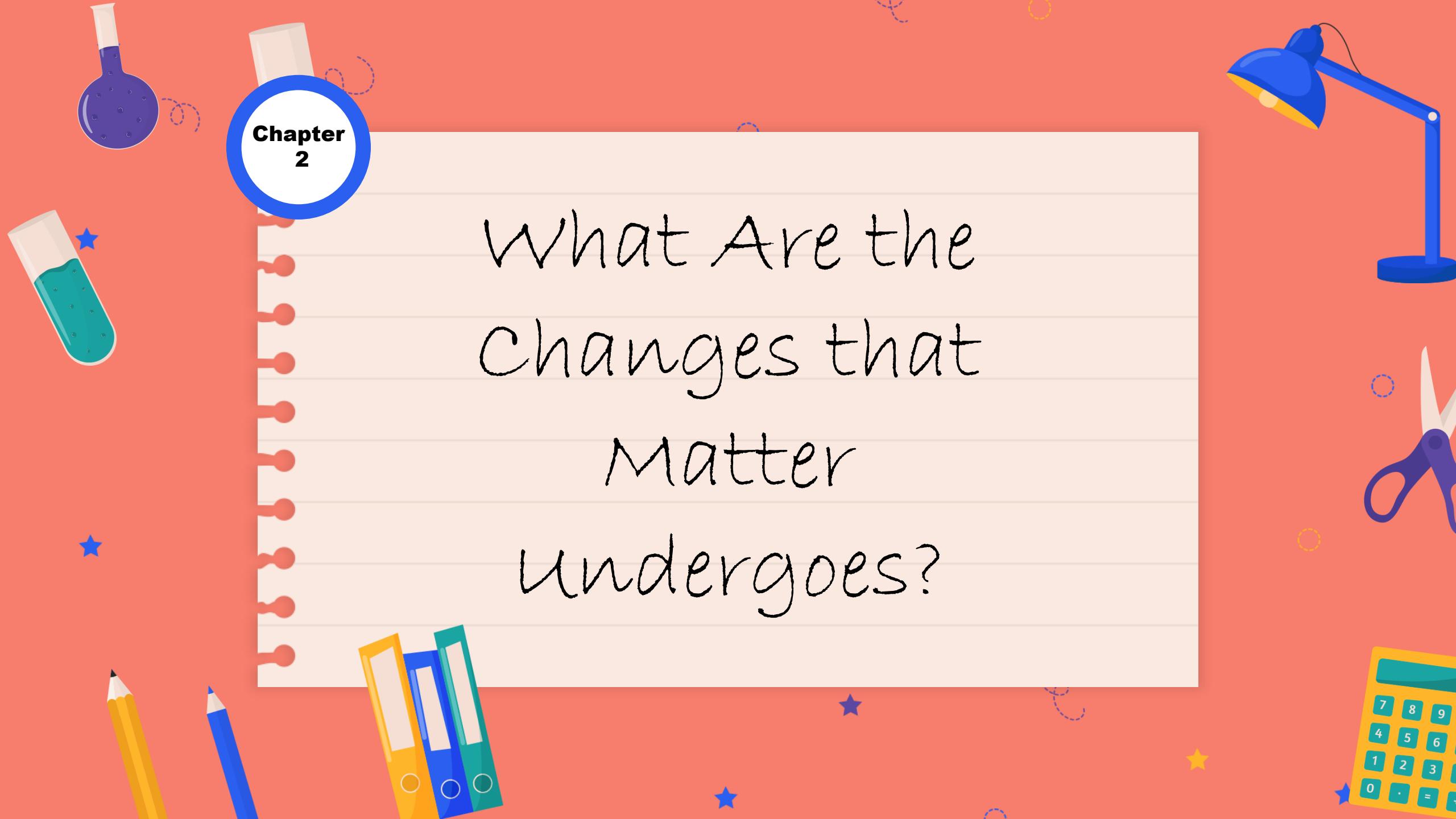


Chapter
2

What Are the
Changes that
Matter
undergoes?



OBJECTIVES OF THIS CHAPTER:

- Identify and describe the kinds of changes that occur in matter
- Explain and cite instances on how changes in matter affect our daily lives.



