Physical & Chemical Changes

EXERCISE

Question 1.

Change – is the law of nature which occurs in everyday life.

State when a substance [Le. matter] undergoes a kind of change.

Answer:

Change is the law of nature which occurs in everyday life. A substance [i.e. matter] undergoes a kind of change when- subjected to energy changes.

Matter is said to undergo certain changes when energy is added to the matter or removed from the matter.

Examples of Changes are :

- 1. Ice melts on supplying heat to it.
- 2. Milk changes into curd when a little curd is added to hot milk.

Question 2.

Give a reason why

(a) Freezing of water is a reversible change while burning of a candle – an irreversible change,

(b) Change of seasons is a periodic change while change of weather is a non-periodic change.

Answer:

(a) Freezing of water is reversible change as on heating frozen ice changes to water by heating. Burning of a candle is irreversible change as on reversing the conditions we can not get candle back out of CO_2 , water vapours and wax vapours.

(b) Change of season is periodic change as it occurs at regular intervals. Change of weather is non-periodic change because, it does not occur periodically at regular interval. Weather can change suddenly and it may rain in the evening.

Question 3. State which of the following pertain to – chemical changes.

- (a) Substance retains its identity
- (b) The change is permanent
- (c) No new substance is formed
- (d) Is easily reversible
- (e) Produces one or more new substances by change in its composition
- (f) The change is temporary
- (g) The composition and properties of the original substance are not altered.

Answer:

Chemical change :

- (b) The change is permanent.
- (e) Produces one or more new substances by change in its composition.

(g) The composition and properties of the original substance care not altered.

Question 4.

Give four reasons why burning of a magnesium ribbon in air is considered a chemical change. **Answer:**

BURNING OF MAGNESIUM RIBBON is chemical change as : It is

- 1. Irreversible change
- 2. New product with new properties is formed (MgO)
- 3. It is permanent change
- 4. Composition is changed
- 5. Energy is required to bring the change.

Question 5.

Compare the energy changes involved during a physical and a chemical change. **Answer:**

- **Physical change :** No gain or loss of energy during the physical change. Energy required for completion of a physical change is released when the change is reversed.
- **Chemical change :** Energy is either absorbed or evolved during the chemical change. Energy in the form of light, percussion (pressure) or generally heat energy is required for a chemical change.

Question 6.

Is change of state of matter – a physical or a chemical change. Give reasons.

Answer:

Change of state of matter is a PHYSICAL change since on reversing the conditions, original state can be attained.

Question 7.

State which of the following terms connected with change of state of matter ie.

- (a) Melting
- (b) Vaporisation
- (c) Condensation
- (d) Freezing

pertain to -

- 1. Conversion of a liquid into a vapour or gas
- 2. Conversion of a liquid into a solid.
- 3. Conversion of a solid into a liquid on heating.

Answer:

- 1. (b) Vaporisation
- 2. (d) Freezing
- 3. (a) Melting

Question 8.

Potassium chloride is added to water and stirred. A salt solution is obtained which is then boiled leaving behind a residue.

(a) Is the above change physical or chemical

(b) Name the residue which remains behind after the salt solution is boiled.

(c) Is the change reversible or not reversible.

(d) Are the composition and properties of the original substance altered.

(e) Give a reason why the above experimentation would not be possible, if calcium carbonate is taken, in place of potassium chloride.

Answer:

(a) Physical change.

(b) White residue of potassium chloride.

(c) Change is reversible.

(d) No, the composition and properties are not altered.

(e) When in place of KC1, we take calcium carbonate the above experiment cannot be possible as no new substance with new properties is produced, since $CaCo_3$ is insoluble in water. Boiling will also not work as $CaCo_3$ is in solid form in water.

Question 9. Give a reason why -

(a) Heating a platinum wire is a reversible change but, heating a magnesium wire is an irreversible change.

(b) Addition of zinc nitrate to water is a physical change but, addition of zinc to dilute nitric acid is a chemical change.

(c) Rusting of iron is a chemical change but, magnetization of iron is a physical change.

Answer:

(a) Heating a platinum wire, final product is again platinum wire (as platinum is noble metal and does not react with air), i.e. no change in composition and is physical change. Heating magnesium wire forms MgO i.e. composition changes a new substance white powder of magnesium oxide is formed is chemical change.

(b) Zinc nitrate (soluble in water) disolves in water and is reversible. No change in composition takes place is a physical change where as zinc reacts with dil. nitfic acid to produce H_2 gas which gets oxidized to water by nitric acid (oxidizing agent) and hence is a chemical change. (c) Rusting of iron is a chemical change as composition changes, reddish brown flaky powder is

formed with new properties and is irreversible, permanent change but magnetization of iron is temporary and reversible change with no change in composition is a physical change.

Question 10.

Select the chemical changes from the following list of changes

- (a) Vaporisation of water into water vapour.
- (b) Boiling of milk.
- (c) Respiration in mammals.

- (d) Rotting of eggs.
- (e) Drying of a fruit
- (f) The carbon cycle.
- (g) Occurrence of lightening.
- (h) Breaking of glass.
- (i) Butter turning rancid.
- (j) Glowing of an electric bulb.
- (k) Crystallisation of a salt from its solution.
- (I) Change of seasons.
- (m) Preparation of carbon dioxide from calcium carbonate & dilute hydrochloric acid.

Answer:

(a) Change of water into water vapours is a PHYSICAL change as no change in composition, only state changes, is reversible change on cooling vapour water is formed.

(b) Boiling milk is PHYSICAL change as no change in composition, temporary and reversible, no new substance with new properties is formed.

(c) Respiration in mammals is a CHEMICAL change, we breathe in oxygen and breathe out carbon dioxide. It is irreversible and composition changes.

