



Chapter 8



Journey Inside the Atom



Tiny particles. Vast energy.
Understanding the building blocks of everything.



Observe



Think



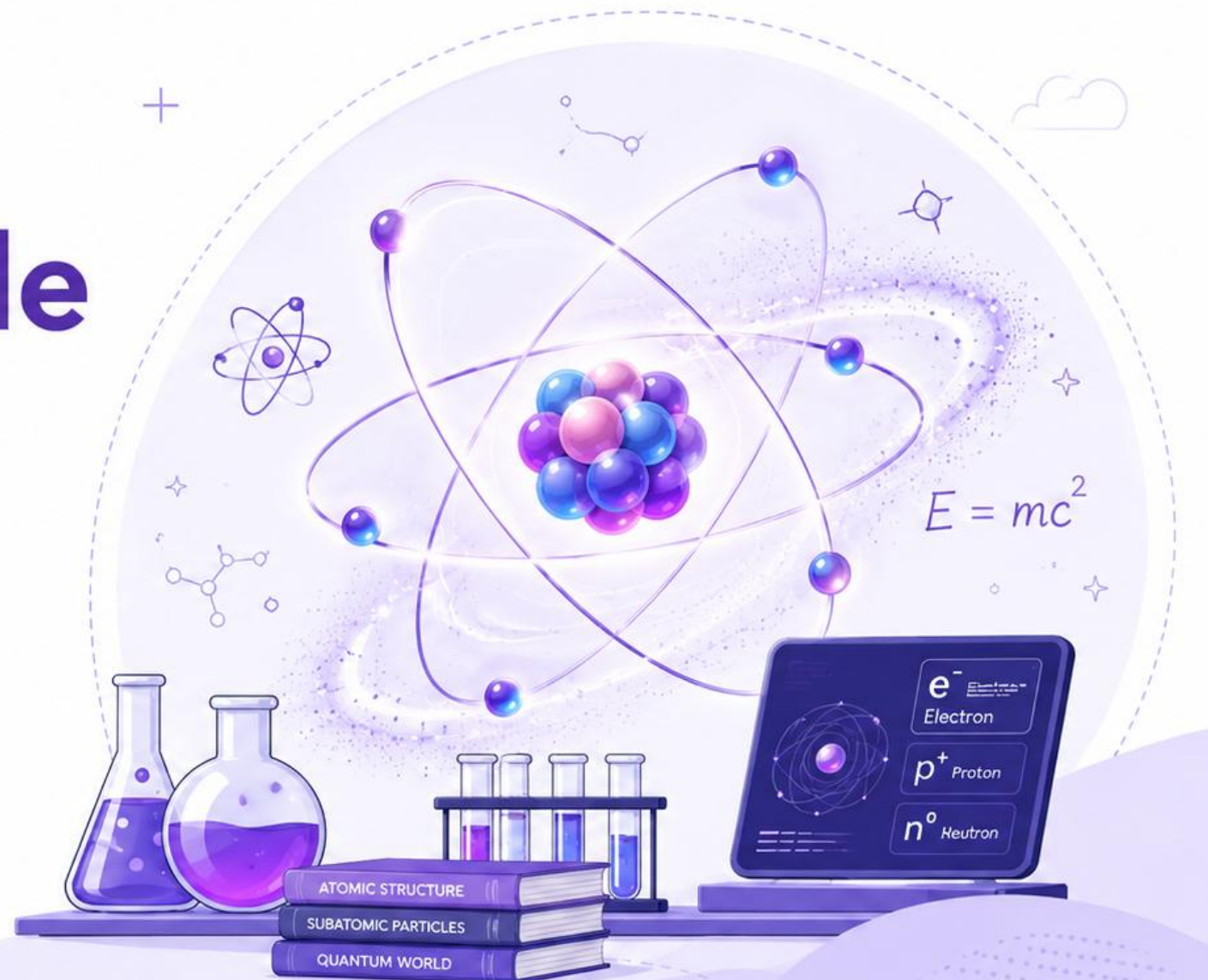
Experiment



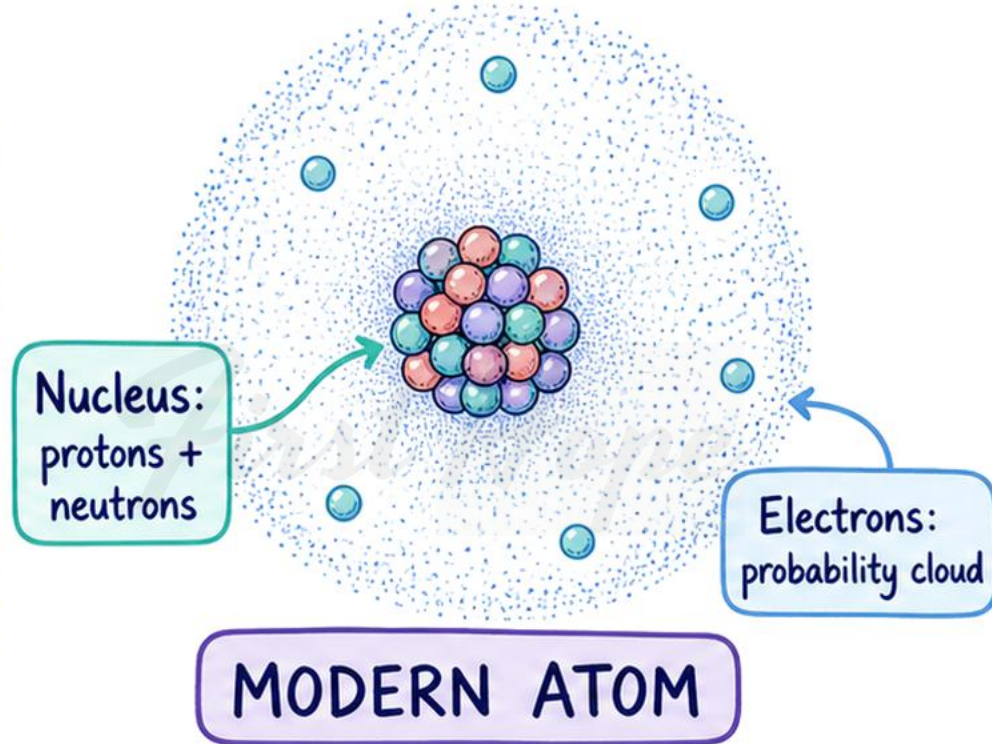
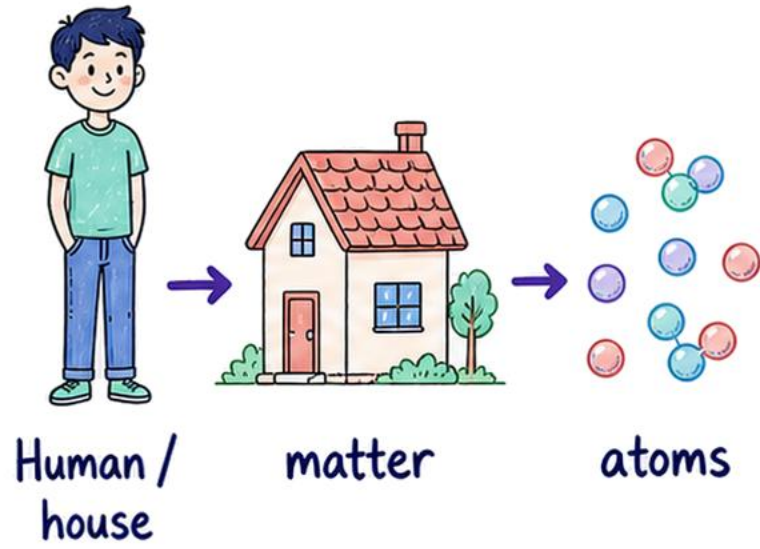
Explore



Discover



JOURNEY INSIDE THE ATOM



- Matter is made of atoms.
- Living and non-living things are ultimately made from atoms.
- Atoms are extremely small.
- Atoms contain smaller subatomic particles.

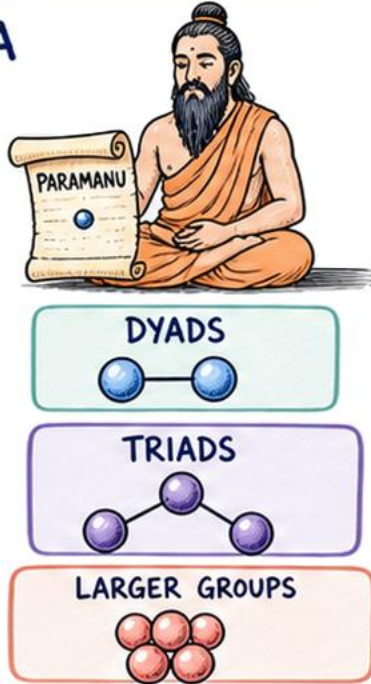
How did experiments make scientists change atomic models?



EARLY IDEAS ABOUT ATOMS.

