

CHAPTER 5

PHYSICAL AND CHEMICAL CHANGES

2-mark questions:

1. When baking soda is mixed with lemon juice, bubbles are formed with the evolution of a gas. What type of change is it? Explain.

Answer:

When baking soda is mixed with lemon juice, bubbles are formed with the evolution of a carbon dioxide gas. This is a chemical change.

Lemon juice + Baking soda \rightarrow Carbon dioxide + other substances

2. When a candle burns, both physical and chemical changes take place. Identify these changes. Give another example of a familiar process in which both chemical and physical changes take place.

Answer:

Candle Burning

Physical change is the melting of the wax.

The chemical change is the burning of wax with the evolution of CO_2 .

Digestion of Food

Physical change is the breakdown of larger food molecules into simpler ones.

The chemical change is the digestion of food by the action of HCl and enzymes.

3. How would you show that the setting of curd is a chemical change?

Answer:

The setting of curd is a chemical change because curd cannot be turned back to milk. The properties of milk and curd are different.

4.Explain why burning wood and cutting it into small pieces are considered two different types of changes.

Answer:

Cutting wood is a physical change as it does not change the nature of the wood. On the other hand, the burning of wood is a chemical change as wood is converted to charcoal with the liberation of CO₂.

4.Describe how crystals of copper sulphate are prepared.

Answer:

Crystals of copper sulphate are prepared using the crystallization method, which is described as follows:

- Take a cupful of water in a beaker.
- Add a few drops of dilute sulphuric acid to this.
- Heat the water, and when it starts boiling, add copper sulphate powder while still stirring.
- Add the copper sulphate powder till the solution becomes saturated. Filter into a China dish and allow it to cool.

- The solution should be kept undisturbed. Slowly, the crystals of copper sulphate separate out.

6. Explain how painting an iron gate prevents it from rusting.

Answer:

Rusting of iron requires contact with water (moisture) and oxygen. By painting an iron gate, we prevent contact between iron, Oxygen and water (moisture); this helps in preventing rusting of iron.

7. Explain why rusting of iron objects is faster in coastal areas than in deserts.

Answer:

Rusting of iron requires contact with water (moisture) and oxygen. In coastal areas, humidity is more in comparison to that in deserts; hence, rusting of iron objects is faster in coastal areas than in deserts.

8. What is the main characteristic that distinguishes physical changes from chemical changes?

Answer:

The main characteristic that distinguishes physical changes from chemical changes is whether new substances are formed. In physical changes, there is no formation of new substances; only the physical properties of the material change. In contrast, chemical changes involve the creation of new substances with different chemical properties.

5-mark questions:

1.Explain the process of galvanization and how it helps prevent rusting in iron articles.

Answer:

Galvanization is a process where a layer of zinc is deposited on the surface of iron articles to prevent rusting. The iron article is dipped into a bath of molten zinc or is electroplated with zinc. This creates a protective layer of zinc coating on the iron.

The chemical equation for galvanization can be represented as follows:

Iron (Fe) + Zinc (Zn)

→

Galvanization

Zinc-coated Iron (Galvanized Iron)

Iron (Fe) + Zinc (Zn)

Galvanization

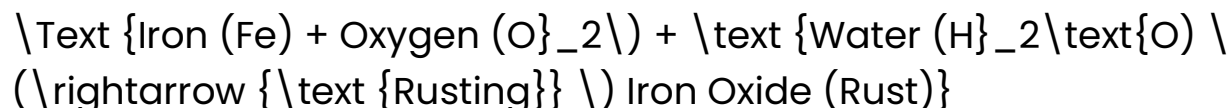
Zinc-coated Iron (Galvanized Iron)

The zinc coating acts as a sacrificial anode. Even if the zinc coating gets corroded, it protects the iron underneath. Zinc corrodes more readily than iron, preventing the iron from rusting. This process is widely used to protect iron articles, especially those exposed to humid or corrosive environments.

2. Describe the chemical changes involved in the rusting of iron. Also, explain two methods to prevent rusting.

Answer:

The rusting of iron involves a series of chemical changes. The overall process can be represented by the equation:



In the presence of oxygen and water, iron undergoes oxidation to form iron oxide, commonly known as rust. Rusting is an electrochemical process where iron is oxidized to Fe

2Fe^{2+} ions, which then react with water and oxygen to form hydrated iron oxide (rust).

