
TOPIC: States of matter and water cycle



SUBJECT: Science - Chemistry

LEVEL/AGE: 10-11 years old

FOREKNOWLEDGE: Concept of matter, its states and properties, understanding of heat and temperature, changes in nature (seasons)

LENGTH: 5 PAGES (DURATION: 50 MINUTES)

LEARNING OUTCOMES

In this lesson, students will learn the characteristics of the different states of matter, as well as the processes to go from one to another, exemplified in nature through the water cycle.

**RESOURCES**

Worksheet, video
projector and screen
Experiment: ice cubes
and a bowl.

TEACHING METHODS

Explanatory videos
Repetition of exercises
Games (role play)
Worksheet

ACTIVITIES

INTRODUCTION (5 minutes)

The teacher can carry out a simple experiment to introduce the topic of the state of matter and the water cycle. Simply have a bowl with ice cubes in it, and apply heat so that the ice turns into water and then into steam. This experiment can be used to explain the different processes by which matter is transformed from one state to another.

A short introductory video can also be used to explain these processes, such as "[Heating Matter and Changes in State](#)" by Next Generation Science.

THEORY PART (15 minutes)

Matter is anything that has weight and takes up space, like you and me. Cars, trees, the food we eat, and the air we breathe are made of matter. Matter has three main forms: solid, liquid, and gas.

In the case of solids, their atoms maintain a fixed position, maintaining their shape like a soccer ball or a carrot; Ice, for example, is made of water in solid form. In liquids, however, molecular cohesion is less, achieving the ability to move, thus taking the shape of its container, such as water, juice or soft drinks. Finally, gas atoms are dispersed and constantly moving, so they have no fixed shape or volume and expand to fill an available space, like air in a balloon or steam.

The state in which a particular substance is found depends on two factors or conditions: temperature and pressure. Therefore, if either or both of these variables are modified, matter can change from one state to another: A solid can change to a liquid, a liquid to a gas, and a gas to a solid.

The changes in matter are as follows:

Melting is when a solid is transformed into a liquid.

Vaporisation is when a liquid is transformed into a gas.

Deposition is the change of matter from the gaseous state to the solid state without passing through the liquid state.

Solidification is the change of state of matter from liquid to solid.

Sublimation is the change of state of matter from solid to gaseous state without passing through the liquid state.

Condensation is the change of state from a gaseous to a liquid state.

HANDS-ON PART (10 minutes)

The “Water Molecules Role Play” activity is a hands-on, interactive way to help students understand the concept of the water cycle by physically representing states of matter. In it, students assume the roles of water molecules in different states: solid (ice), liquid (water) and gas (steam).

Each group physically represents the characteristics of their assigned state by how close they are and how freely they move. The activity then simulates the water cycle: “ice molecules” start in a cold corner, gradually become “water molecules” as they heat and expand, and finally transform into “water vapour molecules” that move freely. Putting them back together completes the cycle, symbolising precipitation and cooling.

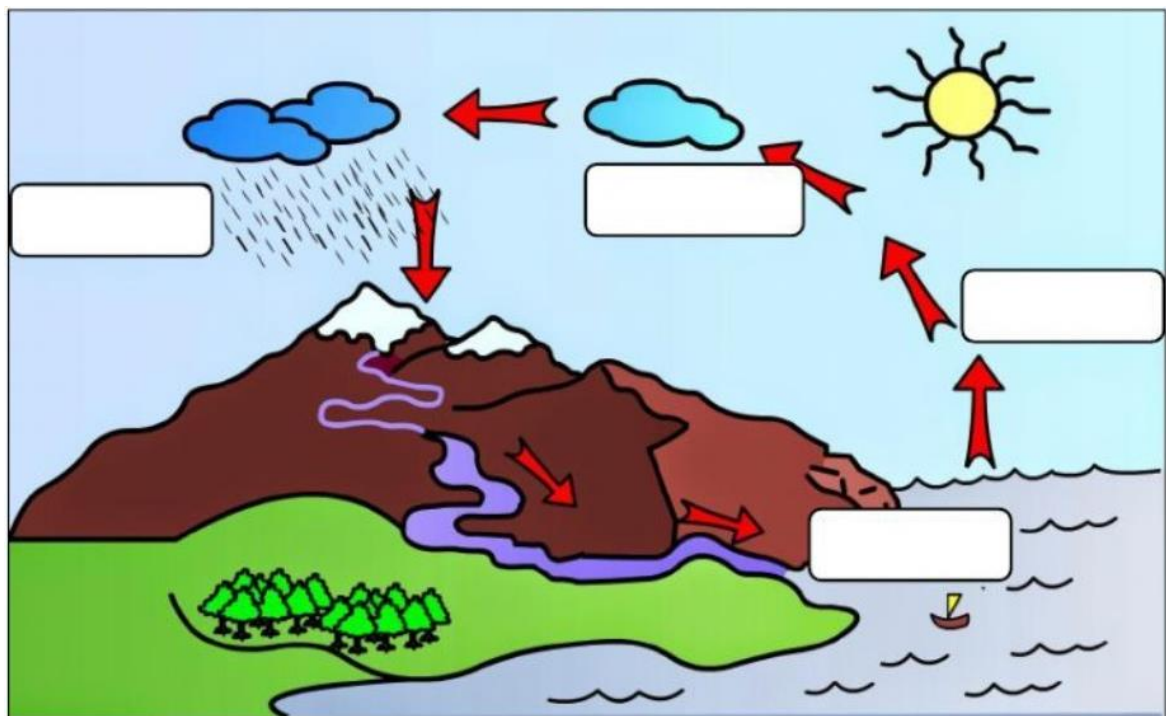
This hands-on approach helps students incorporate water cycle concepts, fostering deeper understanding through experiential learning. Following the activity, a discussion and reflection session further solidifies your understanding of the scientific processes involved.

