

NCERT Solutions for Class 10 Science

Chapter 1 – Chemical Reactions And Equations

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Intext Questions with Solutions of Class 10 Science Chapter 1 – Chemical Reactions and Equations

1.

Why should a magnesium ribbon be cleaned before burning in air?

Ans: Magnesium ribbon must be cleansed prior to combustion in air, as magnesium metal reacts with atmospheric oxygen to generate a stable coating of magnesium oxide (MgO). As a result, it is essential to clean the ribbon to remove the coating of magnesium oxide (MgO) in order to prevent any further interactions with oxygen.

2.

Write the balanced equation for the following chemical reactions.

(i) Hydrogen + Chlorine → Hydrogen chloride

(ii) Barium chloride + Aluminium sulphate → Barium sulphate + Aluminium chloride

(iii) Sodium + Water → Sodium hydroxide + Hydrogen

Ans:

(i) $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$

(ii) $3\text{BaCl}_2 + \text{Al}_2(\text{SO}_4)_3 \rightarrow \text{BaSO}_4 + 2\text{AlCl}_3$

(iii) $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2\uparrow$

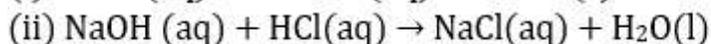
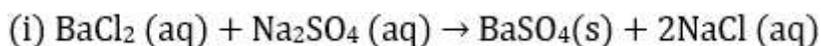
3.

Write a balanced chemical equation with state symbols for the following reactions.

(i) Solutions of barium chloride and sodium sulphate in water react to give insoluble barium sulphate and the solution of sodium chloride.

(ii) Sodium hydroxide solution (in water) reacts with hydrochloric acid solution (in water) to produce sodium chloride solution and water.

Ans:



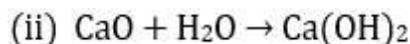
4.

A solution of a substance 'X' is used for whitewashing.

(i) Name the substance 'X' and write its formula.

(ii) Write the reaction of the substance 'X' named in (i) above with water.

Ans: (i) Substance 'X' is calcium oxide also known as quicklime that is used in white washing. Its chemical formula is CaO .



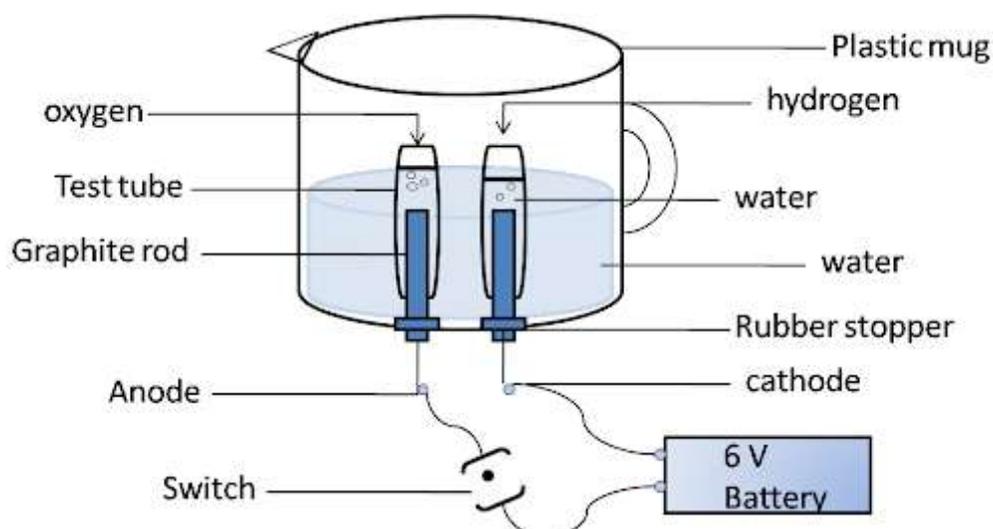
5.

Why is the amount of gas collected in one of the test tubes in Activity 1.7 double of the amount collected in the other? Name this gas.

Ans: Water is electrolyzed in Activity 1.7 to produce H_2 gas at one electrode and O_2 gas at the other electrode.



Accordingly, when two molecules of water are electrolyzed, two molecules of hydrogen gas and one molecule of oxygen gas are produced; in other words, twice as much hydrogen gas would be collected as oxygen gas.



6.

Why does the colour of copper sulphate solution change when an iron nail is dipped in it?

