3 PHYSICAL AND CHEMICAL CHANGES

THEORY

INTRODUCTION

Everyday a lot of changes occur around us all the time. When we keep some ice cubes in a container in the open, the ice cubes change to water. When we add sugar in milk, milk becomes sweet in taste.
If we add some curd in warm milk and keep it at room temperature overnight, it changes to curd.
Similarly, cooking of food, digestion of food, photosynthesis, rusting of iron, etc. are changes occurring around us.
Broadly, all the changes occurring in our surroundings are classified as physical and chemical changes.

PHYSICAL CHANGE

The properties such as size, shape colour and state of a substance are called its physical properties.
When a substance undergoes a change in its physical properties, that change is said to be physical change. During a physical change, no new substance is formed. Physical changes are generally reversible changes.

- **Reversible change:**

  A change in which we can get back the initial substance by reversing the action is an reversible change.

ACTIVITY–1

To observe a physical change with the help the of ice cubes.

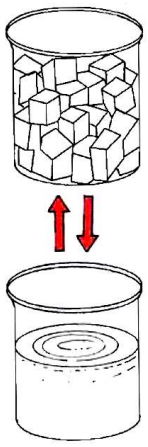
Procedure :

- Take a few ice cubes in a beaker.
- Keep them in the open for 4–5 minutes.

Now ,we will observe that ice (solid) changes into water (liquid). There is a change in the state of ice from soild to liquid.

- Now pour this water back into the ice tray and keep it in the freezer for 30 minutes.

Now, we will get back the ice. Therefore, it is a physical change.



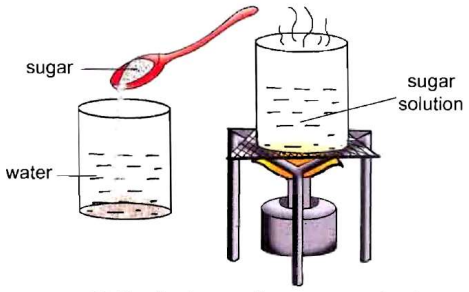
Ice changes to water and water changes back to ice

ACTIVITY–2

To observe a physical change with the help of a sugar solution.

Procedure :

- Take 100 mL of water in a beaker.
- Dissolve a spoonful of sugar into it.
- Now, we will get a solution of sugar and water.
- Now, heat this solution over a burner for sometime.
- Now, we will observe that slowly the water evaporates and sugar is left at the solution.
- We will be able to get back sugar. Therefore, it is a physical change.



Getting back sugar from sugar and water solution

CHARACTERISTICS OF PHYSICAL CHANGE

(i) No new or different product is formed : The composition of molecules of the substance remains unaltered.

Example : Ice melts to form water. In this example only the appearance (state) of matter has changed from solid to liquid. However, the composition of the molecules of ice or water remains same, i.e., for every 1 g of hydrogen, 8 g of oxygen is required . Thus, only a physical change has occurred.

(ii) The change is temporary and is usually reversible : It means the change can be reversed by altering the causes which produce the change.

Example : The water formed from ice can be changed back to ice by placing it in a freezing mixture (a mixture of ice and common salt).

(iii) There is no change in the weight of substance : During a physical change it is only the energy which is added or removed. No matter is added during a physical change. Similarly, no matter is removed during a physical change. Therefore, mass of the substance remains the same.

Some Examples Involving Physical Changes :

Physical Change	Observation	Change in Physical Property
1. Switching on an electric bulb	The bulb glows and gives out heat and light energy.	The physical appearance of the bulb changes.
2. Rubbing a permanent magnet on a steel rod.	The steel rod gets magnetised. If it is brought near iron nails, they get attracted.	The steel rod acquires the property of attracting pieces of iron.
3. Action of heat on iodine	The brownish grey crystals of iodine change to form violet vapours. On cooling, the vapours condense on cooler parts of the test tube to form crystals.	Change in state and colour.
4. Dissolving common salt in water.	The white crystalline salt disappears in water. However, the water tastes exactly like common salt. Moreover, common salt can be recovered by evaporation.	Change of state.

SOME COMMON EXAMPLES OF PHYSICAL CHANGES

- Formation of dew.
- Evaporation of water.
- Crystallisation of sugar from its solution.
- Ringing of an electric bell.
- Breaking of a glass pane.
- Freezing of ice cream.
- A rock rolling down a hill.
- Bending of a glass tube by heating.
- Melting of wax.
- Sublimation of camphor.

