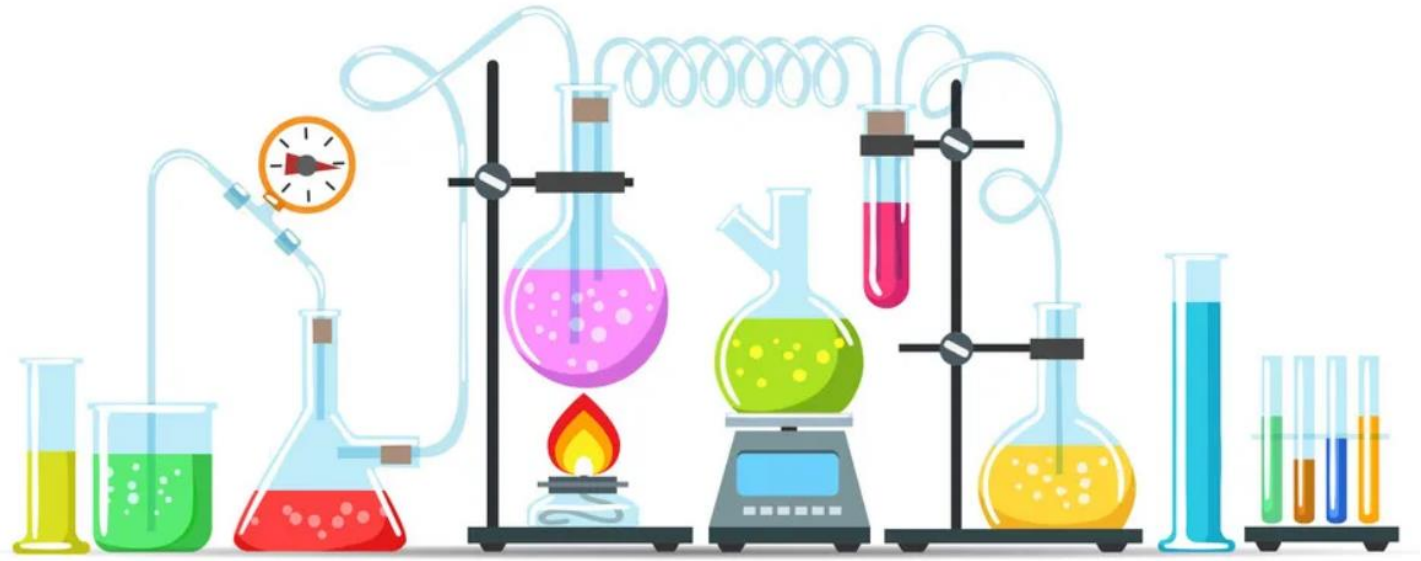
SCIENCE

CHAPTER 6: CHANGES AROUND US



Changes Around Us

Changes occur all around us. When one or more properties of a thing become different, we say that it has changed, or a change has taken place in it.

What is change?

A change is referred to as a difference that occurs in the properties of the substances such as shape, size, colour, state and internal structure etc. For example, a burning candle melts its wax, and this melting wax evaporates to produce a black substance called soot and carbon dioxide.

The most noticeable thing is that changes can occur either instantly or take a longer time, and, they can be temporary or permanent.

Natural changes: The changes occurred by nature are called natural changes. Some common examples are the rotation of the earth on its axis causing day and night, the revolution of the earth around the sun causing different seasons and growing babies into adults.

Man-made changes: The changes that are influenced by human efforts are called man-made changes. Some common examples are the manufacturing of vehicles, making food products and building houses.

The changes can be broadly differentiated based on the properties of the substances: physical, chemical, reversible and irreversible changes.

Types of Changes

Reversible Changes

Changes which are easily reversed to obtain the original form by removing the cause of change are called reversible changes. Melting, boiling, evaporating, and condensing are examples of reversible changes.

Examples:

Pulling of a rubber band

Folding of paper

Melting and boiling

When a solid turns into a liquid, it is called melting. When a liquid becomes a gas, it is called boiling. Melting and boiling are examples of a reversible change.

Example: If an ice cube melts, the water can be frozen back to ice again by lowering the temperature. Steam from evaporated boiling water will condense back to water when the temperature falls.

