

SANJEEVANI PUBLIC SCHOOL, UTTAM NAGAR

CLASS- X (SCIENCE)

CHEMICAL REACTION AND EQUATION

(BY RUPESH GUPTA SIR)

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Q1. Why should a magnesium ribbon be cleaned before burning in air?

Ans. Magnesium ribbon is exposed in air; a layer of oxide is deposited on its surface. This oxide layer on magnesium hinders the burning of magnesium. Hence this oxide layer is removed by rubbing with sand paper before burning so magnesium ribbon can easily burn.

Q2. Write the balanced equation for the following chemical reactions.

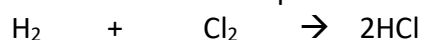


Ans. (1) Hydrogen + Chlorine → Hydrogen Chloride

This chemical equation can be written in symbolic form as



Hence balanced chemical equation is



(2) Barium Chloride + Aluminium Sulphate → Barium Sulphate + Aluminium chloride

This chemical equation can be written in symbolic form as

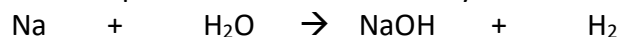


Hence balanced chemical equation is

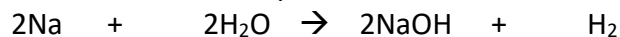


(3) Sodium + water → Sodium Hydroxide + Hydrogen

This chemical equation can be written in symbolic form as



Hence balanced chemical equation is



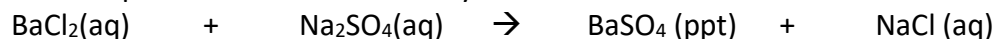
Q3. Write a balanced chemical equation with state symbols for the following reactions.

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

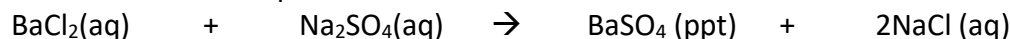
(2) Sodium hydroxide solution (in Water) reacts with hydrochloric acid solution (in water) to produce sodium chloride solution and water.

Ans. (1) Barium chloride (Solution) + Sodium sulphate (Solution) → Barium sulphate (Insoluble) + Sodium Chloride (Solution)

This chemical equation can be written in symbolic form as



Hence balanced chemical equation is



(2) Sodium Hydroxide (solution) + Hydrochloric Acid (solution) → Sodium Chloride (solution) + Water

This chemical equation can be written in symbolic form as



Hence balanced chemical equation is



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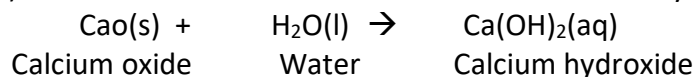
Q1. A solution of substance 'X' is used for white washing.

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

(2) Write the reaction of substance 'X' named in (1) above with water.

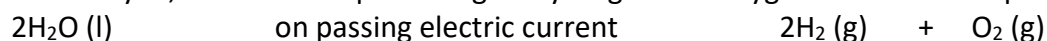
Ans. (1) The substance 'X' is quick lime (Calcium oxide) and its formula is CaO

(2) Calcium oxide react with water to form calcium hydroxide (Slaked lime)



Q2. Why 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. On electrolysis, water decomposes to give hydrogen and oxygen as shown in equation

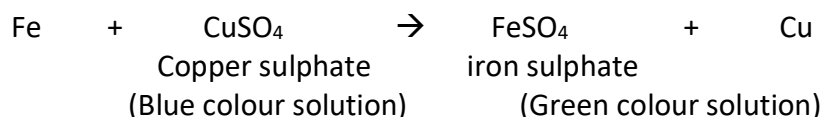


Thus water decomposes to give hydrogen and oxygen in the ratio of 2:1 by volume. The double volume of the gas collected is hydrogen.

