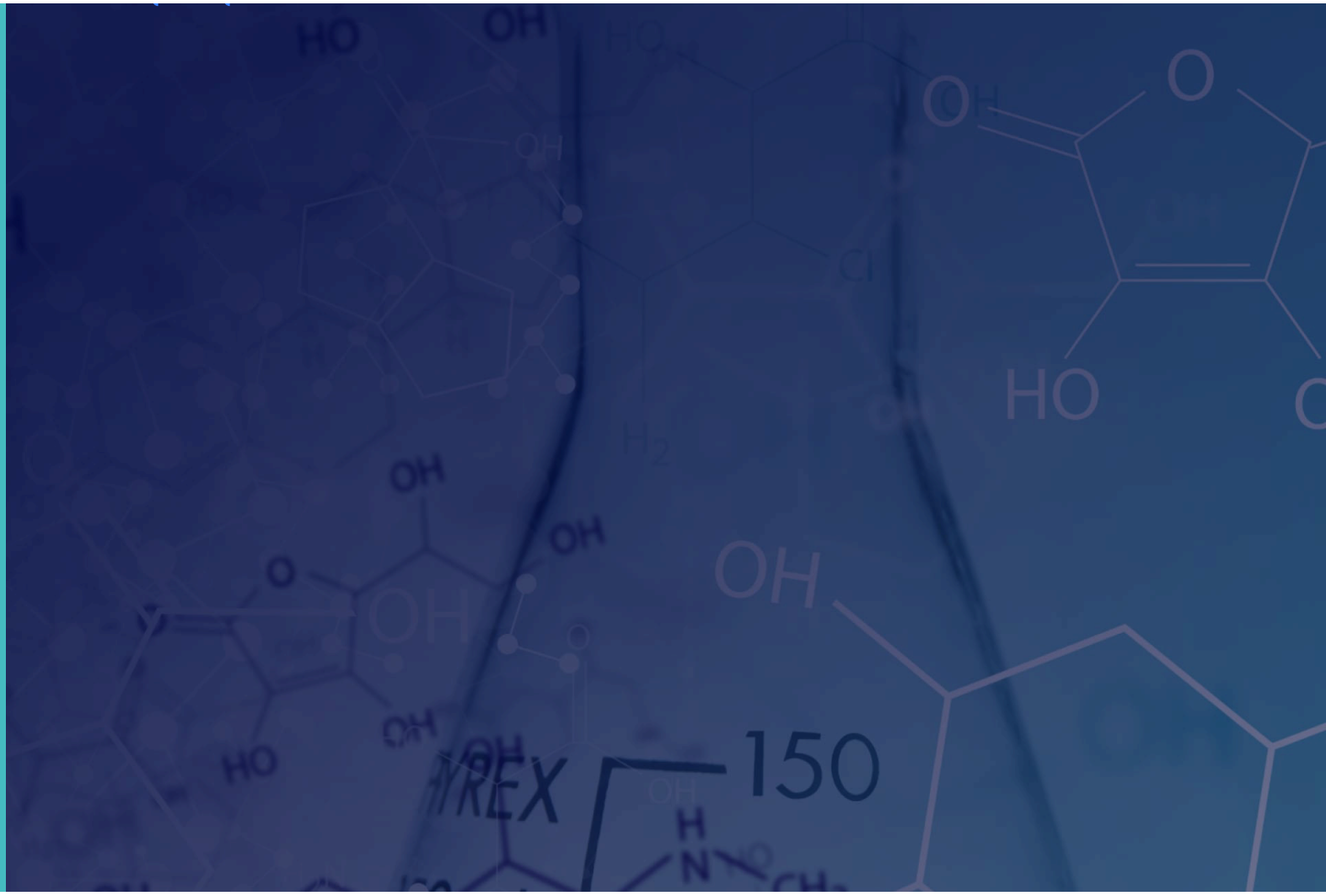

Ontario High School

Grade 11 Chemistry

Summer 2024, Chapter 1 Notes

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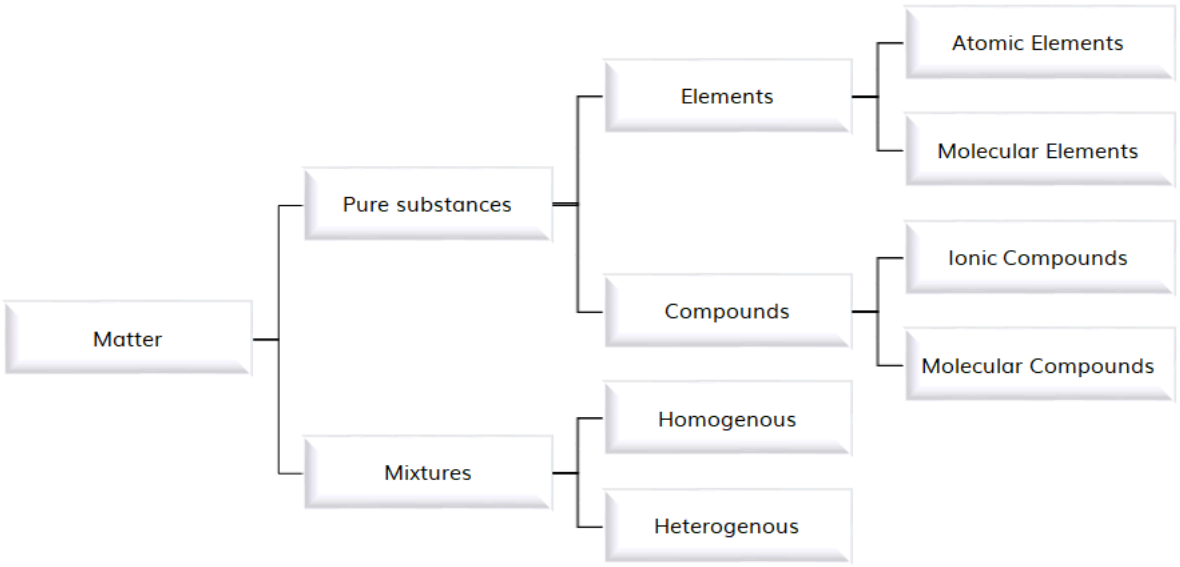
1.1 Classification of Matter