BIG IDEA

- ❑ Matter undergoes change, which can be categorized into physical or chemical changes.



In preparing and cooking food, the ingredients undergo changes.

You may have observed that some materials around you undergo changes. You may also noticed that while there are also those that seem to stay the same. While you cannot see the changes in these materials. It does not mean that they do not undergo changes.

Everything around us undergoes changes at certain conditions even those that seemingly do not change.

What are the pieces of evidence that change really happened to a certain material? How do these changes affect us and the environment?

LESSON 4

PHYSICAL AND CHEMICAL PROPERTIES OF MATTER

IMPORTANT QUESTION

What are the Physical and chemical properties of matter?

Matter refers to all the objects and materials around us. In

studying its different kinds, we usually observe and compare it to

one material to another. For example, when we describe the

difference between a paper rock, we usually look for characteristics

that are not similar in the two objects being described. These

characteristics that make matter distinct from one another called

properties.

The properties of matter can be classified as **physical properties** or **chemical properties**.

PYSICAL PROPERTIES

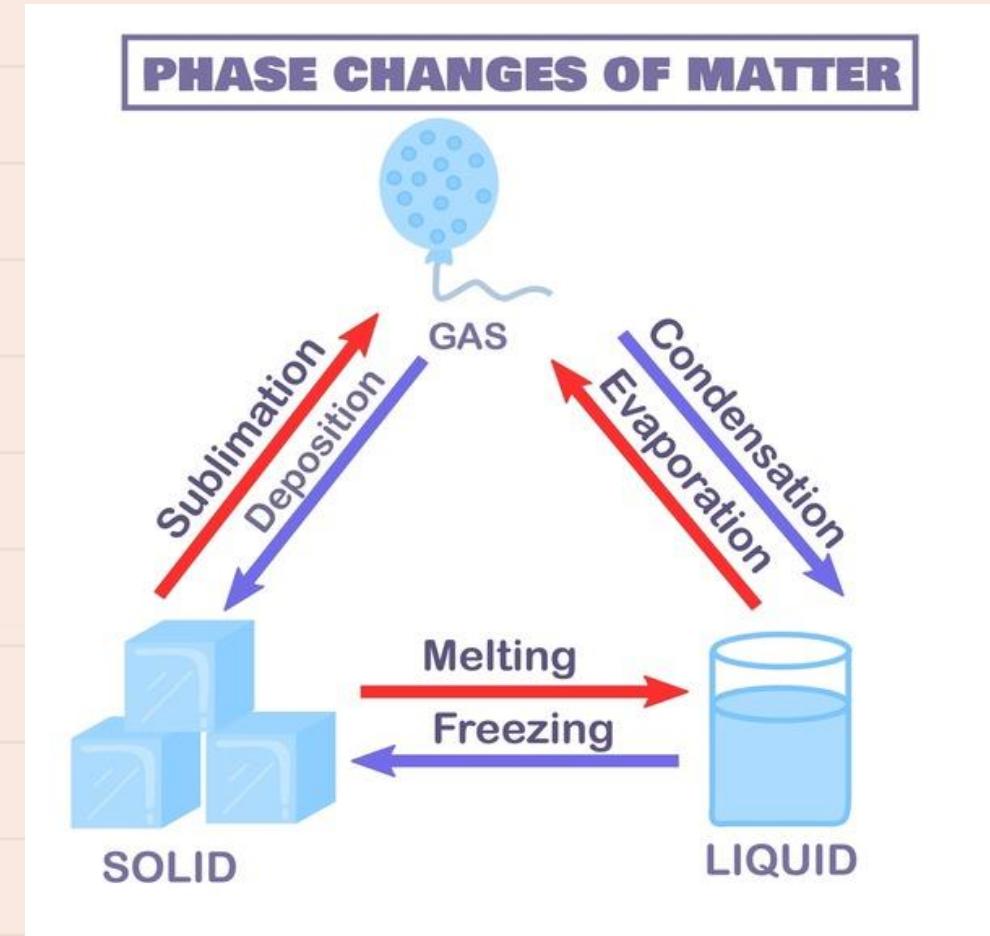
As you have learned in Grade 3, the phase of matter changes depending on the temperature. For example, when water starts to boil, steam or vapor is produced. Although the appearance of water was changed, the water vapor's composition is still similar with that water in liquid form. It shows how water transform to one phase to another without changing its composition.

