Chemical Mystery Tour

*Let’s Review ...*

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Introduction to Chemistry

Some common elements and symbols:

- **H** = hydrogen
- **He** = helium
- **C** = carbon
- **N** = nitrogen
- **O** = oxygen

About 90 elements are found in Nature, not counting those made only in laboratories.

Have ~ 115 elements in all.

Have elements, but also have ... combinations of elements called **compounds**.
Some common compounds and the formula of each:

- $\text{H}_2\text{O} = \text{water}$
- $\text{SO}_2 = \text{sulfur dioxide}$
- $\text{CH}_4 = \text{methane}$
- $\text{NaCl} = \text{sodium chloride}$

Three common phases of matter

Energy sources lead to chemical reactions.

Example:
$\text{H}_2\text{O}$ and $\text{SO}_2$ make $\text{H}_2\text{SO}_4$
(acid rain)

Energy Sources ...

Can calculate masses of reactants and products in chemical reactions:

Stoichiometry

Example:
$\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
Chemistry has **macroscopic** and **microscopic** aspects.

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<th>Macroscopic</th>
<th>Microscopic</th>
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<td>Element</td>
<td>Atoms</td>
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<td>Compound</td>
<td>Molecules</td>
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Molecules have **geometrical structures**!

Different structures mean different properties!

Structure and properties are related.

Chemistry applies to living organisms too!

Have ...

pure materials and mixtures

Heterogeneous mixture

Homogeneous mixture = solution
Part II: Chemistry is Everywhere!

Examples of Mixtures: Saturn and Titan

Titan’s atmosphere ...
95% nitrogen + 5% methane and many “trace” organic materials

Possible Chemical Triggers Include ...
- Solar UV
- Saturn’s Radiation Belts
- Cosmic Rays
- Lightning
Chemistry Really is Everywhere!