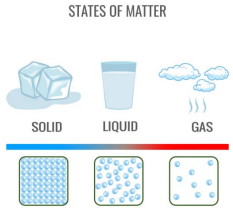
Introduction to Chemistry

Chemistry

The study of matter and how matter changes



Matter

Any substance that has **mass** and takes up **space**
Mass – how *heavy* a substance is (*based on weight*)
Space – the amount of space (*volume*) and object takes up

A *state* of matter is how matter exists in nature based on the connections (*bonds*) between atoms in matter.

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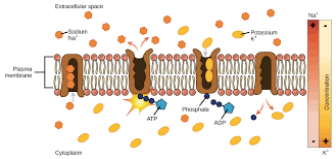
Key Ideas of Chemistry

Chemistry as the *central science*

Chemistry is know as the central science because it connects together many other aspects of science as a whole.



Ion transport in cells based on charged ions of Na^{1+} and K^{1+} (*biology*)

Magma flows from earth mantle due to energy flow in crust (*earth science*)

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Key Ideas of Chemistry

The atom

The fundamental form of matter, containing the subatomic particles protons (p^+), electrons (e^-), and neutrons (n^o) that define each type of atom

Element

Types of atoms based on the subatomic particles (*sodium, Na*)

Compounds / Molecules

Combination of atoms of different elements producing larger chemical structures (*sodium chloride, NaCl, 1 sodium + 1 chlorine*)

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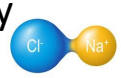
Key Ideas of Chemistry

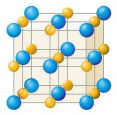
Sodium Chloride

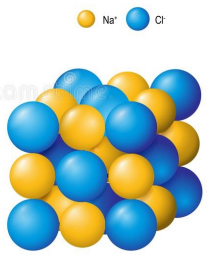


1 atom sodium (*Na*) with 1 atom chlorine (*Cl*)

Na attaches (*bonds*) to Cl through a charged atom (*ion*)

Many NaCl combines together to form a crystal lattice with a specific state of matter.





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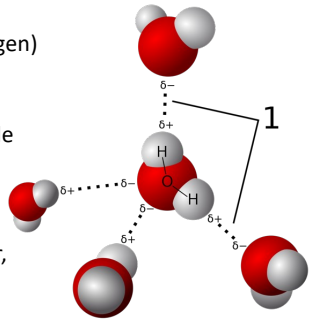
Introduction to Chemistry

Water (Dihydrogen monoxide)

(H_2O, 2 atoms hydrogen and 1 atom oxygen)

Hydrogen attaches to oxygen due to the *sharing* of electrons (e^-), a type of particle that makes up water

Different water molecules connect to each other to form large groups of water, normally as a liquid or solid (*ice*)



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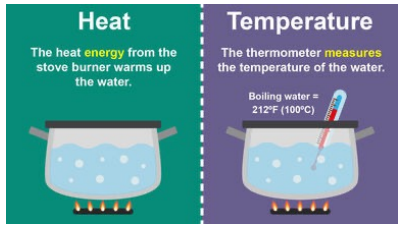
Key Ideas of Chemistry

Energy

All atoms require *energy* to move and change

Heat and Temperature

The energy due to the speed (*temperature*) of matter



Energy is transferred between matter with higher energy to matter with lower energy

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Key Ideas of Chemistry

Chemical Reactions

Atom rearrangement in compounds form new compounds

Biological Systems (living organisms) are living due to constant chemical reactions producing energy

Combustion Reaction

Breaking down chemical structures to produce energy

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Chemical Research

Pure Chemistry

Research into nature and how nature works to just learn about matter

Applied Chemistry

Solving problems through research either applying older concepts or discovering new concepts

All research involves the scientific method

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