

Question 1: Define a chemical change.

Answer: A chemical change is a permanent, not easily reversible change in which the identity of the substance is altered to produce one or more new substances.

Question 2:

Give four examples of a chemical change.

Answer:

- 1) Burning of coal.
- 2) Rusting of iron.
- 3) Photosynthesis in plants.
- 4) Electrolysis of water into hydrogen and oxygen.

Question 3:

Give four characteristics of a physical change.

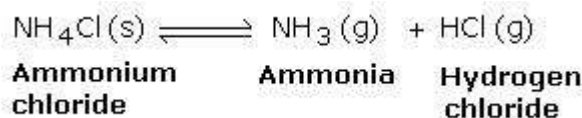
Answer:

- 1) A physical change is temporary and is usually reversible.
- 2) No new substances are formed during a physical change.
- 3) There is no change in mass of the substance during a physical change.
- 4) There is no net absorption or release of energy during a physical change.

Question 4:

Give an example of a chemical change that is reversible.

Answer: Action of heat on ammonium chloride is reversible. When heated, it decomposes to form ammonia and hydrogen chloride. When the products are cooled, they recombine to form ammonium chloride.



Question 5:

Define a physical change.

Answer: A physical change is a temporary and reversible change in which the physical properties of the substance change without altering the composition of the substance.

Question 6:

Classify as physical or chemical change:

- 1) Tearing of paper
- 2) Production of biogas
- 3) Butter going rancid
- 4) Magnetisation of iron
- 5) Clotting of blood

Answer:

- 1) Physical - No change in mass.
- 2) Chemical - New substances with new properties are produced.
- 3) Chemical - New substances are formed and the original substances cannot be re-obtained.
- 4) Physical - Temporary, no new substance is formed.
- 5) Chemical - New substance with new properties is produced. Unclotted blood cannot be reobtained in this change.

Question 7:

Give four examples of a physical change.

Answer:

- 1) Evaporation of water.
- 2) Formation of dew.
- 3) Crystallisation of sugar from its solution.
- 4) Ringing of an electric bell.

Question 8:

Give four characteristics of a chemical change.

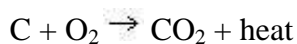
Answer:

- 1) A chemical change is a permanent and not easily irreversible.
- 2) A chemical change results in alteration in the composition of the molecules of the substance undergoing change and the formation of one or more new substances.
- 3) The mass of the substance undergoing a chemical change usually changes.
- 4) Heat is either absorbed or given out during a chemical change.

Question 9:

What do you understand by an exothermic chemical change?

Answer: An exothermic chemical change is one, which takes place with the liberation of heat energy. Example: Burning of coal in air.

**Question 10:**

Explain whether the following are physical or chemical changes. Give one reason for your answer.

- 1) Formation of curd
- 2) Ripening of fruit
- 3) Bending a glass tube by heating
- 4) Melting of wax
- 5) Formation of wine

Answer:

1) Chemical change

New substance (curd) with a different composition is formed from the milk. Milk cannot be reobtained. Hence the change is permanent.

2) Chemical change

The property of the substance has changed. The hard, sour fruit has changed to a soft, sweet form. The change is permanent.

3) Physical change

The physical properties changed on heating, but there was no change in mass.

4) Physical change

On heating the wax melts but on cooling it re-solidifies. So there is no change in properties or composition. The change is temporary and reversible.

5) A chemical change

The properties of the substance changed and new substance like alcohol is produced. The change is permanent and irreversible.

Question 11:

Action of heat on blue vitriol is a physical as well as chemical change. Justify.

Answer: When blue vitriol is gradually heated, it undergoes a physical change to form a white powder. On adding a drop of water to the white powder, it changes back to blue. Thus the change is a physical change.

On strongly heating to about 800°C, copper sulphate decomposes to give new substances like copper oxide and sulphur dioxide. On cooling these, copper sulphate cannot be re-obtained. Thus it is a chemical change.

Question 12:

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Is boiling of water, a chemical change? Give reasons for your answer.

Answer: Boiling of water is not a chemical change it is a physical change. When water boils, it absorbs heat energy and changes to steam. But this change is temporary and reversible. The steam can change back to water by giving out the same amount of heat. Also the mass of water boiling is equal to the mass of steam that is formed. Accordingly, it is a physical change.

Question 13:

A person eats chocolate and then digests it. In doing so a physical and a chemical change takes place. Identify the changes and give reasons for your answer.

Answer: When the person chews the chocolate and breaks it into smaller pieces - it is a physical change. No new substances have been formed as yet. Once acted upon by saliva and other digestive juices, the chocolate is broken down into other simpler substances, which can be absorbed by the blood. This is a chemical change.

