

Topic 2.1: How and why do we study matter?

- Matter and its interactions make up our world.
- Safety is key when working with matter.



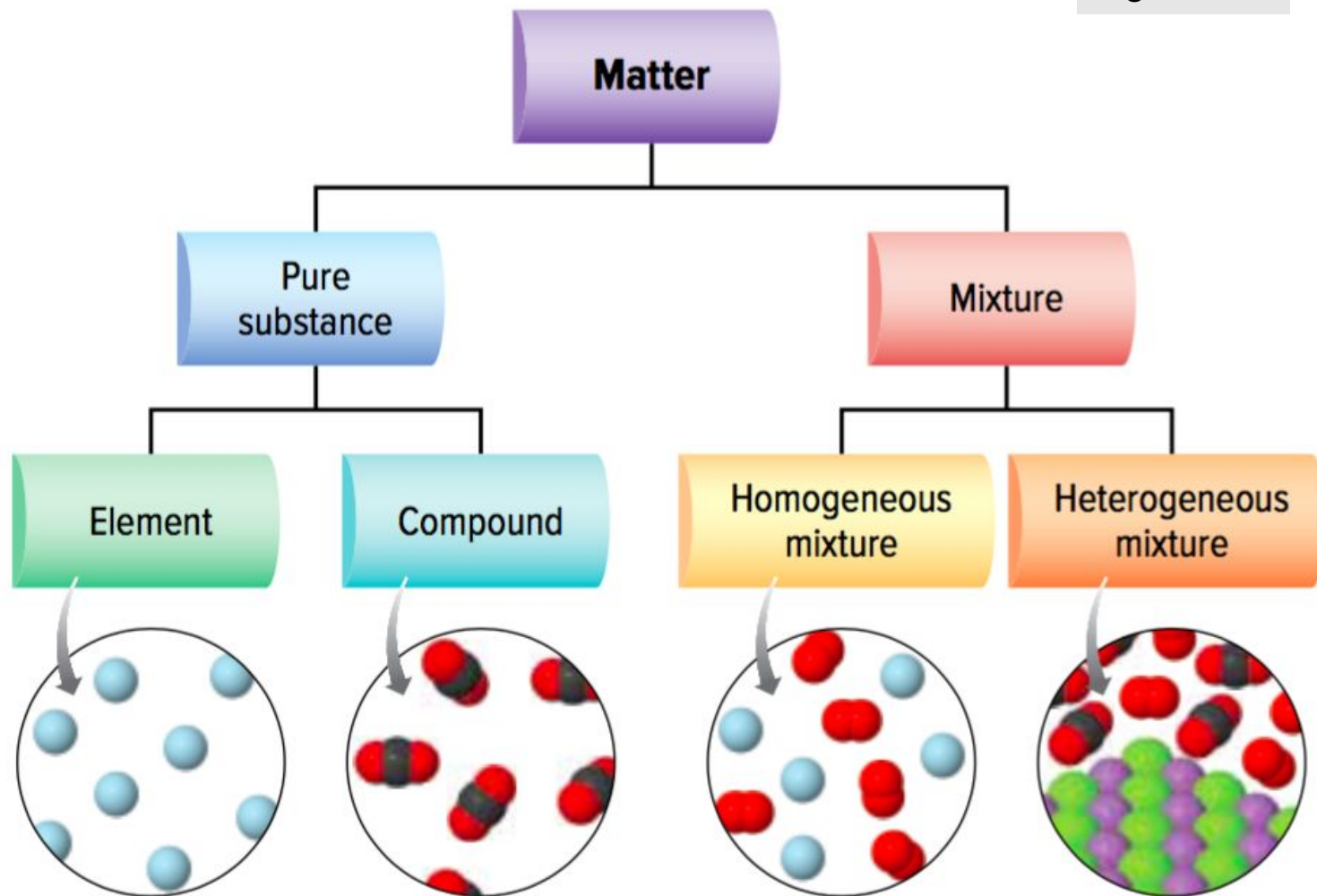
Concept 1: Matter and its interactions make up our world.

Matter: anything that has mass and takes up space

- Classification of matter
 - **Pure substance:** made up of one type of particle; cannot be separated by physical means
 - **Mixture:** made up of two or more pure substances; can be separated by physical means

Matter is either a pure substance or a mixture

Figure 2.1



Mixtures: Homogeneous and Heterogeneous Mixtures

Mixtures can be classified as

- **Homogeneous mixtures** (solutions): mixed uniformly; cannot see their components
 - Example: air (nitrogen, oxygen, hydrogen), steel (iron and other elements)
- **Heterogeneous mixture**: have different components that you can see
 - Example: beach sand, salad dressing

Pure Substances: Compounds and Elements

Pure substances can be classified as

- **Elements:** made up of one type of atom; cannot be broken down into simpler substances (example: gold)
- **Compounds:** made up of two or more elements; can be broken down into simpler substances (example: sodium chloride)

Mixtures, Compounds, and Elements



This train runs on diesel fuel. Diesel is a mixture of chemical compounds made of the elements hydrogen and carbon.

The metal used to make the bridge is steel. Steel is a very strong solid mixture—an alloy—composed of iron and small amounts of other elements, such as carbon.

The rock of the hillside is a mixture that includes quartz, which is a compound made of the elements silicon and oxygen.

This river water is a mixture made up of the compound water, a variety of compounds and elements dissolved in the water, and suspended bits of rock.

Figure 2.2 This pair of railway bridges, called the Cisco bridges, is found at Siska, B.C. **Make a table to list the mixtures, compounds, and elements mentioned. Add one example not mentioned.**

Figure 2.2

Properties of Matter

Matter can be described by

- **Physical properties:** characteristics that can be observed or measured without changing is chemical identity (examples: colour, texture)
- **Chemical properties:** describe the ability of matter to react with another substance to form different substances (examples: combustibility, lack of reactivity)

Physical and Chemical Properties

Table 2.1 Physical and Chemical Properties

Physical Properties		Chemical Properties
<ul style="list-style-type: none">• colour• malleability• texture• viscosity• ability to conduct heat and electricity	<ul style="list-style-type: none">• state of matter• melting point• boiling point• hardness• solubility	<ul style="list-style-type: none">• combustibility• reactivity with acids• reactivity with oxygen• lack of reactivity

Chemical Reactions

Chemical reaction: one or more pure substances interact to form a different substance or substances

- Elements can react to form compounds
- Compounds and elements can react to form new compounds
- Compounds can break apart to form elements and simpler compounds



Figure 2.3: A) Explosive chemical reactions are used in mining to break apart rock and soil.

Discussion Questions

1. What is the difference between a pure substance and a mixture? Use diagrams in your answer.
2. List three physical properties of water at room temperature.

Discussion Questions

3. Give one example of an element and one example of a compound. Explain how they are different.
4. What happens in a chemical reaction?

Topic 2.1 Summary: How and why do we study matter?

- Matter and its interactions make up our world.
- Safety is key when working with matter.

