

NOTES

CLASS 7

SCIENCE

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PHYSICAL AND CHEMICAL CHANGES

Introduction

There are several changes we come across daily e.g dissolving sugar in water, or flattening a metal rod by beating it. These involve changes in the form of the substance. Changes can be classified as:

- (i) Physical
- (ii) Chemical

Physical properties

Physical properties include size, shape, colour and state (solid/liquid/gas) of a substance.

Physical change

- Any change to the physical properties of a substance is called a physical change.
- Physical changes are usually **reversible** as no new substance is formed. It is the same substance but with changed physical properties.

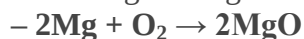
Chemical change

- A change in which one or more new substances are formed is called as a chemical change.
- Usually a chemical change involves a chemical reaction, which forms new products.
- Example : Rusting of Iron, or burning wood.

Metallic Oxides

Formation of metal oxides are examples of chemical changes. They are formed by the reaction of oxygen in air.

– Burning of Magnesium ribbon:



– The product formed is the oxide of magnesium, which is in the form of ash. It does not look anything like the magnesium ribbon used for burning.

Reaction of metallic oxides with water

- Reaction of metal oxides with water form metal hydroxides.
- Example dissolving Magnesium oxide in water, by stirring the ash very well with water.
- $\text{MgO} + \text{H}_2\text{O} \rightarrow \text{Mg(OH)}_2$
- The product formed is basic in nature and turns red litmus paper → blue

Reaction between baking soda and vinegar

When a pinch of baking soda is added to vinegar we hear a hissing sound and observe the formation of bubbles.

– Vinegar (Acetic Acid) + Baking Soda (Sodium bicarbonate) → CO₂ (Carbon dioxide) + Other products

The carbon dioxide produced during the reaction of Vinegar and baking soda, when passed through lime water gives calcium carbonate, as follows:



– The calcium carbonate turns lime water milky.



Observations that indicate a chemical change

- Heat or light is absorbed or given out during a chemical reaction.
- Production of sound
- Production of gases or precipitates
- Production of smell
- A colour change may occur

Rusting

- When substances made of Iron are exposed to oxygen and moisture in the atmosphere, it forms a red layer, which is called **rust**.
- The formation of rust can be represented by the following reaction:
- $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$. The chemical formula for rust is $\text{Fe}_2\text{O}_3 \cdot n\text{H}_2\text{O}$. More the moisture in the air, quicker the formation of rust.
- **Galvanization**
 - The process of depositing zinc on the surface of Iron to prevent rusting is called as **galvanisation**.
 - Example: Iron water pipes are galvanised. Ships are made out of iron which is galvanised. Due to the presence of salts in seawater, the process of rusting is hastened. Hence ships need to replace their iron body every year.
- **Crystallisation**
 - The process of separation of salts from their solution is called as crystallisation. It is a purification technique that purifies seawater or separates crystals from impure samples. It is a physical change.



SOME IMPORTANT QUESTIONS

Very Short Answer -

1. Identify the following changes as physical or chemical.

a. Dissolving sugar in water.	Ans: Physical.
b. Formation of rain from clouds.	Ans: Physical.
c. Formation of acid rain	Ans: Chemical.
d. Combustion	Ans: Chemical.
e. Hammering a nail flat.	Ans: Physical.

Short Answer Questions -

2. What are physical properties? Give examples.

Ans: Physical characteristics are features of a substance that may be determined based on its appearance.

Examples: shape, size, colour, state of compound etc.

3. What are chemical changes? Give examples.

Ans: When one or more compounds react to generate completely new products, this is referred to as a chemical change. The original reactant or substance changes totally as a result of a chemical transformation. The final product is unique. The transformation is irreversible.

Examples: Combustion, corrosion, photosynthesis etc.

4. What are physical changes? Give examples.

Ans: Physical changes occur in a matter that does not result in the creation of a new product. During these transitions, the matter often shifts from one state to another. For example, changes in the state of matter, the solubility of salt and sugar in water, and so on.

5. Explain how burning a strip of magnesium ribbon is a chemical change.

Ans: When magnesium ribbon is burned in the presence of air, it produces white ash with a dazzling white light which is known as magnesium oxide. The ashes formed look physically different in appearance from the initial reactant. It is a chemically unique matter at the same time. Burning magnesium ribbon is an example of a chemical shift because the product is an entirely different compound.

6. What happens when vinegar is added to baking soda? How do you test the gas produced?

Ans: Vinegar is acidic in nature on the other hand baking soda is basic in nature. When we combine these two salts, water along with carbon dioxide gas is formed.

The gas produced is passed through lime water. The lime turns milky or white due to the formation of calcium carbonate. This test confirms the presence of carbon dioxide.

Long Answer Questions –

7. What are the indications of a chemical change?

Ans: The following signs of chemical change are present:

- Heat may be absorbed or released in the reaction.
- There might be the production of sound during or at the end of the reaction.
- A pleasant or pungent odour is created.
- A change in the colour of the solution may occur.
- Formation of gas.

8. Explain the formation of rust.

Ans: The degrading of metals such as iron in response to the environment is known as rusting. When it comes to oxygen and water, iron is extremely reactive. The production of iron oxide from iron is referred to as rust. It causes the iron article to deteriorate. Rust (Iron III oxide) is formed when iron combines with oxygen and water. Rust starts on the surface and works its way deeper into the metal.

Iron (Fe) + Oxygen (O₂) (from the air) + water (H₂O) rust (iron oxide Fe₂O₃)

9. How can rusting of iron be prevented? Suggest and explain any three methods.

Ans: Rusting is a phenomenon that occurs on the surface of a metal. It can be avoided in the following ways:

- Applying oil or grease on the surface inhibits the iron surface from coming into touch with the atmosphere, which prevents rusting.
- Galvanization: A layer of a more reactive metal, such as zinc, is deposited on the surface of iron to protect it from rust.
- Painting: Applying a layer of paint to the metal's surface stops it from coming into contact with the atmosphere once more.
- Alloying: To make alloys, iron can be combined with other metals and non-metals. Rust resistance is a feature of alloys. Stainless steel is an important iron alloy.





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