



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

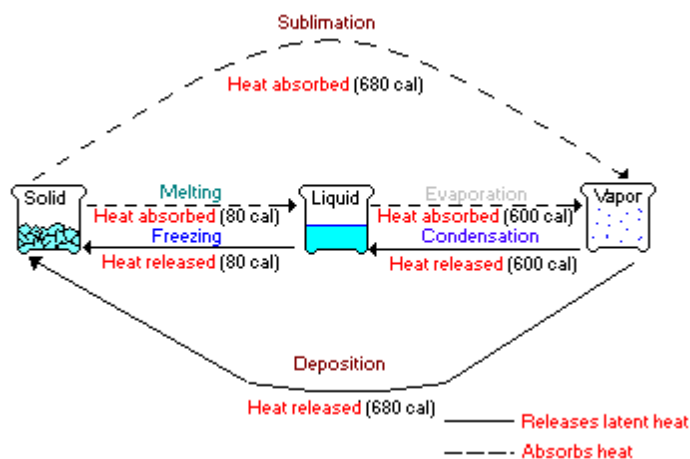
### 1.0 Matter can be described and organized by its physical and chemical properties.

#### 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.



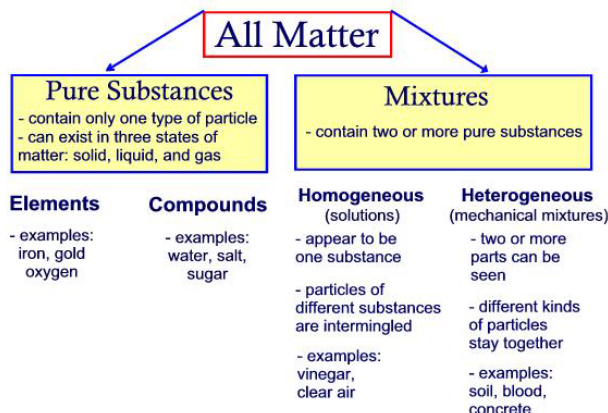
**Properties** are characteristics that can be used to describe a substance. These properties can be physical or chemical.

#### 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:

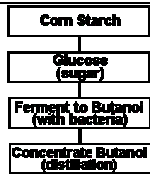
- Change in colour
- Change in odour
- Formation of a gas
- Release or absorption of energy (heat)

## 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.