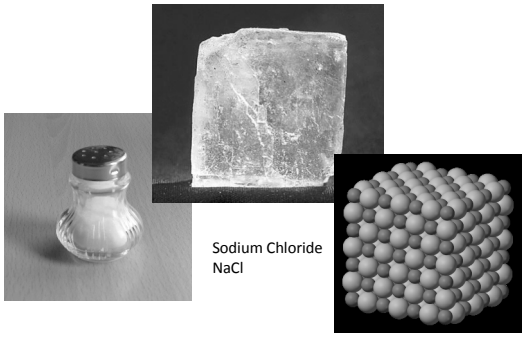
Introduction to Chemistry

Matter, Mixtures, Compounds, and Elements

What is Chemistry

- Chemistry – A science that explains what we see in the world by considering the atoms, molecules, ions, and compounds that make up matter.

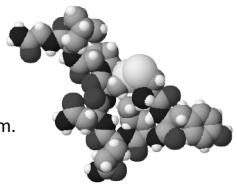
Chemistry-Salt



Sodium Chloride
NaCl

Chemistry-Love

Touch alone sems to create the love



Touch released Ocytocin in the baby and the person holding him.

(Oxytocin $C_{43}H_{66}N_{12}O_{12}S_2$)

Chemistry-Love

There is the same chemical in these Wallaby's. What does this mean?

The Beginning Of Understanding Chemistry is Understanding Matter

Matter – The stuff that makes up living creatures and things are made of.

Classify Matter by

- Its Composition – What's in it
- Mixture or Pure
- Its State – Basic features of how it behaves
- Solid or Liquid or Gas

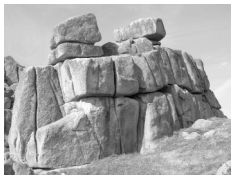
Matter a Formal Definition

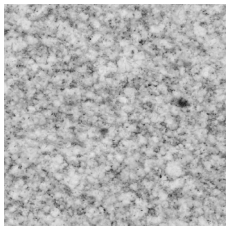
- **Matter:** Anything that has mass and occupies space – things you can see, touch, taste, or smell.

Heat ?	No	Sun ?	Yes
Wind ?	No	Air ?	Yes
Electricity ?	No	Electron ?	Yes

Almost Everything is a Mixture of Other Things

- Granite?





Mixtures

- Kool-Aid?
- Looks Pure-Only 1 Color-Pretty Even
- But the Ingredient List
- "There are a lot of chemicals in this stuff"

Two Types of Mixtures

- Heterogeneous (You can tell it is a mixture.)
- Homogenous (You can't tell is is a mixture just by looking.

Mixtures

Mixtures can be separated physically.

- Pulling Apart – The little bits in granite, or salt and sugar
- Evaporation – Salt left after sea water evaporates
- Crystalization, filtration, distillation, …

Pure Substances

What you have when something can no longer be separated physically.

- For Example in the Kool-Aid

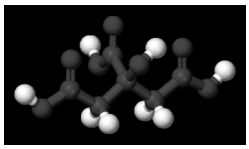
(Citric Acid, Maltodextrin, Calcium Phosphate, Salt, Artificial Flavor, Ascorbic Acid, Red 40, Blue 1)

- Or the metals in a penny.

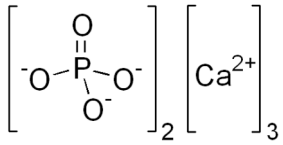
(Copper and Zinc)

Pure Substances – Compounds

- Citric Acid
$C_6H_8O_7$



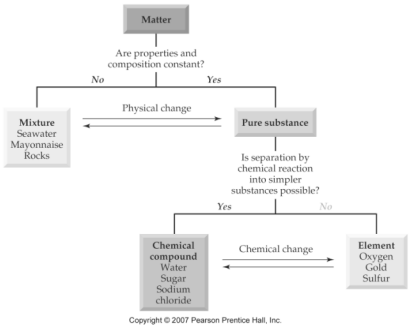
- Calcium Phosphate
$Ca_3(PO_4)_2$



Pure Substances – Compounds and Elements

- Compounds are pure substances but they are composed of something else – Elements
- For example citric acid is composed of carbon atoms, oxygen atoms, and hydrogen atoms
- A compound can be broken into its elements by chemical processes.
- Elements are a particular type of atom, or a substance made by joining only one type of atom together.

•The classification of matter is summarized below.

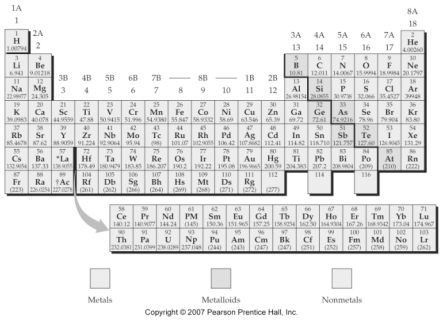


Pure Substances – Compounds and Elements

- Telling which homogenous mixtures are actually pure substances took a lot of effort.
- Figuring out which pure substances were compounds and which the elements were took an awful lot of effort.
- You can recognize elemnts by looking at a periodic table. (If it is in the table it is an element. If it is not in the table it is not an element.) and compounds by their formulas.

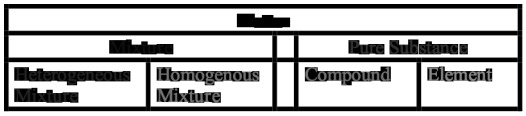
Elements and the Periodic Table

If its in the table its an element



Classification Of Matter

- Matter is either a Mixture or a Pure Substance



- A mixture is either homogenous mixture or heterogeneous mixture
- A Pure Substance is either a compound or an Element.

States of Matter

•Common states of matter are: solid, liquid, and gas.

▸**Solid:** A substance that has a definite shape and volume. Solids are rigid and dense.

▸**Liquid:** A substance that has a definite volume but that changes shape to fill the container. Liquids are dense and fluid.

States of Matter

▸**Gas:** A substance that has neither a definite volume nor a definite shape. Gases are low density fluids.

▸Substances can exist in each of these three states depending on the pressure and the temperature. The conversion of a substance from one state into another is known as change of state.

•The three states of water- the solid state, the liquid state, and the gaseous state

(a) Ice: A solid has a definite volume and a definite shape independent of its container.

(b) Water: A liquid has a definite volume but a variable shape that depends on its container.

(c) Steam: A gas has both variable volume and shape that depend on its container.

Summary

- Chemistry is the study of our world that focuses on atoms, molecules, ions and compounds.
- Matter is that which occupies space and has a mass.
- Matter can be classified by its composition and its state.