The characteristic of a matter that can be readily observed without changing its composition is known **physical property**. Some physical properties are specific to each phase of material. Matter in liquid form has the ability to flow. Some solid matter are known for hardness. Solid materials have different levels of hardness-some are hard while others are soft. Gases, on the other hand, can be compressed and most of them are colorless.



In Moh's Scale of Hardness, diamond is the hardest mineral.

The diagram below shows the different phase changes.



HARDNESS

Hardness is the ability of a material to be rigid and resist pressure that may cause deformation or change in its shape. Hard materials like metal and wood can be used to construct buildings, bridges, or other infrastructure.

BRITTLENESS

Not all hard materials are unbreakable, Though there are solid materials that when subjected to high stress or pressure, crumble or break easily. This property is known as brittleness.

Glass and porcelain are brittle and can break when dropped or slammed against a hard surface or object. However, they can still be useful even when they break. The broken pieces can be arranged as wall décor or as improvised spikes on walls to protect one's home from trespassers.



Glass is a brittle material that can break easily.

FLEXIBILITY

Flexibility is the ability of material to be bent without breaking.

Some plastics and metals exhibit flexibility. Flexible objects like thin metal wires and plastic strings can be used for tying or binding objects and things.

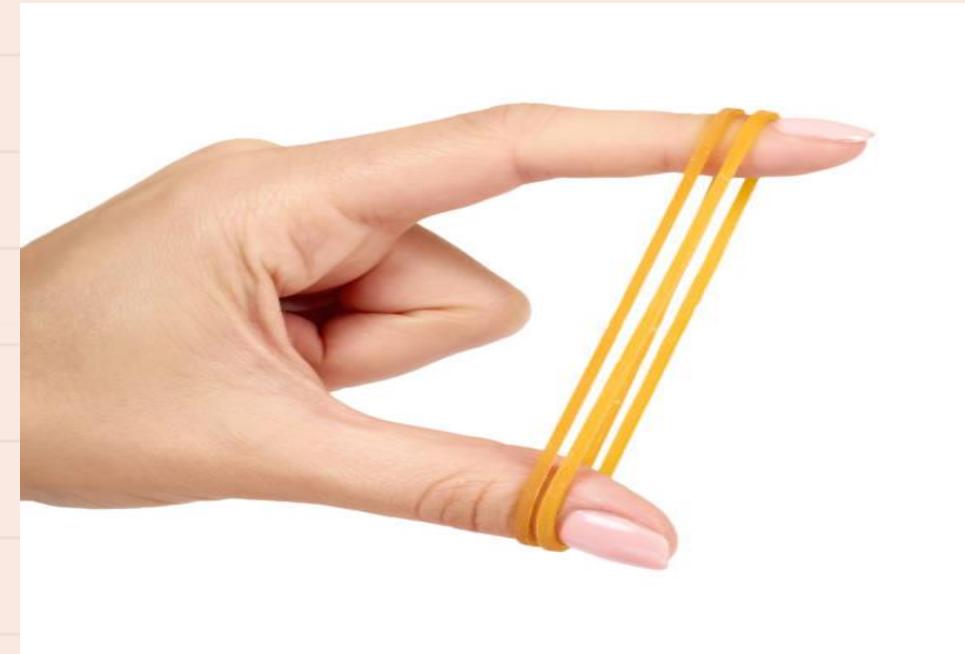
Metal wires can be used to tie and bind things because it can be bent without breaking.



ELASTICITY

Elasticity is the ability of a material to be stretched and then return to its original shape after. A rubber band is an example of an elastic material.

A rubber band is naturally elastic that when stretched, it can return to its original shape.



CONDUCTIVITY

Conductivity is the ability of material to allow heat and electricity pass through it. Metals are good conductors of heat and electricity.

MALLEABILITY

Do you know how a bar of gold can be turned into jewelry?