CHEMICAL CHANGE

A change which alters the specific properties of a material by bringing about a change in its molecular composition, is called a chemical change.On the other hand we can say that when two or more substances reacts in such a way that there is formation of one or more new substances, the change is called a chemical change or a chemical reaction.

During a chemical change, reactants undergo changes to form products. Chemical changes, generally, are irreversible changes.

- **Chemical equations :**

  All chemical changes are accompanied by chemical reactions. These reactions can be described in sentence form, but the description would be quite long. Chemical equations have been framed to describe the chemical reactions.

  A chemical equation links together the substances which react with the new substances that are formed.

- **Reactants** :

  The substances which take part in bringing about chemical change are called reactants.

- **Products :**

  The substances which are produced as a result of chemical change are called products.

$$\underset{\text{(Reactants)}}{\text{Zinc + Hydrochloric acid}} \longrightarrow \underset{\text{(Products)}}{\text{Zinc chloride + Hydrogen}}$$

- These reactions involve breaking and making of chemical bonds.

- **Irreversible change:**

  A change in which we cannot get back the initial substance by reversing the action is an irreversible change.

ACTIVITY–3

To observe the formation of a new substance on heating a magnesium ribbon and then adding water to it.

Procedure:

- Take a small piece of a magnesium ribbon.
- Clean its tip by rubbing it with a sandpaper.
- Hold it with a pair of tongs over the flame of a burner.

Burning of magnesium

Now, we will observe that it burns with a brilliant white light. It leaves behind a powdery ash after burning. The ash obtained is not the same as the magnesium ribbon. Magnesium has lost its properties and a new substance, magnesium oxide (MgO) is formed.

- Collect the ash in a beaker and mix it with a small amount of water.
- Stir it properly.
- With the help of a dropper, put a drop of this solution on red and blue litmus papers to test its chemical nature.

Now, we will observe that red litmus paper turns blue and blue litmus paper remains as it is. This shows that the solution obtained is basic in nature.

Inference : Magnesium oxide, on dissolving in water, forms magnesium hydroxide which is a new substance. Thus, it is a chemical change.

This change is represented as:

$$\underset{(Mg)}{\text{Magnesium}} + \underset{(O_2)}{\text{Oxygen}} \longrightarrow \underset{(MgO)\ (Ash)}{\text{Magnesium oxide}}$$

$$\underset{(MgO)}{\text{Magnesium oxide}} + \underset{(H_2O)}{\text{Water}} \longrightarrow \underset{[Mg(OH)_2]}{\text{Magnesium hydroxide}}$$

ACTIVITY–4

To observe the formation of a new substance on putting an iron nail in copper sulphate solution.

Procedure :

• Take 100 mL water in a 250 mL beaker.

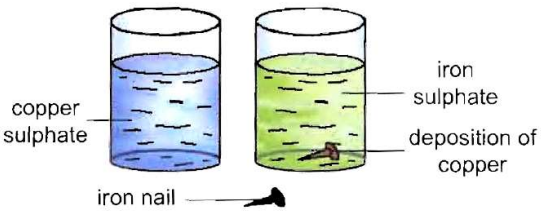
• Dissolve a spoonful of copper sulphate (blue vitriol or neela thotha) in it.

• Add a few drops of dilute sulphuric acid to it.

Now, we will get a blue-coloured solution.

• Divide this solution into two equal parts.

• To the second part, drop an iron nail and leave it for 30 minutes.



Reaction between copper sulphate and iron

• Compare the colour of this solution with the second part of the solution .

Now, we will observe that the blue colour of the solution changes to green colour. Also a brown-coloured layer get deposited on the iron nail.

Inference :

Copper sulphate solution is blue in colour. It changes to green colour due to the formation of a new substance, i.e., iron sulphate. The brown deposit on the iron nail is of copper, another new substance. Hence, this is a chemical change.

This change can be represented as :

Copper sulphate	+ Iron	⟶ Iron sulphate	+ Copper
($CuSO_4$)	(Fe)	($FeSO_4$)	(Cu)
(Blue)	(Grey)	(Green)	(Brown)

Advance Learning

- **Displacement reaction**

Iron is a more reactive metal than copper. Iron replaces copper from copper sulphate solution to form iron sulphate. Such reactions, in which a more reactive metal replaces a less reactive metal from its salt solution is called displacement reaction.

