

DON BOSCO HIGH SCHOOL PANJIM

LESSON 5 CHANGES AROUND US

1. What is a change?

Answer:

A change is any alteration that takes place in the size, shape, colour, state, position, or properties of a substance. Changes occur around us all the time and may be natural or caused by human activities.

Examples: Melting of ice, ripening of fruits, burning of paper, and rusting of iron.

2. What is a physical change?

Answer:

A physical change is a change in which only the physical properties of a substance, such as its size, shape, or state, change. No new substance is formed, and the change is usually reversible.

Examples:

- Melting of ice
 - Breaking a glass
 - Cutting paper
 - Dissolving sugar in water
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3. What is a chemical change?

Answer:

A chemical change is a change in which one or more new substances with different properties are formed. Chemical changes are usually permanent and cannot be easily reversed.

Examples:

- Rusting of iron
- Burning of wood

- Cooking food
 - Curdling of milk
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4. Differentiate between physical and chemical changes.

Physical Change	Chemical Change
No new substance is formed.	A new substance is formed.
Usually reversible.	Usually irreversible.
Only physical properties change.	Chemical composition changes.
Example: Melting of ice	Example: Burning of paper

5. What are the characteristics of a physical change?

Answer:

A physical change:

- Does not form a new substance.
 - Changes only the appearance, shape, size, or state.
 - Is usually reversible.
 - Causes little or no change in the chemical properties.
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6. What are the characteristics of a chemical change?

Answer:

A chemical change:

- Produces one or more new substances.
 - Is usually permanent.
 - May produce heat, light, gas, sound, or a colour change.
 - Cannot usually be reversed.
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7. Why is melting of ice considered a physical change?

Answer:

When ice melts, it changes from a solid to a liquid. The substance remains water, and it can be frozen again to form ice. Therefore, no new substance is formed.

8. Why is burning of paper a chemical change?**Answer:**

Burning paper produces ash, smoke, carbon dioxide, and other gases. Since new substances are formed and the process cannot be reversed, it is a chemical change.

9. Why is rusting of iron a chemical change?**Answer:**

Iron reacts with oxygen and moisture in the air to form **rust (iron oxide)**, which is a new substance. Rust has properties different from iron and cannot easily be changed back into iron.

10. What conditions are necessary for rusting?**Answer:**

Rusting requires:

- Iron
- Oxygen (air)
- Water or moisture

If either oxygen or water is absent, rusting does not occur.

11. How can rusting be prevented?**Answer:**

Rusting can be prevented by:

- Painting
- Oiling or greasing
- Galvanising (coating with zinc)

- Electroplating
 - Keeping iron objects dry
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12. Why is cooking food a chemical change?

Answer:

Cooking changes the ingredients into new substances with different taste, smell, texture, and appearance. The original ingredients cannot be obtained back.

13. Why is curdling of milk a chemical change?

Answer:

Milk changes into curd due to the action of bacteria. A new substance with different taste, texture, and properties is formed.

14. Why is dissolving sugar in water a physical change?

Answer:

No new substance is formed. Sugar can be recovered by evaporating the water. Therefore, it is a physical change.

15. What is crystallisation?

Answer:

Crystallisation is the process of obtaining pure crystals of a substance from its solution. It is a physical change because no new substance is formed.

16. Define weathering.

Answer:

Weathering is the slow breaking down of rocks into smaller pieces due to natural factors such as heat, water, wind, ice, and plant roots. It takes place at or near the Earth's surface.

17. What are the main causes of weathering?

Answer:

Weathering is caused by:

- Heat from the Sun
 - Rainwater
 - Wind
 - Ice
 - Plant roots growing in cracks
 - Changes in temperature
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18. What is erosion?

Answer:

Erosion is the wearing away and carrying away of soil and rock particles by moving water, wind, glaciers, or sea waves from one place to another.

19. What is the difference between weathering and erosion?

Weathering	Erosion
Rocks break into smaller pieces.	Broken rocks and soil are carried away.
Occurs at one place.	Involves movement of materials.
No transportation occurs.	Transportation takes place.

20. How are weathering and erosion related?

Answer:

Weathering first breaks rocks into smaller pieces. Erosion then carries these smaller rock particles and soil to other places by wind, water, or ice. Thus, weathering and erosion work together to shape the Earth's surface.

21. Give two examples of physical changes in daily life.

Answer:

- Melting of butter.
- Cutting vegetables.

In both cases, no new substance is formed.

22. Give two examples of chemical changes in daily life.

Answer:

- Baking a cake.
 - Burning a candle (the wax melts physically, while burning the wax is a chemical change).
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23. Why is breaking a glass a physical change even though it cannot be reversed?

Answer:

Breaking a glass changes only its size and shape. The material remains glass, and no new substance is formed. Therefore, it is a physical change even though it is irreversible.

24. Why is fermentation of dough a chemical change?

Answer:

Yeast converts sugar into carbon dioxide and other substances. The dough rises because of the gas produced, and new substances are formed.

25. Mention three signs that indicate a chemical change has taken place.

Answer:

- Formation of a new substance.
- Change in colour.

- Production of heat, light, gas, or sound.
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26. Why do leaves change colour and fall during certain seasons?

Answer:

The green pigment (chlorophyll) in leaves breaks down, causing the leaves to change colour. This involves chemical changes inside the leaves before they eventually fall.

