

Chemical Equations and Reactions Ncert Solutions

QUESTION 1: Why should a magnesium ribbon be cleaned before burning in air?

Solution; When magnesium ribbon is stored, it reacts with oxygen to form a layer of magnesium oxide. This layer of magnesium oxide is quite stable and prevents further reaction of magnesium with oxygen. Hence a magnesium ribbon should be cleaned before burning in air.

QUESTION 2: Write the balanced equation for the following reaction:

(1) Hydrogen + Chlorine = Hydrogen chloride

(2) Barium chloride + Aluminum sulphate = Barium sulphate + Aluminum chloride

(3) Sodium + Water = Sodium hydroxide + Hydrogen

Solution:

How to solve these type of question

- First convert the word equation into skeletal equation
- Start by finding out how many atoms of each type are on each side of the equation
- You can make a little table listing the numbers of each atom for the left hand side and for the right hand side
- Balance the different Atoms on both side of equation by multiply the chemical species on the side which doesn't have enough atoms of that type by the number required to bring it up to the same as the other side.

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

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

(3) $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$

QUESTION 3: Write a balanced chemical equation with state symbols for the following reaction:

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

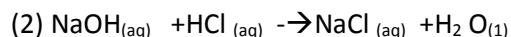
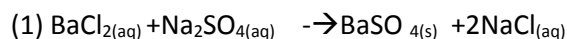
(2) Sodium hydroxide solution (in water) reacts with hydrochloric acid solution (in water)

to produce sodium chloride solution and water.

Solution:

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QUESTION 4: A solution of a substance “X” is used for white washing.

(1) Name the substances “x” and write its formula.

(2) Write reaction of the substance “X” named in (!) above with water.

Solution: (1) The substance “x’ is calcium oxide . Its chemical formula is CaO.

(2) Calcium oxide reacts vigorously with water to form calcium hydroxide (slaked lime)



Calcium oxide water Calcium hydroxide

QUESTION 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.

Solution: Water (H₂O) contains two parts hydrogen and one part oxygen . Therefore, the amount of hydrogen and oxygen produce during electrolysis of water is in a 2:1 ratio. During electrolysis, since hydrogen goes to one test tube and oxygen goes to another, the amount of gas collected in of the test tubes is double of the amount collected in the other. The gas collected in double the amount is hydrogen and the other gas is oxygen.

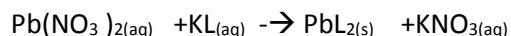
QUESTION 6: Why does the color of copper sulphate solution change when an iron nail is dipped in it.

Solution: When an iron nail is placed in a copper sulphate solution, iron displaces copper from copper sulphate solution forming ferrous sulphate solution and copper metal. Ferrous sulphate is green in color and copper metal is brown.

Therefore, the blue color of copper sulphate fades and green color appears.

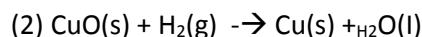
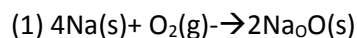
QUESTION 7: Give an example of a double displacement reaction other than the one given in Activity 1.10.

Solution: A double displacement reaction between the reactants lead nitrate and potassium iodide gives new substances lead iodide and potassium nitrate.



In this reaction lead nitrate and potassium iodide exchange ion to form two new compounds lead iodide and potassium nitrate. Hence, it is a double displacement reaction.

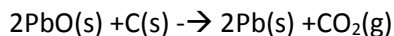
QUESTION 8: Identify the substances that are oxidized and the substances that are reduced in the following reaction.



Solution: (1) Sodium (Na) is oxidized to sodium oxide as it gains oxygen and oxygen gets reduced.

(2) Copper oxide (CuO) is reduced to copper (Cu) while hydrogen (H₂) gets oxidized to water (H₂O).

QUESTION 9 Which of the statements about the reaction below are incorrect?



- (a) Lead is getting reduced.
- (b) Carbon dioxide is getting oxidized.
- (c) Carbon is getting oxidized.
- (d) Lead oxide is getting reduced

(1) (a) and (b)

(2) (a) and (c)

(3) (a) (b) and (c)

(4) all

Solution

oxidation is gain of oxygen and reduction reaction is released of oxygen

(a) and (b)

QUESTION 10 $\text{Fe}_2\text{O}_3 + 2\text{Al} \rightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$

The above reaction is an example of a

- (a) Combination reaction
- (b) Double displacement reaction
- (c) Decomposition reaction
- (d) Displacement reaction

Solution: (d) displacement reaction

QUESTION 11 what happens when dilute hydrochloric acid is added to iron fillings? Tick the correct Solution.

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

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

QUESTION 12:

What is a balance chemical equation? Why chemical equation should is balanced?

Solution: A chemical equation is balanced when the number of atoms of each type involved in a chemical reaction are same on both the reactant and product sides of the equation.

