

# CHAPTER 5: PROPERTIES OF MATTER



# LESSON 1: PROPERTIES OF MATTER — MASS AND CHANGES OF STATE

## LEARNING AIMS

- Learn that gases have properties, such as mass.
- Learn that the following are properties of a substance: the temperature at which it changes state, its thermal conductivity and its electrical conductivity.

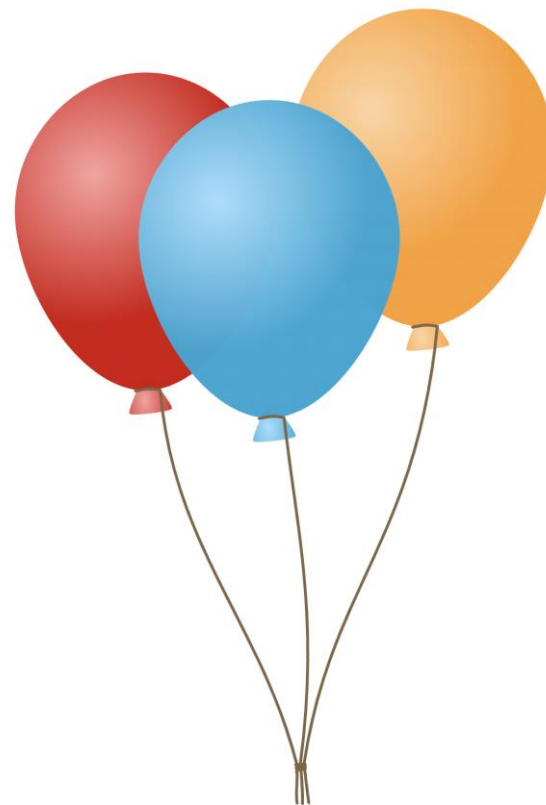
## CHAPTER TRIGGER

- What is happening to the ice cream?
- Does the same thing happen to the cone of the ice cream?



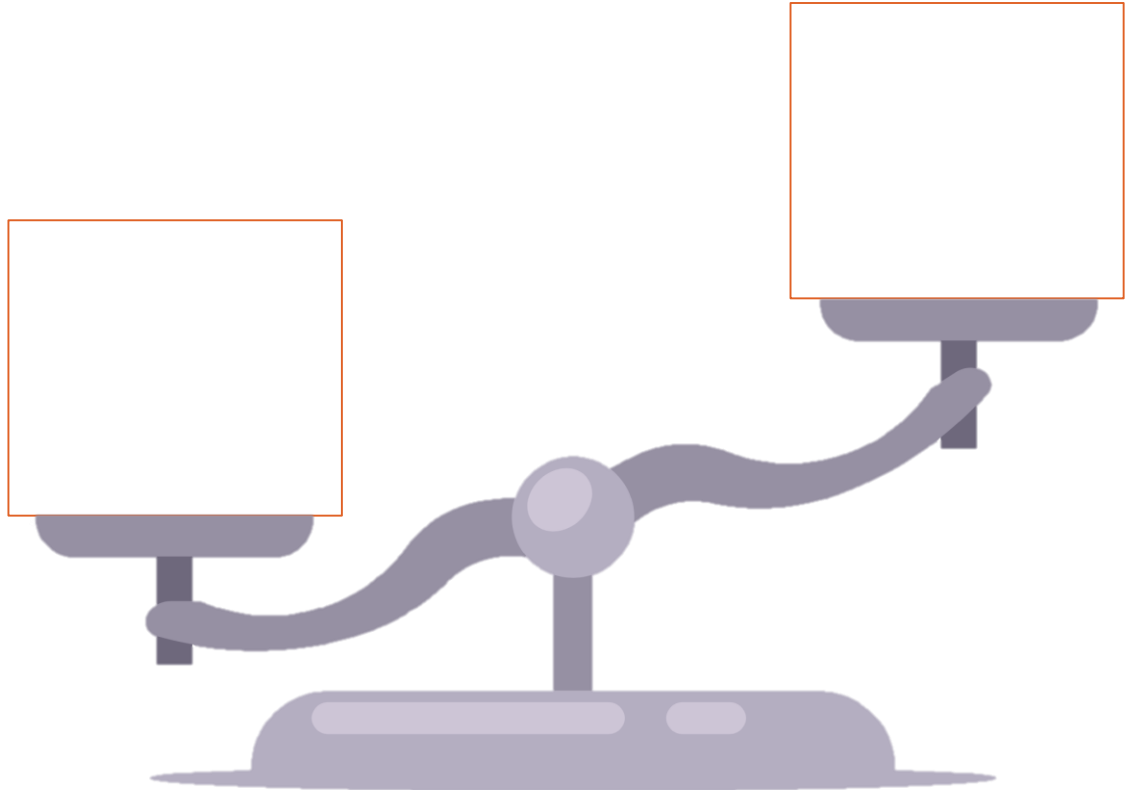
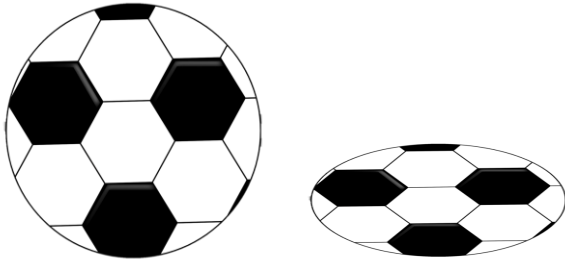
# 1. Mass

