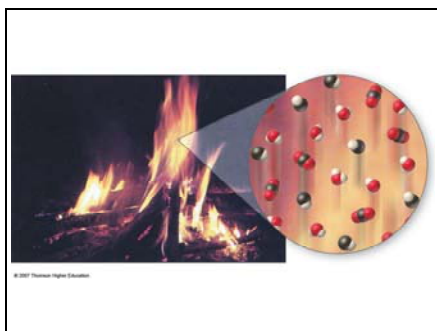


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Chemistry in Focus 3rd edition
Tro

Chapter 1
Molecular Reasons

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Firesticks

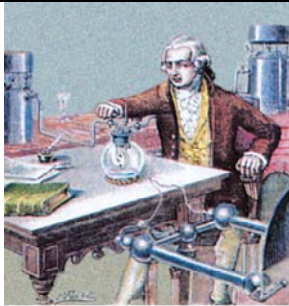
- A chemical reaction is an extraordinary transformation.
- Microscopic vs. Macroscopic Worlds
 - Interpretation of a situation depends manner in which it is framed
 - And so, why *should* nonscience majors study science (chemistry in particular)?

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Molecular Reasons

- Chemistry is a world we cannot see, yet it is the cause of all that is around us.
- Chemists examine the molecular reasons for our macroscopic observations.

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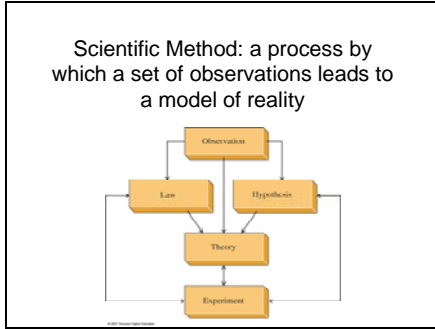


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The Scientist and the Artist

- To what extent can each be used to frame "science" as we know it?
- Antoine Lavoisier
 - Father of modern chemistry
 - Unfortunate end
 - Law of conservation of mass
 - Capable of summary and prediction

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- ### Underlying Causes
- Hypothesis
 - Experiment
 - Theory
 - Further experimentation

 - John Dalton's formulation of atomic theory

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- ### First Wonderers
- Greek philosophers
- Plato
 - Democritus
 - Thales
 - Empedocles
- Aristotelian logic
 - Reigned for 2000 years

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Alchemy

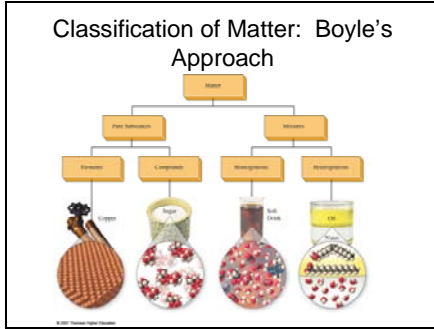
- Goal: transmutation and discovery of the "elixir of life"
- Metallurgy
- Mysticism and secrecy slowed any real scientific progress.

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An Understanding

- The scientific revolution
- Publications by Copernicus and Vesalius emphasized observation and experimentation.
- Opposition from Aristotle and the Church
- Robert Boyle's *Skeptical Chymist*

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Classification by Composition:

- Pure substance
 - Elements cannot be decomposed by any amount of chemical transformation.
 - Compounds are composed of two or more elements in definite proportions.
- Mixtures
 - Combinations of two or more pure substances in variable proportions

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Classification by Phase: Solid, Liquid, and Gas

| | | | |
|--------|----------------|-----------------|----------------|
| Solid | Incompressible | Fixed volume | Fixed shape |
| Liquid | Incompressible | Fixed volume | Variable shape |
| Gas | Compressible | Variable volume | Variable shape |

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Properties of Matter

- Physical properties: those properties that a substance displays **without changing** its composition
- Chemical properties: those properties that a substance displays **only when changing** its composition
- So to, physical and chemical *properties*

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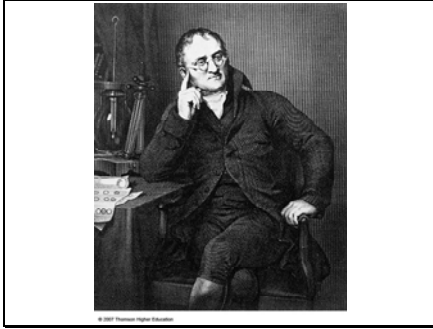
Differentiating between physical and chemical properties (and/or changes) is NOT trivial for the inexperienced observer.

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Atomic Theory Develops

- Lavoisier- law of conservation of mass
- Proust – law of constant composition
 - Refer to examples 1.3 and 1.4 and the associated Your Turns in your textbook.

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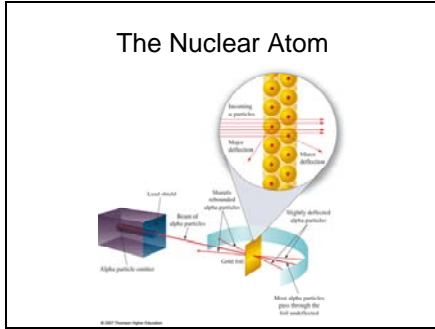
Dalton's Atomic Theory

- All matter is composed of particles called atoms.
- All atoms of a given element are alike in mass and other properties.
- Atoms of different elements combine to form compounds in simple whole number ratios.

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Dalton's theory is synthesized from MANY different sources of information.

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Rutherford's Nuclear Theory

- Three basic tenets
- Still valid today
- Later work demonstrated the existence of sub-nuclear particles.