According to the law of conservation of mass, when a chemical reaction occurs, the mass of the products should be equal to the mass of the reactants. Therefore, the amount of the atoms in each element does not change in the chemical reaction. As a result, the chemical equation that shows the chemical reaction needs to be balanced. A balanced chemical equation occurs when the number of the atoms involved in the reactants side is equal to the number

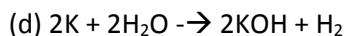
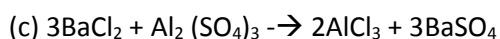
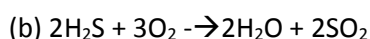
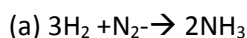
QUESTION 13 Translate the following statements into chemical equations and then balance them.

- (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 aluminum sulphate to give aluminum chloride and a precipitate of barium sulphate
- (d) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.

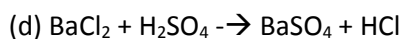
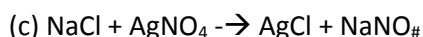
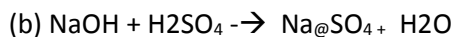
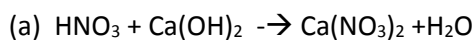
Solution:

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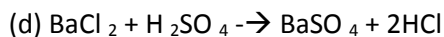
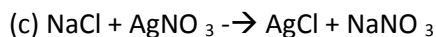
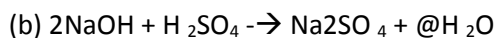
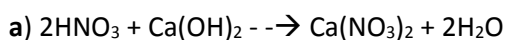
QUESTION 14. Balance the following chemical equation.



Solution:

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QUESTION 15: Write the balance chemical equation for the following reaction.

(a) Calcium hydroxide + Carbon dioxide \rightarrow Calcium carbonate + Water

(b) Zinc + Silver Nitrate \rightarrow Zinc Nitrate + Silver

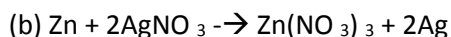
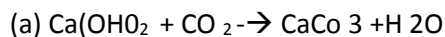
(c) Aluminum + Copper chloride \rightarrow Aluminum Chloride + Copper

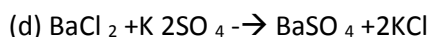
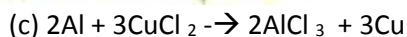
(d) Barium chloride + Potassium sulphate \rightarrow Barium Sulphate + Potassium chloride.

Solution:

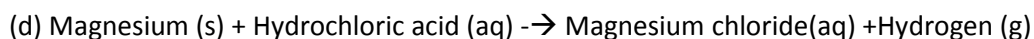
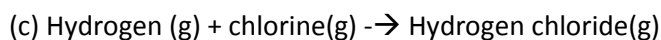
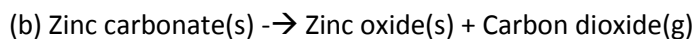
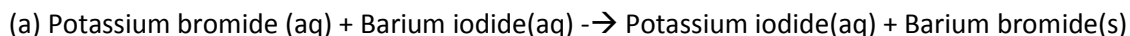
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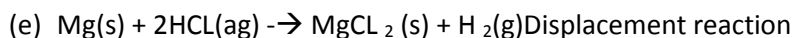
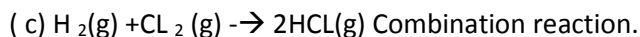




QUESTION 16 Write the balance chemical equation for the following and identify the type of reaction in each case.



Solution: (a) $2\text{KBr}(\text{aq}) + \text{BaI}_2 \rightarrow 2\text{KI}(\text{aq}) + \text{BaBr}_2(\text{s})$, Double displacement reaction.



QUESTION 17 What does one mean by exothermic and endothermic reaction? Give examples.

Solution:

<p>exothermic</p>	<p>Reaction in which heat is released along with the formation of product are called exothermic reaction. Example of exothermic reaction are-</p> <p style="text-align: center;">Burning natural gas : $\text{CH}_4 + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$</p> <p>The key point is heat is released in the process. Exo means out outside</p>
<p>endothermic</p>	<p>Reaction in which energy is absorbed are known as endothermic reaction. Example of endothermic reaction are :</p> <p style="text-align: center;">$2\text{AgBr}(\text{s}) \xrightarrow{\text{sun light}} 2\text{Ag}(\text{s}) + \text{Br}_2(\text{g})$</p> <p>The key point is heat is absorbed in the process. Endo means energy is absorbed</p>

QUESTION 18: Why is respiration considered an exothermic reaction ? explain.

Solution:

The steps to respiration are

Step 1 :Food that we eat includes carbohydrates, proteins etc.

Step 2: During digestion , carbohydrates are broken down in simpler substances called glucose.

Step 3: Glucose combines with oxygen in the cells of our body to provide energy.

This reaction is called respiration. Since energy is released during this process, respiration is an exothermic reaction.



QUESTION 19: Why are decomposition reactions called the opposite of combination reaction ? Write equation for these reactions.

