

Ontario High School Grade 11 Chemistry

Summer 2024, Chapter 1 Notes

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Dana 4.4/5 ★

MSc

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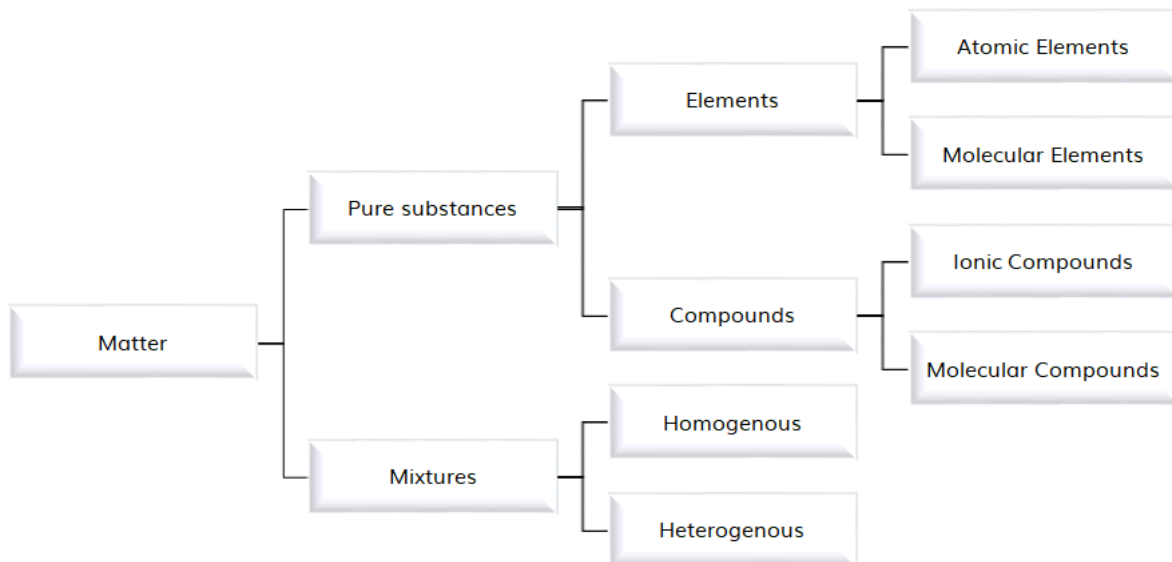
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1. Properties of Matter

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: O₂, H₂, Br₂, Cl₂, I₂, F₂, N₂, O₃, P₄, S₈

Compounds

- **Ionic Compounds:** a compound composed of a positively charged ion and a negatively charged ion

Example: NaCl, Sn(SO₂)₄

- **Molecular Compounds:** a compounds composed of two or more non-metal elements

Example: H₂O, CO₂

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

Watch the video tutorial for this lesson (04:33)

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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 _____

Watch the video tutorial for this lesson (00:53)

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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

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Solutions to these questions, as well as step-by-step breakdowns of the answers at:

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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.



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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

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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 $\text{H}_2\text{O}(\text{s})$ while water is $\text{H}_2\text{O}(\text{l})$ and steam is $\text{H}_2\text{O}(\text{g})$. The compound is still the same and could be frozen again to become ice again.



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!**)



Watch the video tutorial for this lesson (03:18)

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Example: Physical and Chemical Changes

Classify each of the following changes as physical or chemical:

- a. glass breaking _____
- b. milk going bad _____
- c. adding cocoa powder to hot milk _____
- d. melting gold _____
- e. a camp fire _____
- f. a piece of iron rusts _____

Watch the video tutorial for this lesson (01:43)

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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

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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	_____

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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.