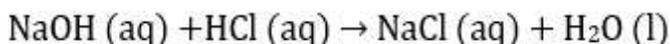
Ans: Because iron is more reactive than copper, it displaces copper out of the copper sulfate solution when an iron nail is dipped in it. As a result, the copper sulphate solution's color changes. The reaction is



7.

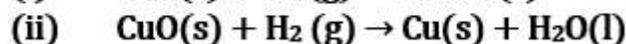
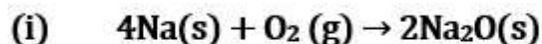
Give an example of a double displacement reaction other than the one given in Activity 1.10.

Ans: In a double displacement reaction, two ions move from one place to another in the reactants to make new compounds in the products. When sodium hydroxide and hydrochloric acid mix to make sodium chloride and water, this is called a double displacement process.



8.

Identify the substances that are oxidised and the substances that are reduced in the following reactions.



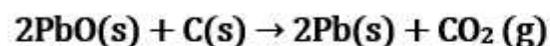
Ans: (i) As oxygen is reduced and absorbed, sodium is oxidized.

(ii) When hydrogen obtains oxygen, it oxidizes, reducing substances like copper.

Exercise Questions with Solutions of Class 10 Science Chapter 1 – Chemical Reactions and Equations

1.

Which of the statements about the reaction below are incorrect?



(a) Lead is getting reduced.

(b) Carbon dioxide is getting oxidised.

(c) Carbon is getting oxidised.

(d) Lead oxide is getting reduced.

(i) (a) and (b)

(ii) (a) and (c)

(iii) (a), (b) and (c)

(iv) all

Ans: Incorrect option is (i) (a) and (b)

Explanation: (a) Because Oxygen is being removed and (b) Because the removed oxygen from Lead is added to the elemental Carbon.

2.

$\text{Fe}_2\text{O}_3 + 2\text{Al} \rightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$ The above reaction is an example of a

- (a) combination reaction.**
- (b) double displacement reaction.**
- (c) decomposition reaction.**
- (d) displacement reaction.**

Ans: The answer is(d) Displacement reaction.

This happens when the oxygen in ferrous oxide moves to aluminium metal, making aluminium oxide. Aluminium, which is more reactive than iron, pushes iron out of its oxide in this reaction. This is called a displacement reaction, and it happens when a more reactive element takes the place of a less reactive one.

3.

What happens when dilute hydrochloric acid is added to iron fillings? Tick the correct answer.

- (a) Hydrogen gas and iron chloride are produced.**
- (b) Chlorine gas and iron hydroxide are produced.**
- (c) No reaction takes place.**
- (d) Iron salt and water are produced.**

Ans: (a) Hydrogen gas and iron chloride are produced.



4.

What is a balanced chemical equation? Why should chemical equations be balanced?

Ans: A balanced equation is one in which the number of distinct atoms on both the reactant and product sides is equal. Balancing chemical equations is essential for the reaction to adhere to the Law of Conservation of Mass. Therefore, a balanced chemical equation maintains that the total mass of the reactants is equivalent to the total mass of the products.

5.

Translate the following statements into chemical equations and then balance them.

- (a) Hydrogen gas combines with nitrogen to form ammonia.
- (b) Hydrogen sulphide gas burns in air to give water and sulphur dioxide.
- (c) Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate.
- (d) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.

Ans:

- (a) $3\text{H}_2 (\text{g}) + \text{N}_2 (\text{g}) \rightarrow 2\text{NH}_3 (\text{g})$
- (b) $\text{H}_2\text{S} (\text{g}) + 3\text{O}_2 (\text{g}) \rightarrow \text{SO}_2 (\text{g}) + 2\text{H}_2\text{O}(\text{l})$
- (c) $3\text{BaCl}_2 (\text{aq}) + \text{Al}_2(\text{SO}_4)_3 (\text{aq}) \rightarrow 2\text{AlCl}_3 (\text{aq}) + 3\text{BaSO}_4 \downarrow(\text{s})$
- (d) $2\text{K} (\text{s}) + 2\text{H}_2\text{O} (\text{l}) \rightarrow 2\text{KOH} (\text{aq}) + \text{H}_2 (\text{g})$

6.

Balance the following chemical equations.

