



Understanding Matter

Ancient Ideas

Democritus



- Argued that matter consists of small particles
- Called the particles “atoms”
 - Greek for indivisible

Antoine Lavoisier (1743-1793)

- French Chemist
- “Father of Modern Chemistry”
- Executed during Reign of Terror in French Revolution

[Video](#)



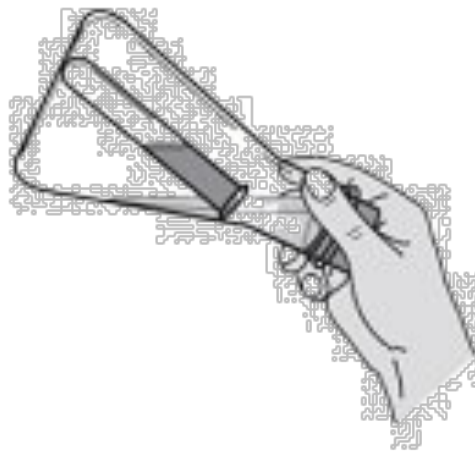
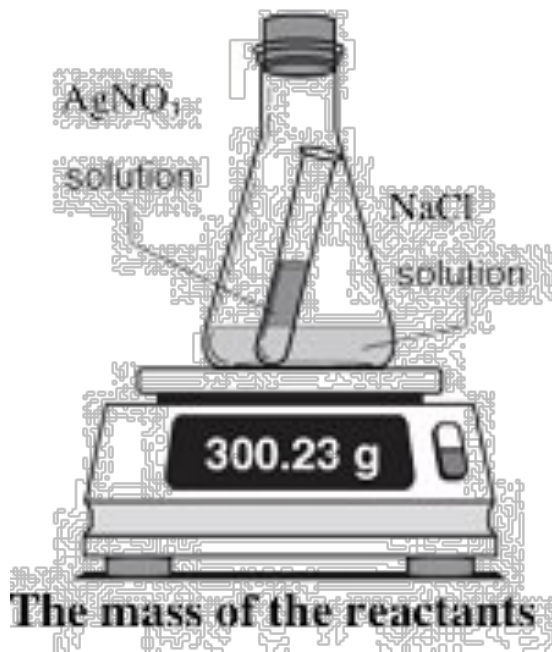
Lavoisier's experiment

• **Studied decomposition of mercury (II) oxide**

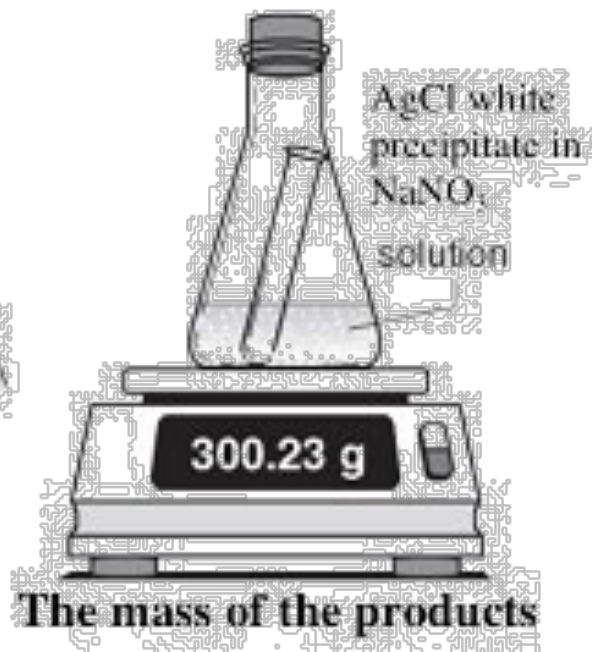
- Found that mass before the reaction equaled the mass after the reaction



Law of Conservation of Mass



Equals



Joseph Proust

- Law of Definite Composition
- Compound contains same ratio of elements, regardless of source or size of sample



Definite Composition

- Compound contains same ratio of elements, regardless of source or size of sample
- Water
 - Always 11% hydrogen, 89% oxygen

Definite Composition

- Water
 - Always 11% hydrogen, 89% oxygen
- Table salt
 - Always 45% sodium, 55% chlorine

John Dalton (1766-1844)



- English scientist and teacher
- Many research interests
- In 1808 Dalton published A New System of Chemical Philosophy

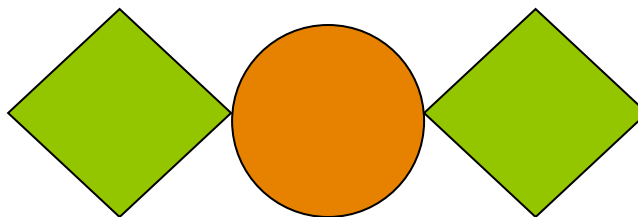
Dalton's Atomic Theory

- All matter is made of indivisible particles called atoms.
- Atoms of each element are different from atoms of other elements.
- All atoms of an element are completely identical in properties and mass.

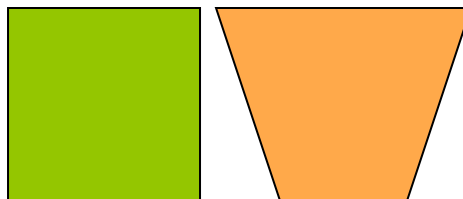
Law of Definite Proportions

- Atoms of different elements combine in small whole number ratios to form compounds.

- Water H_2O



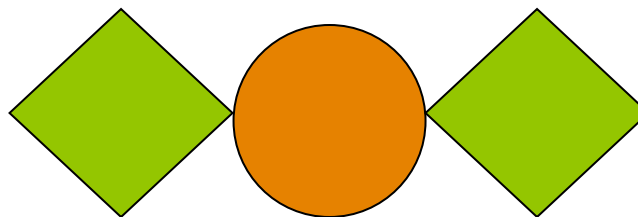
- Table salt (aka sodium chloride) $NaCl$



Law of Multiple Proportions

- Atoms of different elements can combine in different whole number ratios to form different compounds.

Water H_2O
2:1 ratio



Hydrogen peroxide H_2O_2
2:2 ratio