(d) Rotting of eggs is CHEMICAL change, change in composition takes place, is irreversible process.

(e) Drying of a fruit is PHYSICAL change as composition remains same and only state changes, no new substance with new properties is produced.

(f) Carbon cycle is a PHYSICAL change as carbon remains as carbon, mass of carbon remains same in the cycle, is temporary and only change in state takes place.

(g) Occurance of lightening is a CHEMICAL change, energy is produced, new substance with new properties is produced.

(h) Breaking of glass is a PHYSICAL change as no change in composition takes place, no new substance is formed.

(i) Butter turning rancid is a CHEMICAL change as composition changes, new substance with new properties is formed, irreversible and permanent change.

(j) Glowing of an electric bulb is a PHYSICAL change as no change in composition of filament takes place is reversible, only filament glows when electricity is passed and returns to its original form on switching off the electric current.

(k) Crystallisation of a salt from its solution is a PHYSICAL change as only state changes (crystals are formed), composition does not change, is reversible, no change in mass takes place.

(I) Change of season is a PHYSICAL change, only change in temperature is seen and is reversible change.

(m) Preparation of carbondioxide from calcium carbonate and dilute hydrochloric acid is a CHEMICAL change as new K substance with new properties is formed, the change is permanent and irreversible.

OBJECTIVE TYPE QUESTIONS

Q.1. Select the correct answer from the choice in bracket to complete each sentence

Question 1.

A change in which a substance retains its identity is a __ [physical/chemical] change.

Answer:

A change in which a substance retains its identity is a **physical change**.

Question 2.

Matter is added or removed during a ___ [chemical/ physical] change.

Answer:

Matter is added or removed during a **chemical** change.

Question 3.

Energy required for completion of a physical change is __ [released/absorbed] when the change is reversed.

Answer:

Energy required for completion of a physical change is **released** when the change is reversed.

Question 4.

Dissolution of lead nitrate in water is deemed as a __ [physical/chemical] change.

Answer:

Dissolution of lead nitrate in water is deemed as a **physical** change.

Question 5.

A change in which matter undergoes a change but the total mass of substance is unaltered is a _____ [physical/ chemical] change.

Answer:

A change in which matter undergoes a change but the total mass of substance is unaltered is a **chemical**change.

Q.2. State which of the following 1 to 5 pertain to – A: Physical Change B: Chemical change :

- 1. Sublimation.
- 2. Fermentation.
- 3. Liquefaction or condensation.
- 4. Magnetization.
- 5. Respiration.

Answer:

- 1. Sublimation A : Physical Change
- 2. Fermentation B : Chemical change
- 3. Liquefaction or condensation A : Physical Change
- 4. Magnetization A : Physical Change

Q.3. Give reasons why the following are considered as chemical changes.

Question 1.

Copper carbonate on heat gives copper oxide and carbon dioxide.

Answer:

Copper carbonate $[CuCO_3]$ green colour on heating gives copper oxide [Black colour CuO] and CO_2 .

Hence composition is changed new substances CuO [Black] and CO_2 with new properties are produced and it is irreversible reaction hence it is a chemical change.

$$CuCO_3 \xrightarrow{\Delta} CuO + CO_2$$

Black

Green

Question 2.

A bright light is seen evolved when a strip of magnesium is heated.

Answer:

Magnesium is heated producing a bright light to form MgO in air is a chemical change as the composition changes (MgO white powder) is formed, is irreversible. We cannot get magnesium back from MgO.

Question 3.

Sulphur when burnt in air evolves a gaseous acidic product.

Answer:

Is a chemical change as sulphur (yellowish green) on burning produces SO_2 gas which is acidic in nature and a new substance with new properties is formed.

Question 4.

An iron nail kept open in the atmosphere rusts.

Answer:

Rust of iron is a chemical change as iron rust $[Fe_2 O_{3 \chi} H_2 0]$ is brown flaky powder having different composition from original iron metal, is irreversible change.

4Fe +
$$3O_2 \xrightarrow{+2xH_2O} 2Fe_2O_3xH_2O$$

(Iron rust)

Question 5.

A piece of magnesium strip is dropped into a beaker containing dilute hydrochloric acid.

Answer:

When a piece of magnesium strip is dropped in dilute hydrochloric acid, hydrogen gas is evolved and hence it is a chemical change.

Mg + dil.2HCl \longrightarrow MgCl₂ + H₂ \uparrow

as new substances $MgCl_2$ and H_2 with new properties are produced and the reaction is irreversible.

Q.4. Match the examples of changes in List I with the correct type of change in List II.

List I

1. Burning of paper

2. Ringing of an electric bell

- 3. Curdling of milk
- 4. An electric light is switched on

5. Melting of butter

Answer:

List I

List II

1.	Burning of paper.	B :	Chemical change
2.	Ringing of electric bell	B :	Physical change
3.	Curdling of milk	B :	Chemical change
4.	An electric light is switched on	B :	Physical change
5.	Melting of butter	A :	Physical change

Q.5. Name the following.

Question 1.

The salt obtained when a chemical change takes place on addition of iron to dilute sulphuric acid. **Answer:**

FeSO₄ (Iron Sulphate)

Question 2.

The product obtained during a physical change when water converts from a liquid into a solid. **Answer:**

Ice.

Question 3.

The product of the chemical change on keeping a polished iron nail exposed to the atmosphere. **Answer:**

Iron III oxide [Fe₂O₃x H₂0]

Question 4.

A form of energy required for a chemical change.

Answer:

Generally HEAT ENERGY is required but light, pressure or electricity can also be needed.

Question 5.

The gaseous product of the chemcial change which takes place during respiration in living organisms.

Answer:

CO₂ carbon dioxide.

List II

A: Physical change B: Chemical change