- (a) $\text{HNO}_3 + \text{Ca}(\text{OH})_2 \rightarrow \text{Ca}(\text{NO}_3)_2 + \text{H}_2\text{O}$
- (b) $\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$
- (c) $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{NaNO}_3$
- (d) $\text{BaCl}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + \text{HCl}$

Ans:

- (a) $2\text{HNO}_3 + \text{Ca}(\text{OH})_2 \rightarrow \text{Ca}(\text{NO}_3)_2 + 2\text{H}_2\text{O}$
- (b) $2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$
- (c) $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{NaNO}_3$
- (d) $\text{BaCl}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{HCl}$

7.

Write the balanced chemical equations for the following reactions.

- (a) Calcium hydroxide + Carbon dioxide → Calcium carbonate + Water
- (b) Zinc + Silver nitrate → Zinc nitrate + Silver
- (c) Aluminium + Copper chloride → Aluminium chloride + Copper
- (d) Barium chloride + Potassium sulphate → Barium sulphate + Potassium chloride

Ans:

- (a) $\text{Ca}(\text{OH})_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$
(b) $\text{Zn} + 2\text{AgNO}_3 \rightarrow \text{Zn}(\text{NO}_3)_2 + 2\text{Ag}$
(c) $2\text{Al} + 3\text{CuCl}_2 \rightarrow 2\text{AlCl}_3 + 3\text{Cu}$
(d) $\text{BaCl}_2 + \text{K}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{KCl}$

8.

Write the balanced chemical equation for the following and identify the type of reaction in each case.

(a) Potassium bromide(aq) + Barium iodide(aq) → Potassium iodide(aq) + Barium bromide(s)

(b) Zinc carbonate(s) → Zinc oxide(s) + Carbon dioxide(g)

(c) Hydrogen(g) + Chlorine(g) → Hydrogen chloride(g)

(d) Magnesium(s) + Hydrochloric acid(aq) → Magnesium chloride(aq) + Hydrogen(g)

Ans:

(a) $2\text{KBr}(\text{aq}) + \text{BaI}_2(\text{aq}) \rightarrow 2\text{KI}(\text{aq}) + \text{BaBr}_2(\text{s})$

Reaction Type : Double displacement reaction

(b) $\text{ZnCO}_3(\text{s}) \rightarrow \text{ZnO}(\text{s}) + \text{CO}_2(\text{g})$

Reaction Type : Decomposition reaction

(c) $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{HCl}(\text{g})$

Reaction Type : Combination reaction

(d) $\text{Mg}(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{MgCl}_2(\text{aq}) + \text{H}_2(\text{g})$

Reaction Type : Displacement reaction

9.

What does one mean by exothermic and endothermic reactions? Give examples.

Ans: Exothermic reactions: Exothermic reactions are those that result in the evolution of heat.

Writing "+ Heat" on the products side of an equation indicates an exothermic reaction

(Examples: Explosions, respiration, nuclear fission and fusion).

eg: $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + \text{Heat}$

Endothermic reactions: Endothermic reactions are those in which heat is absorbed. "Heat" is typically written on the product side of a chemical equation to indicate an endothermic reaction (For example, Photosynthesis, melting of ice, evaporation).

eg: $\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{NO}(\text{g}) - \text{Heat}$

10.

Why is respiration considered an exothermic reaction? Explain

Ans: Exothermic reactions are the ones that give off heat. These reactions create energy because the reactants have more energy than the products. The process via which our body's glucose and oxygen in our cells combine to give us energy is called respiration. Respiration is an exothermic reaction since the glucose is broken down during digestion, which also gives us energy when combined with oxygen. The following is the reaction that takes place:

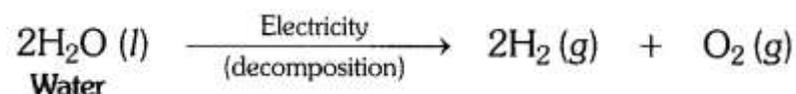


11.

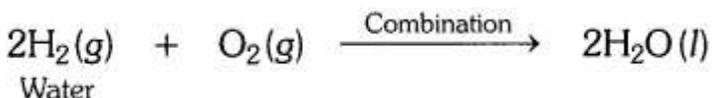
Why are decomposition reactions called the opposite of combination reactions?

Write equations for these reactions.

Ans: One compound decomposes into two or more simpler compounds in a decomposition reaction.



