

## Chapter 1: Chemical Reactions and Equations

# C01

### 1. What happens when?

- a) Milk is left at room temperature during summers.
  - b) An iron tawa/pan/nail is left exposed to humid atmosphere.
  - c) Grapes are fermented.
  - d) Food is cooked.
  - e) Food gets digested in our body.
  - f) We respire.
- a) Curdling of milk takes place.
  - b) Rusting of iron takes place.
  - c) Alcohol is produced.
  - d) Cooking alters the chemical composition of various nutrients. It also kills the several microorganisms.
  - e) Energy is released.
  - f) Release of energy takes place with the help of enzymes.

### 2. Write one difference between a physical change and a chemical change.

In physical change, no new substance is formed whereas in a chemical change a new substance is formed.

### 3. What is a chemical reaction?

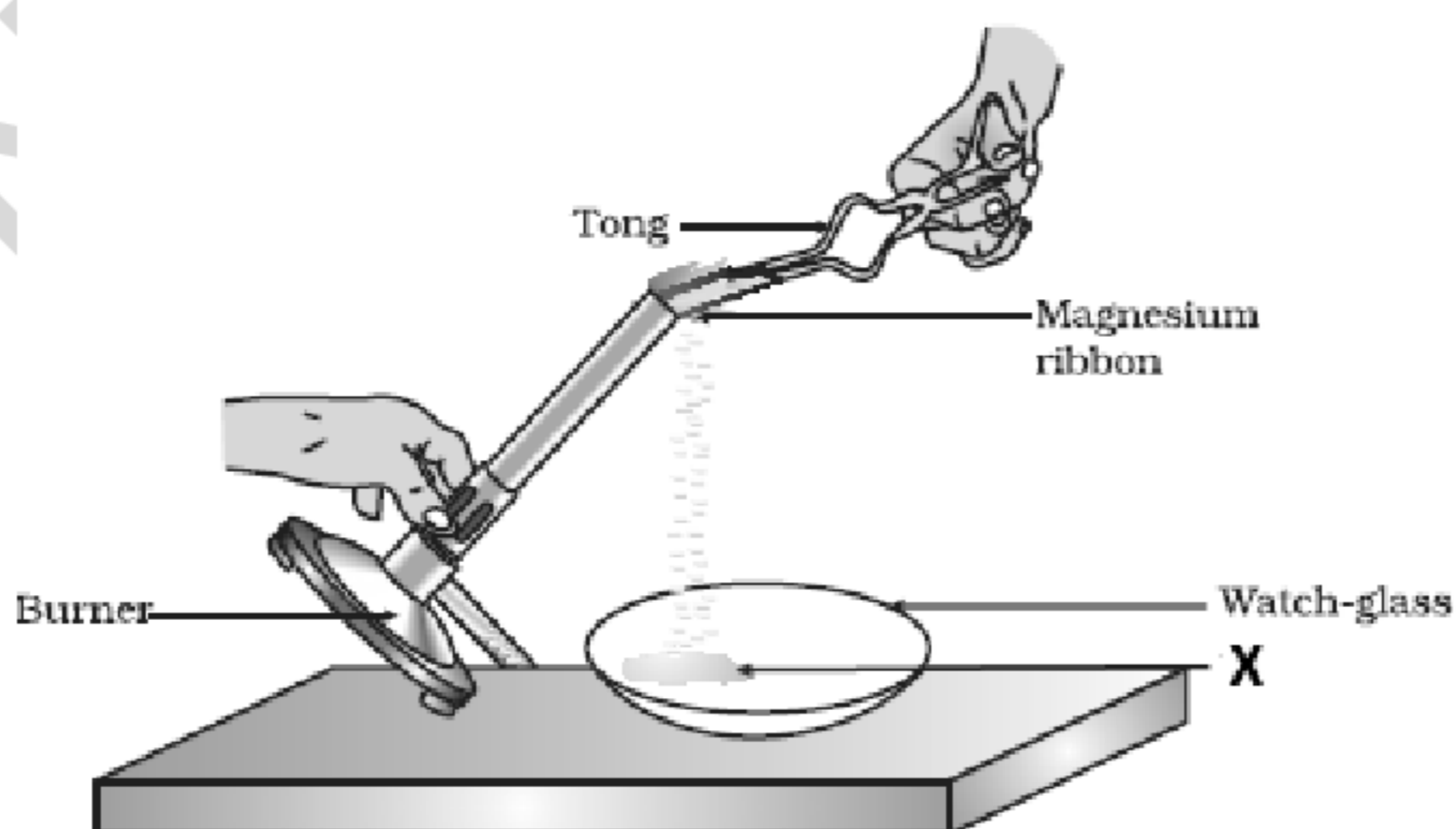
Chemical reactions are the processes in which new substances with new properties are formed.

### 4. What happens when a magnesium ribbon is burnt in air?

Magnesium ribbon burns with a dazzling white flame and changes into a white powder. This powder is magnesium oxide. It is formed due to the reaction between magnesium and oxygen present in the air.



### 5. In the diagram, identify the compound X.



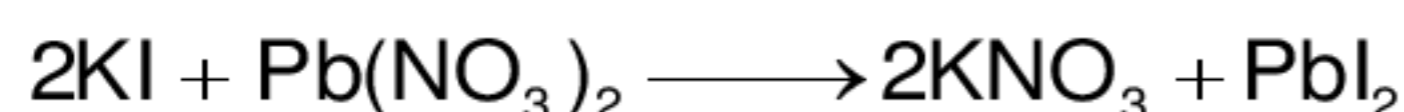
The compound X is magnesium oxide. Magnesium ribbon burns with a dazzling white flame and changes into a white powder.

**6. Why should magnesium ribbon be cleaned before burning in air?**

Magnesium is an extremely reactive metal. When stored, it reacts with oxygen to form a layer of magnesium oxide on its surface. This layer of magnesium oxide is quite stable and prevents further reaction of magnesium with oxygen. The magnesium ribbon is cleaned by sand paper for removing this layer so that the underlying metal can be exposed to air.

**7. What happens when a potassium iodide is added to a test tube containing lead nitrate solution?**

When potassium iodide reacts with lead nitrate, it forms potassium nitrate and lead iodide.

**8. What happens when dilute hydrochloric acid is added to a conical flask containing few zinc granules?**

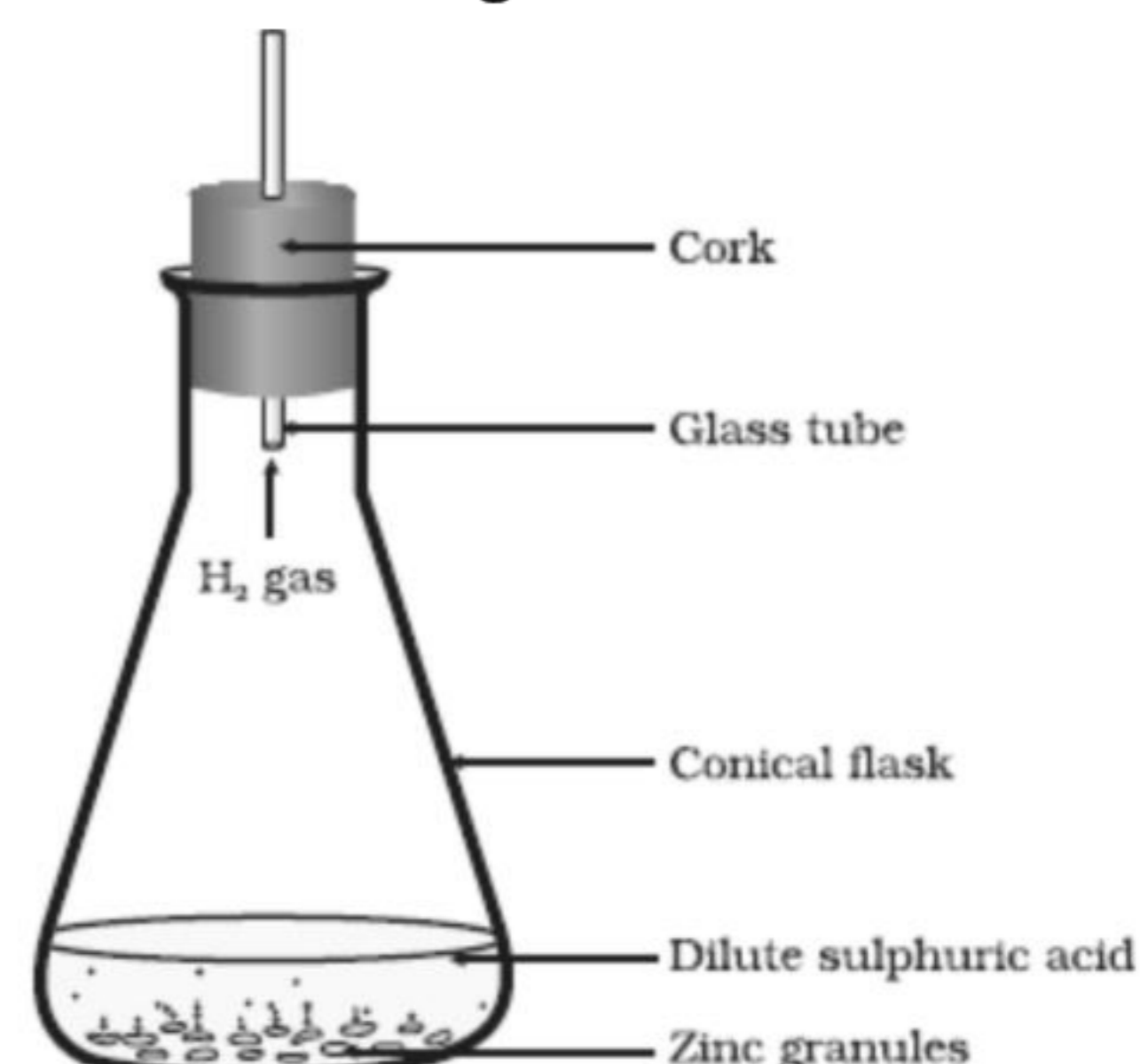
Zinc reacts with dilute HCl to form zinc chloride.

**9. What happens when dilute sulphuric acid is added to a conical flask containing few zinc granules?**

Zinc reacts with dilute sulphuric acid to form zinc sulphate.

**10. In the diagram, a) What do you observe happening around the zinc granules? b) Is there any change in the temperature of the conical flask?**

- Bubbles of hydrogen gas are being formed around zinc granules
- We observe a rise in temperature when we touch the conical flask

**11. What characteristics of a chemical reaction?**

- Change in state.
- Change in colour.
- Evolution of a gas.
- Change in temperature.
- Formation of precipitate.

**12. What is a chemical equation?**

The method of representing a chemical reaction with the help of symbols and formulas of the substances involved in it is known as chemical equation.

**13. What are reactants in a chemical reaction?**

The substances which undergo chemical change in the reaction are called reactants.

**14. What are products in a chemical reaction?**

The new substances formed during a chemical reaction are called products.

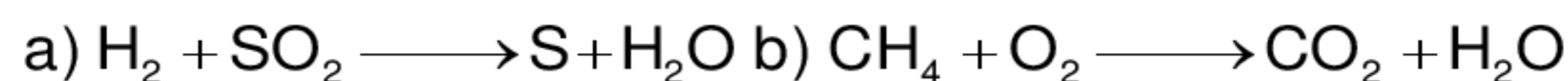
**15. What is meant by a skeletal chemical equation? Give example.**

If the number of atoms of any element in a chemical equation is not equal on both sides, then it is a skeletal equation.  $\text{Mg} + \text{HCl} \longrightarrow \text{MgCl}_2 + \text{H}_2$

16. Write the skeletal equation for the following reactions:

a) Hydrogen sulphide reacts with sulphur dioxide to form sulphur and water.

b) Methane on burning combines with oxygen to produce carbon dioxide and water.



17. What is meant by balanced chemical equation?

A balanced chemical equation means total number of atoms of each element is equal on both sides of a chemical reaction.

18. Why should a chemical equation be balanced?

A chemical reaction should be balanced because matter can neither be created nor be destroyed. The total mass of reactants should be equal to the total mass of the products.

19. Using suitable chemical reaction, differentiate between a skeletal chemical equation and a balanced chemical equation.