Question 14:

When we mix iron filings with sulphur and grind it, a physical change takes place. However if we heat the mixture, a chemical change takes place. Explain why the former is said to be a physical change while the latter process is said to be a chemical change.

Answer: Mixing iron filings with sulphur is considered to be a physical change because the mixture can be easily separated and no new substance is formed. Moreover, no energy changes occur while mixing iron and sulphur.

When the mixture is heated, the two substances combine to form a new substance known as ferrous sulphide. The original substance, iron and sulphur, cannot be re-obtained by cooling the ferrous sulphide. Consequently, it is a permanent chemical change involving an energy change.

Question 15:

State whether the following statements are true or false. Correct the false statements.

- 1) Chemical changes are generally accompanied by an exchange of energy.
- 2) A physical change is usually reversible.
- 3) When a magnesium ribbon burns brilliantly in air a physical change takes place.
- 4) Ammonium chloride dissolves in water with the absorption of heat. This is an exothermic reaction.

Answer:

- 1) True
- 2) True
- 3) False Correct statement: When a magnesium ribbon burns brilliantly in air a chemical change takes place.
- 4) False Correct statement: Ammonium chloride dissolves in water with the absorption of heat. This is an endothermic reaction.

Question 16:

Identify physical or chemical changes in the following:

- 1) A rock rolls down a slope
- 2) Baking of cake
- 3) Plucking of fruit
- 4) Burning of L. P. G
- 5) Cutting of carrots

**Answer:**

- 1) Physical change: No change in mass.
- 2) Chemical change: Properties of the original substance change.
- 3) Physical change: No change in mass. Properties of the substance do not change.
- 4) Chemical change: New substance like carbon dioxide is formed. Energy change is involved (heat is evolved).
- 5) Physical change: No change in mass before and after cutting the carrots.

Question 17:

Explain whether the addition of dilute sulphuric acid to iron is a physical or chemical change.

Answer:

It is a chemical change for the following reasons:

- 1) Iron reacts with dilute H_2SO_4 to form ferrous sulphate (a pale green solution) and liberates bubbles of hydrogen gas. New products are formed and the change is permanent.
- 2) Heat energy is evolved in the reaction i.e., it is an exothermic change.

Question 18:

Heating of iodine crystals is considered to be a physical change. Explain.

Answer: When iodine crystals are heated, the solid changes to the vapour state i.e., it sublimates. This is identified as a physical change since:

- 1) The vapours formed settle on the cooler parts of the test tube as solid - so the change is temporary and reversible.
- 2) There is no change in mass.
- 3) There is no energy (heat) change involved because the heat absorbed when the solid iodine changes to vapour, is given out when the vapour changes back to solid.
- 4) The chemical composition of the solid is same as that of the vapour.

Question 19:

Burning of a candle may be considered as showing physical and chemical changes occurring simultaneously. Explain.

Answer: When the candle burns, the heated wax melts. The melted wax re-solidifies and no new substance is formed, therefore this is a physical change. However, the wax and the wick continue to burn and produce new substances like carbon dioxide and water vapour. This burning process is a chemical change as it is a permanent change. Also, energy in the form of heat and light is evolved.

Question 20:

Given the following equation:

Zinc + Hydrobromic acid \rightarrow Zinc bromide + Hydrogen

- 1) Write the equation using symbols and formulae.
- 2) Name a solid reactant in the reaction.
- 3) Name a gaseous product formed in the reaction.

Answer:

- 1) $\text{Zn} + 2\text{HBr} \rightarrow \text{ZnBr}_2 + \text{H}_2 \uparrow$
- 2) Zinc
- 3) Hydrogen

Question 21:

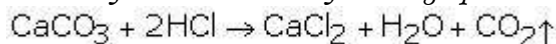
What information is conveyed by a chemical equation?

Answer: A chemical equation tells us:

- 1) The nature of reactants and the products of the chemical change.
- 2) Number of molecules of each substance taking part in the change as well as the number of molecules produced after the chemical change.
- 3) The quantities of the reactants taking part in the reaction and also of the products formed as a result of the reaction.
- 4) The actual result of the chemical change.

Question 22:

What information does the following equation convey?



Answer: The above equation tells us that,

- 1) One molecule of calcium carbonate reacts with two molecules of hydrochloric acid to produce one molecule each of calcium chloride, water and carbon dioxide.
- 2) Adding individual atomic weights (in grams), the total mass of a compound can be calculated. Thus, 100 grams of calcium carbonate reacts with 73 g of hydrochloric acid to produce 111g of calcium chloride, 18g of water and 44g of carbon dioxide.