Evaporation and Condensation

Evaporation is the process of a substance in the liquid form transitioning into the gas phase. Condensation is when a gas returns to the liquid form.
Example: With the heat of the Sun, water in the sea evaporates and turns into water vapour. Water vapour in the air gets cold and changes back into liquid, forming clouds. This occurs because of condensation.

Expansion

Expansion on heating is a reversible change. On heating, the size of the object generally increases. However, this change is a reversible change.

Example: Fixing of an iron rim to the wooden wheel of a cart

Non-reversible Changes

Changes in a substance which cannot be converted back to its original form are called non-reversible changes.

Example:

Rusting of iron

Physical Changes:

The changes in the physical properties of the substances occur, but no change occurs in their chemical composition. Such changes are called physical changes. The following characteristics of physical changes are:

- These changes only affect the physical properties of the substances such as temperature, shape, size, odour, position and texture.
- The result cannot lead to the formation of the new substance.
- No change in the internal structure of the substances occurred.
- These changes are temporary.

Some examples of physical changes have physical processes such as:

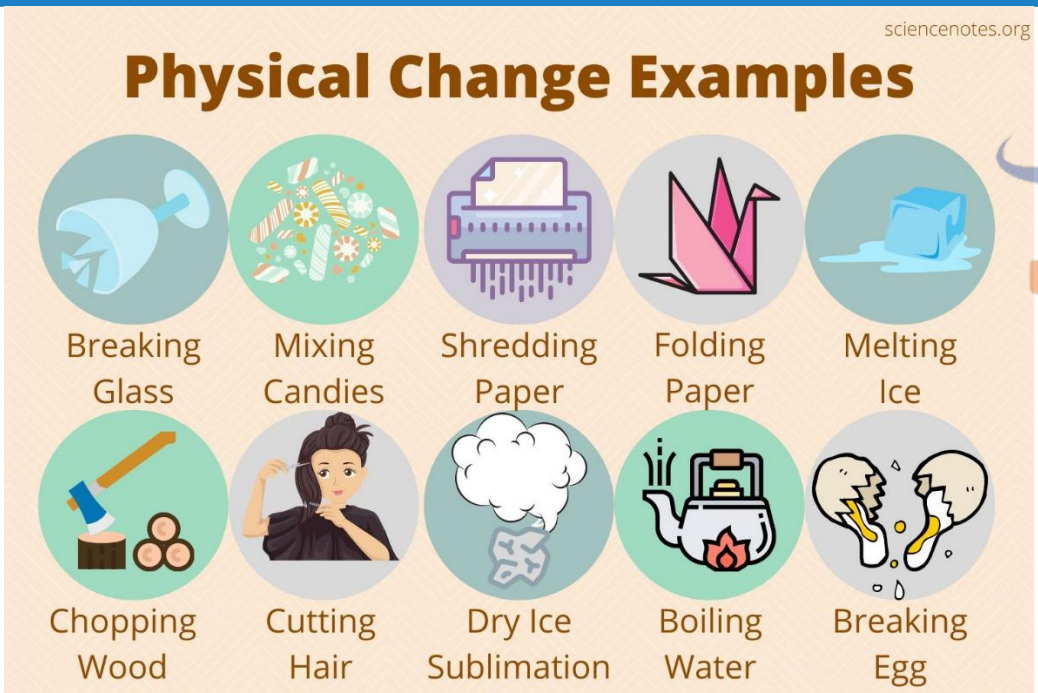
Evaporation: The water changes into water vapours.

Melting: Ice changes into water.

Freezing: The water changes into solid.

All these processes have state conversions that occurred due to the changes in the temperature, but no chemical composition is changed.

Physical changes are mostly reversible but not all physical changes are reversible such as breaking glass, tearing of paper and bursting of balloons. Some methods that we apply in our daily life like heating, cooling, cutting and pushing or pulling, etc.



Chemical Changes

The changes that occur in the chemical composition of the substances that lead to the formation of new substances are called chemical changes. A chemical change can take place when two or more substances chemically react together. In a chemical change, the substances that are combined are chemically called reactants, whereas the newly formed substances are called products. Some examples are:

- The burning of paper turns into ash. This newly formed product ash has different properties than the paper.
- The combination of the atoms or molecules of different elements together formed a new compound. For example, water is formed, when two atoms of hydrogen are linked with one atom of oxygen in the presence of heat.

Fermentation is also a chemical change. For example, yeast and bacteria convert sugar into alcohol and carbon dioxide. This process is called fermentation.

