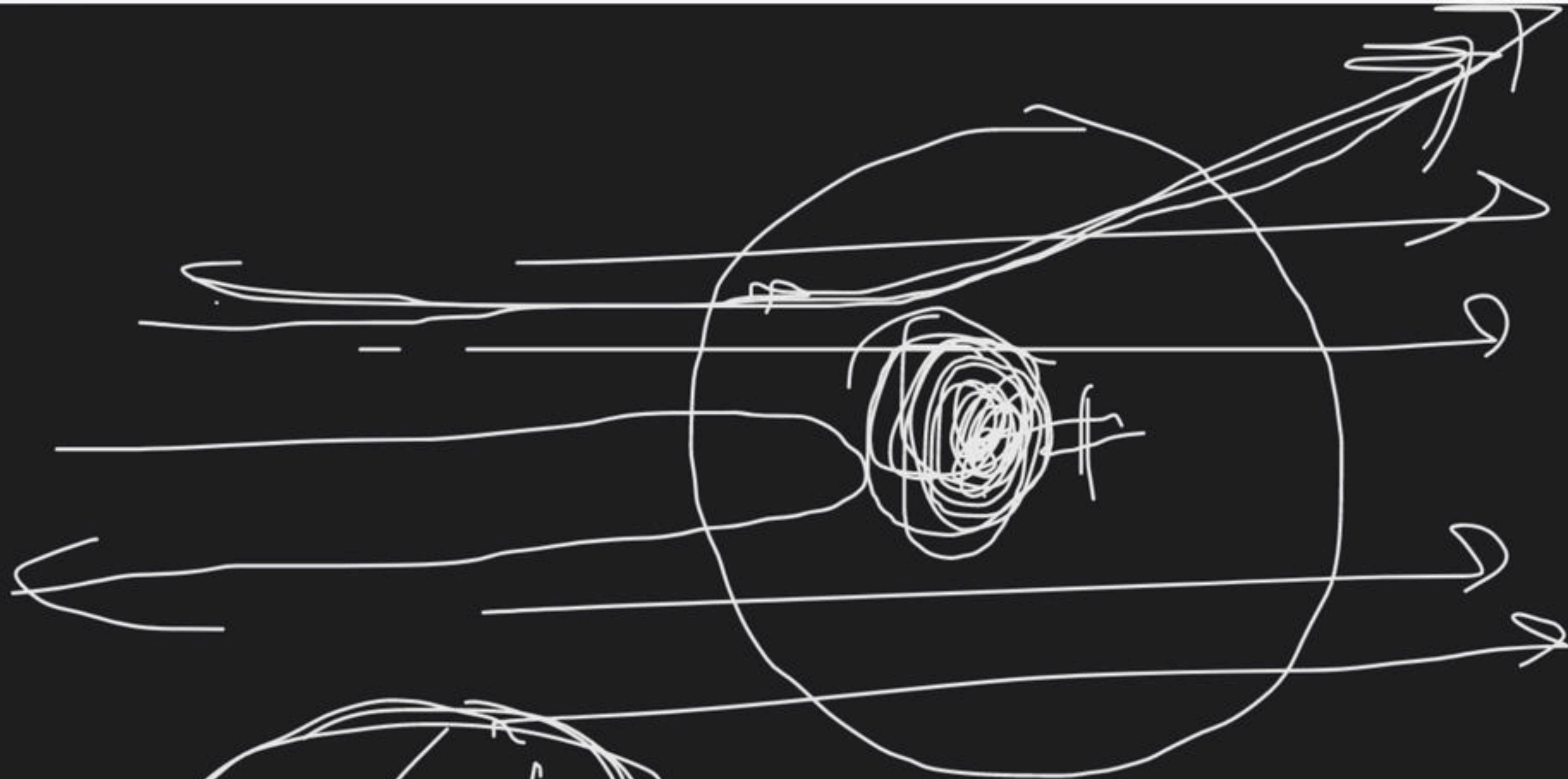
1. Most of the  $\alpha$ -particle passed undeflected through the gold foil.
- 2) A small fraction of the  $\alpha$ -particles was ~~was~~ deflected by angle

3) A very few  $\alpha$ -particle  
(1 out of 20000) bounced  
back (deflected by  $180^\circ$   
nearly)

Conclusions

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$$\frac{10}{1} - 10$$

$$\frac{10}{1} - 15$$



① Most of the space in the atom is empty as most of the  $\alpha$ -particles passed

undeflected  
2) The positive charge has to be concentrated

in a very small volume  
that repelled and deflected  
positively charged  $\alpha$ -particles

~~by~~ calculations by that  
(3) Rutherford showed that  
volume occupied by



is very small. The radius of an atom is nearly  $10^{-10}$  m and that of nucleus  $10^{-15}$  m.

