PHYSICAL AND CHEMICAL CHANGES

EXERCISE

Question 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 aluminium to make aluminium foil
(f) Digestion of food

Answer:
(a) Photosynthesis - Chemical change
(b) Dissolving sugar in water - Physical change
(c) Burning of coal - Chemical change
(d) Melting of wax - Physical change
(e) Beating aluminium to make aluminium foil - Physical change
(f) Digestion of food - Chemical change

Question 2:
State whether the following statements are true or false. In case a statement is false, write the correct statement in your notebook.
(a) Cutting a log of wood into pieces is a chemical change.
(b) Formation of manure from leaves is a physical change.
(c) Iron pipes coated with zinc do not get rusted easily.
(d) Iron and rust are the same substances.
(e) Condensation of steam is not a chemical change.

Answer:
(a) False, cutting a log of wood into pieces is a physical change.
(b) False, formation of manure from leaves is a chemical change.
(c) True
(d) False, iron and rust are two different substances.
(e) True

Question 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.

Answer:
(a) calcium carbonate
(b) sodium hydrogen carbonate
(c) galvanisation, painting
(d) physical
(e) chemical

Question 4:
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 (sodium bicarbonate) is mixed with lemon juice (citric acid), a chemical change occurs. In this reaction, new substances like carbon dioxide are formed and heat is evolved. This change is irreversible; hence, it is a chemical change.

The reaction takes place as:
Sodium bicarbonate ($NaHCO_3$) + Citric acid $\rightarrow$

Sodium citrate + Carbon dioxide $\uparrow$ + Water + Heat

Question 5:
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:
Physical changes in burning candle: On heating, candle's wax melts. Since it can be turned into solid wax again on cooling, it is a physical change.

Chemical changes in burning candle: The wax near to flame burns and gives new substances like carbon dioxide, carbon soot, water vapours, heat and light. Hence, it is a chemical change.

Cooking of food, boiling of eggs are examples of both physical and chemical changes. In both cases, the appearance of the substances change and new substances are formed together.

Question 6:
How would you show that setting of curd is a chemical change?

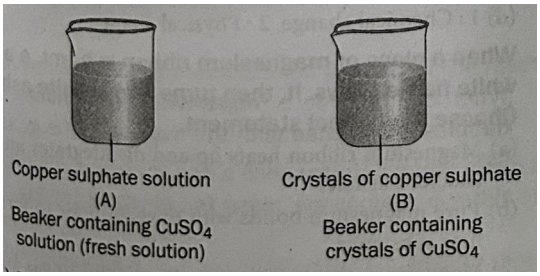
Answer:
Setting of curd is a chemical change because we cannot get the original substance (milk) back. The new substance, i.e. curd is different from the milk in taste, smell and chemical properties.

Question 7:
Explain why burning of wood and cutting it into small pieces are considered as two different types of changes?

Answer:
Burning of wood is a chemical change, while cutting of wood is a physical change because during burning, new substances are formed. After burning, we cannot get the original substance (i.e. wood) back. Cutting of wood into small pieces is a physical change because no new substance is formed.

Question 8:
Describe how crystals of copper sulphate are prepared?

Answer:
Crystals of copper sulphate are prepared in the following manner:
(i) Take a cup full of water in a beaker.
(ii) Add a few drops of dilute sulphuric acid.
[**Caution:** Never add water to the acid as the acid may splash on you.]
(iii) Heat the water.



(iv) When it starts boiling, add copper sulphate powder slowly with constant stirring.
(v) Continue adding copper sulphate powder till no more powder can be dissolved.
(vi) Filter the solution.
(vii) Allow it to cool.
(viii) Do not disturb the solution when it is cooling.
(ix) Look at the solution after some time and wait till it changes into crystals.

Question 9:
Explain how painting of an iron gate prevents it from rusting?

Answer:
Painting an iron gate prevents it from rusting by creating a protective barrier between the iron and the external environment. This barrier blocks moisture and oxygen from coming into direct contact with the iron surface. Since rusting requires both water (or moisture) and oxygen, the paint effectively stops these elements from initiating the rusting process, thereby protecting the iron from corrosion.

Question 10:
Explain why rusting of iron objects is faster in coastal areas than in deserts?

Answer:
We know that for rusting, the presence of both oxygen and water (water vapours) is essential. Thus, in coastal areas, the air contains high moisture, which means more humid environment, so rusting becomes faster. Whereas in deserts, moisture in air is less. Hence, rusting of iron is very slow there.

Question 11:
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.
(a) Process A is a chemical change
(b) Process B is a chemical change
(c) Both processes A and B are chemical changes
(d) None of these processes is a chemical change

Answer:
(b) Process B, i.e. burning of gas is a chemical change. Process A is a physical change. The LPG in the cylinder is in liquid form because of high pressure. When it comes out from the cylinder, it turns into gas which is a physical change.

Question 12:
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.
(a) Process A is a chemical change
(b) Process B is a chemical change
(c) Both processes A and B are chemical changes
(d) None of the above processes is a chemical change

Answer:

(c) Both processes A and B are chemical changes. Bacteria act on waste and convert it to biogas (change A). During biogas production, it works as a fuel (change B) and produces CO_2 and heat. Hence, A and B both are chemical changes.