The following characteristics of chemical changes are:

- The newly formed substances have different properties and compositions than the reactants.
- These changes are considered as irreversible.
- The absorption or emission of heat are both involved in chemical changes.

Common Causes of Physical and Chemical Changes

- **Mixing of two or more substances:** The mixing of two or more substances leads to physical change. For example, the occurrence of evaporation recovered the dissolved salt in the water. The mixing of two or more substances also leads to the chemical change. For example, the reaction between lemon juice and baking soda causes hissing sounds and bubbles, forming a substance with completely different properties.
- **chemical reaction:** It is a cause of chemical change. For example, rusting of iron takes place due to corrosion (a rough black coating on the iron).
- **Heating and cooling:** The heating and cooling effects cause changes in the physical states of matter. For example, the physical processes depend on heating and cooling factors.
- **Application of force:** The force of air changes the shape and size. For example, a balloon inflated due to the force of air.

Effects of Heating and Cooling

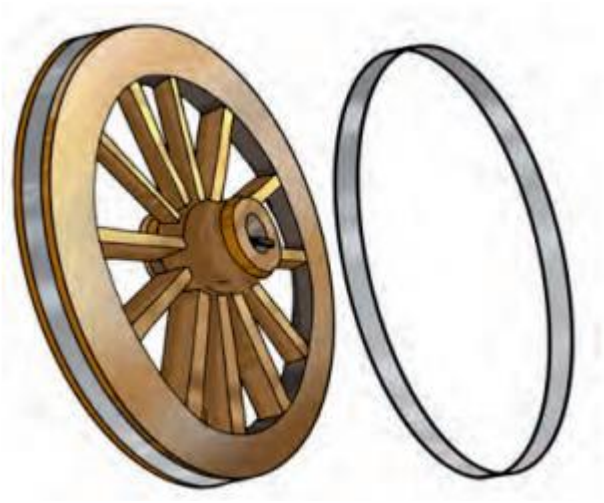
The effects of heating and cooling can lead to various changes. For example, the heating of iron expands it while it contracts when gets cooled.

Applications of contraction and expansion

The expansion and contraction are caused due to the effects of various parameters such as temperature and force, etc. The following applications of contraction and extraction are:

- The wooden wheel of a cart has a metal rim because it helps the cartwheel to move smoothly. On heating the metal rim, it expands. Afterward, the heated metal rim expels out of the cartwheel that is later placed over the cartwheel and poured with the cold

water which makes it contracts and fitted in the cartwheel



Cooling and heating of metal rim.

- The small gaps between two adjacent sections of rails on the railway track are also an example of the heating and cooling effect

Small gaps between rails on the railway track.

One of the excellent examples of heating and the cooling effect is a clinical thermometer that contains liquid mercury for measuring the temperature of the human body. On cooling the bulb of the thermometer, the temperature drops down while putting it under the mouth of the human can raise the temperature significantly