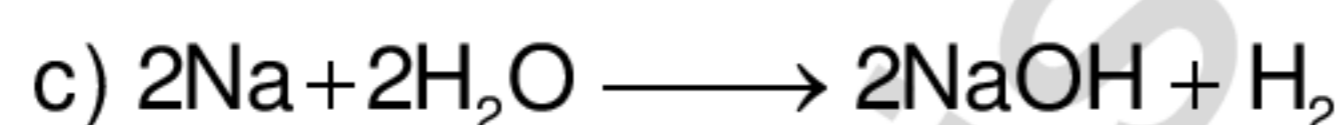
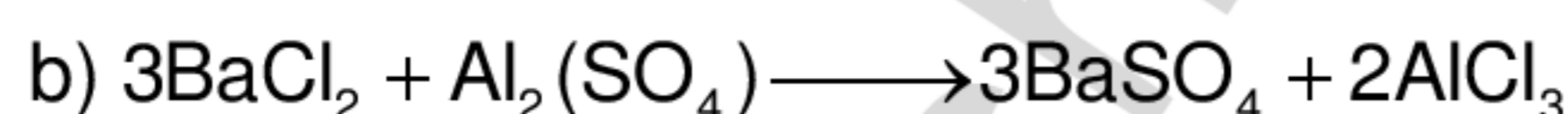
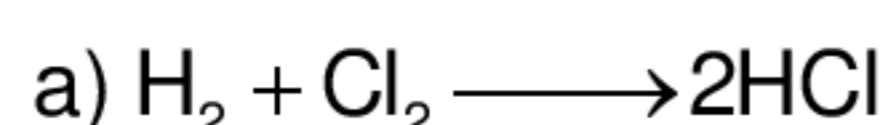
Skeletal chemical equation	Balanced chemical equation
<p>If the number of atoms of any element in a chemical equation is not equal on both sides, then it is a skeletal equation.</p> <p><math>\text{Mg} + \text{HCl} \longrightarrow \text{MgCl}_2 + \text{H}_2</math></p>	<p>If the number of atoms of different elements on both sides of a chemical equation is equal, then it is balanced chemical equation.</p> <p><math>\text{Mg} + 2\text{HCl} \longrightarrow \text{MgCl}_2 + \text{H}_2</math></p>

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

a) Hydrogen + Chlorine  $\rightarrow$  Hydrogen chloride

b) Barium chloride + Aluminium sulphate  $\rightarrow$  Barium sulphate + Aluminium chloride

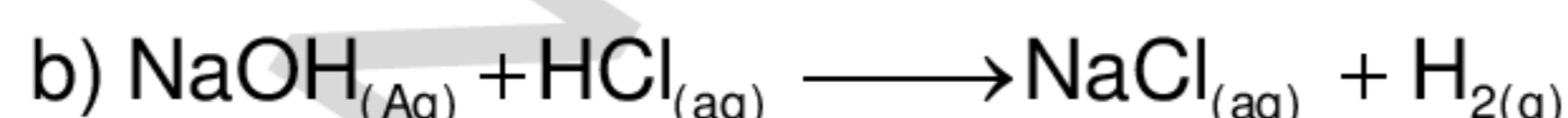
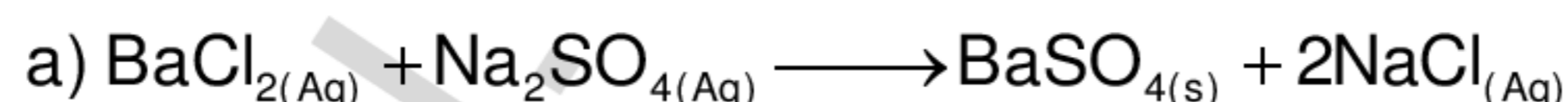
c) Sodium + Water  $\rightarrow$  Sodium hydroxide + Hydrogen



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

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

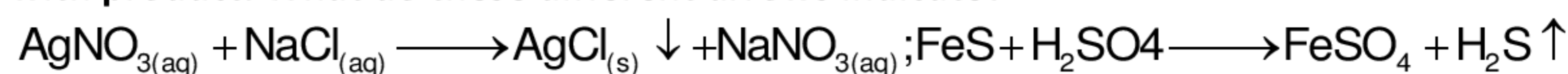
b) Sodium hydroxide solution (in water) reacts with hydrochloric acid solution (in water) to produce sodium chloride solution and water.



22. On what basis is a chemical equation balance?

Law of conservation of mass.

23. In the below chemical equations with two different kinds of arrows ( $\uparrow$  and  $\downarrow$ ) along with product. What do these different arrows indicate?



$\uparrow$  shows the gas evolved whereas  $\downarrow$  shows insoluble substance (precipitate) formed.

**24. What do chemical reactions involve?**

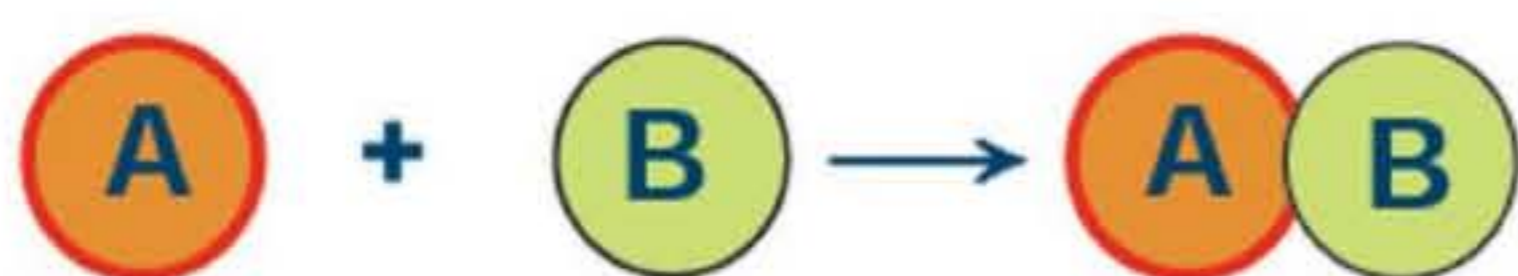
Chemical reactions involve breaking and making of bonds between atoms to produce new substances.

**25. What happens when water is added to a small amount of calcium oxide or quick lime in a beaker?**

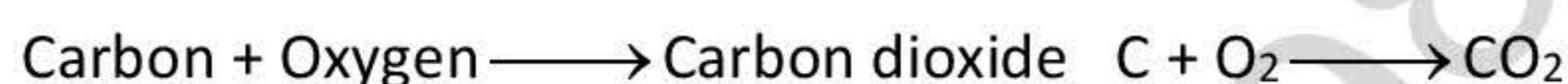
Calcium oxide reacts vigorously with water to produce slaked lime (calcium hydroxide) releasing a large amount of heat.  $\text{CaO} + \text{H}_2\text{O} \longrightarrow \text{Ca(OH)}_2$

**26. What is a combination reaction?**

A reaction in which two or more reactant combine to form a single product is called combination reaction.



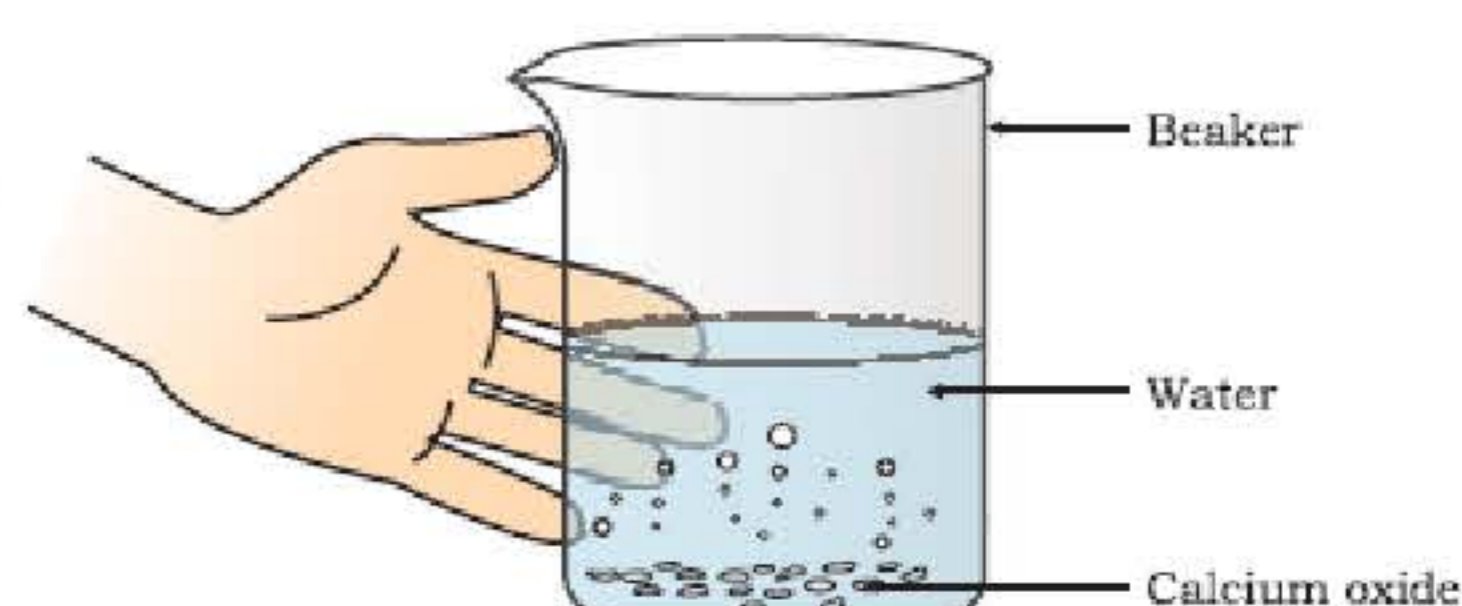
Example:

**27. Why do walls after white washing appears shiny after a few days?**

Slaked lime (calcium hydroxide) used for white washing reacts slowly with carbon dioxide in air to form a thin layer of calcium carbonate. Calcium carbonate gives a shiny finish to the walls.

**28. In the diagram, a small amount of calcium oxide or quick lime in a beaker and water is added. Do you feel any change in temperature?**

Yes, there is an increase in temperature because calcium oxide reacts with water to produce slaked lime releasing a large amount of heat.

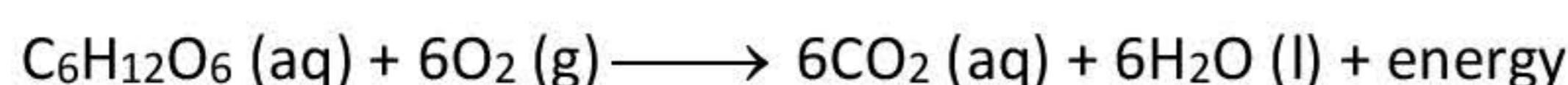
**29. What is an exothermic reaction?**

A Reaction in which heat is released along with formation of products is called exothermic reaction.

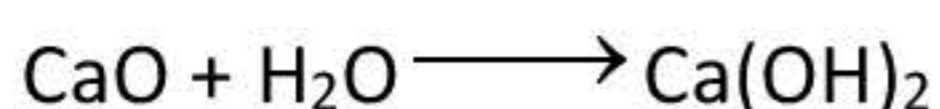
Burning of natural gas



Respiration is also an exothermic reaction.

**30. What is observed when water is added slowly to a small amount of calcium oxide (quick lime). Name the type of reaction that takes place and write a balanced equation for the reaction involved.**

Calcium oxide reacts with water to produce slaked lime releasing a large amount of heat. It is an example of exothermic reaction.



**31. Is respiration an exothermic process?**

Energy in our body is obtained from the food we eat. During digestion, large molecules of food are broken down into simpler substances such as glucose. Glucose combines with oxygen in the cells and provides energy. The special name of this combustion reaction is respiration. Since energy is released in the whole process, it is an exothermic process.



