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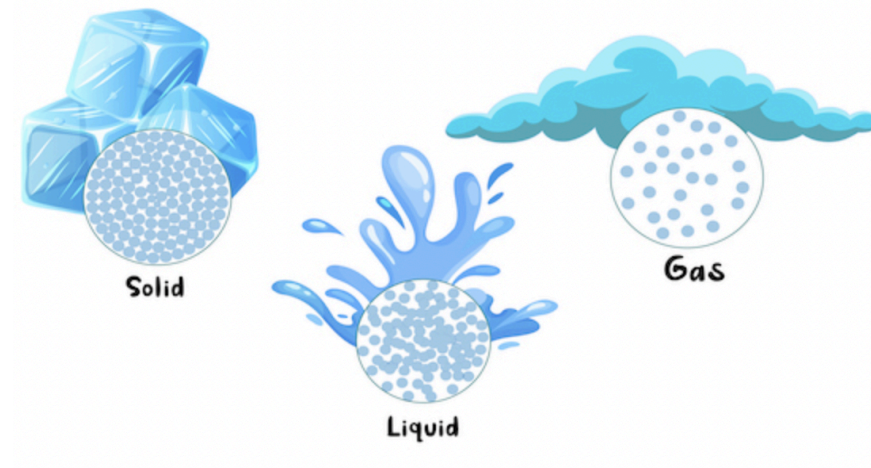
Study Guide  
Grade 5

## States of Matter (2.1)

**Solid:** an object with a definite volume and definite shape.

**Liquid:** an object with a definite volume and indefinite shape.

**Gas :** an object with an indefinite volume and indefinite shape.



## Physical Changes (2.2)

A change in some properties of matter that does not form a different kind of matter

→ Example: a melted juice pop, torn paper and broken glass

Types of Physical Changes

### ☐ **Changes in shape**

→ Matter often changes size and shape

→ Example: glass shattered, cutting paper and stretching a rubber band

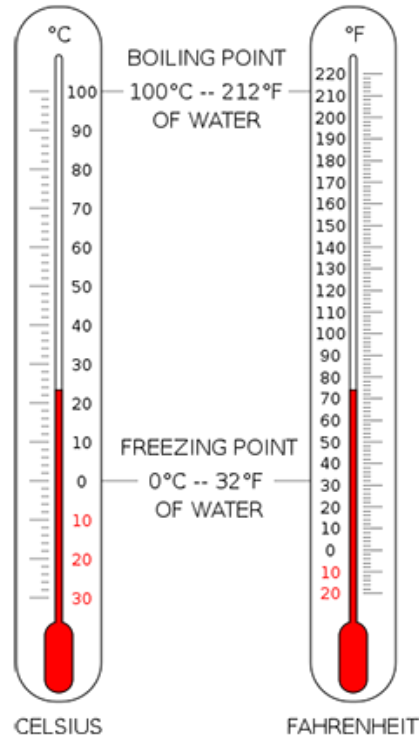
### ☐ **Changes in temperature**

→ If you put an inflated balloon in the freezer it will shrink, this is because the volume of air will change when the air temperature changes. After you take it out of the freezer it will become warmer and return to its original size

### Types of Physical Changes

#### ❑ A change of physical state

- Freezing: when a liquid becomes a solid
- Freezing point: the temperature at which a liquid becomes a solid
- Melting: when a solid becomes a liquid



- Melting point: the temperature at which a solid becomes a liquid
- Melting point of water is 0°C

#### ❑ Particle changes

- Evaporation: when a liquid becomes a gas
- Boiling point: the temperature at which a liquid becomes a gas
- Boiling point of water is 100°C

## Chemical Changes (2.3)

**Chemical Change:** A change that produces one or more new substances

→ Also known as a chemical reaction

→ Example: when charcoal burns, charcoal and oxygen form new substances which are ashes and gases

**Particles and Chemical Change:** When a chemical change occurs, particles that make up the original substances rearrange to form new substances



Each ball represents a different kind of particle. After a chemical change occurs, the same particles are in the two new substances, but are arranged differently

### **Evidence of Chemical Change**

- Release of heat or light

→ Example: lit candle, fireworks, fireplace

- A change in color

→ Rusting

- A new smell
- Gas bubbles
- Formation of a solid

## Mixtures and Solutions (2.4)

### Mixtures:

- A **mixture** has different materials placed together, BUT each material in the mixture keeps its own properties. The parts are easily separated.
  - Example: Fruit salad- you can take each individual fruit out of the mixture and it still has the same property.
- **Component** means parts.
  - Sometimes mixtures are not as easy to separate the components.