EXERCISE PART (10 minutes)

1. Answer whether the following statements are true or false.

- Water vapour has a solid form.
- The process of water in nature does not repeat itself.
- In the process of condensation, water vapour is transformed into a liquid.
- It is not possible for a solid to turn directly into a gas without first passing through a liquid.
- The water in the oceans does not participate in the water cycle, as it always remains in the same location.
- Precipitation is the return of water to the earth's surface in the form of rain, snow or hail.

2. Complete the picture with the words below.

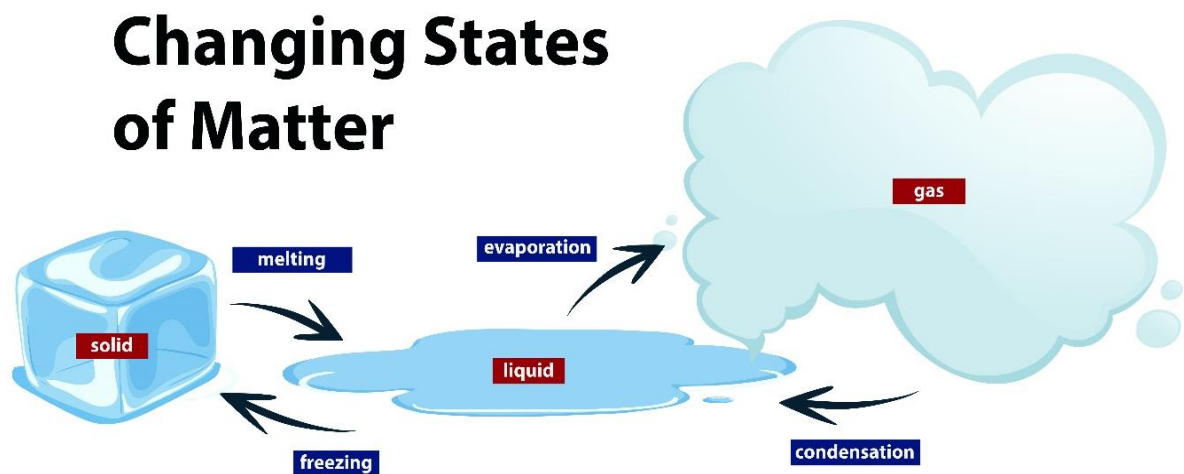


- Precipitation Accumulation Evaporation Condensation

SYNTHESIS/SUMMARY (10 minutes)

- **Solid, Liquid, and Gas:** Everything on Earth is made of matter, and it can exist in three main states: solid (ice), liquid (water), and gas (steam).
- Molecules, which are small particles, group together differently in each state. In a solid, they are very close together and barely move. In a liquid, they have more space and can move around a bit. In a gas, they are far apart and move freely.
- **Melt and Freeze:** When you heat a solid, like ice, the molecules move faster and become liquid (melt). When cooled, the molecules slow down and clump together again into a solid (freeze).
- **Evaporate and Condense:** When you heat a liquid, like water, the molecules become faster and turn into a gas (evaporate). When cooled, the molecules group together and form water droplets, becoming liquid again (condense).

Here is an infographic about the processes and changes in states of matter.



Source: Freepkik.com

BIBLIOGRAPHY

- Next Generation Science (March 2022), "[Heating Matter and Changes in State](#)" (YouTube)
- Britannica Kids. (s. f.). [Matter: states of matter](#)
- TheSchoolRun. (s. f.). [What are states of matter?](#)