**32. Look at the figure and answer the following questions. 2g of ferrous sulphate crystals are heated in a dry test tube.**

**a) What is the colour of ferrous sulphate crystals before and after heating?**

**b) How do you identify the gas evolved on heating?**

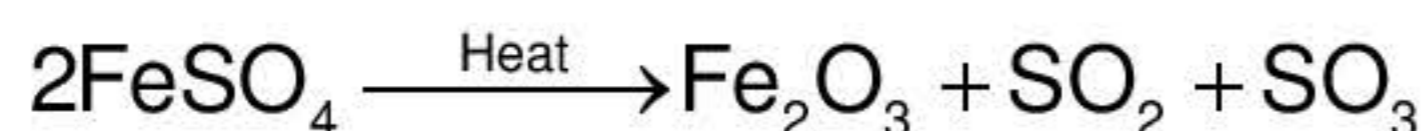
**c) Write balanced chemical equation.**

**d) What kind of reaction does it represent?**

a) Before heating the crystals are green in colour.

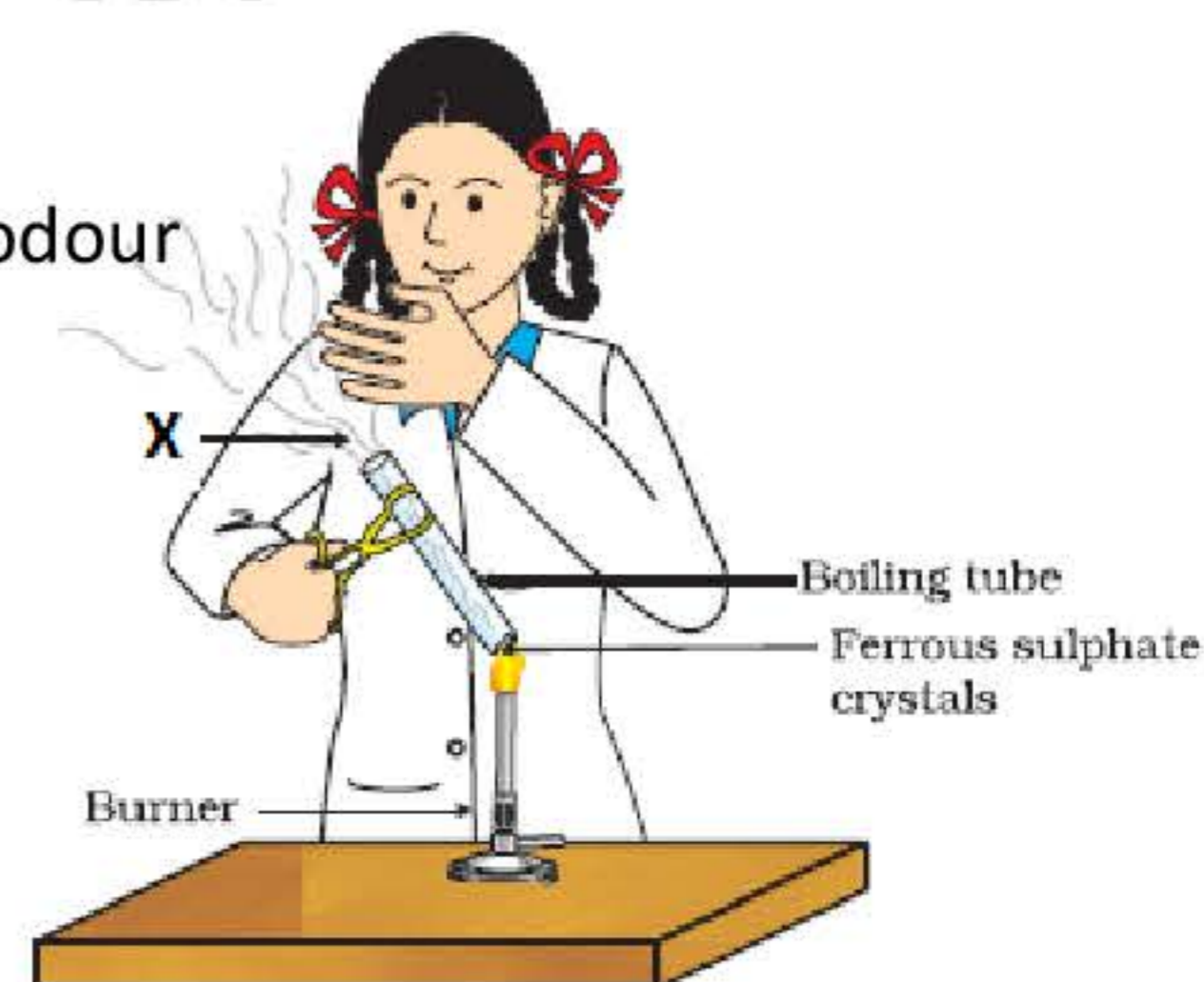
After heating they turn white.

b) The gas evolved is identified by the characteristic odour of burning sulphur.



c) (green colour) (red-brown)

d) It is a decomposition reaction.



**33. Name the gas obtained when a few crystals of ferrous sulphate are heated in a dry test tube.**

Sulphur dioxide

**34. A green coloured hydrated metallic salt on heating loses its water of crystallisation and gives the smell of burning sulphur. Identify the salt and write the reaction involved.**

The salt is ferrous sulphate.



(green colour) (red-brown)

**35. Name the products formed when a few crystals of ferrous sulphate are heated in a dry test tube.**

Ferric oxide (solid), sulphur dioxide (gas) and sulphur trioxide (gas)

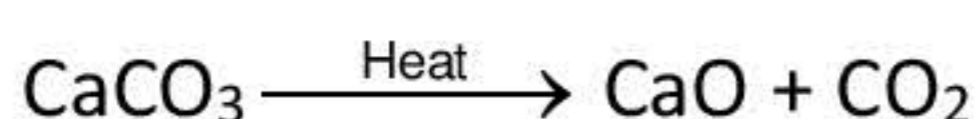
**36. Why does the colour of ferrous sulphate change when it is heated in a dry test tube?**

Ferrous sulphate crystals lose water when heated and the colour of the crystals changes.

**37. What is meant by thermal decomposition?**

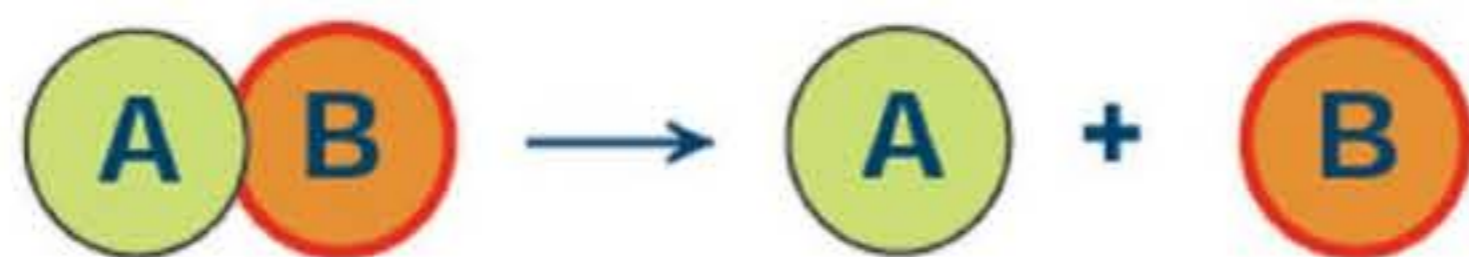
When a decomposition reaction is carried out by heating, it is called thermal decomposition.

Ex: Calcium carbonate on heating decomposes to calcium oxide and carbon dioxide.



**38. What is decomposition reaction?**

The reaction in which a compound splits into two or more simple substances is called decomposition reaction.

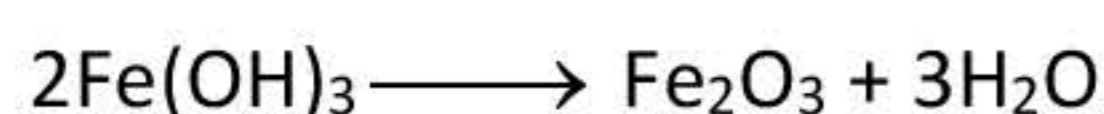


When calcium carbonate is heated, it decomposes into calcium oxide and carbon dioxide



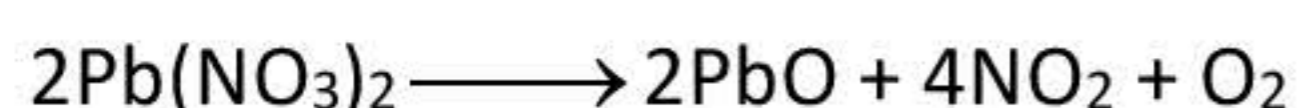
Calcium carbonate  $\longrightarrow$  Calcium oxide + Carbon dioxide

When ferric hydroxide is heated, it decomposes into ferric oxide and water



Ferric hydroxide  $\longrightarrow$  Ferric oxide + Water

When lead nitrate is heated, it decomposes into lead oxide, nitrogen dioxide and oxygen.



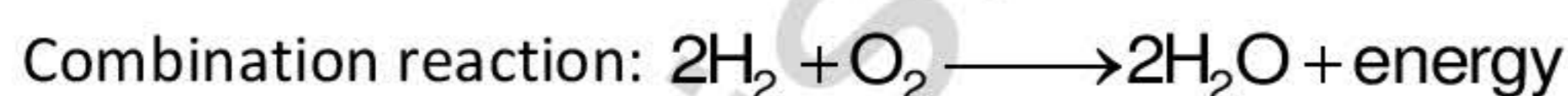
Lead nitrate  $\longrightarrow$  Lead oxide + Nitrogen oxide + Oxygen

**39. Why is the conversion of calcium carbonate to calcium oxide a thermal decomposition reaction?**

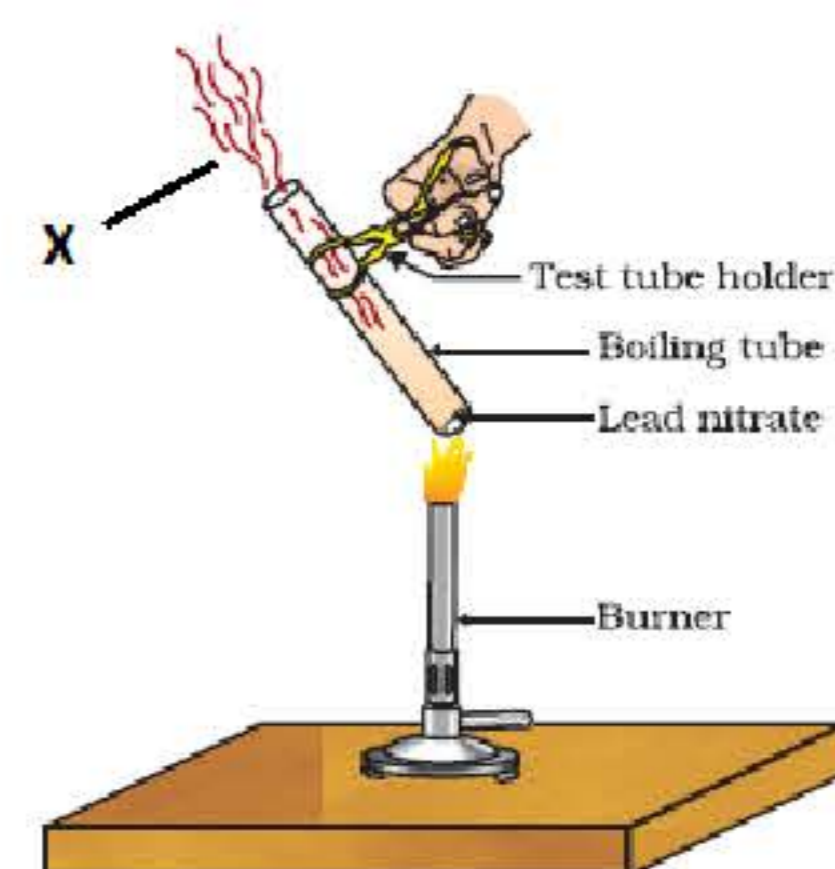
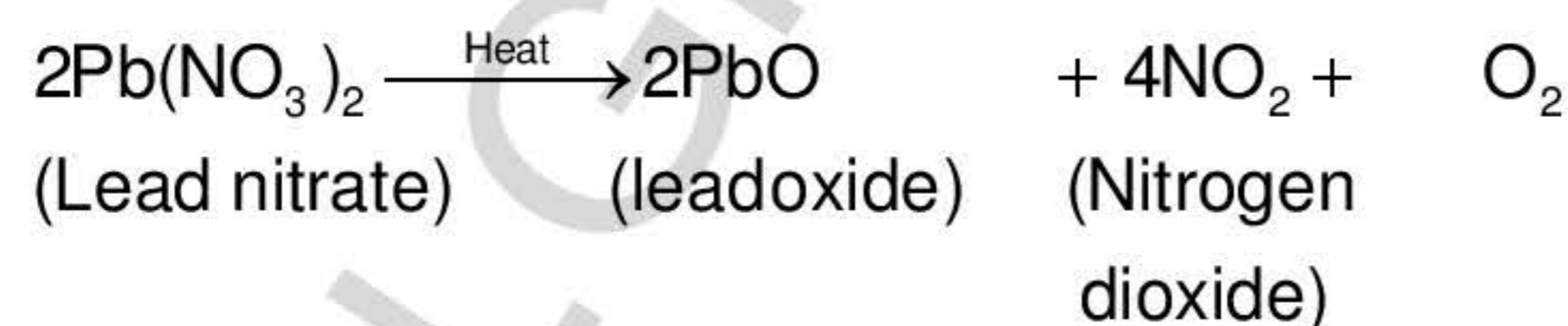
Calcium carbonate on heating decomposes to calcium oxide so it is referred to as decomposition reaction.