### ③ Rutherford nuclear atomic model : $\rightarrow$

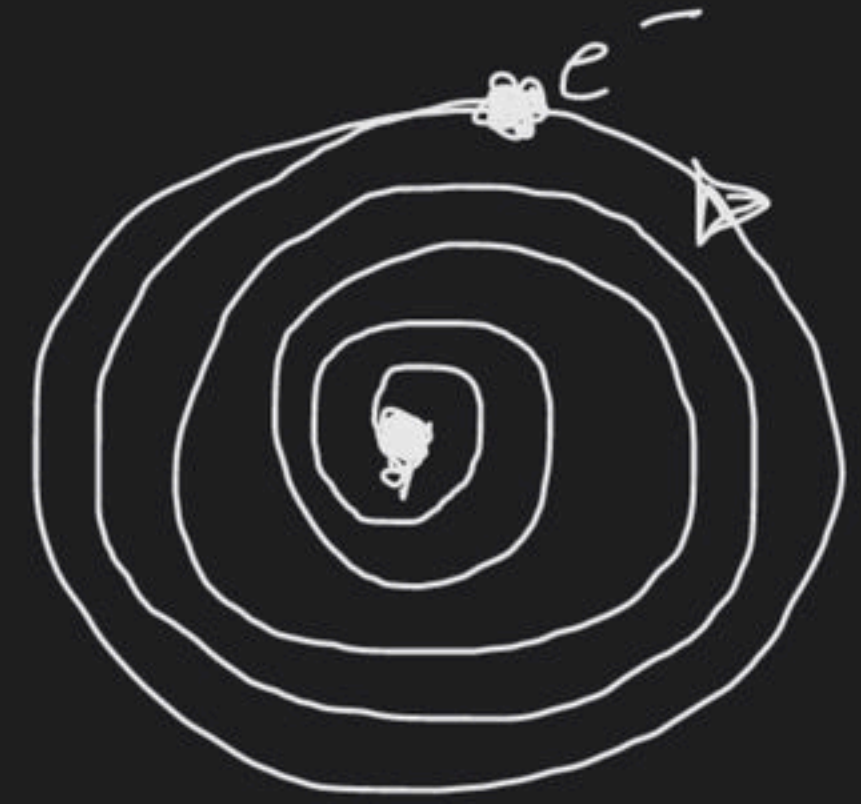
- ① Positive charge and mass of an atom is densely concentrated in a very small region at the centre of the atom called nucleus.
- ② The nucleus is surrounded by  $e^-$ , that move ~~is~~ around the nucleus in circular path called orbits.
- ③

③ Electrons and nucleus are held together by electrostatic force of attraction.



# Drawbacks

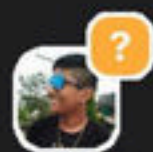
①



(1) As per Maxwell electromagnetic theory a charge particle under acceleration must emit energy continuously. In Rutherford Model  $e^-$  revolves around nucleus in circular path, in which  $e^-$  experience acceleration so it must also emit energy continuously and should fall in nucleus following spiral path.

(2) Why atoms form chemical bond is also not explained by Rutherford.





## Question

from dwarkadhis...

### Evolution of Doctor's Handwriting Any doctor you know ?

Handwri Hing	10 <sup>th</sup>
Handwritting	11 <sup>th</sup>
Handwritting	12 <sup>th</sup>
Handwritting	MBBS
Handwring	PG
Handwring	Junior Doctor
Handwring	Senior Doctor
Handwring	Specialist Doctor

Boltzman (1906)

1900-1930  
↓