• When we leave cut slices of apple, brinjal, potato, etc. they acquire a brown-coloured layer. This change of colour is due to the formation of a new substance on reaction with atmospheric air.

SOME COMMON EXAMPLES OF CHEMICAL CHANGES

- Burning of wood or charcoal
- Burning of candle
- Digestion of food
- Curdling of milk
- Formation of biogas (Gobar gas)
- Burning of petrol or diesel
- Drying of paint
- Rusting of iron
- Ripening of fruit
- Clotting of blood
- Fading of the colour of a dyed cloth
- Baking of cake
- Photosynthesis
- Formation of wine
- Butter turning rancid
- Electrolysis of water into hydrogen and oxygen
- Formation of water from hydrogen and oxygen

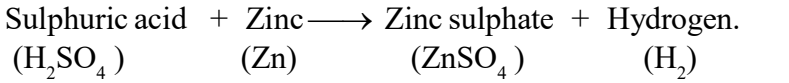
CHARACTERISTICS OF CHEMICAL CHANGE

In addition to the formation of new substances, a chemical change may be accompanied by one or more of the following six changes :

(i) Evolution of gas

For example:

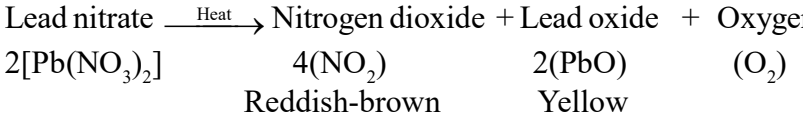
- When zinc granules are added to dilute sulphuric acid, hydrogen gas is evolved. If a burning matchstick is brought near the mouth of a test tube, it burns with a pop sound.



(ii) Change of colour

For example :

- When solid lead nitrate is heated, reddish-brown nitrogen dioxide gas is evolved. Also, a yellow-coloured lead monoxide is formed.

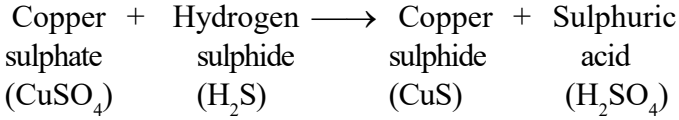


(iii) Formation of precipitate

Precipitate is a solid substance that deposits from a solution .

For example:

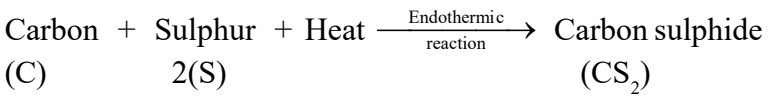
- When hydrogen sulphide gas is passed through blue coloured copper sulphate solution, black precipitate of copper sulphide is formed . .



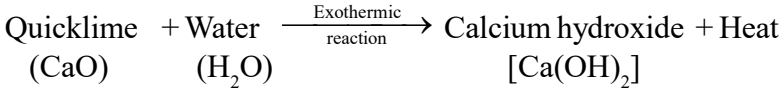
(iv) Absorption or evolution of heat, light or any other radiation

For example :

- When carbon and sulphur are heated, i.e., heat energy is absorbed, then carbon sulphide is formed.

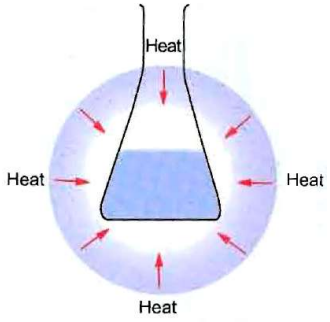


- When water is added to quicklime, heat energy is evolved.

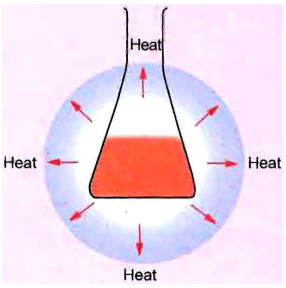


Advance Learning

- **Endothermic Reaction**
  The reaction in which heat energy is absorbed is called endothermic reaction.
- **Exothermic Reaction**
  The reaction in which heat energy is evolved is called exothermic reaction.