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

Decomposition reactions are those in which a compound breaks down to form two or more substances. These reactions require a source of energy to proceed. Thus, they are the exact opposite of combination reactions in which two or more substances combine to give a new substance with the release of energy.

**41. What change do you observe when 2g of lead nitrate powder is heated in a test tube?**

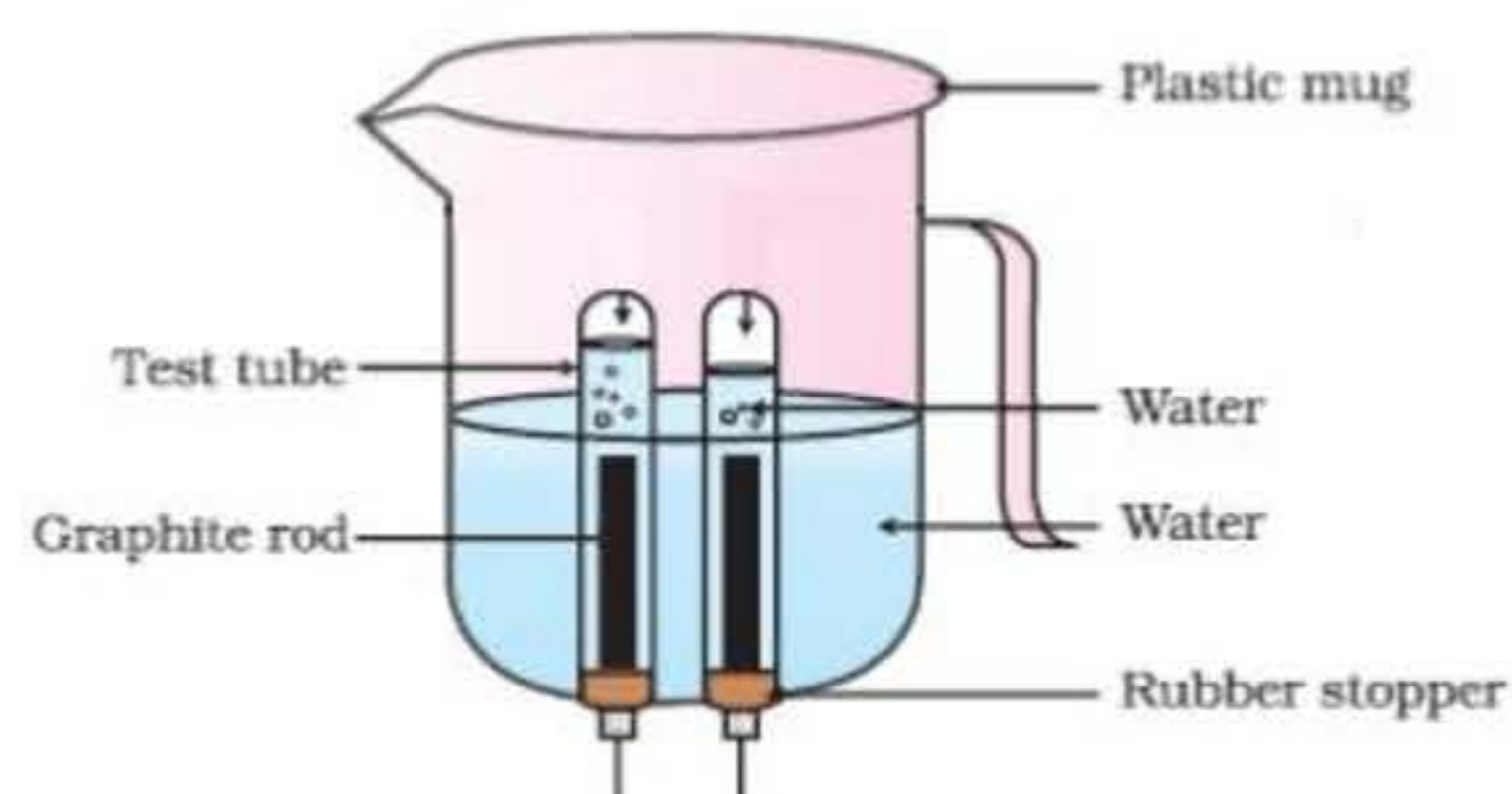
Heating of lead nitrate powder produces brown fumes of nitrogen dioxide ( $\text{NO}_2$ ).

**42. Name the gas obtained when lead nitrate is heated in a test tube.**

Nitrogen dioxide

**43. In the diagram given below,**

- Is the volume of gas collected the same in both test tubes?
- Which gas is present in each test tube?
- What happens at each electrode?



- a) No, the volume of gas collected at the negative electrode is double the volume of gas collected at the positive electrode.
- b) The gas collected at the anode is oxygen.  
The gas collected at the cathode is hydrogen.
- c) Water on electrolysis decomposes to hydrogen and oxygen gas. Hydrogen gas burns explosively (hydrogen is highly combustible) whereas oxygen gas helps in burning (oxygen is a supporter of combustion)

**44. Why is the amount of gas collected in one of the test tubes in electrolysis of water double of the amount collected in the other? Name this gas.**

Water (H<sub>2</sub>O) contains two parts hydrogen and one part oxygen. The amount of hydrogen and oxygen produced during electrolysis of water is in a 2:1 ratio. During electrolysis, hydrogen goes to one test tube and oxygen goes to another, the amount of gas collected in one of the test tubes is double of the amount collected in the other.

**45. What happens when 2g of silver chloride taken in a china dish is kept exposed to sunlight?**

Silver chloride decomposes into silver and chlorine. The white silver chloride turns grey when exposed to sunlight.



**46. What happens when 2g of silver bromide taken in a china dish is kept exposed to sunlight?**

Silver bromide decomposes into silver and bromine gas. The white silver chloride turns grey when exposed to sunlight.



**47. Why is silver bromide stored in dark bottle?**

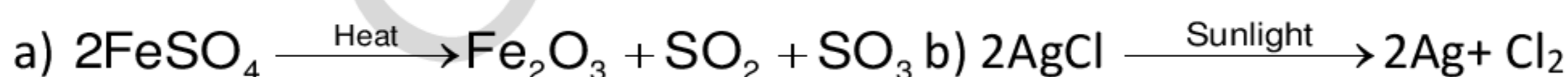
Silver bromide decomposes when exposed to light. Hence it is stored in dark bottle.

**48. What form of energy is required for decomposition reaction?**

Decomposition reaction requires energy in the form of heat, light or electricity.

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

**a) Thermal decomposition b) Decomposition by light c) Decomposition by electricity**

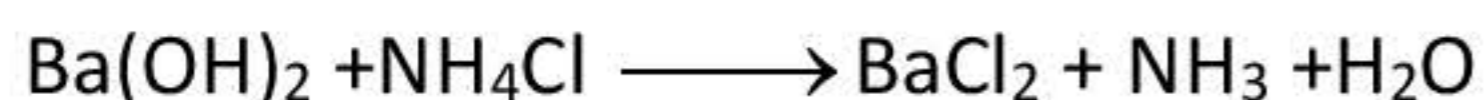


**50. What is endothermic reaction?**

Reactions in which energy is absorbed in the form of heat, light or electricity to break reactants are known as endothermic reactions.

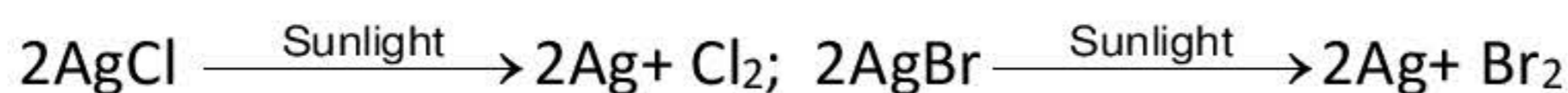
**51. 1g of ammonium chloride is mixed with 2g of barium hydroxide in a test tube with a glass rod. Touch the bottom of the test tube. Is it an exothermic or endothermic reaction?**

Forms aqueous ammonia and barium chloride. The reaction is endothermic.



52. Name two salts that are used in black and white photography. Give reaction when they are exposed to light.

Silver chloride and silver bromide are used in black and white photography.



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

a) Name the substance 'X' and write its formula.

b) Write the reaction of the substance 'X' named in (a) above with water.

a) The substance 'X' is calcium oxide. Its chemical formula is CaO.

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



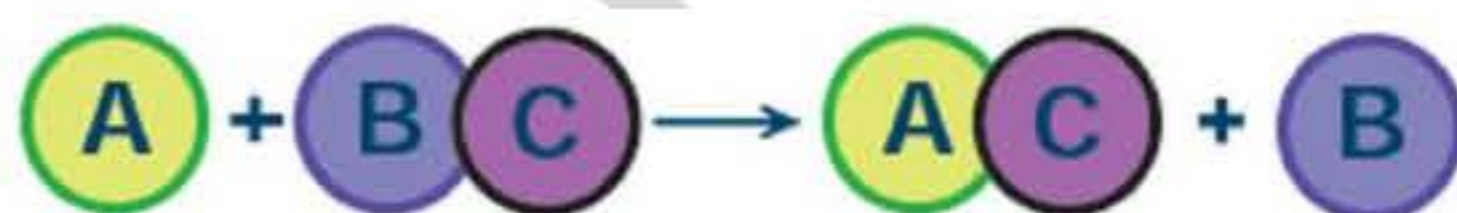
54. An iron nail is kept in blue coloured copper sulphate solution. After some time the colour of the solution turns green. Explain the process with the help of a reaction and identify both the solutions.

The iron nail becomes brownish in colour by deposition of copper and blue colour of copper sulphate changes green colour due to formation of FeSO<sub>4</sub>. Iron displaces copper from copper sulphate solution.

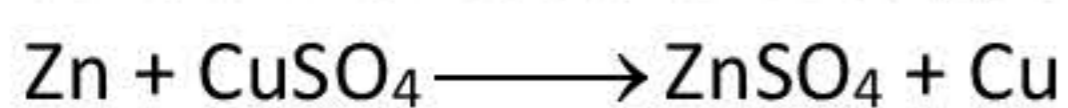


55. What is meant by displacement reaction?

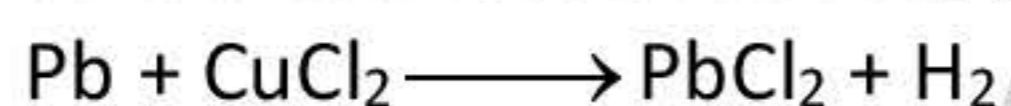
The chemical reaction in which more reactive element displaces less reactive element from its salt solution is called displacement reaction.



When zinc reacts with copper sulphate, it forms zinc sulphate and copper metal.



When lead reacts with copper chloride, it gives lead chloride and copper metal.



When silver metal is dipped in copper nitrate, no reaction takes place.



56. Give reason: Silver metal is dipped in copper nitrate, no reaction takes place.

Silver metal is less reactive than copper.

57. A silver spoon is kept immersed in an aqueous solution of copper sulphate. What change would be observed in the spoon and the solution? Justify your answer.

