Unit 2: Chemistry

Chapter 4 Characteristics And Properties Of Matter

4.1 Describing Matter

Learning Outcomes

- What properties you can use to describe matter

Why Is It Important

- Properties of matter determine how different materials can be used

Skills you will use in this chapter

- Observe and describe different samples of solids liquids and gases

Key Terms:

Infer – To conclude something from reasoning; to make an educated guess.
Observe – To notice something; watch attentively
Record – To write down and take note of something (observations in this case)

4.1 Describing Matter (Lesson Notes p.102-110)

- Properties of matter determine how different materials can be used
- Describing and measuring matter enable you to communicate your observations to others
- You and all the materials in living things in the world are made of matter

Chemistry is the study of matter and its changes
You could say that chemistry is the science that studies all the stuff in the entire world.
A more scientific term for "stuff" is "matter."

Matter makes up every living thing and every material object (all the physical things in the universe).

All the stars in the galaxies, the sun and planets in our solar system, the Earth, and everything on it and in it are matter. All human-made objects, all organisms, the gases in the atmosphere, and anything else that has mass and takes up space, including you, are examples of matter.

Observations Of Matter
Properties of matter are used to determine how you use the materials – bicycles (p.100)
Properties of matter help you describe and identify unknown materials

Using Your Senses To Observe Matter
Sight – what do you see? What can you observe by simply looking at the object/material?
Touch – what does the object/material feel like to touch? What does it feel like in your hand?
Smell – Does the object/material have any odor or scent? Can you smell anything? Strong or weak?
* Taste (never used in science because of the dangerous chemicals used in the labs

Using Properties to Describe Matter

Properties: characteristics or features that help to describe matter
Each kind of matter has its own set of properties
When you use your senses to observe a material you are observing its properties
You can use properties to help you identify a specific type of matter

Quantitative property

Any property of matter that you can measure or describe with the numerical value.
Temperature at which a material melts is a quantitative property.

Qualitative property

Any property that you can observe directly with your senses.
You describe qualitative properties with words: color, odor, and shape are examples of qualitative properties because you describe them using words.
States of matter is an important qualitative property of matter.

State of matter: a qualitative property

All matter on earth normally exists in one of three forms. These forms are called **states of matter.** The three states of matter are: solid, liquid, and gas.

Solid: Form of matter that has a fixed shape, this means that the shape stays the same unless the solid is acted on forcefully with the tool such as a hammer. Gold is solid at room temperature, so is wood and rubber. Water is a solid (ice) at temperatures below 0 degrees Celsius.

Liquid: Fluid (flowing) form of matter. A liquid has no shape of its own, it takes the shape of its container and forms a surface within its container. Engine oil is a liquid at room temperature, so are rain (liquid water) milk, and juice.

Gas: Also a fluid form of matter. A gas has no shape of its own. It takes the shape of its container and fills its container completely. A gas does not form a surface in its container. Air is a gas at room temperature so are water vapor, carbon dioxide, and natural gas.

1. Matter (solid, liquid, and gas) is made up of tiny particles called atoms and molecules.
2. The atoms or molecules that make up matter are always in motion.

Quantitative Properties of Matter

Temperature: Measures how hot or cold matter is.
Temperature is described to the number that is expressed in units of degrees Celsius.

Melting Point: all materials have a characteristic temperature at which they melt to become a liquid or freeze to become a solid. Scientists call this temperature a material's melting point. This can also be called freezing point.

Boiling Point: all materials have a characteristic temperature at which they boil to become a gas. Scientists call this temperature a material's boiling point, the boiling point of water is 100°C.