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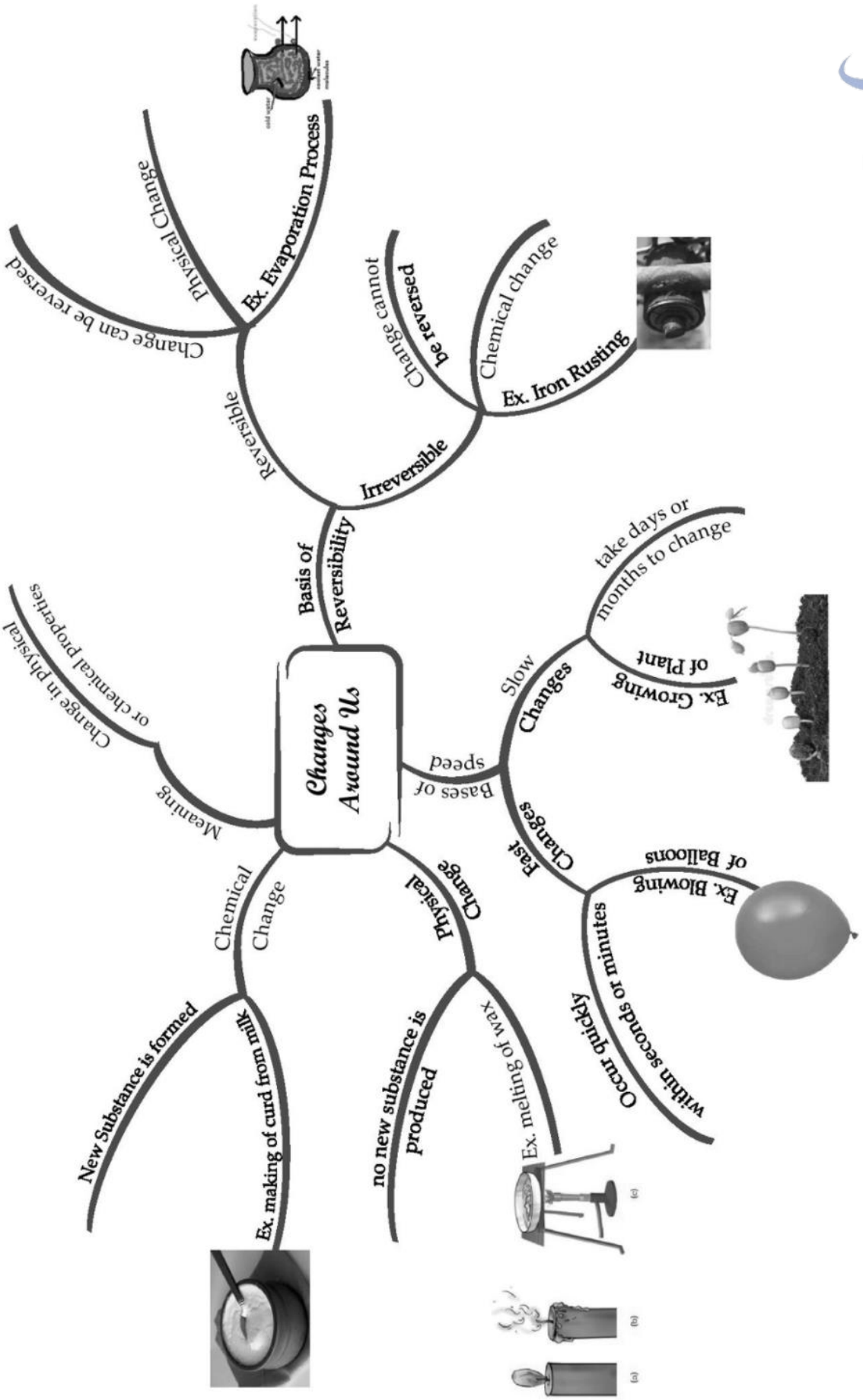
CHAPTER - 6 CHANGES AROUND US



Important Questions

Multiple Choice Questions:

Question 1. When ice melts into water, what types of changes do you observe?

(a) Physical changes

(b) Chemical changes

(c) Both (a) and (b)

(d) None of these

Question 2. Cooked food is the:

(a) Chemical change

(b) Physical change

(c) Both (a) and (b)

(d) None of these

Question 3. If we burn a candle, the height of a candle will.

(a) Decreased

(b) Increased

(c) Remain same

(d) None of these

Question 4. For making the curd, we should the milk.

(a) Heat

(b) Cool

(c) Boil

(d) None of these

Question 5. Metal rim is made slightly than the wooden wheel.

(a) Bigger

(b) Smaller

(c) Equal

(d) None of these

Question 6. The metal rim expands and fits into the wheel.

(a) On boiling

(b) On cooling

(c) On heating

(d) All of these

Question 7. The black material (tar) for repairing road is.

(a) Heated

(b) Cooled

(c) Heated and cooled

(d) None of these

Question 8. The incense stick has burnt to give off.

(a) Gases

(b) Ashes

(c) Both (a) and (b)

(d) None of these

Question 9. Metal expand on heating and contract on.

(a) Boiling

(b) Washing

(c) Cooling

(d) Both (a) and (b)

Question 10. A change in a substance can be brought by heating it or by it with other substances.

(a) Cooling

(b) Boiling

(c) Washing

(d) Mixing

Question 11. An iron piece is heated red hot and beaten into a shape.