MORE THAN 2,000 YEARS AGO

- ACHARYA KANADA
- Repeated division of matter reaches indivisible parmanu.
- Parmanus combine as dyads, triads and larger groups.
- Philosophical idea — not a tested quantitative theory.



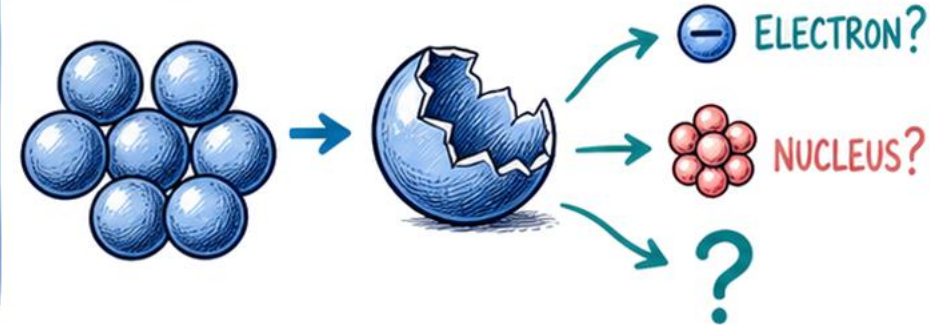
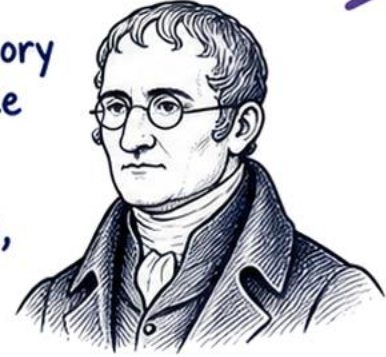
GREEK THINKERS

- Leucippus + Democritus
- atomos = indivisible
- Conceptual idea, not modern experimental evidence.



1808 — JOHN DALTON

- First scientific atomic theory based on chemical evidence of his time.
- Matter is made of atoms, treated as indivisible building blocks.

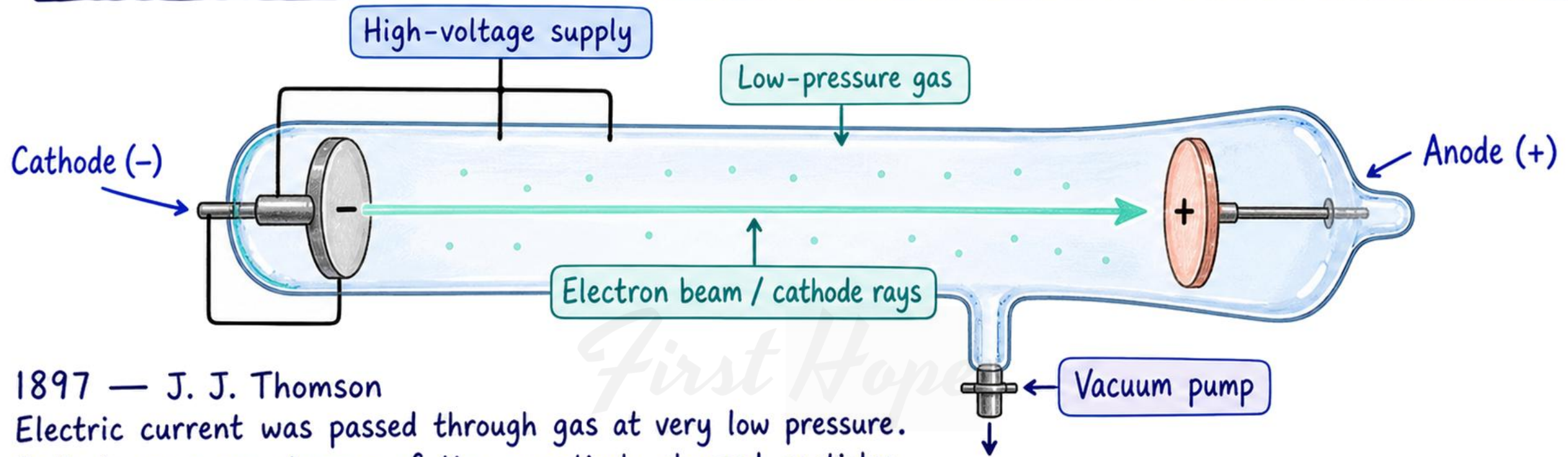


Later experiments showed atoms are divisible.

Idea → evidence → model → new evidence → improved model

What are atoms made of?

CATHODE RAYS REVEAL THE ELECTRON



- 1897 — J. J. Thomson
- Electric current was passed through gas at very low pressure.
- Cathode rays are streams of tiny negatively charged particles.
- These particles were called electrons.