No change will be observed in the silver spoon and aqueous solution of copper sulphate because silver is less reactive than copper. So it will not replace copper from copper sulphate solution.

58. What happens when 3ml of sodium sulphate solution is mixed with 3ml solution of barium chloride solution in a test tube?

When solution of barium chloride reacts with the solution of sodium sulphate, white precipitate of barium sulphate is formed along with sodium chloride.

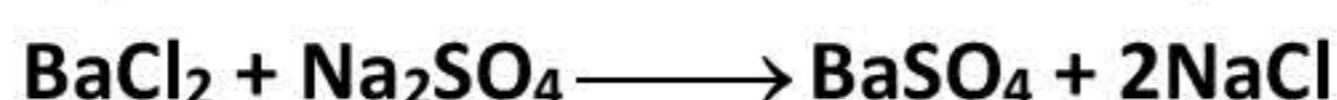




**59. What is a precipitation reaction?**

A reaction that produces a precipitate is called a precipitation reaction.

Ex: When solution of barium chloride reacts with the solution of sodium sulphate, white precipitate of barium sulphate is formed along with sodium chloride.

**60. Aqueous solution of sodium sulphate and barium chloride reacts as follows:**

a) Identify the type of reaction.

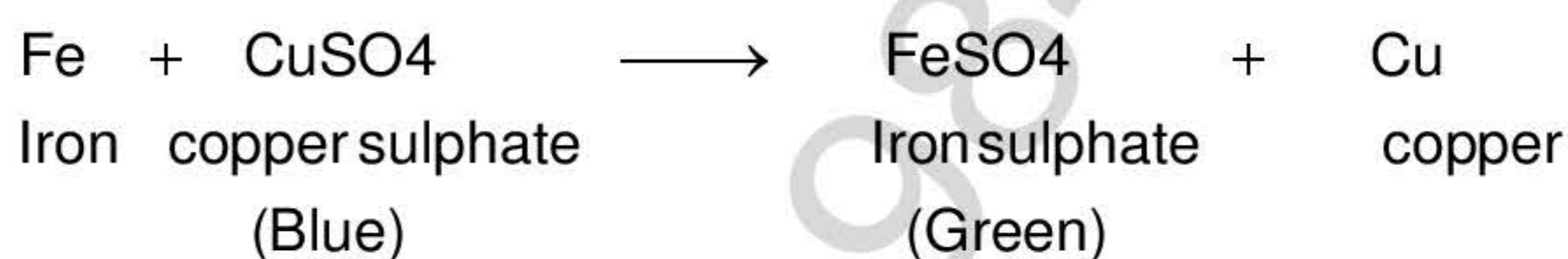
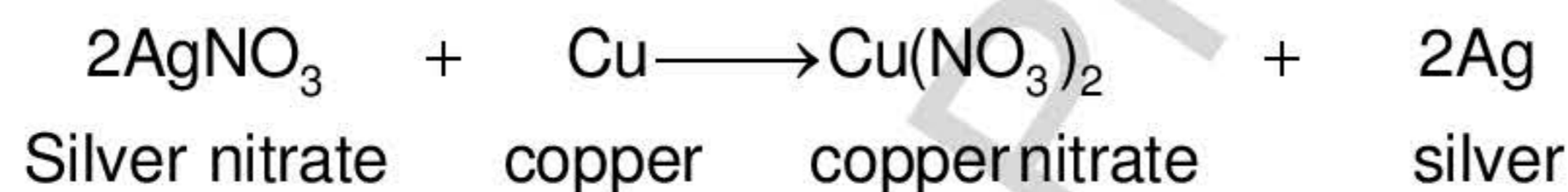
b) What is the other name to this reaction?

a) It is a precipitation reaction.

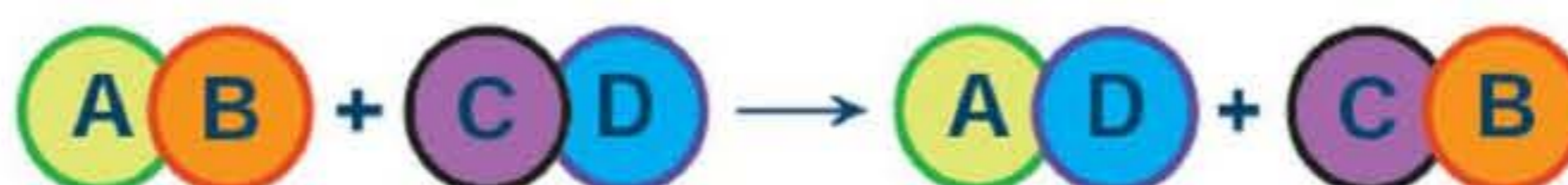
b) This reaction is also called double displacement reaction.

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

When an iron nail is placed in a copper sulphate solution, iron displaces copper from copper sulphate solution forming iron sulphate, which is green in colour. Therefore, the blue colour of copper sulphate solution fades and green colour appears.

**62. In the refining of silver, the recovery of silver from silver nitrate solution involved displacement by copper metal. Write down the reaction involved.****63. What is a double displacement reaction?**

Reactions in which ions are exchanged between two reactants forming new compounds are called double displacement reactions.



When solution of barium chloride reacts with the solution of sodium sulphate, white precipitate of barium sulphate is formed along with sodium chloride.



When sodium hydroxide (a base) reacts with hydrochloric acid, sodium chloride and water are formed.

**64. When a potassium iodide is added to a test tube containing lead nitrate solution.**

a) What is the colour of the precipitate formed?

b) Name the compound precipitated.

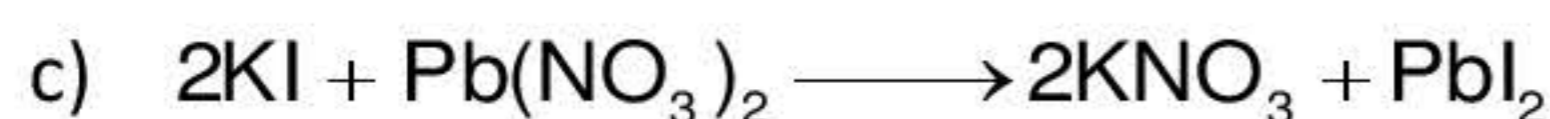
c) Write the balanced chemical equation.

d) What type of reaction is it?

a) Yellow colour

b) Lead iodide

N.Girish : Ph: 9844217032



d) It is a double decomposition reaction. Lead nitrate and potassium iodide react to form two new compounds lead iodide and potassium nitrate.

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

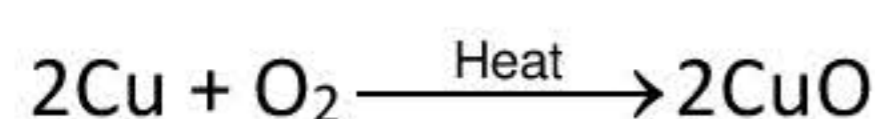
In a displacement reaction, a more reactive element replaces a less reactive element from a compound.

In a double displacement reaction, two atoms or a group of atoms switch places to form new compounds.



**66. What happens when a china dish containing 1g of copper powder is heated?**

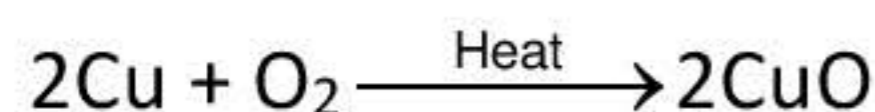
The surface of copper powder becomes coated with black copper (II) oxide. Oxygen is added to copper and copper oxide is formed.



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

'X' is copper (Cu) and the black-coloured compound formed is copper oxide (CuO).

The equation of the reaction involved on heating copper is given below.



**68. Look at the figure and answer the following questions.**

**a) State the colour of the reactant and the product of the chemical reaction.**

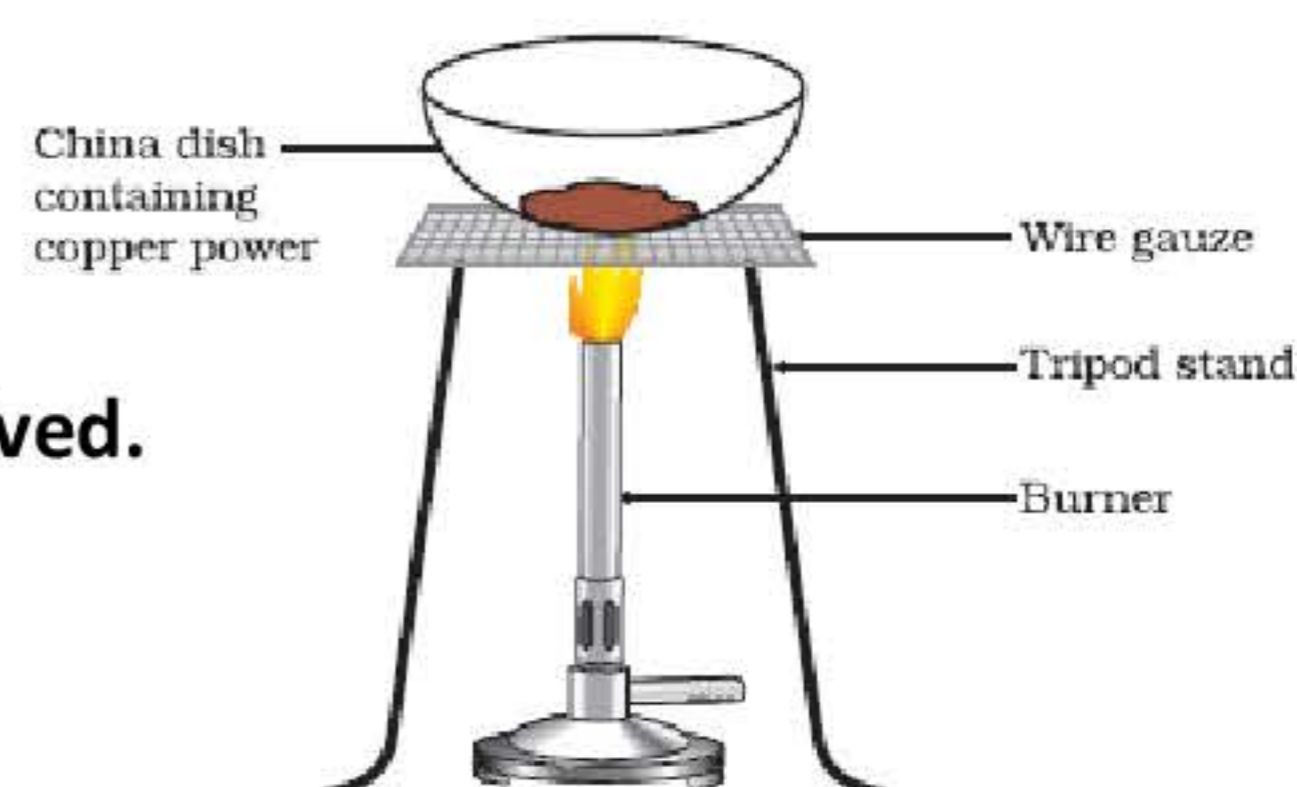
**b) Write the chemical equation involved.**

**c) Can we reverse the reaction? Write the equation involved.**

a) Copper powder (reactant) is brown colour; Copper oxide (product) is black colour.



c) It can be reversed.  $\text{CuO} + \text{H}_2 \xrightarrow{\text{Heat}} \text{Cu} + \text{H}_2\text{O}$