27. What role do plant roots play in weathering?

Answer:

Plant roots grow into cracks in rocks. As the roots grow thicker, they exert pressure on the rocks, causing them to crack and break into smaller pieces.

28. Why is weathering important?

Answer:

Weathering:

- Helps in the formation of soil.
 - Releases minerals needed by plants.
 - Shapes the Earth's surface.
 - Provides materials for erosion.
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29. Why is erosion harmful?

Answer:

Excessive erosion:

- Removes fertile topsoil.
 - Reduces agricultural productivity.
 - Causes landslides and floods.
 - Damages the environment.
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30. Complete the table.

Change	Physical/Chemical	Reason
Melting ice	Physical	No new substance formed
Rusting iron	Chemical	Iron oxide is formed
Burning paper	Chemical	Ash and gases are produced
Dissolving sugar	Physical	Sugar can be recovered
Cooking food	Chemical	New substances are formed
Breaking glass	Physical	Only shape changes
Weathering of rocks	Physical	Rocks break into smaller pieces without forming a new substance
Erosion of soil	Physical	Soil and rock particles are moved from one place to another

Higher-Order Thinking Questions

1. A blacksmith heats an iron rod and beats it into a new shape. Is this a physical or chemical change? Explain.

Answer:

It is a **physical change** because only the shape of the iron changes. No new substance is formed.

2. Why is burning wood considered an irreversible change?

Answer:

Burning wood produces ash, smoke, carbon dioxide, and other gases. These new substances cannot be changed back into wood, making it irreversible.

3. A student leaves an iron nail in water for several days. What will happen and why?

Answer:

The iron nail will develop a reddish-brown coating called **rust** because iron reacts with oxygen dissolved in water and moisture in the air.

4. Explain how weathering and erosion together help shape the Earth's surface.**Answer:**

Weathering breaks rocks into smaller pieces. Erosion then carries these pieces away and deposits them elsewhere. Over time, these processes form valleys, plains, riverbeds, beaches, and other landforms.

5. Why is it important to control soil erosion?**Answer:**

Controlling soil erosion is important because it:

- Protects fertile topsoil needed for farming.
 - Prevents floods and landslides.
 - Maintains soil fertility.
 - Helps conserve the environment and supports plant growth.
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Quick Revision Table

Term	Meaning
Change	Any alteration in the properties or state of a substance.
Physical Change	No new substance is formed; usually reversible.
Chemical Change	New substance is formed; usually irreversible.
Rusting	Formation of iron oxide when iron reacts with oxygen and moisture.
Weathering	Breaking down of rocks into smaller pieces by natural agents.
Erosion	Carrying away of soil and rock particles by wind, water, ice, or waves.

Crystallisation	Formation of pure crystals from a solution.
Reversible Change	A change that can be undone.
Irreversible Change	A change that cannot be easily undone.

31. What happens when magnesium ribbon is burnt in air? Why is it a chemical change?

Answer:

When a **magnesium (Mg) ribbon** is heated, it burns with a **bright dazzling white flame** and forms a **white powder called magnesium oxide (MgO)**.

Reaction:

Magnesium + Oxygen → Magnesium Oxide

This is a **chemical change** because:

- A **new substance (magnesium oxide)** is formed.
 - The new substance has properties different from magnesium.
 - The change cannot be easily reversed.
 - Heat and bright light are produced during the reaction.
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32. What happens when magnesium oxide is mixed with water?

Answer:

When magnesium oxide is mixed with water, it forms **magnesium hydroxide**, which is a **base**.

Reaction:

Magnesium Oxide + Water → Magnesium Hydroxide

Since magnesium hydroxide is basic, it turns **red litmus paper blue**.

33. What is lime water?

Answer:

Lime water is a clear solution of **calcium hydroxide** in water. It is commonly used in laboratories to test for the presence of **carbon dioxide gas**.

34. What happens when carbon dioxide is passed through lime water? Why?

Answer:

When carbon dioxide is passed through lime water, the lime water **turns milky** because a white insoluble substance called **calcium carbonate** is formed.

Reaction:

Calcium Hydroxide + Carbon Dioxide → Calcium Carbonate + Water

This is a **chemical change** because:

- A **new substance (calcium carbonate)** is formed.
 - There is a visible change (lime water turns milky).
 - The properties of the new substance are different from those of lime water.
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35. Why is the burning of magnesium ribbon followed by passing the gas through lime water considered evidence of a chemical change?

Answer:

Burning magnesium ribbon forms **magnesium oxide**, showing that a new substance has been produced. Similarly, when **carbon dioxide** is passed through lime water, the solution turns **milky** due to the formation of **calcium carbonate**. In both cases:

- New substances are formed.
- The changes are irreversible.
- The substances formed have properties different from the original substances.

Therefore, both are **chemical changes**.

Additional Higher-Order Thinking Question

36. A student burns a magnesium ribbon and collects the white ash formed. The ash is mixed with water and tested with red litmus paper. Predict the observation and explain it.

Answer:

The white ash is **magnesium oxide**. When mixed with water, it forms **magnesium hydroxide**, which is **basic**. Therefore, **red litmus paper turns blue**.

This shows that burning magnesium produces a new substance, and the product forms a base when mixed with water.
