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

Key Concepts • Workplace Hazardous Materials Information System (WHMIS) and safety
• substances and their properties

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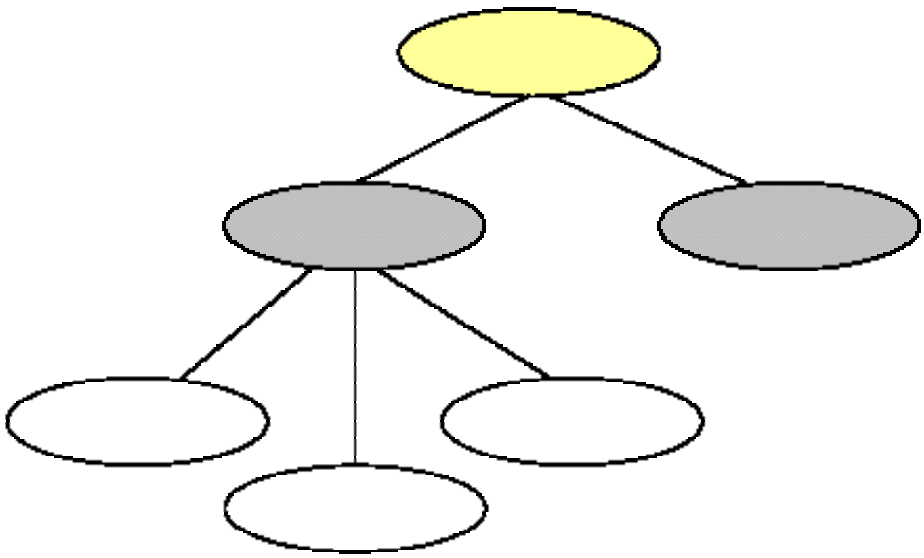
Recognition of **WHMIS** symbols is important to lab safety. Identify the following **WHMIS** symbols.

	_____		_____
	_____		_____
	_____		_____
	_____		_____

Matter can be organized in different ways. One way is as solids, liquids, and gases. Another way is as mixtures and pure substances. Complete the Organizational Chart showing how matter is organized as pure substances and mixtures. (p. 103) (Extend the chart if you need to)



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Identify the 4 different types of mixtures and explain how they are different from each other.

Physical properties of matter such as color, hardness, boiling point, and density are used to identify substances.
Describe each of the following physical properties of matter. (p. 99)

Ductility	
Solubility	
Malleability	
Conductivity	
Density	

Chemical properties describe how a substance interacts with other substances.
Describe 5 examples of chemical properties. (p.102)

_____

_____

_____

_____

_____

Identify the **evidence** that would be used to determine if a chemical change has occurred

_____

_____

_____

_____

2.0 *An understanding of the nature of matter has developed through observations over time.*

Key Concepts • elements, compounds, and atomic theory
• periodic table

Human understanding of matter grew as people suggested explanations for their observations of the natural world. Theories were confirmed or rejected as people learned more about matter.

Describe the evolving theories of matter from the stone age, the bronze age and the iron age.

Stone Age	Bronze Age	Iron Age

The Greek philosopher Democritus stated that matter was made up of tiny indivisible particles called atomos. This theory was not widely accepted for 2000 years.
Outline a brief timeline that describe the experiments with matter from **Alchemy to Chemistry**

Aristotle's view Matter Made up of Earth, Air Fire, Water

Investigations by scientists, such as Robert Boyle, in the 1600s confirmed that matter is made up of tiny particles. Further investigation by researchers gradually developed the understanding we have today that matter is made up of atoms. Each atom has a nucleus containing protons and neutrons. Electrons orbit the nucleus.
Outline a brief timeline that describe the **Atomic Theory**

Dalton suggested (1808) Matter was made Up of elements

Elements are pure substances made up of only one type of atom.
What symbols were used in Ancient times to represent the 7 known elements?

gold	silver	iron	mercury	tin	copper	lead
Sun	**Moon**	**Mars**	**Mercury**	**Jupiter**	**Venus**	**Saturn**

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The periodic table organizes the elements according to their atomic number and atomic mass. The atomic number is the number of protons in the nucleus. The atomic mass is the average mass of an atom of an element.