Question 23:

Balance the following equations after writing them as molecular equations.

- 1) Sodium + Nitrogen \rightarrow Sodium nitride.
- 2) Aluminium + Chlorine \rightarrow Aluminium chloride
- 3) Iron (III) oxide + Hydrogen \rightarrow Iron + Water
- 4) Phosphorous + Oxygen \rightarrow Phosphorous pentoxide
- 5) Trilead tetra oxide \rightarrow Lead monoxide + Oxygen.

Answer:

- a) $6\text{Na} + \text{N}_2 \rightarrow 2\text{Na}_3\text{N}$
- b) $2\text{Al} + 3\text{Cl}_2 \rightarrow 2\text{AlCl}_3$
- c) $\text{Fe}_2\text{O}_3 + 3\text{H}_2 \rightarrow 2\text{Fe} + 3\text{H}_2\text{O}$
- d) $4\text{P} + 5\text{O}_2 \rightarrow 2\text{P}_2\text{O}_5$
- e) $2\text{Pb}_3\text{O}_4 \rightarrow 6\text{PbO} + \text{O}_2$

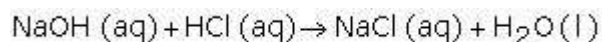
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Question 24:

What do you understand by

- 1) *thermal decomposition*
- 2) *electrolytic decomposition?*

- Answer:**
- 1) Thermal decomposition is the breaking down of substances into simpler substances by the action of heat.
 - 2) Electrolytic decomposition is the breaking down of substances into simpler substances by electricity.

Question 25:

What type of reaction is this? Why is it called so?

Answer: This is a neutralisation reaction. The hydrogen ion (H^+) of the acid reacts with the hydroxyl ion (OH^-) of the alkali to form water. Neutralisation of acid with base takes place.

Question 26:

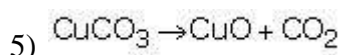
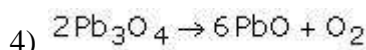
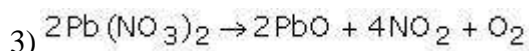
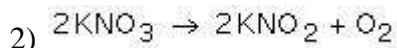
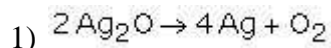
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CHEMICAL REACTIONS AND EQUATIONS

Give the balanced equation for reactions that take place when the following are heated:

- 1) Silver oxide
- 2) Potassium nitrate
- 3) Lead nitrate
- 4) Trilead tetraoxide
- 5) Copper carbonate.

Answer:



Question 27:

When an iron knife is dipped in a solution of copper sulphate, a reddish brown layer gets formed on the knife. Explain.

Answer: Iron is more reactive metal than copper and displaces it from its solution of copper sulphate. The reddish brown layer seen on the knife is the deposit of displaced copper that is formed.

Question 28:

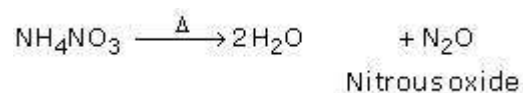
When hydrochloric acid is converted to chlorine, is the acid getting oxidised? Explain.

Answer: Hydrochloric acid is converted to chlorine by removal of hydrogen from it. The removal of hydrogen from a compound is called oxidation. Hence the acid is oxidised.

Question 29:

Ammonium nitrate when heated disappears completely. Why?

Answer: Ammonium nitrate on heating decomposes into colourless gaseous products namely, water vapour and nitrous oxide.



Both products being gases, escape into the surroundings, leaving behind no visible products. Thus it seems that ammonium nitrate has disappeared.

Question 30:

Chemical reactions are often accompanied by heat changes. Explain.

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Answer: Chemical reactions involve breaking of old bonds and forming of new ones. The breaking of bonds requires energy. Depending on whether the formation of new bonds release more or less energy than that involved in breaking old ones, energy is either released or absorbed during a chemical reaction.

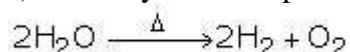
Question 31:

State what type of reaction the following are:

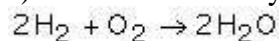
- 1) Splitting of water into hydrogen and oxygen.
- 2) Burning of hydrogen in air.
- 3) Action of iron with copper sulphate solution.
- 4) Action of heat on calcium carbonate.
- 5) Treating silver nitrate with hydrochloric acid. Give equations with your answer.