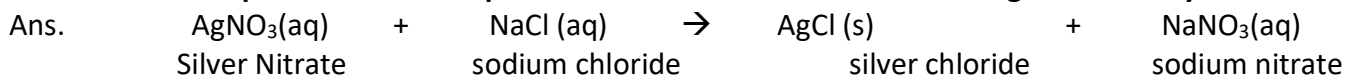
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Q1. Why does the colour of copper sulphate solution change when an iron nail is dipped in it?

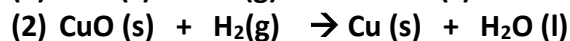
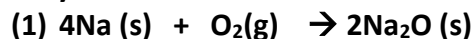
Ans. Iron is more reactive than copper so it displace copper from copper sulphate to form iron sulphate solution.



Q2. Give an Example of a double displacement reaction other than the one give in activity 1.10

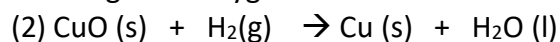


Q3. Identify the substances that are oxidized and the substances that are reduced in the following reactions



Ans. (1) $4\text{Na (s)} + \text{O}_2\text{(g)} \rightarrow 2\text{Na}_2\text{O (s)}$

Na has gained oxygen to form Na₂O. Hence Na has been oxidized to Na₂O and O₂ has been reduced



CuO has lost oxygen to form Cu. Hence CuO has been reduced to Cu. And H₂ has gained oxygen to form H₂O hence; H₂ has been oxidized to H₂O.

EXERCISES

Q1. Look in NCERT

Ans. (1) is the correct option

Q2. Look in NCERT

Ans. Option (d) is correct

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Q3. Look in NCERT

Ans. Option (a) is correct

Q4. What is the balanced chemical equation? Why should a chemical equation be balanced?

Ans. A chemical equation has an equal number of atoms of different elements in the reactants and products are said to be balanced chemical equation.

According to law of conservation of mass, the total mass of the reactant side is equal to the total mass of product side it is only possible when the number of atoms are equal in both the side so to full fill the law of conservation of mass equations are balanced.

Q5. Translate the following statements into chemical equations and then balanced them.

(a) Hydrogen gas combines with nitrogen to form ammonia.

(b) Hydrogen sulphide gas burns in air to give water and sulphur dioxide

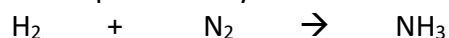
(c) Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate.

(d) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.

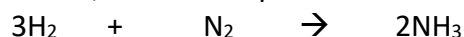
Ans. (a) Hydrogen gas combines with nitrogen to form ammonia this statement can be written as in word equation as

Hydrogen + Nitrogen → Ammonia

This equation in symbolic form can be re-present as



Hence, balanced equation is



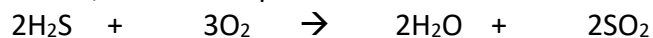
(b) Hydrogen sulphide gas burns in air to give water and sulphur dioxide this statement can be written as in word equation as

Hydrogen sulphide + Oxygen → water + sulphur dioxide

This equation in symbolic form can be re-present as



Hence, balanced equation is



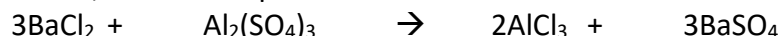
(c) Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate this statement can be written as in word equation as

Barium chloride + Aluminium sulphate → Aluminium chloride + Barium sulphate

This equation in symbolic form can be re-present as



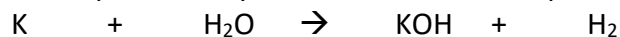
Hence, balanced equation is



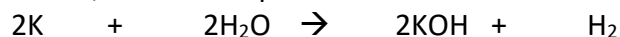
(d) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas this statement can be written as in word equation as.

Potassium + Water → Potassium hydroxide + Hydrogen

This equation in symbolic form can be re-present as



Hence, balanced equation is



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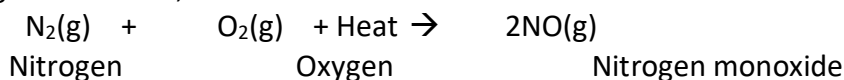
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Endothermic reactions: - Those chemical reactions in which heat is absorbed are called endothermic reactions. It is indicated by writing '+ Heat on Reactant side'

Example: - When nitrogen and oxygen are heated to a very high temperature, they combine to form nitrogen monoxide, and a lot of heat is absorbed in this reaction.