Two methods to prevent rusting are:

Coating with Paint or Grease: Applying a coat of paint or grease creates a barrier between iron and the surrounding environment, preventing direct contact with oxygen and water.

Galvanization:

As mentioned earlier, galvanization involves coating iron with a layer of zinc. Zinc acts as a sacrificial anode, protecting the iron from corrosion even if the zinc layer corrodes.

3.Explain the difference between physical and chemical changes. Provide examples of each.**Answer:****Physical Changes:**

Physical changes involve alterations in the physical properties of substances without forming new substances. These changes are often reversible. Examples include changes in shape, size, color, or state of matter. For instance, cutting a log of wood into pieces, melting wax, and dissolving sugar in water are physical changes.

Chemical Changes:

Chemical changes result in the formation of new substances with different chemical properties. These changes are typically irreversible. Examples include burning of coal, digestion of food, and rusting of iron. In these processes, the original substances transform into entirely new substances with distinct chemical compositions

3. Fill in the blanks in the following statements:

(a) When carbon dioxide is passed through lime water, it turns milky due to the formation of _____.

(b) The chemical name of baking soda is _____.

(c) Two methods by which rusting of iron can be prevented are _____ and _____.

(d) Changes in which only _____ properties of a substance change are called physical changes.

(e) Changes in which new substances are formed are called _____ changes.

Solution:

(a) When carbon dioxide is passed through lime water, it turns milky due to the formation of **Calcium carbonate**.

(b) The chemical name of baking soda is **Sodium hydrogen carbonate**.

(c) Two methods by which rusting of iron can be prevented are **painting** and **galvanization**.

(d) Changes in which only **physical** properties of a substance change are called physical changes.

(e) Changes in which new substances are formed are called **chemical** changes.

1. Classify the changes involved in the following processes as physical or chemical changes.

(a) Photosynthesis

(b) Dissolving sugar in water

(c) Burning of coal

(d) Melting of wax

(e) Beating aluminum to make aluminum foil

(f) Digestion of food

Answer:

a) Chemical change

b) Physical Change

c) Chemical change

d) Physical Change

e) Physical Change

f) Chemical change

2. State whether the following statements are true or false. In case a statement is false, write the corrected statement in your notebook.

**(a) Cutting a log of wood into pieces is a chemical change.
(True/False)**

**(b) Formation of manure from leaves is a physical change.
(True/False)**

**(c) Iron pipes coated with zinc do not get rusted easily.
(True/False)**

(d) Iron and rust are the same substances. (True/False)

**(e) Condensation of steam is not a chemical change.
(True/False)**

Answer:

a) False

b) False

c) True

d) False

e) True

3. The gas we use in the kitchen is called liquified petroleum gas (LPG). In the cylinder, it exists as a liquid. When it comes out from the cylinder, it becomes a gas (Change – A) then it burns (Change – B). The following statements pertain to these changes. Choose the correct one.

(i) Process – A is a chemical change.

(ii) Process – B is a chemical change.

(iii) Both processes A and B are chemical changes.

(iv) None of these processes is a chemical change.

Answer:

The answer is (ii) Process – B is a chemical change.

4. Anaerobic bacteria digest animal waste and produce biogas (Change – A). The biogas is then burnt as fuel (Change – B). The following statements pertain to these changes. Choose the correct one.

(i) Process – A is a chemical change.

(ii) Process – B is a chemical change

(iii) Both processes A and B are chemical changes.

(iv) None of these processes is a chemical change.

Answer:

The answer is (iii) Both processes A and B are chemical changes.

Summary:

In this chapter, we explored the concepts of physical and chemical changes in substances. Physical changes involve alterations in the physical properties of materials, such as size or shape, without forming new substances. On the other hand, chemical changes result in the creation of new substances with distinct chemical properties.

Several activities were conducted to illustrate these changes. For instance, the melting of ice represented a physical change, while the burning of magnesium showcased a chemical change. The importance of distinguishing between physical and chemical changes was emphasized, especially in practical applications like preventing rusting in iron.

Additionally, crystallization was discussed as a method to obtain pure substances from their solutions. Examples of chemical changes, such as rusting of iron, were explored, along with preventive measures like galvanization.

The chapter concluded by highlighting real-world applications of chemical changes, from the production of medicines to the formation of useful materials like plastics and detergents. Overall, the study of physical and chemical changes provides insights into the transformations occurring in the substances around us.