**69. What happens when hydrogen gas is passed over copper oxide?**

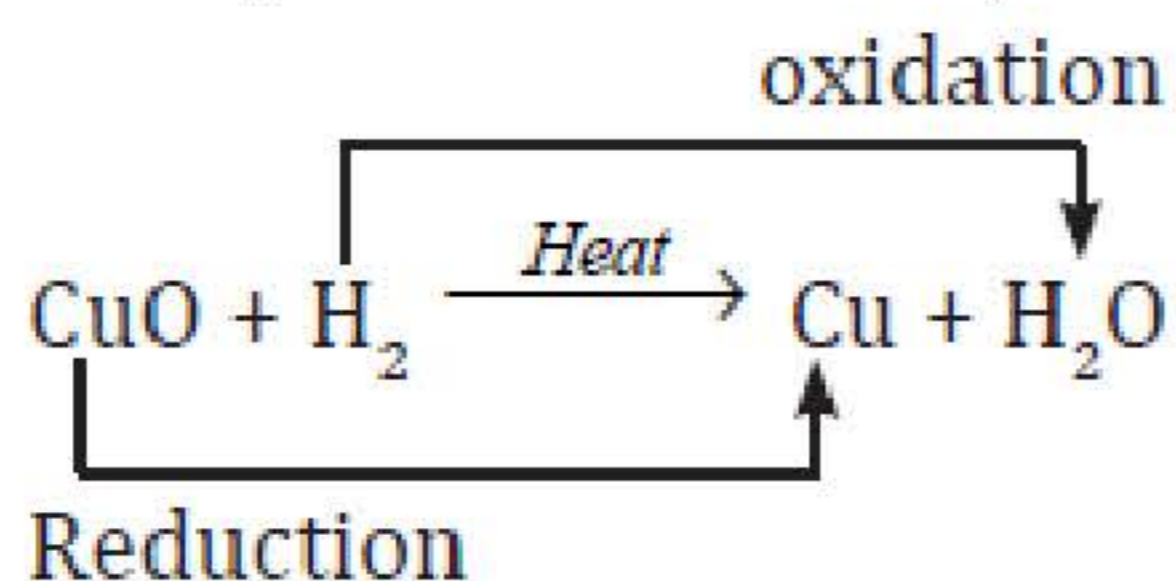
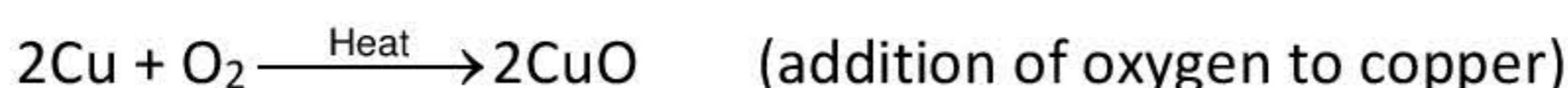
If hydrogen gas is passed over copper oxide, the black coating on the surface turns brown and copper is obtained.  $\text{CuO} + \text{H}_2 \xrightarrow{\text{Heat}} \text{Cu} + \text{H}_2\text{O}$

**70. When is a substance said to be oxidised?**

If a substance gains oxygen during a reaction, it is said to be oxidised.

**71. What is meant by oxidation?**

Addition of oxygen (non-metallic element) or removal of hydrogen (metallic element) from a compound is known as oxidation.



Hydrogen sulphide combines with iodine to give hydrogen iodide and sulphur

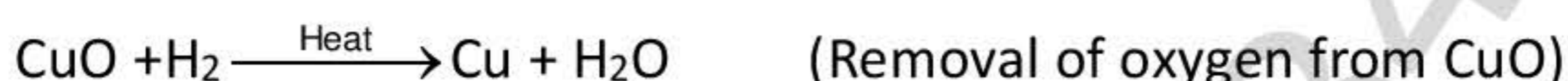


**72. What is oxidising agent?**

Compounds which can add oxygen or a non-metallic compound or remove hydrogen or metallic element are known as oxidizing agents. Ex: Chlorine

**73. What is meant by reduction?**

Addition of hydrogen (metallic element) or removal of oxygen (non-metallic element) from a compound is called reduction.



**74. When is a substance said to be reduced?**

If a substance loses oxygen during a reaction, it is said to be reduced.

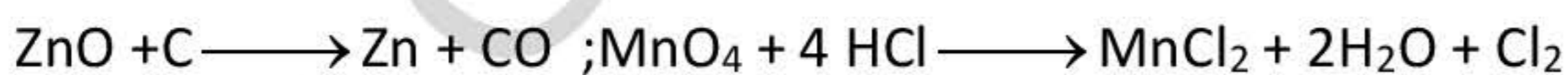
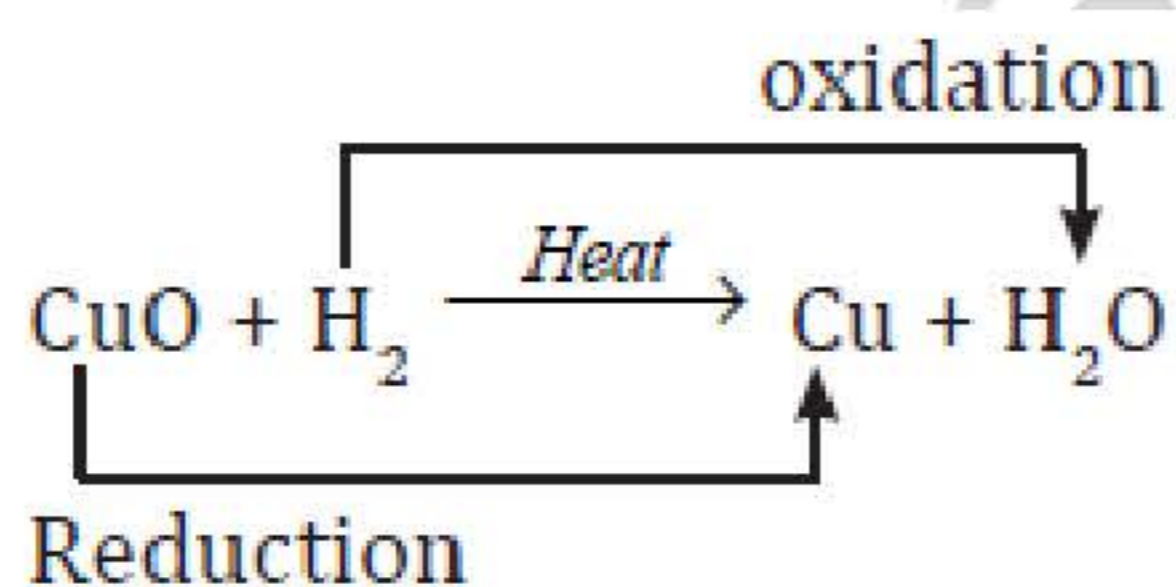
**75. What is a reducing agent?**

Compounds or elements which can cause reduction are called reducing agents. Ex: Hydrogen sulphide.

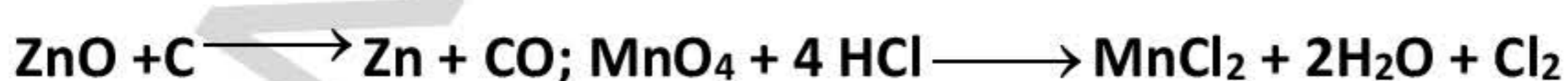
**76. What is redox reaction?**

In a chemical reaction if oxidation and reduction both take place simultaneously then it is called redox reaction.

When copper oxide reacts with hydrogen, CuO is losing oxygen, hydrogen is gaining oxygen is being oxidised.



**77. In the following examples, identify the oxidising agent and reducing agent.**



Carbon is oxidized to carbon monoxide. Zinc oxide is reduced to zinc.

HCl is oxidized to Cl<sub>2</sub>. MnO<sub>2</sub> is reduced to MnCl<sub>2</sub>.

**78. Explain why sodium acts as an oxidising agent while chlorine acts as a reducing agent in the reaction  $2\text{Na} + \text{Cl}_2 \longrightarrow 2\text{NaCl}$**

Sodium loses electron and forms Na<sup>+</sup> ions and thus acts as oxidising agent while chlorine gains electrons and forms Cl<sup>-</sup> ions and thus a reducing agent.

79. When a magnesium ribbon burns in air. Is magnesium oxidised or reduced? Write the chemical equation involved.

Magnesium ribbon burns in oxygen of air to form magnesium oxide. So magnesium is oxidized to magnesium oxide.  $2\text{Mg} + \text{O}_2 \longrightarrow 2\text{MgO}$

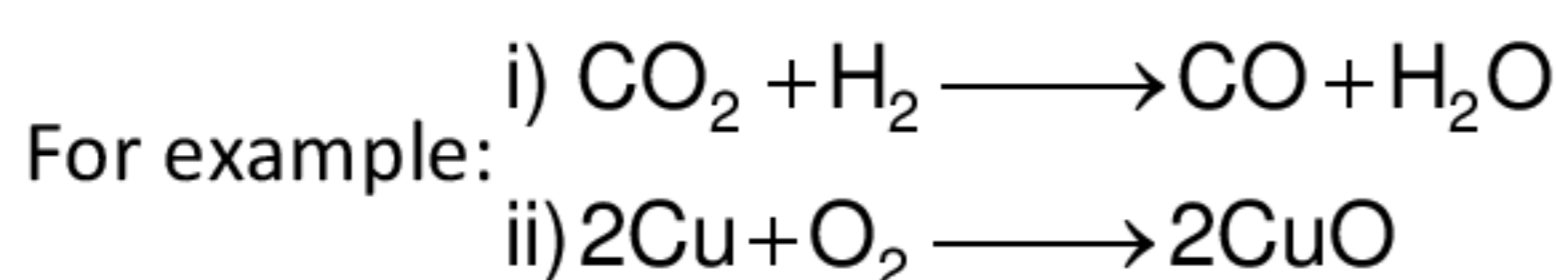
80. State some reactions of oxidation observed in everyday life.

- Shiny iron articles on exposure to moist air get rusted.
- Copper articles on exposure to air get coated with a greenish layer.
- Silver articles on exposure to air become black.
- Fats and oils in food left for a long time get oxidised.

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

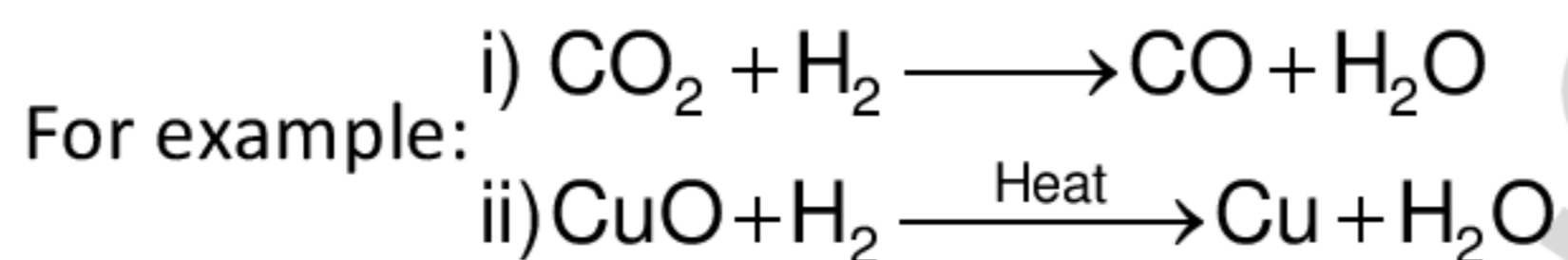
(a) Oxidation (b) Reduction

a) Oxidation is the gain of oxygen.



In equation (i),  $\text{H}_2$  is oxidized to  $\text{H}_2\text{O}$  and in equation (ii),  $\text{Cu}$  is oxidised to  $\text{CuO}$ .

(b) Reduction is the loss of oxygen.



In equation (i),  $\text{CO}_2$  is reduced to  $\text{CO}$  and in equation (ii),  $\text{CuO}$  is reduced to  $\text{Cu}$ .

82. A brown substance 'X' on heating in air forms a substance 'Y'. When hydrogen gas is passed over heated 'Y', it changes back into 'X'.

- Name the substance X and Y.
- Name the type of chemical reaction occurring during both the changes.
- Write the chemical equation.

- X is copper and Y is copper oxide.
- Oxidation reduction reaction.
- $2\text{Cu} + \text{O}_2 \longrightarrow 2\text{CuO}$  ;  $\text{CuO} + \text{H}_2 \longrightarrow \text{Cu} + \text{H}_2\text{O}$

83. Identify the substances that are oxidised and the substances that are reduced in the following reactions.  $4\text{Na} + \text{O}_2 \longrightarrow 2\text{Na}_2\text{O}$  ;  $\text{CuO} + \text{H}_2 \longrightarrow \text{Cu} + \text{H}_2\text{O}$

- Sodium ( $\text{Na}$ ) is oxidised as it gains oxygen and oxygen gets reduced.
- Copper oxide ( $\text{CuO}$ ) is reduced to copper ( $\text{Cu}$ ) while hydrogen ( $\text{H}_2$ ) gets oxidised to water ( $\text{H}_2\text{O}$ ).