### Solutions:

- A **solution** is a mixture in which substances are spread out evenly and do not settle to the bottom of the container.
  - Examples: Salt mixed with water. The salt dissolves in the water.
- A **solute** is the substance that is dissolved in a **solution**.
  - The salt is the solute in the salt water mixture.
- One way to make a solid dissolve in a liquid faster is by **stirring** or **heating** the solution. Grinding a solid into small pieces may help too.



- Not all solutions are made by dissolving a solid in liquid. Two or more liquids can also make a solution
  - Example: soybean oil and sunflower oil.
- A gas can also dissolve in a liquid.
  - Example: Water can have dissolved oxygen and carbon dioxide gasses.

### Separating Solutions:

- Since a solution is easily mixed and spread out evenly you cannot pick out chunks of one material.
- To separate the parts of a solution, you use **physical properties** of the substances in the solution. You have to cause a **physical change** to one or more of its components.
  - Example: You can evaporate the liquid by heating it

### Mixtures and Solutions:

- ALL solutions are **mixtures**, but not all mixtures are solutions.
- You can tell the difference by observing the mixture closely.
  - The solution is the same in all **parts**.

## Topic 3 Earth's Systems

### GEOSPHERE

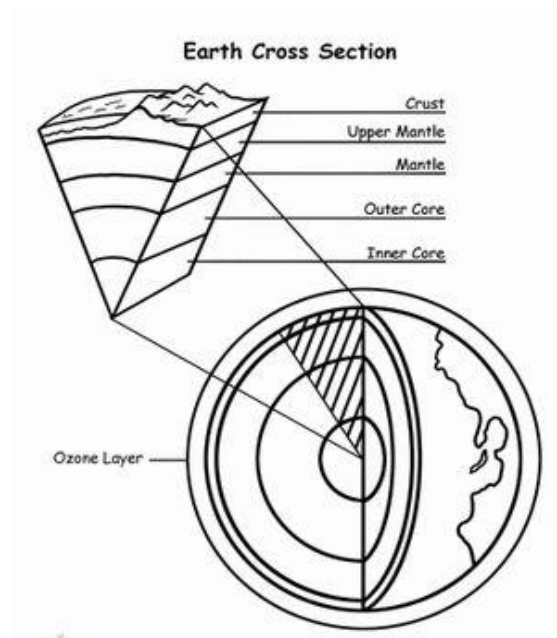
Geo means "earth." The Earth's geosphere (sometimes called the lithosphere) is **the portion of the earth that includes rocks and minerals**. It starts at the ground and extends all the way down to Earth's core. We rely on the geosphere to provide natural resources and a place to grow food. Volcanos, mountain ranges, and deserts are all part of the geosphere. Put simply, without the geosphere, there would be no Earth!

### LAYERS

Earth is made up of three layers. The outer layer is called the crust, where humans live. Inside Earth are the mantle and the core, which hold metals and minerals.

### LITHOSPHERE

The lithosphere comes from the Greek word lithos, which means "rock." That's a great name for it because it's a sphere made out of rock. In other words, **it's the outer part of the earth, including the crust and the upper mantle**.





## BIOSPHERE

Bio means “life.” The biosphere is made up of **all the living things on Earth** and it includes fish, birds, plants, and even people. The living portion of the Earth interacts with all the other spheres. Living things need water (hydrosphere), chemicals from the atmosphere, and nutrients gained by eating things in the biosphere.

## HYDROSPHERE

**All of the water found on earth in any of its forms** is considered to be a part of the hydrosphere. Most of the water on Earth is salt water, while there is also freshwater found in rivers and lakes. Snow, rain and hail are also in the hydrosphere.

## ATMOSPHERE

**The layer of mixed gasses that surrounds the Earth.** The most plentiful of these are oxygen and nitrogen. While you can also find methane, carbon dioxide and water vapor. The atmosphere also protects the earth from UV rays that come from the sun. It allows most visible light to enter the atmosphere to warm up the earth.

## INTERACTIONS OF EARTH'S SYSTEMS

All the spheres interact with other spheres. For example, rain (hydrosphere) falls from clouds in the atmosphere to the lithosphere and forms streams and rivers that provide drinking water for wildlife and humans as well as water for plant growth (biosphere). River action erodes banks (lithosphere) and uproots plants (biosphere) on the riverbanks. Flooding rivers wash away soil.

You get the idea!



### **Volcano >> geosphere >> atmosphere >> hydrosphere >> biosphere**

Volcanoes (an event in the geosphere) release a large amount of particulate matter into the atmosphere. These particles serve as nuclei for the formation of water droplets (hydrosphere). Rainfall (hydrosphere) often increases following an eruption, stimulating plant growth (biosphere). Particulate matter in the air (atmosphere) falls out, initially smothering plants (biosphere), but ultimately enriching the soil (geosphere) and thereby stimulating plant growth (biosphere).