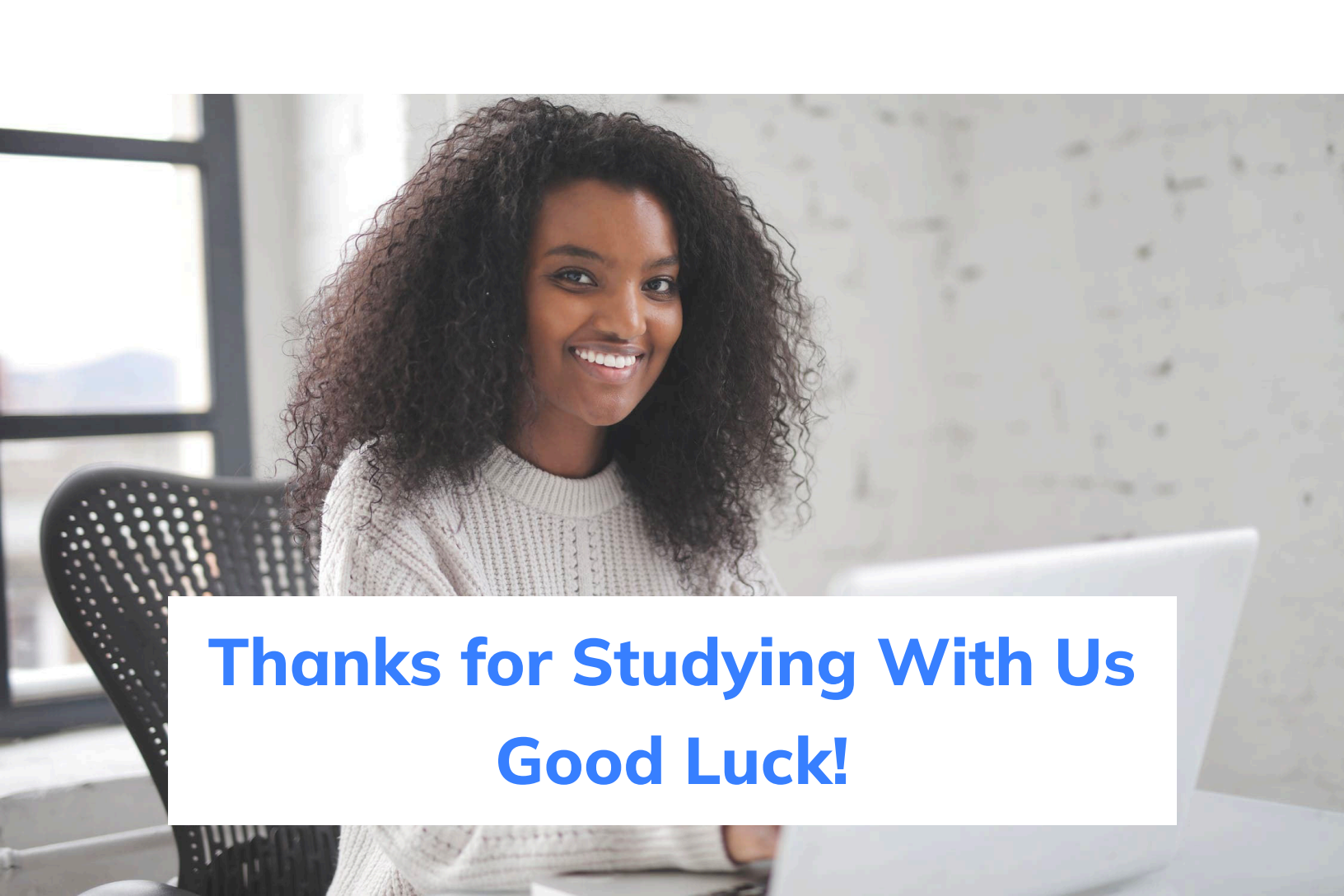


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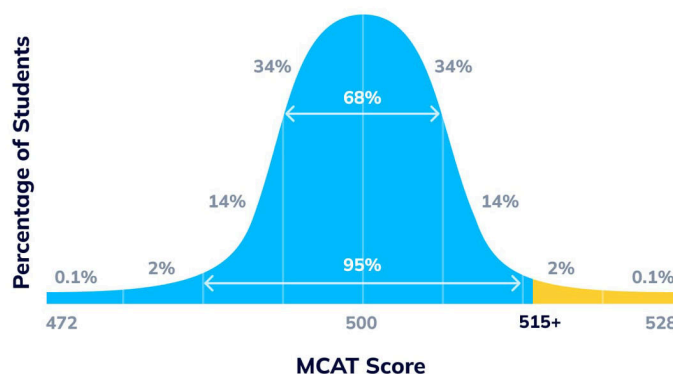
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