16		2- 4+ 5+
	S	
	Sulphur **32.1**	

Identify the following for the element shown:

Atomic Number _____ Atomic Mass _____

Ion Charge _____

Patterns of information on the periodic table include groupings of metals, metalloids, and nonmetals.
Complete the chart by describing each of the identified patterns of information in the Periodic table

Group 1 elements	Alkali metals This group of elements are _____
Group 2 elements	Alkali-earth metals This group of elements _____
Group 17 elements	Halogens This group of elements are _____
Group 18 elements	Noble gases This group of elements are _____

3.0 ***Compounds form according to a set of rules.***

Key Concepts
- chemical nomenclature
- Ionic and Molecular compounds

Every chemical compound has a chemical formula and chemical name. The chemical formula identifies the elements in the compound and their proportions.
Identify the chemical name or formula in the following chart and tell whether it is ionic or molecular.

Chemical name	Chemical formula	Ionic or Molecular
Sodium Bicarbonate	$NaHCO_{3+}$	Ionic
Sodium Chloride		
Sugar		
Sulfuric Acid	H_2SO_4	
	H_2O	
	CO_2	Molecular
Lithium Oxide		
Copper (II) Sulfate	$CuSO_4$	

An ion is an atom or a group of atoms that has become electrically charged through the loss or gain of electrons from one atom to another.

Complete the comparison chart showing how ionic and molecular compounds are different.

Ionic Compounds	Characteristic	Molecular Compounds
Ionic compounds form between atoms of metals and non-metals	Type of elements present	Molecular compounds form between atoms of non-metals.
	Boiling point	

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4.0 ***Substances undergo a chemical change when they interact to produce different substances.***

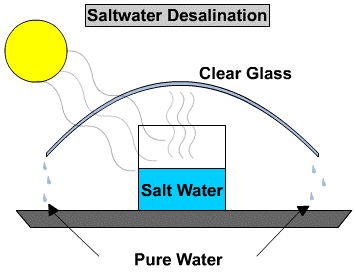
Key Concepts
- endothermic and exothermic reactions
- reactants and products
- conservation of mass
- factors affecting reaction rates

A physical change may change the appearance or state of a substance but not its composition (e.g., melting). A chemical change results in the formation of one or more different substances.

Identify the following either as a physical or chemical change (*circle your choice*)

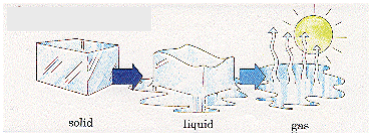
A fire

Physical Chemical



Removing salt from saltwater

Physical Chemical



Ice melting

Physical Chemical

Reactions involving oxygen are some of the most common types of chemical reactions. These include combustion, corrosion, and cellular respiration.

What is the difference between a **combustion reaction** and a **corrosion reaction**?

_____

_____

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A chemical reaction occurs when substances called reactants interact to produce different substances called products.

Identify the **reactants** and **products** in the reaction below:

Wood + Oxygen ------- > Carbon Dioxide + Water + Energy (released)

Reactants are _____

Products are _____

Identify the chemical word equation for the information provided below

Reactants are **$C_6H_{12}O_{22}$** and **O_2**

Products are **CO_2** and **H_2O** and **energy** (released)

This word equation represents _____

According to the principle of the conservation of mass, the mass of the products in a chemical reaction equals the mass of the reactants.

What is necessary in order for this **Law Of Conservation of Mass** to be accurately verified when doing any experiment?

_____

_____

An exothermic reaction gives off energy. An endothermic reaction takes in energy.

What is the difference between an **endothermic reaction** and an **exothermic reaction**?

_____

_____

The rate of reaction can be affected by the addition of a catalyst, or an increase in the concentration, temperature, or surface area of the reactants.

Describe the action of an **enzyme**, such as ***catalase***, that is present in our cells.

_____

_____

_____

_____