Answer:

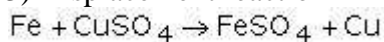
- 1) Electrolytic decomposition reaction



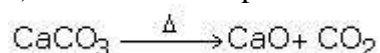
- 2) Combination or Synthesis reaction



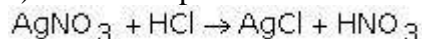
- 3) Displacement reaction



- 4) Thermal decomposition reaction



- 5) Double displacement reaction

**Question 32:**

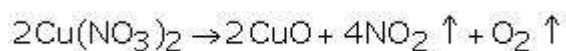
When ice is exposed to air, it melts to form water and when hydrogen is burnt in air, it forms water. How do these changes differ?

Answer: Ice melting to form water is a physical change. No new substance is formed in this process and the mass of the melting ice is equal to the mass of water formed. However, burning hydrogen in air is a chemical change as a new substance i.e., water is formed. This change is a permanent change.

Question 33:

Blue Copper Nitrate crystals turns black when heated. Explain

Answer: Copper nitrate crystals decompose into copper oxide, nitrogen dioxide and oxygen on heating. The latter two are gases and escape into the surroundings. The residue left is of copper oxide, which is black in colour.

**Question 34:**

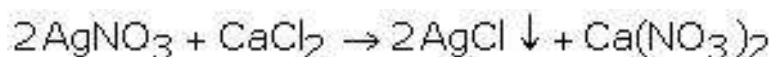
When chlorine is passed through potassium iodide solution containing chloroform, purple colour is observed. Explain.

Answer: Chlorine displaces iodine from the potassium iodide solution. The displaced iodine dissolves in chloroform giving it a purple colouration.

Question 35

When silver nitrate is added to seawater, a white precipitate is formed. Explain.

Answer: Sea water contains dissolved chlorides of calcium and magnesium. These react with silver nitrate to form silver chloride by double displacement. Silver chloride is insoluble in water and thus appears as a white precipitate.

**Question 36:**

Classify the following reactions into various types.

- 1) Treating dilute sulphuric acid with sodium hydroxide solution.
- 2) Heating ammonium chloride.
- 3) Changing ammonium chloride into sodium and chlorine.
- 4) Heating a mixture of iron and sulphur.
- 5) Passing chlorine through a solution of potassium bromide.

Answer:

- 1) Neutralisation
- 2) Thermal dissociation
- 3) Electrolytic decomposition
- 4) Synthesis
- 5) Displacement.

Question 37:

Define a double decomposition reaction.

Answer: Double decomposition is a reaction in which the positive and negative radicals of two substances in solution are mutually interchanged.

Question 38:

What type of change takes place in the following, physical or chemical? Briefly explain.

- 1) Heating of zinc oxides.
- 2) Action of sodium with water.
- 3) Rain cycle.
- 4) Heating calcium carbonate.
- 5) Action of dilute acids on magnesium.

Answer:

- 1) Physical change occurs. There is only a colour change. No new substance is formed.
- 2) Chemical change takes place. New substances are formed.
- 3) Physical change occurs. Change of the state of water occurs.
- 4) Chemical change occurs and new substances are formed.
- 5) Chemical change occurs and new substances are formed.

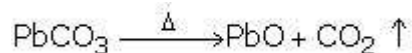
Question 39:

Name the following and give equations for these reactions:

- 1) A white solid, which when heated, leaves behind a yellow solid and gives CO₂.
- 2) A bluish green powder, on heating, leaves behind a black solid and gives CO₂.
- 3) A colourless solid produces a yellow solid when hot and a white solid when cold and gives a reddish brown gas. Give equations for each.

Answer:

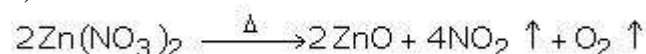
1) Lead carbonate



2) Copper carbonate

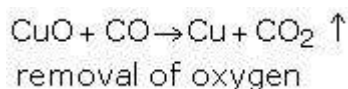


3) Zinc nitrate

**Question 40:**

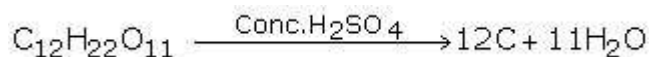
Reaction of carbon monoxide with heated copper oxide is a reduction reaction. Explain.

Answer: Carbon monoxide removes the oxygen from copper oxide leaving behind metallic copper. Removal of oxygen is called reduction.

**Question 41:**

What do you observe when concentrated sulphuric acid is added to sugar?

Answer: The sugar changes into a black spongy mass of carbon, which swells up. The sulphuric acid acts as a dehydrating agent removing all the water molecules from sugar.

**Question 42:**

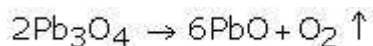
What do you observe when zinc oxide is heated and then cooled?

