CHAPTER 1

Chemical Reactions and Equations

Hello! mere pyare bachhon aaj hum sabhi chemical reaction and Equation ke bare me sudhi karenge bahut maja aayega is Chapter me —

→ इस Chapter को start करने से पहले हमें **Physical change** and **Chemical change** समझना होगा

Physical change	Chemical change
1. In a physical change, only physical properties such as colour, physical state, density, volume, etc. change; chemical properties remain unchanged.	1. In a chemical change, the chemical composition and chemical properties undergo a change.
2. No new substance is formed in a physical change.	2. A new substance is formed in a chemical change.
3. Very little or no energy in the form of heat, light or sound is usually absorbed or given out in a physical change.	3. A chemical change is always accompanied by absorption or evolution of energy.
4. A physical change is a temporary change.	4. A chemical change is a permanent change.
5. The original form of substance can be regained by simple physical methods.	5. Original substance cannot be obtained by simple physical methods.
6. A physical change is reversible.	6. A chemical change is irreversible.

Note — chemical change को सिर्फ chemical reaction का द्वारा होता है " जहाँ chemical change वहाँ chemical reactions

- milk is left at room temperature during summers.
- an iron tawa/pan/nail is left exposed to humid atmosphere.
- grapes get fermented.
- food is cooked.
- food gets digested in our body.
- we respire.

↳ these are example of chemical change.

other example —
- Burning of paper
- digestion of food
- rusting of iron
- formation of curd

Activity 1.1

CAUTION: This Activity needs the teacher's assistance. It would be better if students wear suitable eyeglasses.

- Clean a magnesium ribbon about 3-4 cm long by rubbing it with sandpaper.
- Hold it with a pair of tongs. Burn it using a spirit lamp or burner and collect the ash so formed in a watch-glass as shown in Fig. 1.1. Burn the magnesium ribbon keeping it away as far as possible from your eyes.
- What do you observe?

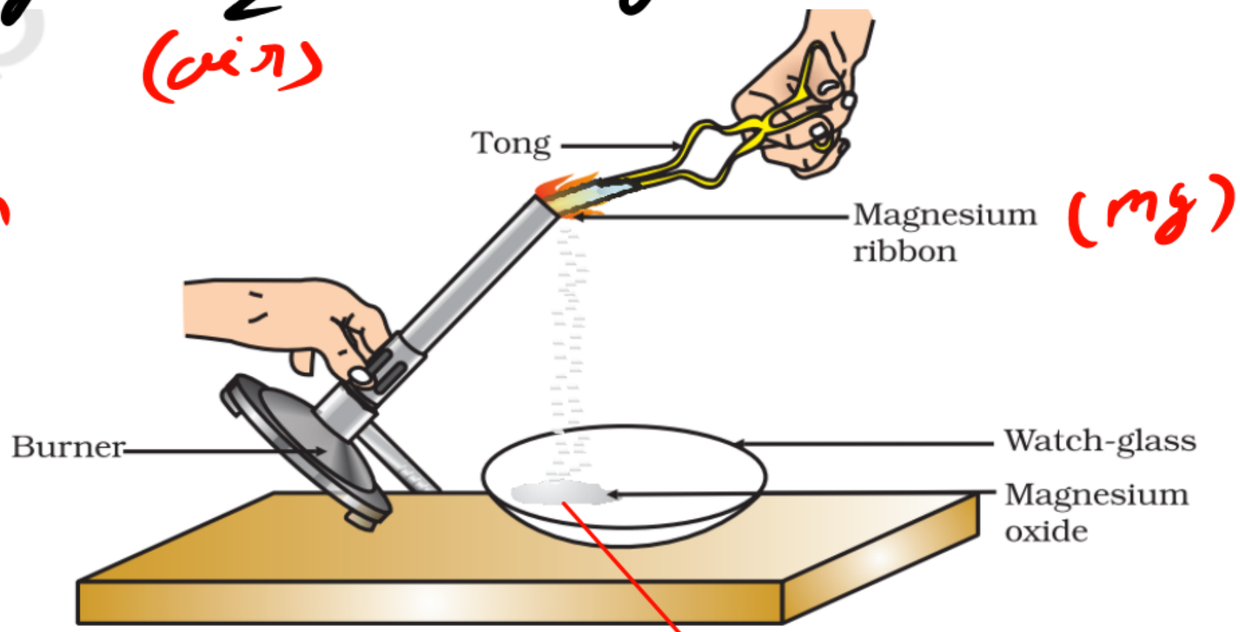


Figure 1.1
Burning of a magnesium ribbon in air and collection of magnesium oxide in a watch-glass

You must have observed that 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.