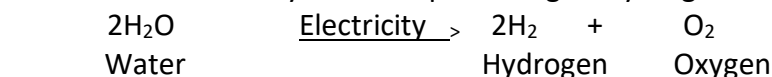
Q10. Why is respiration considered an exothermic reaction? Explain.

Ans. During the respiration food is oxidized to give carbon dioxide and water and heat is released. Such reaction in which heat is released known as exothermic reaction so hence, In respiration heat is released so it is an exothermic reaction.

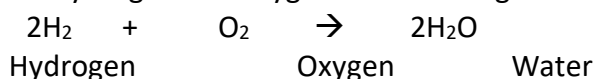
Q11. Why are decomposition reactions called the opposite of combination reactions? Write equations for these reactions.

Ans. In decomposition reactions, a single substance is broken to give two or more substances while in combination reaction two or more substances combine to give a single substance so hence decomposition reaction is opposite to combination reaction.

Example: - Water on electrolysis decomposes to give hydrogen and oxygen is a decomposition reaction



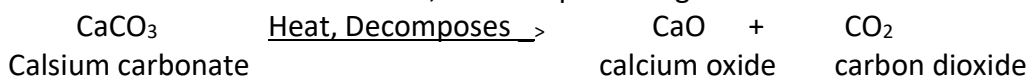
Whereas hydrogen and oxygen combine to give water is a combination reaction



Q12. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light or electricity.

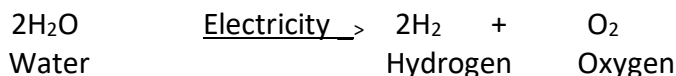
Ans. **Example: - Decomposition by heat**

When calcium carbonate is heated, it decomposes to give calcium oxide and carbon dioxide.



Example: - Decomposition by electricity

When electric current is passed through acidified water, it decomposes to give hydrogen gas and oxygen gas.

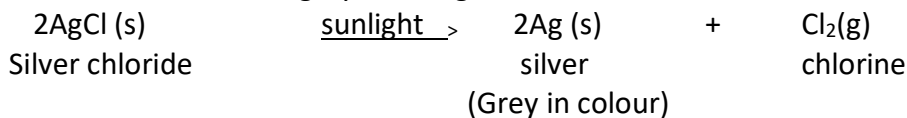


This reaction is known as electrolysis of water.

Example: - Decomposition by light

Silver chloride decomposes in presence of sunlight to give silver and chloride.

Silver chloride turns grey in sunlight



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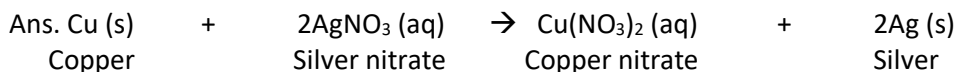
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Q13. What is the difference between displacement and double displacement reactions? Write equations for these reactions.

Ans.

| Displacement reaction | Double displacement reaction |
|--|--|
| <p>1. Those reactions, in which one element takes the place of another element in a compound, are known as displacement reactions. A more reactive element displacement a less reactive element from its compound.</p> <p>2. In displacement reaction an element and a compound is react.</p> <p>Example: -When a strip of zinc metal is placed in copper sulphate solution, then zinc sulphate solution and copper are obtained.</p> $\text{CuSO}_4(\text{aq}) + \text{Zn}(\text{s}) \rightarrow \text{ZnSO}_4(\text{aq}) + \text{Cu}(\text{s})$ <p>Coppersulphate zinc zinc sulphate copper (Blue solution)</p> | <p>1. Those reaction in which two compound react by an exchange of ions to form two new compounds are called double displacement reactions. These reactions also known as metathesis reactions.</p> <p>2. In double displacement reaction two compounds are react</p> <p>Example: 1. When silver nitrate solution is added to sodium chloride solution, then a white ppt of silver chloride is formed along with sodium nitrate solution.</p> $\text{AgNO}_3(\text{aq}) + \text{NaCl}(\text{aq}) \rightarrow \text{AgCl}(\text{s}) + \text{NaNO}_3(\text{aq})$ <p>Silver Nitrate sodium chloride silver chloride sodium nitrate</p> |