Endothermic Reaction



Exothermic Reaction

(v) Sound may be produced

For example :

- when baking soda is added to vinegar, carbon dioxide gas is produced with a hissing sound.

$$\underset{(CH_3COOH)}{\text{Vinegar}} + \underset{(NaHCO_3)}{\text{Baking soda}} \longrightarrow \underset{(CO_2)}{\text{Carbon dioxide}} + \text{Hissing sound}$$

(vi) Change of smell may occur or a new smell may be given off

For example :

- When cooked food containing oils and fats is kept in the open (not refrigerated) for long, it gets spoiled and gives a foul smell.

DIFFERENCE BETWEEN PHYSICAL AND CHEMICAL CHANGES

Physical Change	Chemical Change
1. The change takes place only in the state, texture, colour, electrical or magnetic properties or solubility, etc. However, molecular properties (composition) do not change.	1. The change takes place in the state, texture, colour, electrical or magnetic properties along with the change in its molecular properties (i.e. its molecular arrangement changes).
2. The specific properties of the substance remain unaltered after the physical change.	2. The specific properties of the substance change completely after the chemical change.
3. No new substances are produced.	3. Always new substances are produced.
4. There is no change in weight, if a substance is undergoing a physical change.	4. There is always a change in apparent weight of substance, when it undergoes a chemical change.
5. Energy change may or may not occur during a physical change.	5. There is always a net absorption or release of energy during a chemical change.
6. It is a temporary change and is usually reversed by removing the cause of the change.	6. It is a permanent change and cannot be reversed by removing the cause of the change.

CORROSION

It is a gradual deterioration of metals on interaction with their environment as a result of chemical changes between them. Almost every metal is susceptible to degradation. Rusting of iron and tarnishing of silver are common examples of corrosion.

Corrosion decreases their intended usage period. The strength and appearance are also degraded.

RUSTING OF IRON

When iron objects are left exposed to moist air (oxygen and water both), a substance with a brown flaky layer is observed on their surfaces. This brown flaky layer is hydrated iron oxide. It is called rust.

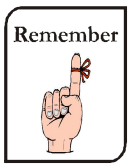
Rust falls off the surface, exposing the iron surface beneath. Rusting of iron is a slow change that destroys the whole iron object.

Iron is an important metal. It is used in making bridges, cars, ships, trucks, gates, benches and various other useful articles. Every year, a lot of monetary loss occurs due to damage of iron articles by rusting.

The process of rusting of iron is represented as:

Iron + Oxygen + Water $\longrightarrow$ Rust

(Fe) (O_2) (H_2O) (Hydrated iron oxide $Fe_2O_3.xH_2O$)



- Rusting of iron takes place in the presence of both oxygen and water (or water vapour). If anyone of these is not present, rusting will not occur.

- Rusting of iron becomes faster if the content of moisture in the air increases.
- Rusting is faster in salty water.

Prevention of Rusting of Iron

Rusting of iron can be prevented in many ways.

(i) By avoiding direct contact with air and moisture :

It is done by using the following methods :

- **Applying grease or oil** on the exposed parts of iron articles.
- **Painting** the surface of iron articles.
- **Galvanizing** the surface of iron articles. Galvanization is a process in which a layer of metals like chromium or zinc is deposited on the surface of iron articles electrolytically, i.e., by passing electric current.
- **Electroplating** the surface of iron articles with metals, which are not attacked by atmospheric moisture. The shining parts of bicycles are given a coating of chromium (chrome plating) to protect them from rusting.

(ii) By alloying : When mixed with certain corrosion resistant metals or some non-metals, iron forms alloys which are resistant to rusting. Stainless steel, an alloy of iron, nickel and chromium does not rust.

- **Electroplating**

It is the deposition of a metallic coating (say gold) by passing electric current through a solution containing dissolved metal ions and the metal object to be electroplated.
This is the process by which wrist watches, jewellery and other items are plated with gold.

CRYSTALLIZATION

Closely observe common salt and sugar. we will notice that all common salt and sugar particles are of uniform shape and size, i.e., almost cubical. Such uniform structures are called crystals.
In a crystal, atoms are arranged in a regular pattern. The crystals of common salt, sugar, alum, etc. are obtained from the solutions of these substances in water by a process called crystallization.
During crystallization, a solid is first dissolved in water. Then the water in the solution formed is allowed to evaporate. By this method, large crystals of pure substances can be obtained.
Seawater contains salt. Salt is obtained by collecting seawater in shallow ponds. The water gets evaporated under the heat of the sun and solid salt is left behind.