(a) Desired

(b) Undesired

(c) Same

(d) All of these

Question 12. The change which can be reversed is known as:

(a) Reversible change

(b) Irreversible change

(c) Both (a) and (b)

(d) None of these

Question 13. The change which cannot be reversed is known as:

(a) Reversible change

(b) Irreversible change

(c) Both (a) and (b)

(d) None of these

Question 14. A process in which liquid changes into gas is known as:

(a) Solution

(b) Fusion

(c) Condensation

(d) Evaporation

Question 15. A process by which gas is turned into liquid is known as:

(a) Solution

(b) Fusion

(c) Condensation

(d) Evaporation

Very Short Question:

1. Give two examples of slow changes.

2. Give two examples of fast changes.

3. Give two examples of reversible changes.

4: Give two examples of irreversible changes.

5. Can you say deforestation is an irreversible or reversible change?

6. Does the size of the paper change after making an aeroplane by folding it or by cutting it?

7. Can you change the shape of an eraser after erasing?

8. Why does a blacksmith heat the metal rim to fix it on a cart wheel?

9. What are slow and fast changes? Give examples.

10. Classify the following into slow and fast changes:

(i) Spinning of top

(ii) Formation of day and night

(iii) Formation of curd from milk

(iv) Change of season

(v) Making curd from milk by adding lemon juice.

Short Questions:

1. What is a physical change? Explain with example.
2. What is a chemical change? Explain with example.
3. What happens when sugar is heated?

Long Questions:

1. Explain how a metal rim slightly smaller than a wooden wheel can be fixed on it.
2. How does curd being set? Is this change reversible?

Answer Key-

Multiple Choice Answers:

1. (a) Physical changes
2. (a) Chemical change
3. (a) Decreased
4. (a) Heat
5. (b) Smaller
6. (c) On heating
7. (a) Heated
8. (c) Both (a) and (b)
9. (c) Cooling
10. (d) Mixing
11. (a) Desired
12. (a) Reversible change
13. (b) Irreversible change
14. (d) Evaporation
15. (c) Condensation

Very Short Answers:

1. Answer:

(a) Growing of plants

(b) Ripening of fruits.

2. Answer:

(a) Blowing of balloon

(b) Rolling out roti from dough ball.

3. Answer:

(a) Drying of wet clothes

(b) Heating of milk.

4. Answer:

(a) Milk to cheese

(b) Cooking of food.

5. **Answer:** It is an irreversible change.

6. **Answer:** Yes.

7. **Answer:** Yes.

8. **Answer:** A blacksmith heats the metal rim to fix it onto a cart wheel because a metal rim is made slightly smaller. On heating, the rim expands and fits onto the wheel. Then on cooling, the rim contracts and fits tightly onto the wheel.

9. **Answer:** The changes which take place in a long period of time are called slow changes whereas those changes which take place in a short period of time are called fast changes.

Examples:

(a) Rusting of iron, formation of day and night, ripening of fruits, growing of trees are slow changes.

(b) Burning of paper, stretching of rubber band, blowing of balloons, bursting of crackers are fast changes.

10. Answer:

(i) Fast change

(ii) Slow change

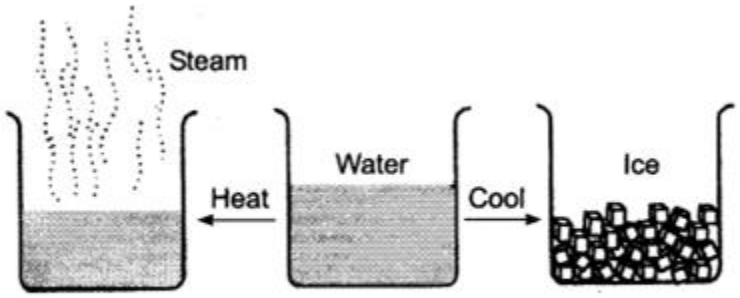
(iii) Slow change

(iv) Slow change

(v) Fast change.

Short Answer:

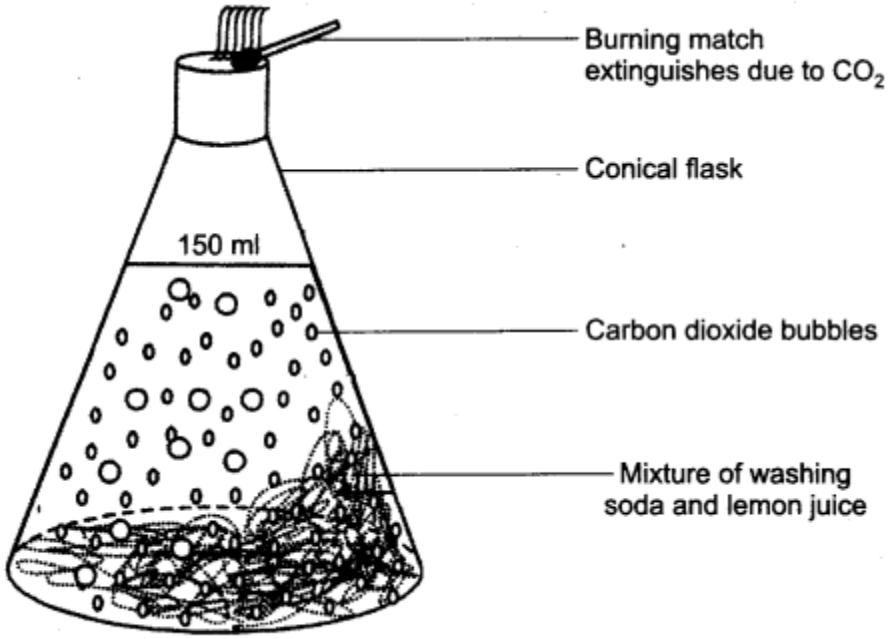
1. **Answer:** The changes in which only physical properties of substances are changed and no new substance is formed is called physical change. It is a reversible change. Example: Boiling and freezing of water.



Physical changés

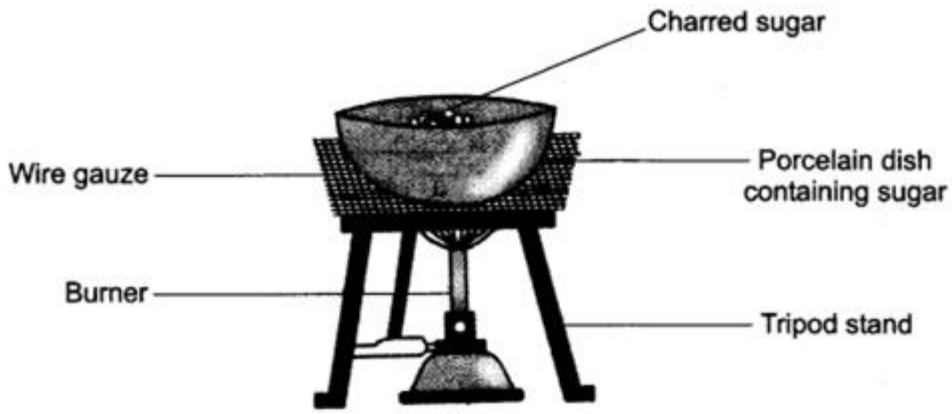
2. **Answer:** The changes in which new substance with new chemical properties are formed are called chemical changes.

   Example: Reaction between washing soda and lemon juice in which C02 and other substances are formed.



Reaction between washing soda and lemon juice

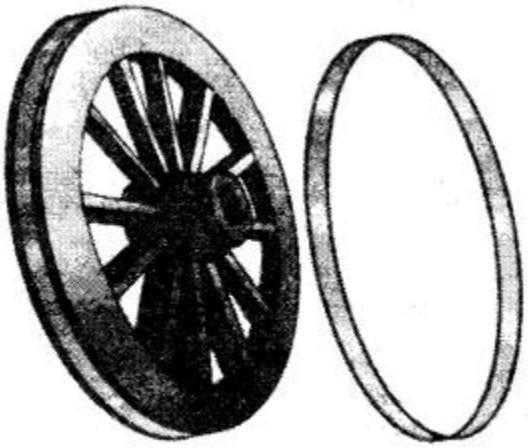
3. **Answer:** When sugar is heated continuously then a black powdery substance is formed. This is a chemical change.



Heating of sugar

Long Answer:

1. **Answer:** The metal rim is always made slightly smaller than the wooden wheel. The metal rim is heated. On heating, the rim expands and fit onto the wheel. Cold water is then poured over the rim. Due to cooling the metal rim contracts and fits tightly onto the wheel.



Cart wheel with metal rim fixed on it.

2. **Answer:** A small quantity of curd is added to warm milk. The milk is stirred and is set aside undisturbed for a few hours at a warm place. In a few hours, the milk changes into curd.

   Curd formed from milk cannot be changed into milk again. So, this an irreversible (cannot be reversed) change.