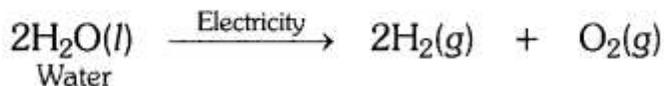
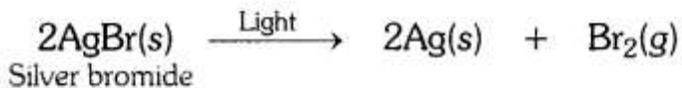
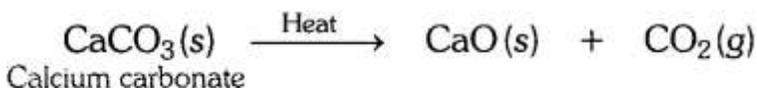
In contrast, two or more chemicals merely join to generate a new substance in a combination reaction.



12.

Write one equation each for decomposition reactions where energy is supplied in the form of heat, light or electricity.

Ans:



13.

What is the difference between displacement and double displacement reactions? Write equations for these reactions.

Ans: A displacement reaction occurs when a more reactive substance displaces a less reactive one from its salt solution, whereas a double displacement reaction occurs when two compounds exchange ions mutually.

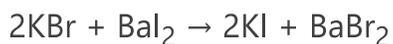
In a displacement reaction, a single displacement occurs, while in a double displacement reaction, two displacements occur between the molecules, as the name implies.

Example:

Displacement reaction



Double displacement reaction



14.

In the refining of silver, the recovery of silver from silver nitrate solution involved displacement by copper metal. Write down the reaction involved.

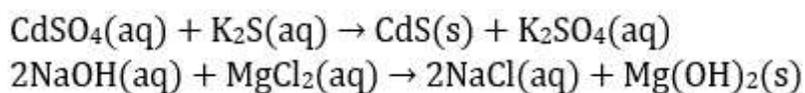
Ans:



15.

What do you mean by a precipitation reaction? Explain by giving examples.

Ans: A precipitation reaction is the kind of reaction in which the reactants exchange ions to generate an insoluble material known as a precipitate.



16.

Explain the following in terms of gain or loss of oxygen with two examples each.

(a) Oxidation (b) Reduction

Ans:

(a) Oxidation : The addition of oxygen to a substance is called oxidation.

Example :

(i) $S(s) + O_2(g) \rightarrow SO_2(g)$ (Addition of oxygen to sulphur)

(ii) $2Mg(s) + O_2(g) \rightarrow 2MgO(s)$ (Addition of oxygen to magnesium)

(b) Reduction : The removal of oxygen from a substance is called reduction.

Example:

(i) $CuO + H_2 \xrightarrow{\text{Heat}} Cu + H_2O$

Here, copper oxide is being reduced to copper because oxygen gets removed from copper oxide.

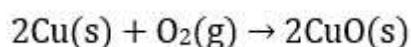
(ii) $ZnO + C \rightarrow Zn + CO$

Here, zinc oxide is being reduced to zinc because oxygen gets removed from zinc oxide.

17.

A shiny brown coloured element 'X' on heating in air becomes black in colour. Name the element 'X' and the black coloured compound formed.

Ans: Copper metal (Cu) is the gleaming brown element. Copper oxide is created when the metal reacts with atmospheric oxygen while heated in air. Thus, copper oxide is the black-colored substance.



18.

Why do we apply paint on iron articles?

Ans: Because it is a reactive metal, iron can react with air and moisture. Long-term exposure to air or moisture can cause iron objects to corrode and develop rust. Therefore, paint is put to iron objects to stop them from rusting and to create a barrier against moisture and air exposure.

19.

Oil and fat containing food items are flushed with nitrogen. Why?

Ans: Items that contain oils or fat are perishable and can go bad when they come into contact with oxygen. The reason for this is because oil and fats are easily oxidized due to their reactive nature. These objects are flushed with nitrogen gas to stop oxidation. Since nitrogen is an inert gas, it has a difficult time reacting with fats or oils. Food products that contain oils and fats are therefore stored in nitrogen gas-filled packets, which extends their shelf life and prolongs their shelf life.

20.

Explain the following terms with one example each.

(a) Corrosion (b) Rancidity

Ans: (a) The process of corrosion occurs when ambient oxygen oxidizes a refined metal to produce oxides or other more stable compounds. The corrosion process causes the metal to progressively deteriorate. An excellent illustration of corrosion is the rusting of iron, which turns the metal into iron oxide. Every year, millions of dollars are spent to keep bridges and other landmarks from rusting.

(b) The state that results in a disagreeable taste and odour due to the aerial oxidation of the fat and oil in the food. Because the low temperature in the refrigerator does not encourage the oxidation reaction, the rancidity is delayed.