- The amount of matter in a substance is its mass.
- Gas is a state of matter. So, substances that are gases have mass too.



## ACTIVITY

Complete the diagram to show if the inflated or the deflated ball has a greater mass.



## 2. The Melting and Boiling Points:

- Substances can change in state when they gain or lose heat.
- Different substances change in state at different temperatures.  
**This is a property of a substance. Each substance has its own melting or boiling point.**

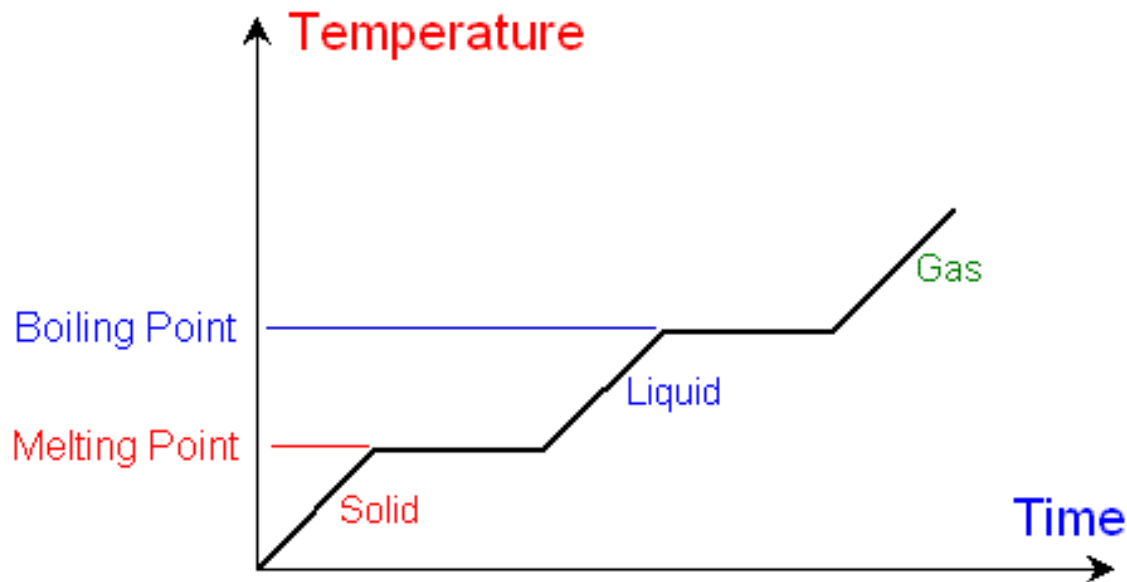
**The melting point:** is the temperature at which a substance changes from solid state to liquid state.

**The boiling point:** is the temperature at which a substance changes from liquid state to gaseous state.



# The Melting and Boiling Points:

The graph below shows how the temperature changes with time as a substance is heated at a constant rate.



## WRAP-UP

Substance	Melting point (°C)
Ice	0
Glass	1710
Silver	962

1. If all the substances are heated at the same time, which one will change into a liquid first?
2. Which substances are solids at room temperature of 25°C?



## LESSON 2: PROPERTIES OF SUBSTANCES — THERMAL AND ELECTRICAL CONDUCTIVITY

- What type of material do you think the gloves should be made of? Why?