Gold can be hammered into flat sheets until the desired shape of jewelry is obtained. This property is called malleability. Silver, iron, and aluminum are examples of malleable materials.

Are bottle caps that made of metal still useful? Yes, they may be used to make a doormat. They may also be hammered into thin sheets to make an improvised tambourine.

Are bottle caps that made of metal still useful? Yes, they may be used to make a doormat. They may also be hammered into thin sheets to make an improvised tambourine.

Bootle caps can be hammered into thin sheets to make a doormat or an improvised tambourine.



DUCTILITY

Some metals also exhibit ductility, or the ability to be drawn into thin wires. This is why most of the electrical wirings are made up of metals.

POROSITY

Some materials such as paper and cloth can absorb liquid well. These materials exhibit porosity have plenty of spaces inside where liquid can be absorbed.

Chemical Properties

Not all properties of matter can be observed immediately. Sometimes, the composition of a material has change first before a certain property can be observed. This property is known as chemical property.

A **Chemical Property** is most evident when certain material chemically reacts with another material. Below are some chemical properties of materials.

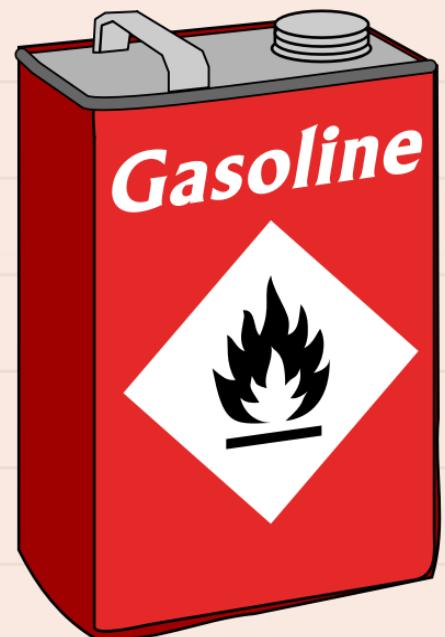
Combustibility and Flammability

Combustibility is the ability of a material to burn, while **Flammability** is the ability of a material to ignite or catch fire easily.

Alcohol is an example of a combustible material. It burns when it reacts with a lighted matchstick. Other examples of combustible materials are wood, sawdust, dried leaves, paper, wax, gasoline, kerosene, oil, thinner, and varnish.

Alcohol and gasoline are both combustible and flammable. They can burn fast. However, not all combustible materials are flammable. For example, a big chunk of wood can burn when subjected to high amount of heat, but it will not catch fire easily unless you expose it longer so that it will start burning.

Gasoline, which is used as fuel in cars, is a highly combustible and flammable material.



Combustible and flammable materials need to be disposed of properly because they react readily and easily when exposed to extreme heat. These materials are useful in some ways but proper handling must be done when using them.

Wood is a combustible material. Burning it can be harmful to the environment.



Biodegradability

Some materials can decompose or decay through the action of bacteria and other organisms. When these materials decompose, their particles return to the soil. The ability of a material to decompose is also known as **biodegradability**.

Examples of biodegradable materials are fruit and vegetable peelings, plant clippings, and dead plants animals. They can be buried in a compost pit, which is a shallow hole dug in the ground, then covered with topsoil. Over time, earthworms and microorganisms act on the buried materials in the pit and gradually break them down into compost, which is a natural fertilizer.

Nonbiodegradable materials take a much longer time to be fully decomposed. Thus, these materials must be reused in another way.

Evidence of Chemical Change

Whenever a material undergoes chemical change, one or more of these evidences are observed:

1. Formation of new product. When a nail is exposed to oxygen and water, rust forms on its surface. Once rust is formed, original material is unidentifiable.

2. **Formation of gas.** This evidence usually coincides with the formation of a new product. For example, when a material is burning, gas in the form of smoke is released together with the formation of ashes. Also, when baking soda is mixed with vinegar, bubbles are formed as the baking soda starts to curdle or form lumps.

3. **Release of heat.** There are instances when chemical change results in the sudden heating or cooling of a material. For example, when a metal is soaked in an acid, heat is released as the metal starts to wear away due to the acid's strength.

Thank You!!