Extracting salt from seawater

ACTIVITY–5

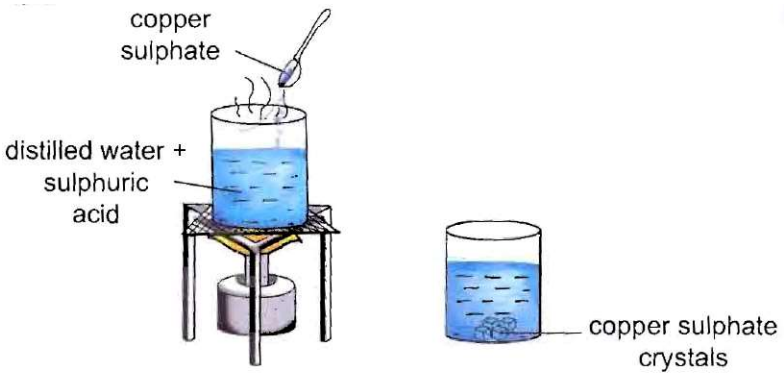
To observe the process of crystallization.

Procedure:

- Take 50 mL of distilled water in a 100 mL beaker.
- Add 2-3 drops of dilute sulphuric acid to it.
- Heat it over a burner.
- When it starts boiling, add a small amount of copper sulphate powder to it.
- Stir it continuously to dissolve.
- Continue adding copper sulphate powder till no more powder can be dissolved.
- Carefully filter the hot solution.
- Leave it undisturbed overnight.

Observation : We will observe clean blue crystals of copper sulphate at the bottom of the beaker.

Inference : Crystals of copper sulphate are formed by the process of crystallization.



Crystallization

KEY WORDS

1. **Chemical change :** These are the changes in which chemical properties of substances are changed and new substances are formed.
2. **Chemical reaction :** The process involving chemical changes are accompanied with chemical reaction.
3. **Crystallisation :** It is the process of getting crystals of pure substance from their solutions.
4. **Galvanisation :** The process of depositing a layer of zinc on iron is called galvanisation.
5. **Physical change :** A change in only physical properties of a substance is called physical change.
6. **Rusting :** If a piece of iron is left open for some time, it acquires a film of brownish substance. This substance is called rust and the process is called rusting.

CONCEPT APPLICATION LEVEL - I [NCERT Questions]

Q.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

Ans. (a) Chemical change (b) Physical change
(c) Chemical change (d) Physical change
(e) Physical change (f) Chemical change

Q.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. (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)

Ans. (a) False
Correct statement: Cutting a log of wood into pieces is a physical change.
(b) False
Correct statement: Formation of manure from leaves is a chemical change.
(c) True
(d) False
Correct statement: Iron and rust are two different substances.
(e) True

Q.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.

Ans. (a) Calcium Carbonate
(b) Sodium Hydrogen Carbonate
(c) Greasing, Galvanisation
(d) Physical
(e) Chemical

Q.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.

Ans. The reaction between baking soda and lemon juice is given below :
Lemon juice (citric acid) + Baking soda (sodium hydrogen carbonate) $\longrightarrow$ Carbon dioxide (bubbles) + Other substances.
Since, in this reaction a new substance is formed, therefore, it is a chemical change.

Q.5 When a candle burns, both physical and chemical changes take place. Identify these changes. Give another example of a familiar process in which the chemical and physical changes take place.

Ans. When a candle burns, both physical and chemical changes occur as given below:
(i) **Physical change :** Melting of wax, vapourisation of melted wax.
(ii) **Chemical change :** Burning of the vapours of wax to give carbon dioxide, heat and light.
Burning of LPG in our kitchen is another such example in which a physical change occurs when LPG comes out of cylinder and is converted from liquid state to gaseous state and a chemical change occurs when this gas burns in air.

Q.6 How would you show that setting of curd is a chemical change?

Ans. A change is said to be a chemical change, if:
(i) we cannot get back the substance in original state.
(ii) a new substance is formed as a product.
In setting of curd :
(i) the curd cannot be reversed into milk.
(ii) a new substance is formed with different taste, smell and other properties. Hence, we can say that setting of curd is a chemical change.