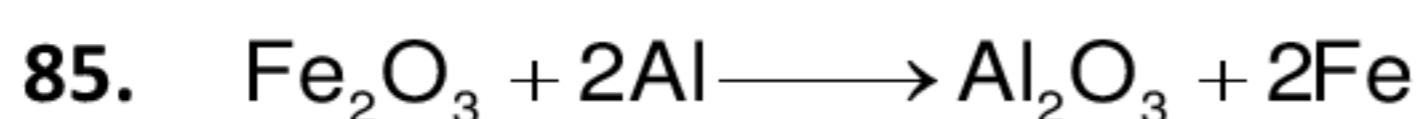
84. Which of the statements about the reaction below are incorrect?



- Lead is getting reduced.
- Carbon dioxide is getting oxidised.
- Carbon is getting oxidised.
- Lead oxide is getting reduced.

(i) (a) and (b)    (ii) (a) and (c)    (iii) (a), (b) and (c)    (iv) all

(i) (a) and (b)



The above reaction is an example of a (a) combination reaction. (b) double displacement reaction. (c) decomposition reaction. (d) displacement reaction.

(d) The given reaction is an example of a displacement reaction.

86. **What is rusting of iron?**

The process in which iron articles get coated with a reddish brown powder when exposed to moist air is called rusting of iron.

87. **Write the chemical name and formula of rust.**

Rust is chemically hydrated iron oxide. Its formula is  $\text{Fe}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$

88. **What is corrosion?**

When a metal is exposed to substances around it such as moisture, acid etc. for some time, a layer of hydrated oxide is formed. This process is called corrosion.

89. **What are the problems caused by corrosion?**

- a) Corrosion damages the car body.
- b) It damages metal bridges, iron railings
- c) It damages ships made of metal.

90. **A student has been collecting silver and copper coins. One day she observes a black coating on silver coins and green coating on copper coins. Which chemical phenomenon is responsible for this change? Write the chemical name of black and green coating.**

The phenomenon is called corrosion. Black coating on silver coin is silver sulphide. Green coating on copper is copper oxide.

91. **Why do we apply paint on iron articles?**

Iron articles are painted because it prevents them from rusting. When painted, the contact of iron articles from moisture and air is cut off. Hence, rusting is prevented. So presence of air and moisture is essential for rusting to take place.

92. **What is meant by rancidity?**

The oxidation of fats and oils when exposed to air is known as rancidity.

93. **What are antioxidants?**

Substances which prevent oxidation are called antioxidants.

94. **What happens when fats or oils become rancid?**

When food items become rancid, their smell and taste change.

95. **How can we prevent rancidity of food items?**

- a) Keeping food in air tight containers.
- b) Filling an inert gas like nitrogen in packets containing food items.
- c) By adding antioxidants.

96. **Give reason: Smell and taste of foods containing fats and oil change after some time.**

Fats and oils in food kept for long time get oxidised and become rancid. Hence the smell and taste of food changes.

**97. Give reason: Potato chips manufacturers fill the packet of chips with nitrogen gas.**

To prevent potato chips from oxidation, manufacturers remove oxygen and fill it with an inert gas like nitrogen.

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

Nitrogen is an inert gas and does not easily react with these substances. On the other hand, oxygen reacts with food substances and makes them rancid. Thus, bags used in packing food items are flushed with nitrogen gas to remove oxygen inside the pack. When oxygen is not present inside the pack, rancidity of oil and fat containing food items is avoided.

**99. Give reason: Oily foods should be kept in air tight containers.**

Oily foods should be kept in air tight containers to prevent oxidation of fats and oils present in them. Otherwise their taste and smell will change.

**100. Name any two changes that take place when oily food gets oxidised.**

The food item smells badly. It has a bad taste.

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

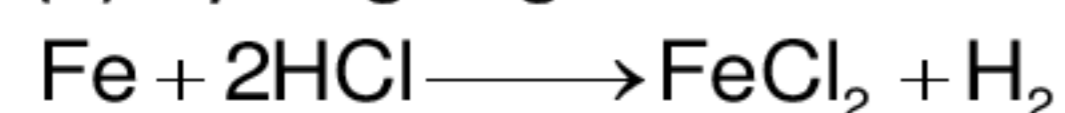
(a) Hydrogen gas and iron chloride are produced.

(b) Chlorine gas and iron hydroxide are produced.

(c) No reaction takes place.

(d) Iron salt and water are produced.

(a) Hydrogen gas and iron chloride are produced. The reaction is as follows:



**102. What change in colour do you observe when?**

a) Ferrous sulphate crystals are heated in a dry test tube.

b) Lead nitrate powder is heated in a test tube.

c) Silver chloride is exposed to sunlight.

d) Copper powder is heated in a china dish.

a) Green colour changes to reddish brown.

b) Colourless changes into brown.

c) White silver colour changes to grey.

d) Brown colour changes to black.

**103. Write one use of the following.**

a) Lime or quick lime.

b) Silver bromide.

a) Quick lime is used in the manufacture of cement.

b) Silver bromide is used in black and white photography.

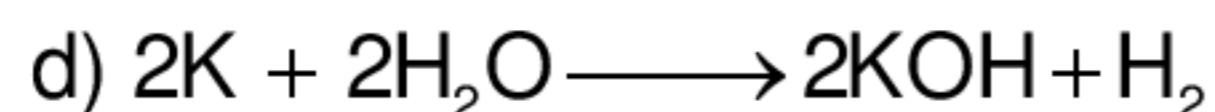
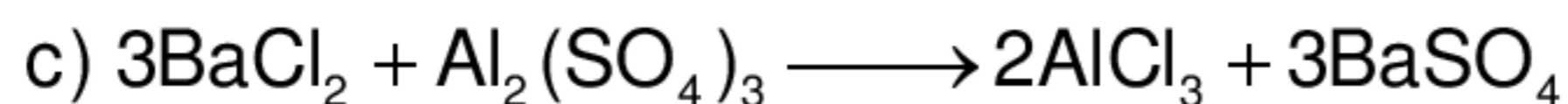
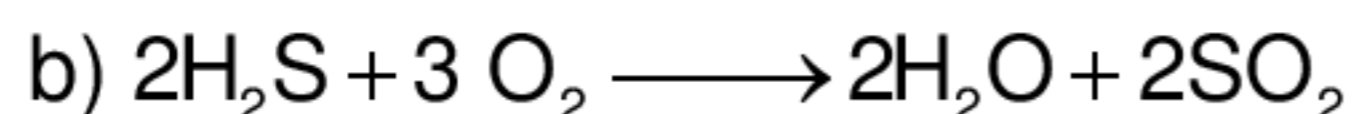
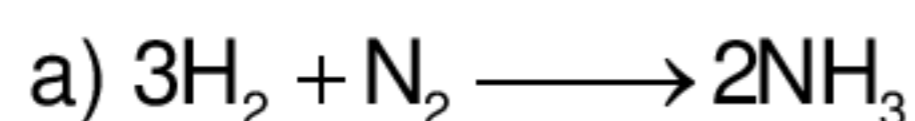
**104. Translate the following statements into chemical equations and then balance them.**

a) Hydrogen gas combines with nitrogen to form ammonia.

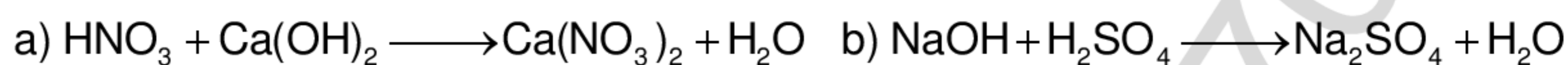
b) Hydrogen sulphide gas burns in air to give water and sulphur dioxide.

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.



105. Balance the following equations:



106. Write the balanced chemical equations for the following reactions.

a) Calcium hydroxide + Carbon dioxide  $\longrightarrow$  Calcium carbonate + Water

b) Zinc + Silver nitrate  $\longrightarrow$  Zinc nitrate + Silver

c) Aluminium + Copper chloride  $\longrightarrow$  Aluminium chloride + Copper

d) Barium chloride + Potassium sulphate  $\longrightarrow$  Barium sulphate + Potassium chloride



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

a) Potassium bromide (aq) + Barium iodide (aq)  $\longrightarrow$  Potassium iodide (aq) + Barium bromide(s)

b) Zinc carbonate (s)  $\longrightarrow$  Zinc oxide (s) + Carbon dioxide (g)

c) Hydrogen (g) + Chlorine (g)  $\longrightarrow$  Hydrogen chloride (g)

d) Magnesium (s) + Hydrochloric acid (aq)  $\longrightarrow$  Magnesium chloride (aq) + Hydrogen (g)

a)  $2\text{KBr} + \text{BaI}_2 \longrightarrow 2\text{KI} + \text{BaBr}_2$  Double displacement reaction

b)  $\text{ZnCO}_3 \longrightarrow \text{ZnO} + \text{CO}_2$  Decomposition reaction

c)  $\text{H}_2 + \text{Cl}_2 \longrightarrow 2\text{HCl}$  Combination reaction

d)  $\text{Mg} + 2\text{HCl} \longrightarrow \text{MgCl}_2 + \text{H}_2$  Displacement reaction

Fill in the blanks:

- 1) Chemical formula of marble is  $\text{CaCO}_3$ .
- 2) Respiration is an example of exothermic reaction.
- 3) Decomposition of vegetable matter into compost is an example of exothermic reaction.
- 4) The gas produced when a few crystals of ferrous sulphate are heated in a dry test tube is sulphur dioxide.
- 5) The solid produced when a few crystals of ferrous sulphate are heated in a dry test tube is ferric oxide.

- 6) Calcium oxide is called quick lime.
- 7) Water added to quick lime is an example of a/an exothermic reaction.
- 8) Calcium oxide is used in the manufacture of cement.
- 9) Silver bromide is used in black & white photography.
- 10) A salt used in black & white photography is silver bromide.
- 11) Burning of coal is an example of combination reaction.
- 12) Formation of water from hydrogen and oxygen is an example of combination reaction.
- 13) The colour of ferrous sulphate crystals is green.
- 14) White Silver chloride turns grey when exposed to sunlight.
- 15) A reaction in which energy is absorbed is known as endothermic reaction.
- 16) Zinc and lead are more reactive than copper.
- 17) The insoluble substance formed which is insoluble in water is known as precipitate.
- 18) A reaction in which there is exchange of ions between reactants is called double displacement reaction.
- 19) The product formed when copper powder reacts with oxygen is copper oxide.
- 20) If a substance gains oxygen during a reaction, it is said to be oxidised.
- 21) If a substance loses oxygen during a reaction, it is said to be reduced.
- 22) A reaction in which one reactant gets oxidised while the other gets reduced during a reaction is called redox reaction.
- 23) Magnesium ribbon burning with oxygen is an example of oxidation reaction.
- 24) The process in which metals are deteriorated by action of air, moisture, chemicals is called corrosion.
- 25) The chemical decomposition of oils and fats is called rancidity.
- 26) A substance which prevents oxidation is called antioxidant.
- 27) The inert gas which is used by manufacturers to store fried food packets is nitrogen.
- 28) If the number of atoms of any element in a chemical equation is not equal on both sides, then it is called skeletal equation.
- 29) The balancing of chemical equation is in accordance with law of conservation of mass.
- 30) Decomposition reactions are opposite of combination reactions.
- 31) The reaction that is normally carried out in the presence of heat, light or electricity is called endothermic reaction.
- 32) The reaction between hydrogen and oxygen to form water is a combination reaction.
- 33) It is called oxidation reaction when hydrogen is removed from a substance.
- 34) The reaction in which oxygen atoms are added to a substance is called oxidation reaction.
- 35) Electrons are lost and gained during redox reactions.
- 36) The substance which loses hydrogen is called reducing agent.
- 37) Antioxidants are often added to packed foods to prevent rancidity due to oxidation.