EVIDENCE

Same behaviour for different cathode materials and gases



Electrons are present in atoms of every element

CHARGE

- Electron charge = $-1.602 \times 10^{-19} \text{ C}$
- Relative charge = -1
- Electron mass is much smaller than atomic mass.

KEY IDEA: Atoms contain smaller subatomic particles.

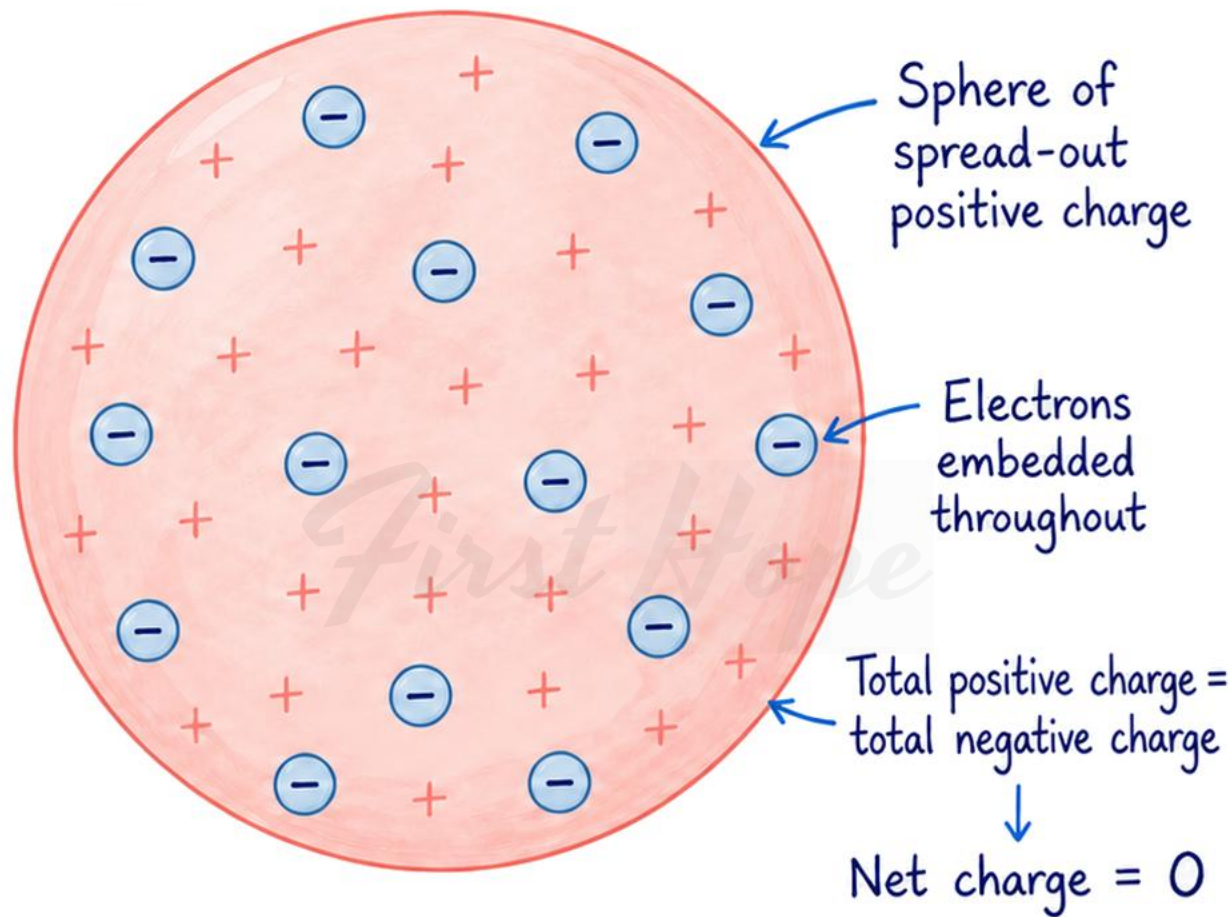
THOMSON'S MODEL OF THE ATOM

THE PUZZLE

Atoms contain negative electrons, yet atoms are neutral.

Where is the positive charge?

Total positive charge =
total negative charge
Net charge = 0



PLUM PUDDING / WATERMELON MODEL



Positive matter →
pudding or red pulp

Electrons →
plums or seeds



STRENGTH:

First physical model to include positive and negative parts inside the atom.



LIMITATION:

No small nucleus; could not explain alpha-particle scattering.

* Diagram colours are only for understanding.



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