# CRITICAL THINKING

Wearing a woolen jacket can keep us warm. Why?



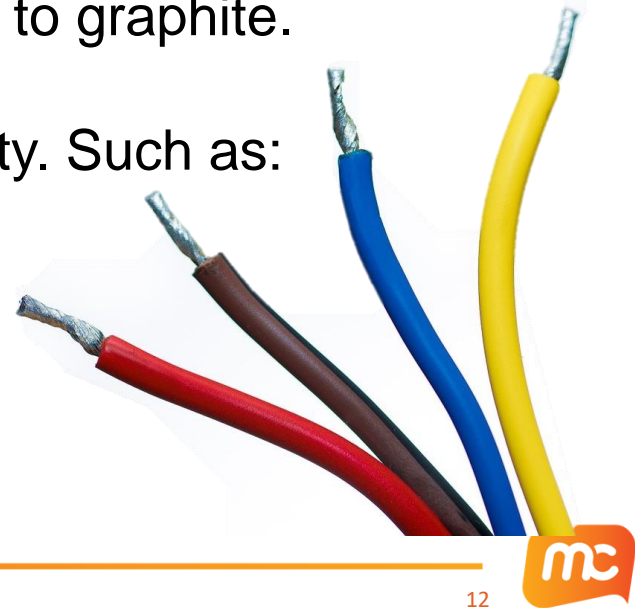
### 3. Thermal Conductivity:

- Thermal conductivity is the ability to conduct heat.
- Thermal conductors are good at conducting heat. Examples are metals.
- Thermal insulators are poor at conducting heat. Examples are wood, rubber and plastic.
- Think: What are the handles of the cooking pot made of? why?



## 4. Electrical Conductivity:

- Electrical conductivity is the ability to conduct electricity.
- Electrical conductors allow electricity to flow easily. All metals are electrical conductors, in addition to graphite.
- Electrical insulators do not conduct electricity. Such as: Plastic, Glass and rubber.



## ACTIVITY

Classify the materials into the correct groups.

fabric

copper

iron

plastic

rubber

wood

Electrical conductors

Electrical insulators

## WRAP-UP

Fill in the blanks.

1. Thermal conductivity is the ability of a substance to conduct heat.
2. Electrical insulators are poor at conducting electricity.
3. Cooking pots are made of metal because metal is a good thermal conductor.
4. Electrical conductivity is a measure of how well a substance can conduct electricity.



## 5. Is it Magnetic or not?

**Magnetic Materials are:**

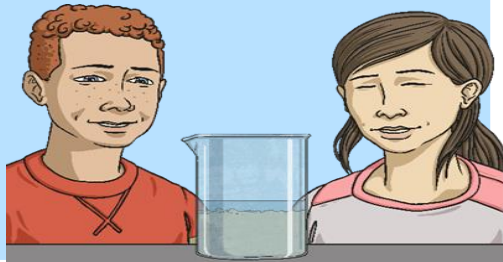
- 1. Iron**
- 2. Cobalt**
- 3. Nickel**

**In addition to Steel that is made up from iron.**



## 6. Soluble or Insoluble?

Materials that will dissolve are known as soluble. Materials that won't dissolve are insoluble.

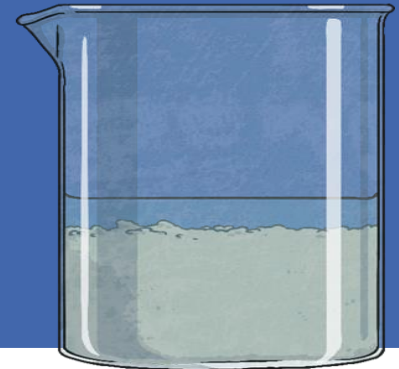


Mix a teaspoonful of each material with 50ml of water.

If the material does dissolve, the water will be clear. It may have changed colour but will be clear. You will not see the particles of solid any more.

