

Chapter 2

2.1 Key Concepts

Why are elements and compounds classified as pure substances?
 How mixtures differ from pure substances?
 What is the main difference among solutions, suspensions, and colloids?

Describe the properties of each object. Record your properties in the chart below.

Examples of properties include: color, smell, freezing point, boiling point, melting point, infra-red spectrum, attraction (paramagnetic) or repulsion (diamagnetic) to magnets, opacity, viscosity and density.

Examples of chemical properties are: heat of combustion, reactivity with water, PH, and electromotive force.

There are many more examples. Note that measuring each of these properties will not alter the basic nature of the substance.

Example - Is the material flexible or rigid?
 Is the material easily torn or broken?
 Is the material easily stretched?
 What color is it?
 Is it metallic?

Material	Properties
Rubber Band	
Toothpick	
Water	
Pencil Lead	

Compositions

Latin - a putting together
 What is it made of?
 What materials are in it?

Matter

anything that takes up space and has mass

can be divided into either

Pure Substances or Mixtures

Pure Substance

matter that will always be the same composition
 every sample will have all the same properties

Pure Substances are either elements or compounds.

Atom

smallest part of an element

Element

can not be broken down into a simpler substance
 only one type of atom
 most elements are solids
 some are gases
 2 are liquids

Compounds

made of two or more substances that CAN be broken down
 when broken down form either elements or other compounds
 compounds may have different properties as elements than as a compound
 compounds always have the same composition

Mixture

properties of a mixture vary
 combination of substances
 example - salad - lettuce, tomatoes, onions, cheese

Mixtures classified by how the substances in the mixture distribute throughout the mixture. Mixtures are classified into Heterogeneous Mixtures and Homogeneous Mixtures.

Heterogeneous Mixtures

Hetero = "different"

Two or more different parts mixed together, but keep their own properties

Combination of two or more pure substances in which the original substances retain their chemical properties

Examples - oil/water, sand/water, ice cubes/pop

Homogeneous Mixtures

Homo = "same"

Mixture where the components that make up the mixture are uniformly distributed throughout the mixture - it is the same throughout, appears

Examples - air, water, steel, dishwashing soap

Heterogeneous and Homogeneous mixtures are divided into 3 groups. The size of the Particles will determine if the mixture is a solution, suspension, or a colloid.

Solution

Substances dissolve and form a homogeneous mixture.

Examples - tap water, sugar/water

Suspension

Substances separate into layers and forms a heterogeneous mixture.

Particles settle out

Example - Muddy water, kool aid with sugar

Colloid

Particles disperse through the solution but are so small so they stay suspended and do not form layers.

Example - milk, fog

<https://www.youtube.com/watch?v=Fxi5NGR2Sp8> Mixtures/solutions -23 min.

Assignment

2.1 Classifying Matter

Use for review

https://www.youtube.com/watch?v=A0PzbYPUm&list=PLos7xky22__Oen4pjXxoy

<https://www.youtube.com/watch?v=kezsLzyR-Pc>

2.2 Key Concepts

What are some examples of physical properties?

How can knowing the physical properties of matter be useful?

What processes are used to separate mixtures?

Physical Property

Characteristics that can be observed or measured without changing the composition of the substance

Examples:

Viscosity

tendency of a liquid to resist flowing
higher the viscosity = slower it flows
usually decreases when heated

Conductivity

ability to allow heat to flow
conductors - material that allows heat to flow
metals
wood is not a good conductor

Malleability

ability to be hit and shaped and not shatter
gold most malleable metal

Hardness

ability to scratch another object
diamond - hardest known material

Melting Point

temperature where the substance changes
from a solid to a liquid

Boiling Point

temperature where the substance boils

Density

used to test the purity of a substance
ratio of mass to volume $d = m/v$ g/cm³

Using Physical Properties

Physical Properties are used to identify a material, to choose a material for a specific purpose, or to separate the substances in a mixture.

Using Properties to Separate Mixtures

Filtration

process that separates particles based on size

Distillation

process that separates the substances based on boiling points

Physical Change

occurs when the physical properties change but NOT the materials

example: change shape, changes in states of matter,

2.3 Chemical Properties

When can chemical properties be observed?

What observation might indicate that a chemical change has occurred?

What is the difference between chemical and physical changes?

Chemical Property

any ability to produce a change in the composition of matter

Chemical properties can be observed only when the substances in a sample of matter are changing into different substances.

Examples of Chemical Properties

Flammability

a materials ability to burn in the presence of oxygen

Example: Candles, paper, gasoline, clothes

Flame resistant: Children's PJs -if they do ignite, they burn slowly

Reactivity

A property that describes how readily a substance combines chemically with other substances.

Example: Oxygen=high (Iron oxide=rust)
Iron =high reactivity (No jewelery please)
Nitrogen =low

Pump Nitrogen gas in ships to reduce the rust caused by dissolve oxygen in seawater.

Recognizing Chemical Change

Chemical Change

occurs when a substance reacts and forms one or more new substances

Examples: Banana ripening, baking a cake, leaves on a tree, digested food

Evidence for a chemical change

Change in color
is the new substance a different color

Production of a gas
formation of CO_2
Bubble, fizz

Formation of a Precipitate
new substance is a solid

Light/Heat and sometimes Sound (ENERGY)

Reminder

Some of the evidence may not be an actual chemical change. Just because it turned red when heated, ask yourself did it turn into something new.