Q.7 Explain why burning of wood and cutting it into small pieces are considered as two different types of changes.

Aus. Burning of wood is a chemical change because in burning new substances are formed as given below:

$$\text{Wood} + \text{Oxygen} \longrightarrow \text{Coal} + \text{Carbon dioxide} + \text{Heat} + \text{Light}.$$

While cutting it into small pieces is physical change because by cutting we can only reduce the size of the log of wood and no change in its chemical properties occur and no new substance is formed.

Q.8 Describe how crystals of copper sulphate are prepared.

Ans. We can prepare the crystals of copper sulphate by following activity :
Take 100 ml of water in a beaker and add a few drops of dilute sulphuric acid to it. Heat the beaker. When it starts boiling, add copper sulphate powder slowly and stir continuously (Fig.). Keep on adding of copper sulphate powder till no more powder can be dissolved. Filter the warm solution of copper sulphate. Allow it to cool. Do not disturb the solution when it is cooling. Crystallization begins and after some time blue crystal of copper sulphate is seen at the base of beaker.

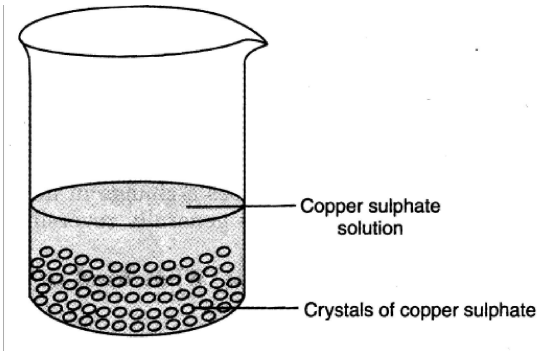


Fig. Crystals of copper sulphate

Q.9 Explain how painting of an iron gate prevents it from rusting.

Ans. We know that the process of rusting requires exposure to both oxygen and water (or moisture). Painting prevents the surface of iron gate from coming in contact with oxygen and moisture thus prevents it from rusting.

Q.10 Explain why rusting of iron objects is faster in coastal areas than in deserts.
Ans. Since content of moisture in the air in coastal areas is higher than in the air in deserts, so the process of rusting becomes faster in the coastal areas.

Q.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.**
(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.
Ans. (ii) Process-B is a chemical change.

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

CONCEPT APPLICATION LEVEL - II

VERY SHORT ANSWER TYPE QUESTIONS :

Q.1 How many kinds of changes are occurring around us?
Ans. Two kinds of changes occur around us: (i) Physical change and (ii) Chemical change.

Q.2 Name some physical properties of a substance.
Ans. The shape, size, colour and state of a substance are called its physical properties.

Q.3 What is chemical reaction?
Ans. A change in which one or more new substances are formed is called a chemical reaction.

Q.4 What is galvanization?
Ans. The process of depositing a layer of zinc on iron is called as galvanization.

Q.5 Why stainless steel do not rust?
Ans. Stainless steel is made-up mainly of iron but being an alloy, it has lost the ability to rust

Q.6 What kind of change is rusting?
Ans. Chemical change.

Q.7 What are the essential conditions for rusting?
Ans. Presence of moisture and air (oxygen) are the two conditions.

SHORT ANSWER TYPE QUESTIONS :

Q.8 What is a physical change?

Ans. A change in which a substance undergoes a change in its physical properties only is called a physical change. A physical change is generally reversible. In such a change no new substance is formed.

Q.9 Give some examples of physical changes.

Ans. Examples of physical changes are:
(i) Tearing of sheet of paper into pieces.
(ii) Melting of ice.
(iii) Change of water into steam.
(iv) Breaking of glass tumbler.
(v) Glowing of electric bulb.
(vi) Disolution of sugar or salt in water.
(vii) Heating of tip of blade for some time when its colour changes.

Q.10 Formation of clouds is a physical change. Explain.

Ans. Formation of clouds is a physical change as it is phase of transformation of natural water from liquid to gas during water cycle and then, gas to liquid. Hence the property of water never changes in cloud form.

Q.11 Give some examples of chemical changes.

Ans. Examples of chemical changes are:
(i) Burning of paper, wood, candle, etc.
(ii) Formation of curd.
(iii) Cooking of food.
(iv) Rusting of iron.
(v) Mixing of vinegar with baking soda.
(vi) Ripening of food.