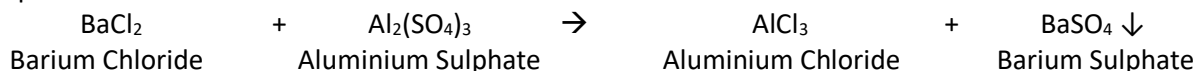
Q14. In the refining of silver, the recovery of silver from silver nitrate solution involved displacement by copper metal. Write down the reaction involved.



Q15. What do you mean by a precipitation reaction? Explain by giving example

Ans. **Precipitation Reaction:** - precipitation reaction are those reaction in which precipitate (i.e. undissolve substance remain in the solution) is formed

Example: - Barium chloride solution reacts with aluminium sulphate to form aluminium chloride and a ppt of barium sulphate remains in the solution



Q16. Explain the following in terms of gain or loss of oxygen with two examples each.

(a) Oxidation

(b) Reduction

Ans. **Oxidation:** - It is the process which involves gain of oxygen

Example: - (1) $2\text{Mg}(\text{s}) + \text{O}_2(\text{g}) \rightarrow 2\text{MgO}(\text{s})$

Mg gained oxygen to form MgO. Hence, Mg has been oxidized to MgO.

(2) $\text{CuO}(\text{s}) + \text{H}_2(\text{g}) \rightarrow \text{Cu}(\text{s}) + \text{H}_2\text{O}(\text{g})$

H₂ has gained oxygen to form H₂O. Hence H₂ has been oxidized to H₂O.

Reduction: - It is the process which involves loss of oxygen.

Example: -(1) $\text{ZnO}(\text{s}) + \text{C}(\text{s}) \rightarrow \text{Zn}(\text{s}) + \text{CO}(\text{g})$

ZnO has lost oxygen to form Zn. Hence ZnO has been reduced to Zn

(2) $\text{CuO}(\text{s}) + \text{H}_2(\text{g}) \rightarrow \text{Cu}(\text{s}) + \text{H}_2\text{O}(\text{g})$

CuO has lost oxygen to form Cu. Hence CuO has been reduced to Cu

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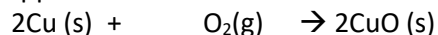
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Q17. A shiny brown coloured element 'X' on heating in air becomes black in colour. Name the element 'X' and black coloured compound formed.

Ans. The shiny brown coloured element is Copper

When copper is heated in air it combine with oxygen to form a black coloured compound copper (II) oxide [CuO]



Q18. Why do we apply paint on iron articles?

Ans. Paint covers the surface of iron articles. Hence, moist air cannot attack iron and prevent rusting.

Q19. Oil and fat containing food items are flushed with nitrogen. Why?

Ans. In the presence of oxygen of the air, the fats present in the fatty food are oxidized to compounds which have bad smell (i.e. food is rancid) flushing with nitrogen cuts off oxygen and protects the food from rancidity.

Q20. Explain the following terms with one example each.

(a) **Corrosion**

(b) **Rancidity**

Ans. **Corrosion**: - "The eating up of metal by the action of air and moisture on their surface is called corrosion."

For example- iron metal corrodes when kept in damp air for a considerable time, and then a red brown substance called rust ($\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$) is formed on its surface. Rust is soft and porous

Rancidity: - The oxidation of oils or fats in a food resulting into a bad smell and bad taste is called rancidity

Example: - A bad smell coming from food is an example of rancidity