Solution:

Decomposition reaction	<p>When a single substance decomposes to give two or more substances .It is called decomposition reaction</p> <p>The generalized reaction for chemical decomposition is:</p> <p>Decomposition reaction: $\text{AB} + \text{Energy} \rightarrow \text{A} + \text{B}$</p> <p>Example: $\text{CaCO}_3(\text{s}) \xrightarrow{\text{Heat}} \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$</p> <p>$2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$</p>
combination reaction	<p>When two or more substances combine to form a new single substance</p> <p>Combination reaction: $\text{A} + \text{B} \rightarrow \text{AB} + \text{energy}$</p> <p>Example: Burning of coal: $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g})$</p>

So it is clear that Decomposition reaction are opposite of combination reactions.

QUESTION 20: Write one equation each for decomposition reaction where energy is supplied in the form of heat , light or electricity.

Solution:

We already know that When a single substance decomposes to give two or more substances .It is called decomposition reaction

So examples are

Heat	$\text{CaCO}_3(\text{s}) \xrightarrow{\text{Heat}} \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$
Light	$2\text{AgBr}(\text{s}) \xrightarrow{\text{Light}} 2\text{Ag}(\text{s}) + \text{Br}_2(\text{g})$
Electricity	$2\text{H}_2\text{O}(\text{l}) \xrightarrow{\text{Electricity}} 2\text{H}_2 + \text{O}_2(\text{g})$

QUESTION 21: What is the difference between displacement and double displacement reaction ?
Write equation for these reactions.

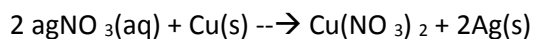
Solution:

A displacement reaction	<p>It is chemical reaction in which a more reactive element displaces a less reactive element from its salt solution.</p> <p>Example: $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$</p> <p>In this reaction , one displacement is taking place. Fe is displacing Cu</p>
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Double displacement reaction	It is a chemical reaction in which there is an exchange of ions between the reactants to give new substances. There are two displacements taking place in a double displacement reaction. Example: $3\text{BaCl}_2 + \text{Al}_2(\text{SO}_4)_3 \rightarrow 2\text{AlCl}_3 + 3\text{BaSO}_4$ In these reaction two displacements is taking place. Ba is displacing AL and AL is displacing Ba
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QUESTION 22: In refining of silver, the recovery of silver from silver nitrate solution involved displacement by copper metal. Write down the reactions involved.

Solution:



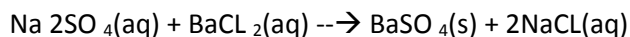
QUESTION 23 What do mean by precipitation reaction? Explain by giving example.

Solution:

Important points are

- 1) Any reaction that produces a precipitate can be called a precipitation reaction.
- 2) Precipitation reaction produce insoluble salts which settle down as precipitate.

For example : When aqueous sodium sulphate solution and aqueous barium chloride are reacted, aqueous solution of sodium chloride and white precipitate of barium sulphate are formed.



QUESTION 23: Explain the following in terms of gain or loss of oxygen with two examples each.

- (a) Oxidation
- (b) Reduction

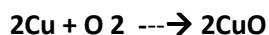
Solution:

Oxidation	Oxidation is the gain of oxygen.
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	<p>Example 1: $\text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}$</p> <p>In this reaction, ZnO is getting reduced to Zn and C is getting oxidized to CO. Therefore the conversion of ZnO is reduction and the conversion of C to CO is oxidation.</p>
Reduction	<p>Reduction is the loss of oxygen.</p> <p>Example2: $\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O}$</p> <p>IN this reaction, CuO is getting to Cu and H₂ is getting oxidized to H₂O. Therefore, the conversion of CuO is reduction and the conversion of H₂ to H₂O is oxidation.</p>

QUESTION 24: A shiny brown coloured element “X” on heating in air becomes black in colour. Name the element “X” and the black coloured compound formed.

Solution: The element “X” is copper and the black coloured compound is copper oxide (CuO). The chemical reaction is :



QUESTION 25: Why we do apply paint on iron articles?

Solution:

Iron react with air and moisture and corrode .So we apply paint on iron articles to avoid rusting of iron. Paint will stop the contact of air and moisture with iron.

QUESTION 26: Oil and fat containing food items are flushed with nitrogen. Why?

Solution: When fats and oil are oxidized, they become rancid and their smell and taste change. Food items containing fat and oil are flushed with nitrogen to prevent rancidity of oil and fat as nitrogen is an inert gas and prevent the oxidation of oil and fats.

QUESTION 27: Explain the following terms with one example each.

(a) Corrosion

(b) Rancidity

Corrosion	<ul style="list-style-type: none">• Corrosion is the process of eating away of metals by the attack of substances such as moisture, acids, etc. Example- the black coating on silver and the green coating on copper are other examples of corrosion.• Corrosion is a natural process, which converts a refined metal to a more stable form, such as its oxide or hydroxide. It is the gradual destruction of materials (usually metals) by chemical reaction with their environment.
Rancidity	<ul style="list-style-type: none">• When food items containing fats and oils are oxidized, their smell and taste change. This process is known as rancidity.• Example: Butter when kept in open for long time , taste and smell bad because of rancidity• In general terms it refers to the spoilage of a food in such a way that it becomes undesirable (and usually unsafe) for consumption. When people say that a food has "gone bad," what they're usually talking about is rancidity.