LONG ANSWER TYPE QUESTIONS :

Q.12 Most physical changes are reversible. Give reasons with two examples.

Ans. (i) Melting of ice: During this change, the water changes from its solid form to liquid form. It can be solidified again. The water composition of remains same in both cases, hence reversible.
(ii) Glowing of an electric bulb: During this change, electricity is passed through the filament which becomes white, hot and starts to glow, but when switch is off, the filament returns to its original shape and condition, hence totally reversible.

Q.13 What are rust , and rusting?

Ans. If we leave a piece of iron in the open for some time, it acquires a film of brownish substance. This substance is called rust and the process of its formation is called rusting. This is the only change that effects iron articles and slowly destroys them. Since iron is used in making bridges, ships, cars, truck bodies and many other articles, the monatory loss due to rusting is huge. For rusting, the presence of both oxygen and water (or water vapour) is essential.
In fact, if the moisture content in air is high which means if it is more humid, rusting becomes faster.

Q.14 Identify the type of change and state whether the energy is absorbed or evolved in each one of the following :
Burning of a candle ; lighting of a bulb; preparation of food by green plants; volcanic, volcanic eruption lightening.

Ans.

Burning of candle	Chemical change	Energy is evolved
Lighting of bulb	Physical change	Energy is evolved
Preparation of food by green plants	Chemical change	Energy is absorbed
Volcanic eruption	Chemical change	Energy is evolved
Lightening	Physical change	Energy is evolved

CONCEPT APPLICATION LEVEL - III

SECTION–A

FILL IN THE BLANKS :

Q.1 Changes that lead to the formation of new substances are called ..... .

Q.2 Melting of candle wax is a ..... change but it's burning is a ..... change.

Q.3 Energy is ..... in the formation of curd from milk.

Q.4 A brown layer formed when an iron article is left exposed in an open area is called ..... .

Q.5 The brown layer deposited on an iron nail dipped in copper sulphate solution is due to ..... .

Q.6 Large crystals of pure substance are obtained by ..... .

Ans. 1. Chemical changes 2. Physical, chemical 3. evolved
4. rust 5. Copper metal 6. crystallisation

TRUE (T) OR FALSE (F) :

Q.7 The cooking of rice is a physical change. [ ]

Q.8 When you cut an apple with knife interactions between the apple and the knife takes place. [ ]

Q.9 When catechu (kaththa) is applied on lime while making a pan {bettie} a chemical change takes place. [ ]

Q.10 Eruption of volcano is a reversible change. [ ]

Q.11 Formation of clouds is a reversible change. [ ]

Q.12 The salt obtained by evaporation is pure. [ ]

Q.13 Both oxygen and water are essential for rusting. [ ]

Q.14 In chemical changes new substances are produced. [ ]

Ans. 7. False 8. False 9. True 10. False 11. True 12. False
13. True 14. True

MATCH THE COLUMN

Q.15

Column–I	**Column–II**
(i) Rust	(a) Calcium hydroxide ($Ca(OH)_2$)
(ii) Vinegar	(b) Ferric oxide ($Fe_2O_3 . xH_2O$)
(iii) Baking soda	(c) Copper sulphate ($CuSO_4.5H_2O$)
(iv) Lime water	(d) Acetic acid (CH_3COOH)
(v) Neela thotha	(e) Sodium hydrogen carbonate ($NaHCO_3$)

Ans. (i)–(b), (ii)–(d), (iii)–(e), (iv)–(a), (v)–(c)

SECTION–B

MULTIPLE CHOICE QUESTIONS :

Q.1 In which type of change a new substance is formed?
(A) In physical change (B*) In chemical change
(C) In both (A) and (B) (D) In neither of these

Q.2 Which among the following is a physical change?
(A*) Cutting a log of wood in small pieces (B) Burning of wood
(C) Ripening of fruit (D) Cooking of food

Q.3 Which of the following is a chemical change?
(A) Bursting of a fire cracker (B) Germination of seed
(C) Coal formation from buried trees (D*) All of these

Q.4 Which is a method to prevent rust?
(A) Crystallization (B) Sedimentation
(C*) Galvanisation (D) None of these

