



Science in Action Textbook (pgs. 88-109) Unit 2 Matter and Chemical Change

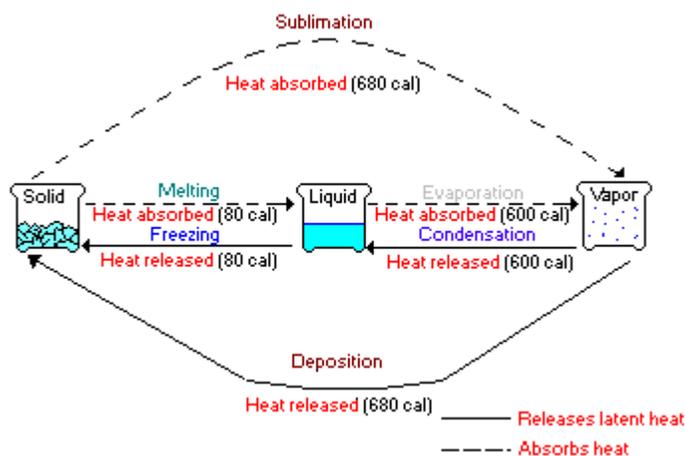
1.0 Matter can be described and organized by its physical and chemical properties.

1.1 Safety in the Science Classroom

Lab Safety Notes (Detailed)

1.2 Organizing Matter

Matter exists in three states: solid, liquid, or gas.
Matter can undergo a change in state when energy is used or released.



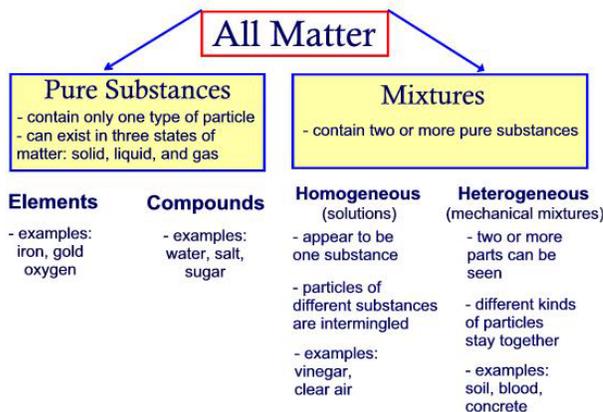
Properties are characteristics that can be used to describe a substance. These properties can be physical or chemical.

Physical properties (sia p. 77)

These can include: color, luster, melting point, boiling point, hardness, malleability, ductility, crystal shape, solubility, density and conductivity.

Chemical properties describe how a substance interacts with other substances. Chemical properties include: reaction with acids, ability to burn, reaction with water, behaviour in air and reaction to heat. A **chemical change** always results in the formation of a different substance, which has its own unique 'different' physical properties.

Pure Substance or Mixture?



The physical and chemical properties of a substance show us whether a substance is **'pure'** or a **'mixture'**.

A pure substance is made up of only one kind of matter and has its own unique set of physical properties.

Types of Pure Substances

- **element**
- cannot be broken down into any simpler substance
- **compound**
- is a combination of two or more elements in fixed proportions

A mixture is a combination of pure substances

Types of Mixtures

- **mechanical (*heterogenous*)**
- each substance in the mixture is visible
- **solution (*homogeneous*)**
- each substance is not clearly visible (A substance dissolved in water is called an aqueous solution)
- **suspension**
- is a cloudy mixture in which tiny particles are held (suspended) with another substance, and can be filtered out
- **colloid**
- is also a cloudy mixture, but the particles are so small that they cannot be filtered out easily

1.3 Observing Changes in Matter

Matter can change from one form to another, or create new materials.

A **physical change** occurs when a material changes state.

A **chemical change** occurs when two or more substances react and create a new substance.

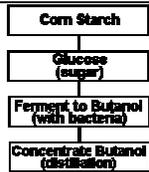
Evidence that a chemical change has occurred includes:

- Change in colour
- Change in odour
- Formation of a gas
- Release or absorption of energy (heat)

Controlling Changes In Matter To Meet Human Needs

Freeze-drying allows food to be processed by removing the water (by freezing and sublimation) and then packaged to be **ready to eat** just by adding hot water. Biologists, to study plant cells and tissue, also use the freeze-drying method. It has also benefited scientists who need to restore ancient relics or documents that have been damaged by water.

Butanol From Corn



From Corn To Nail Polish Remover and Plastic Wrap?

Scientists are able to change other common materials into useful products.

Corn - makes soda pop bottles, removes paint or nail polish and **fuels some cars**. These refined products are more environmentally friendly.