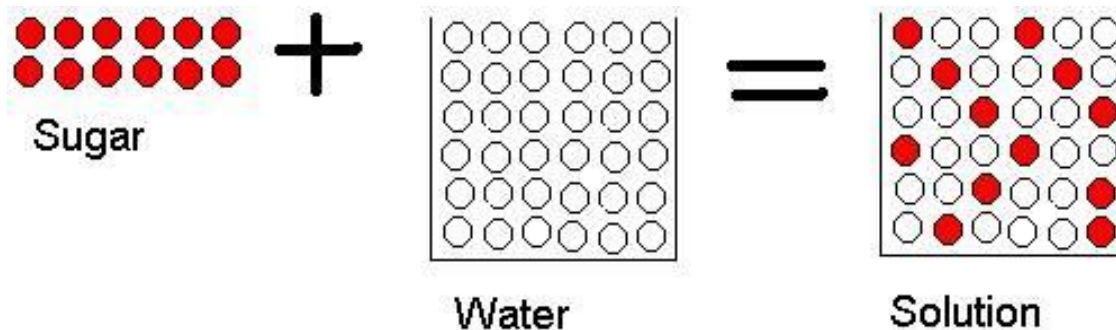


If the material does not dissolve, you will still see the particles of the solid in the water.

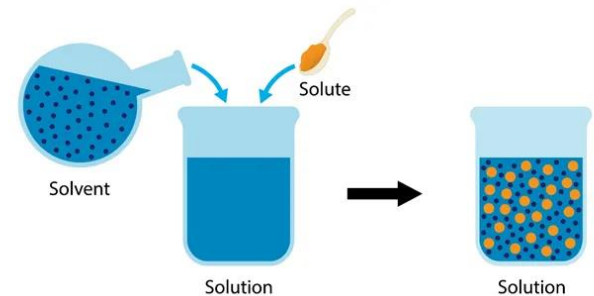




# What happens when a solid dissolves?



- A substance that can dissolve in water is called: **soluble**. Examples: **Salt, sugar, jelly powder**.
- A substance that cannot dissolve in water is called: **insoluble**. Examples: **Sand, chalk and steel powder**.
- After dissolving:
- The substance that **is dissolved** in a liquid is called: **solute**.
- The **liquid** at which a substance dissolves is: **solvent**.
- The **mixture** of a solute and solvent is: **solution** .



# LESSON 3: BOILING AND EVAPORATION

## LEARNING AIM

- Describe how boiling and evaporation are different.



## LESSON TRIGGER

- We have learnt about boiling and evaporation in Stage 5.
- Is the water in the pan boiling or evaporating?



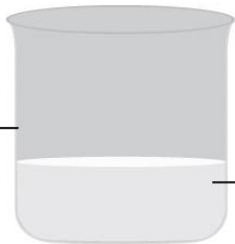
# MAIN CONCEPT

Boiling	Evaporation
Boiling occurs when a liquid reaches its boiling point.	Evaporation occurs at all temperatures.
Boiling occurs throughout the liquid.	Evaporation only occurs at the surface of the liquid.
Bubbles are formed.	No bubbles are formed.
Boiling is a fast process.	Evaporation is a slow process.

# ACTIVITY

Which beaker shows boiling?

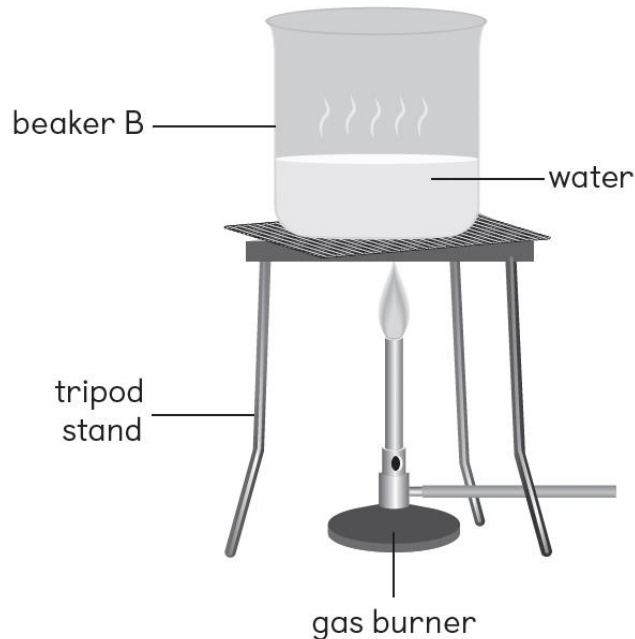
Which beaker shows evaporation?



water

boiling

evaporation



# WRAP-UP

Tick the correct box beside each sentence.



	True	False
During evaporation, water on the surface boils and changes into water vapour.		
Particles of a substance gain heat during both boiling and evaporation.		