

Historical Development of Atomic Theory

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(A concise, chronological overview for quick study)

1. Early Philosophical Roots (c.400 BC – 17th century)

Era / Thinker	Key Idea	Significance
Leucippus & Democritus (ancient Greece)	Matter consists of indivisible <i>atomos</i> (uncuttable).	First explicit atomic hypothesis; purely philosophical.
Aristotle (384–322 BC)	Rejected atomism; matter is continuous, composed of the four elements.	Dominated Western thought for centuries, delaying experimental progress.
Alchemists (Middle Ages)	Sought a <i>prima materia</i> underlying substances.	Kept the idea of fundamental building blocks alive, albeit mystically.
Robert Boyle (1627–1691)	“Matter is made of particles that combine in different ways.”	Early experimental support for particulate matter.

2. Classical Chemistry (late 18th–early 19th century)

Date	Scientist	Contribution
1774	Antoine Lavoisier	Law of Conservation of Mass ? quantitative chemistry.
1789	Joseph Priestley	Discovered several gases, showing substances can be transformed.
1803	John Dalton	Dalton’s Atomic Theory (postulates: 1) Elements consist of identical atoms; 2) Atoms of different elements differ in mass; 3) Compounds are combinations of atoms in fixed ratios; 4) Chemical reactions rearrange atoms).
1808	Jöns Jakob Berzelius	Introduced chemical symbols and atomic weights.

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Date	Scientist	Contribution
	Jöns	
1828	Berzelius	Distinguished <i>atoms</i> (indivisible) from <i>molecules</i> (composed of atoms). (again)

3. The Rise of the Periodic Table (mid-19th century)

Year	Scientist	Key Insight
1869	Dmitri Mendeleev	Arranged elements by atomic weight, predicting undiscovered elements. Implicitly assumed each element has a unique atom.
1871	Lothar Meyer	Similar periodic arrangement; reinforced the idea of atomic regularity.

Impact: The periodicity of properties hinted at an underlying atomic structure.

4. Discovery of Subatomic Particles (late 19th – early 20th century)

Year	Experiment / Scientist	Finding
1897	J.J. Thomson – cathode ray tube	Electron discovered; atoms are divisible.
1904	Robert Millikan – oil drop experiment	Measured electron charge & calculated electron mass.
1911	Ernest Rutherford – gold foil experiment	Nucleus (tiny, dense, positively charged) at atom's center; electrons orbit around it.
1913	Niels Bohr – hydrogen spectrum	Quantized electron orbits; introduced energy levels.

5. Quantum Mechanics & the Modern Atom (1920s-1930s)

Year	Scientist(s)	Advancement
1925	Werner Heisenberg	– matrix