1.1.1

Classification of Matter



Pure Substances

- Pure substances cannot be broken down into different substances,
- They are uniform and constant in composition

Elements

- **Atomic Elements:** only one atom in the formula
  Example: Ar, Ne, Na

- **Molecular Elements:** an element that exists as a molecule; there are two or more of the same atom bounded together
  Example: O_2, H_2, Br_2, Cl_2, I_2, F_2, N_2, O_3, P_4, S_8

Compounds

- **Ionic Compounds**: a compound composed of a positively charged ion and a negatively charged ion
  Example: $NaCl$, $Sn(SO_2)_4$

- **Molecular Compounds:** a compounds composed of two or more non-metal elements
  Example: H_2O, CO_2

Mixtures

- Mixtures are made of two or more substances and can be separated by physical means
- **Homogenous mixtures** are mixtures that are uniform throughout. A **solution** is a special type of homogenous mixture.
  Example: salt water
- **Heterogenous mixtures** are mixtures that are not uniform throughout. Also known as **mechanical mixtures**
  Example: soup

Example: Classifying Matter

Classify each of the following substances as either an element, a compound, a heterogenous mixture or a homogenous mixture,

a. hydrogen peroxide _____

b. gold _____

c. whole milk _____

d. sand _____

1.1.3

Practice: Classifying Matter

Match the following substances with the type of matter that they represent

A. compound

B. element

C. mixture

syrup

charcoal

magnesium oxide

1.1.4

Practice: Properties of Ionic and Molecular Compounds

Mark the following statements as either TRUE or FALSE.

a. Most molecular compounds are solid at room temperature

b. Ionic compounds have high melting points, whereas molecular compounds have low melting points

c. In aqueous solutions, ionic compounds do not conduct electricity

d. Molecular compounds are poor conductors of electricity

a.

b.

c.

d.

1.1.5

Practice: Identifying Compounds as Ionic or Molecular

Identify the following compounds as either molecular (M) or ionic (I) based on their properties.

a. Compound A is a gas at room temperature

b. Compound B has a melting point of 800°C and is soluble in water

c. Compound C conducts electricity in an aqueous solution, but not as a solid

d. Compound D is a liquid at room temperature and does not conduct electricity

a. M or I

b. M or I

c. M or I

d. M or I

1.2 Properties of Matter

1.2.1

Physical and Chemical Properties of Matter

Physical Properties and Changes

- A **physical property** is any property of matter that can be measured and that does not involve a change in the identity of the compound.
  Example: colour, state of matter, melting point, boiling point, density, solubility, electrical conductivity

- A **physical change** does not involve the breaking and forming of bonds. Instead, these involve a **change of state or physical properties of matter.**

  - Physical changes are reversible.
    Example: When ice melts, we get liquid water. Ice is $H_2O(s)$ while water is $H_2O(l)$ and steam is $H_2O(g)$. The compound is still the same and could be frozen again to become ice again.

$$\text{Solid} \rightleftharpoons \text{Liquid} \rightleftharpoons \text{Gas}$$

Chemical Properties and Changes

- A **chemical property** involves the ability of a compound to change into a new compound.
  Example: flammability, corrosion, acidity

- A **chemical change** occurs when bonds are broken and formed between different atoms.

  - Chemical changes are irreversible.
    Example: Burning a compound in a chemical reaction is an example of a chemical change. The compound is changed as a result of the burning and can't be changed back (we **get a new compound!**)

$$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$$

Example: Physical and Chemical Changes

Classify each of the following changes as physical or chemical:

a. glass braking _____

b. milk going bad _____

c. adding cocoa powder to hot milk _____

d. melting gold _____

e. a camp fire _____

f. a piece of iron rusts _____

1.2.3

Practice: Properties of Matter Vocabulary

Match the following terms and definitions

A. a process that causes a substance to change into a new substance with a new chemical formula.

B. a process that does not cause a substance to become a fundamentally different substance.

C. describes the ability of a substance to undergo a specific chemical change

D. characteristic of a substance that can be observed or measured without changing the identity of the substance

physical property

chemical property

physical change

chemical change

1.2.4

Practice: Physical and Chemical Properties

Identify each of the following as an example of a physical (P) or a chemical property (C).

Property	P (physical property) or C (chemical property)?
Leafs are green	
Helium does not react with any other element	
Pure aluminum is soft	
Gold is a very malleable metal	
Methane gas is flammable	
Sodium metal reacts violently with water	

1.2.5

Practice: Physical and Chemical Changes

Identify the following as being true or false

a. A change in shape is a physical change
b. An example of a chemical change is when water boils
c. When vinegar and baking soda mix, a chemical change occurs because a gas is produced.
d. When food rots, this is a physical change because there is a change in color.

a.

b.

c.

d.