Match the following:



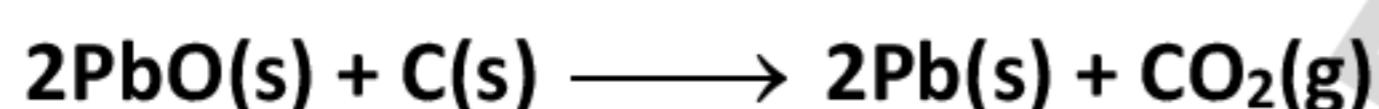
Column I	Column II
1. $\text{H}_2 + \text{Cl}_2 \longrightarrow 2\text{HCl}$	a) Photo decomposition reaction
2. $\text{CuO} + \text{H}_2 \longrightarrow \text{Cu} + \text{H}_2\text{O}$	b) Redox reaction
3. $2\text{AgBr} \longrightarrow 2\text{Ag} + \text{Br}_2$	c) Thermal decomposition reaction
4. $2\text{H}_2\text{O} \longrightarrow 2\text{H}_2 + \text{O}_2$	d) Combination reaction
5. $\text{ZnCO}_3 \longrightarrow \text{ZnO} + \text{CO}_2$	e) Electrolytic decomposition reaction

Match the following:

Column I	Column II
1. Combination reaction	a) $\text{Pb} + \text{CuCl}_2 \longrightarrow \text{PbCl}_2 + \text{H}_2$
2. Decomposition reaction	b) $\text{CuO} + \text{H}_2 \xrightarrow{\text{Heat}} \text{Cu} + \text{H}_2\text{O}$
3. Displacement reaction	c) $\text{C} + \text{O}_2 \longrightarrow \text{CO}_2$
4. Double displacement reaction	d) $\text{BaCl}_2 + \text{Na}_2\text{SO}_4 \longrightarrow \text{BaSO}_4 + 2\text{NaCl}$
	e) $\text{CaCO}_3 \xrightarrow{\text{Heat}} \text{CaO} + \text{CO}_2$

Multiple choice questions:

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

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

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

3. What happens when dilute hydrochloric acid is added to iron fillings?

- (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.

4. Which of the following is not a physical change?

- (a) Boiling of water to give water vapour (b) Melting of ice to give water  
 (c) Dissolution of salt in water (d) Combustion of Liquefied Petroleum Gas (LPG)

5.  $4\text{NH}_3(\text{g}) + 5\text{O}_2(\text{g}) \longrightarrow 4\text{NO}(\text{g}) + 6\text{H}_2\text{O}(\text{g})$  The reaction is an example of a

- (i) displacement reaction (ii) combination reaction

(iii) redox reaction

(iv) neutralisation reaction

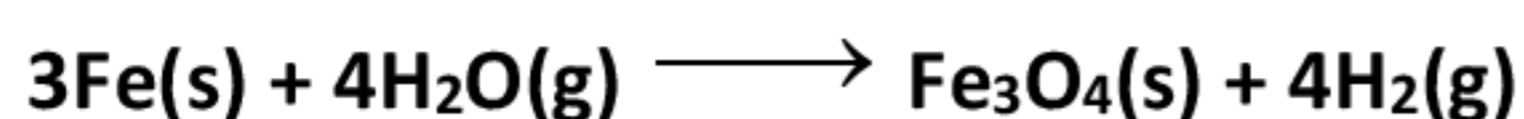
(a) (i) and (iv)

(b) (ii) and (iii)

(c) (i) and (iii)

(d) (iii) and (iv)

6. Which of the following statements about the given reaction are correct?



(i) Iron metal is getting oxidized

(ii) Water is getting reduced

(iii) Water is acting as reducing agent

(iv) Water is acting as oxidising agent

(a) (i), (ii) and (iii)

(b) (iii) and (iv)

(c) (i), (ii) and (iv)

(d) (ii) and (iv)

7. Which of the following are exothermic processes?

(i) Reaction of water with quick lime

(ii) Dilution of an acid

(iii) Evaporation of water

(iv) Sublimation of camphor (crystals)

(a) (i) and (ii)

(b) (ii) and (iii)

(c) (i) and (iv)

(d) (iii) and (iv)

8. Three beakers labelled as A, B and C each containing 25 mL of water were taken. A small amount of NaOH, anhydrous CuSO<sub>4</sub> and NaCl were added to the beakers A, B and C respectively. It was observed that there was an increase in the temperature of the solutions contained in beakers A and B, whereas in case of beaker C, the temperature of the solution falls. Which one of the following statement(s) is(are) correct?

(i) In beakers A and B, exothermic process has occurred.

(ii) In beakers A and B, endothermic process has occurred.

(iii) In beaker C exothermic process has occurred.

(iv) In beaker C endothermic process has occurred.

(a) (i) only

(b) (ii) only

(c) (i) and (iv)

(d) (ii) and (iii)

9. A dilute ferrous sulphate solution was gradually added to the beaker containing acidified permanganate solution. The light purple colour of the solution fades and finally disappears. Which of the following is the correct explanation for the observation?

(a) KMnO<sub>4</sub> is an oxidising agent, it oxidises FeSO<sub>4</sub>(b) FeSO<sub>4</sub> acts as an oxidising agent and oxidises KMnO<sub>4</sub>

(c) The colour disappears due to dilution; no reaction is involved

(d) KMnO<sub>4</sub> is an unstable compound and decomposes in presence of FeSO<sub>4</sub> to a colourless compound.

10. Which among the following is(are) double displacement reaction(s)?

(i)  $\text{Pb} + \text{CuCl}_2 \longrightarrow \text{PbCl}_2 + \text{Cu}$ (ii)  $\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \longrightarrow \text{BaSO}_4 + 2\text{NaCl}$ (iii)  $\text{C} + \text{O}_2 \longrightarrow \text{CO}_2$ (iv)  $\text{CH}_4 + 2\text{O}_2 \longrightarrow \text{CO}_2 + 2\text{H}_2\text{O}$ 

(a) (i) and (iv)

(b) (ii) only

(c) (i) and (ii)

(d) (iii) and (iv)

11. Which among the following statement(s) is(are) true? Exposure of silver chloride to sunlight for a long duration turns grey due to

(i) the formation of silver by decomposition of silver chloride

(ii) sublimation of silver chloride

(iii) decomposition of chlorine gas from silver chloride

(iv) oxidation of silver chloride

(a) (i) only

(b) (i) and (iii)

(c) (ii) and (iii)

(d) (iv) only

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12. Solid calcium oxide reacts vigorously with water to form calcium hydroxide accompanied by liberation of heat. This process is called slaking of lime. Calcium hydroxide dissolves in water to form its solution called lime water. Which among the following is (are) true about slaking of lime and the solution formed?
- (i) It is an endothermic reaction  
(ii) It is an exothermic reaction  
(iii) The pH of the resulting solution will be more than seven  
(iv) The pH of the resulting solution will be less than seven
- (a) (i) and (ii)      **(b) (ii) and (iii)**      (c) (i) and (iv)      (d) (iii) and (iv)
13. Barium chloride on reacting with ammonium sulphate forms barium sulphate and ammonium chloride. Which of the following correctly represents the type of the reaction involved?
- (i) Displacement reaction      (ii) Precipitation reaction  
(iii) Combination reaction      (iv) Double displacement reaction
- (a) (i) only      (b) (ii) only      **(c) (iv) only**      (d) (ii) and (iv)
14. Electrolysis of water is a decomposition reaction. The mole ratio of hydrogen and oxygen gases liberated during electrolysis of water is:
- (a) 1:1      **(b) 2:1**      (c) 4:1      (d) 1:2
15. Which of the following is(are) an endothermic process(es)?
- (i) Dilution of sulphuric acid      (ii) Sublimation of dry ice  
(iii) Condensation of water vapours      (iv) Evaporation of water
- (a) (i) and (iii)      (b) (ii) only      (c) (iii) only      **(d) (ii) and (iv)**
16. In the double displacement reaction between aqueous potassium iodide and aqueous lead nitrate, a yellow precipitate of lead iodide is formed. While performing the activity if lead nitrate is not available, which of the following can be used in place of lead nitrate?
- (a) Lead sulphate (insoluble)      **(b) Lead acetate**  
(c) Ammonium nitrate      (d) Potassium sulphate
17. Which of the following gases can be used for storage of fresh sample of an oil for a long time?
- (a) Carbon dioxide or oxygen      (b) Nitrogen or oxygen  
(c) Carbon dioxide or helium      **(d) Helium or nitrogen**
18. The following reaction is used for the preparation of oxygen gas in the laboratory  $2\text{KClO}_3(\text{s}) \longrightarrow 2\text{KCl}(\text{s}) + 3\text{O}_2(\text{g})$  Which of the following statement(s) is(are) correct about the reaction?
- (a) It is a decomposition reaction and endothermic in nature**  
(b) It is a combination reaction  
(c) It is a decomposition reaction and accompanied by release of heat  
(d) It is a photochemical decomposition reaction and exothermic in nature
19. Which one of the following processes involves chemical reactions?

- (a) Storing of oxygen gas under pressure in a gas cylinder  
 (b) Liquefaction of air  
 (c) Keeping petrol in a china dish in the open  
**(d) Heating copper wire in presence of air at high temperature**
20. In which of the following chemical equations, the abbreviations represent the correct states of the reactants and products involved at reaction temperature?
- (a)  $2\text{H}_2(\text{l}) + \text{O}_2(\text{l}) \longrightarrow 2\text{H}_2\text{O}(\text{g})$       (b)  $2\text{H}_2(\text{g}) + \text{O}_2(\text{l}) \longrightarrow 2\text{H}_2\text{O}(\text{l})$   
 (c)  $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \longrightarrow 2\text{H}_2\text{O}(\text{l})$       (d)  $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \longrightarrow 2\text{H}_2\text{O}(\text{g})$
21. Which of the following are combination reactions?
- (i)  $2\text{KClO}_3 \xrightarrow{\text{Heat}} 2\text{KCl} + 3\text{O}_2$       (ii)  $\text{MgO} + \text{H}_2\text{O} \longrightarrow \text{Mg}(\text{OH})_2$   
 (iii)  $4\text{Al} + 3\text{O}_2 \longrightarrow 2\text{Al}_2\text{O}_3$       (iv)  $\text{Zn} + \text{FeSO}_4 \longrightarrow \text{ZnSO}_4 + \text{Fe}$   
 (a) (i) and (iii)      (b) (iii) and (iv)      (c) (ii) and (iv)      **(d) (ii) and (iii)**
22. Which of the following is an unbalanced chemical equation?
- (a)  $\text{H}_2 + \text{Cl}_2 \longrightarrow 2\text{HCl}$       (b)  $2\text{H}_2 + \text{O}_2 \longrightarrow 2\text{H}_2\text{O}$   
 (c)  $\text{Zn} + \text{HCl} \longrightarrow \text{ZnCl}_2 + \text{H}_2$       (d)  $\text{ZnO} + \text{C} \longrightarrow \text{Zn} + \text{CO}$
23. The reaction of  $\text{H}_2$  gas with oxygen gas to form water is an example of:
- (a) Combination reaction      (b) Exothermic reaction  
 (c) Redox reaction      **(d) All of these**
24. Which of the following is a double displacement reaction?
- (a)  $\text{HCl} + \text{NaOH} \longrightarrow \text{NaCl} + \text{H}_2\text{O}$**       (b)  $\text{CaO} + \text{H}_2\text{O} \longrightarrow \text{Ca}(\text{OH})_2$   
 (c)  $\text{CuO} + \text{H}_2 \longrightarrow \text{H}_2\text{O} + \text{Cu}$       (d) All of these reactions
25. Which of the following is not an example of single displacement reaction?
- (a)  $\text{CuO} + \text{H}_2 \longrightarrow \text{H}_2\text{O} + \text{Cu}$       (b)  $\text{Zn} + \text{CuSO}_4 \longrightarrow \text{ZnSO}_4 + \text{Cu}$   
**(c)  $4\text{HN}_3 + 5\text{O}_2 \longrightarrow 4\text{NO} + 6\text{H}_2\text{O}$**       (d)  $\text{Zn} + 2\text{HCl} \longrightarrow \text{H}_2 + \text{ZnCl}_2$
26. Reddish-brown copper metal forms a black solid on combination. Which of the following statements is incorrect?
- (a) Black solid is  $\text{CaO}$       (b) The reaction is a redox reaction  
**(c) The reaction is a precipitation reaction**      (d) Copper is being oxidized
27. The reaction in which two compounds exchange their ions to form two new compounds is called:
- (a) Displacement reaction      (b) Combination reaction  
**(c) Double displacement reaction**      (d) Redox reaction