Q.5 How crystal of pure substances are obtained?
(A*) By crystallization (B) By chromatography
(C) By peptization (D) By all these methods

Q.6 What is the formula of rust?
(A*) $Fe_2O_3.xH_2O$ (B) Fe_4O_3 (C) FeO (D) None of these

Q.7 What will happen if carbon dioxide gas is passed through lime water?
(A) Calcium carbonate is formed (B) The lime water turns milky
(C*) Both of these (D) None of these

Q.8 When an iron nail is dipped in copper sulphate solution and kept undisturbed for half an hour or more?
(A) The solution turns from blue to green (B) A brown layer is deposited on the nail
(C) A chemical reaction takes place (D*) All of these.

Q.9 The gas you use in kitchen is called liquefied petroleum gas (LPG). In the cylinder, it exists as a liquid. When it comes out of the cylinder, it becomes a gas (process A), then it burns (process B). Choose the correct statement.
(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.

Q.10 Anaerobic bacteria digest animal wastes and produce biogas (change A). The biogas is burnt as a fuel (change B). Choose the correct statement.
(A) Change (A) is a chemical change
(B) Change (B) is a chemical change.
(C*) Both changes A and B are chemical changes
(D) None of these changes is a chemical change.

Q.11 A chemical reaction, in which heat is evolved is called -
(A) endothermic reaction.
(B*) exothermic reaction.
(C) neutralisation reaction.
(D) displacement reaction.

Q.12 Slow eating away of iron articles in the presence of moist air is called -
(A) galvanisation (B) crystallisation
(C*) rusting (D) neutralisation

Q.13 Sun rises in the east and sets in the west, this repeated change is called -
(A) irreversible change (B*) periodic change (C) physical change (D) chemical change

Q.14 When food eaten by us is digested it undergoes _____ change.
(A) periodic (B) reversible (C*) irreversible (D) physical

Q.15 Melting of wax is a _____ change, while burning of candle is _____change.
(A) irreversible, reversible (B*) reversible, irreversible
(C) physical, reversible (D) chemical, irreversible

Q.16 Select the reversible changes from the following and choose the answer from the option given below -
(i) melting of wax
(ii) freezing of water
(iii) formation of curd from milk
(iv) evaporation of water
(A) (i) & (ii) (B*) (i), (ii) & (iv)
(C) (iii) only (D) All of the above

Q.17 Fraction of ship's iron has to be replaced every year because -
(A*) rusting makes iron weak
(B) its colour fades away
(C) ship can move properly in water only after replacement
(D) all the above

Q.18 ---------- is a physical change where surface molecules of a liquid escape.
(A*) Evaporation (B) Condensation
(C) Foaming (D) None of these

Q.19 Which one of the following is a physical change ?
(A) Digestion of food (B) Boiling of an egg
(C) Making a cup of tea (D*) None of these

Q.20 Photosynthesis is a ----------.
(A) physical change (B*) chemical change
(C) both (A)&(B) (D) None of these

Q.21 The process of obtaining pure crystals of copper sulphate from copper sulphate solution is known as -
(A*) crystallisation (B) galvanisation
(C) rusting (D) None of these

Q.22 During all changes, physical or chemical , total mass is -
(A) gained (B*) conserved
(C) loss (D) None of these

Q.23 Coating iron with a thin layer of zinc, to prevent rusting is -
(A*) galvanization (B) anodizing
(C) crystallization (D) None of these

Q.24 Examples of physical properties are -
(A) corrosiveness and strength
(B) flammability and ability to conduct electricity
(C*) melting point and solubility
(D) None of these

Q.25 The gas in the atmosphere which acts as a natural shield against ultra violet radiation is -
(A*) ozone (B) sulphur dioxide (C) oxygen (D) None of these

Q.26 Why rusting of iron is faster in coastal areas than in deserts ?
(A*) Because air has more moisture in coastal areas than in desert areas.
(B) Because air has less moisture in coastal areas than in desert areas.
(C) None of these
(D) Both (A) and (B)

Q.27 On a hot summer day ice-cream melts faster than in winters. This process of melting is -
(A) chemical change (B*) physical change
(C) periodic change (D) irreversible change

Q.28 During rusting, the layer deposited on the surface of iron is -
(A) FeO (B) Fe_2O_3 (C*) $Fe_2O_3.xH_2O$ (D) None of these