Answer: When white zinc oxide is heated, it turns yellow. On cooling it turns back to white. This is a physical change.

Question 43:

What do you observe when trilead tetraoxide is heated?

Answer: On heating, the red powder of trilead tetraoxide decomposes and produces a colourless gas. As this gas can rekindle a glowing splinter, it is oxygen. The residue left behind is orange-brown when hot but changes to yellow on cooling and fuses with the glass.

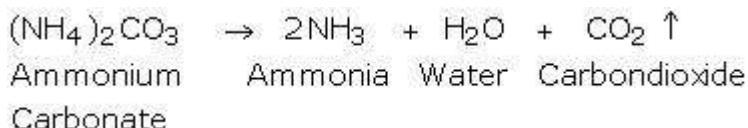


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Question 44:

What happens when ammonium carbonate is kept open?

Answer: Ammonium carbonate on exposure to air decomposes to give ammonia, water and carbon dioxide.



Question 45:

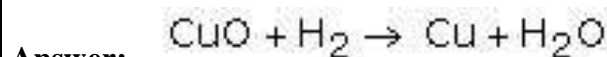
Why is the reaction between steam and red hot iron said to be a reversible reaction?

Answer: If steam is passed over red hot iron, it is converted into its magnetic oxide and hydrogen gas. If on the other hand, hydrogen is passed over heated magnetic oxide, it will change back to iron and steam. This reaction can be made to proceed in both directions, so it is called reversible reaction.



Question 46:

Give an example of a redox reaction involving a metallic oxide and a neutral gas as the only reactants.



Here H_2 reduces CuO to Cu and itself gets oxidised to water. Hence it is a redox reaction.

Question 47:

Classify the following reactions as exothermic and endothermic.

- i) $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$
- ii) $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$
- iii) $\text{C} + 2\text{S} \rightarrow \text{CS}_2$
- iv) $\text{N}_2 + \text{O}_2 \rightarrow 2\text{NO}$
- v) $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$

Answer: 1) Exothermic 2) Exothermic 3) Endothermic
4) Endothermic 5) Endothermic.

Question 48:*State the effect of:*

- 1) An endothermic reaction
- 2) An exothermic reaction on the surroundings.

Answer:

- 1) When an endothermic reaction takes place, the surroundings cool down as the reactants absorb heat.
- 2) When an exothermic reaction occurs, the temperature of the surroundings increase as heat is released into the surrounding.

Question 49: *Predict the products for the following reactions and balance.*

- a) $\text{HCl} + \text{Zn} \rightarrow$
- b) $\text{NaBr} + \text{Cl}_2 \rightarrow$
- c) $\text{H}_2\text{SO}_4 + \text{Fe} \rightarrow$
- d) $\text{Na} + \text{H}_2\text{O} \rightarrow$
- e) $\text{Cu} + \text{AgNO}_3 \rightarrow$

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- a) $2\text{HCl} + \text{Zn} \rightarrow \text{ZnCl}_2 + \text{H}_2$
- b) $2\text{NaBr} + \text{Cl}_2 \rightarrow 2\text{NaCl} + \text{Br}_2$
- c) $\text{H}_2\text{SO}_4 + \text{Fe} \rightarrow \text{FeSO}_4 + \text{H}_2$
- d) $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$
- e) $\text{Cu} + 2\text{AgNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + 2\text{Ag}$

Question 50: *Complete the following double displacement reactions.*

- a) $\text{KOH} + \text{H}_2\text{SO}_4 \rightarrow$
- b) $\text{NaOH} + \text{HCl} \rightarrow$
- c) $\text{Al}_2(\text{SO}_4)_3 + \text{NaOH} \rightarrow$
- d) $\text{BaCl}_2 + \text{Na}_2\text{SO}_4 \rightarrow$
- e) $\text{PbSO}_4 + \text{Na}_2\text{CO}_3 \rightarrow$

Answer:

- a) $2\text{KOH} + \text{H}_2\text{SO}_4 \rightarrow \text{K}_2\text{SO}_4 + 2\text{H}_2\text{O}$
- b) $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
- c) $\text{Al}_2(\text{SO}_4)_3 + 6\text{NaOH} \rightarrow 2\text{Al}(\text{OH})_3 + 3\text{Na}_2\text{SO}_4$
- d) $\text{BaCl}_2 + \text{Na}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{NaCl}$
- e) $\text{PbSO}_4 + \text{Na}_2\text{CO}_3 \rightarrow \text{PbCO}_3 + \text{Na}_2\text{SO}_4$