Note - Chemical reaction होने के लिए इनमें से कोई एक चीज होना जरूरी है

1. Heat
2. Electrolysis
3. Light

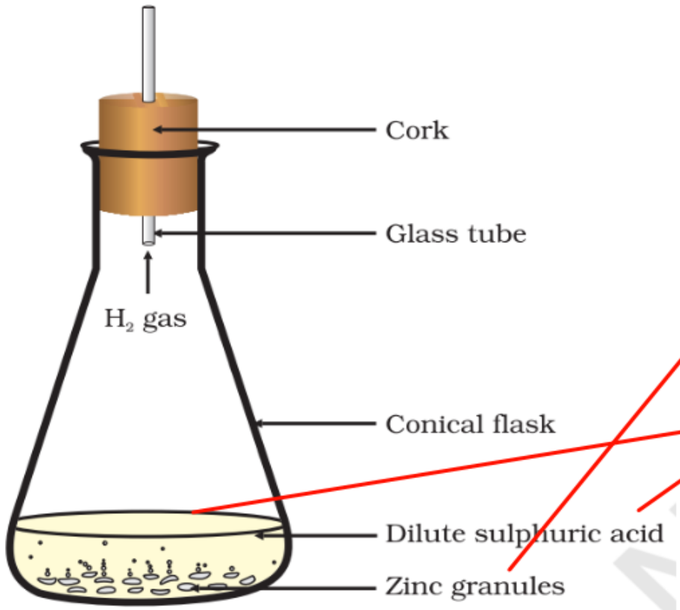
Activity 1.2

- Take lead nitrate solution in a test tube.
- Add potassium iodide solution to this.
- What do you observe?

$$Pb(NO_3)_2\,(aq) + KI\,(aq) \rightarrow PbI_2\,(s) + KNO_3\,(aq)$$

Activity 1.3

- Take a few zinc granules in a conical flask or a test tube.
- Add dilute hydrochloric acid or sulphuric acid to this (Fig. 1.2).
  CAUTION: Handle the acid with care.
- Do you observe anything happening around the zinc granules?
- Touch the conical flask or test tube. Is there any change in its temperature?



$$Zn + H_2SO_4 \longrightarrow ZnSO_4 + H_2\uparrow$$

(zinc) sulphuric acid — zinc sulphate — hydrogen

Exothermic reaction

Characteristic of chemical reaction –

- change in state → Solid, liquid, gas
- change in colour
- evolution of a gas
- change in temperature.
- Precipitate (aqueous sol^{n})

Ex –

Ice → water → Steam } Change in state
Solid liquid gas

$Zn + H_2SO_4 \longrightarrow ZnSO_4 + H_2\uparrow$ } evolution of gas

1.1 CHEMICAL EQUATIONS

Activity 1.1 can be described as – when a magnesium ribbon is burnt in oxygen, it gets converted to magnesium oxide. This description of a chemical reaction in a sentence form is quite long. It can be written in a shorter form. The simplest way to do this is to write it in the form of a word-equation.

The word-equation for the above reaction would be –

Magnesium + Oxygen → Magnesium oxide (1.1)

(Reactants) (Product)

long sentence

$Mg + O_2 \rightarrow MgO$ } short word equation

chemical eqn

1.1.1 Writing a Chemical Equation

$Mg_{(s)} + O_{2(g)} \rightarrow MgO_{(s)}$

Reactants (LHS) — Product (RHS)

→ different compound जो ⊕ करके दिया जाता है

→ reaction में participate करने वाले compound जो Reactants कहते हैं।

→ After reaction जो new compound बनता है उसे Product कहते हैं

Important terms :-

→ solid ⟶ (s)

→ liquid ⟶ (l)

→ gas ⟶ (↑) or (↑)

→ Precipitate ⟶ (Aq) or (↓)

→ temperature ⟶ Δ

→ dilute ⟶ less amount

→ concentration ⟶ large amount

→ catalyst ⟶ Reaction are fast and slow करने वाले agent → Ni, Pt, Pd etc

Sometimes the reaction conditions, such as temperature, pressure, catalyst, etc., for the reaction are indicated above and/or below the arrow in the equation. For example –

To make a chemical equation more informative, the physical states of the reactants and products are mentioned along with their chemical formulae. The gaseous, liquid, aqueous and solid states of reactants and products are represented by the notations (g), (l), (aq) and (s), respectively. The word aqueous (aq) is written if the reactant or product is present as a solution in water.

अरे e ..... k minute –

नहीं तो conservation of mass के law का word लगा गया

Ex - $Mg + O_2 \rightarrow MgO$

2 molecules of O

1 molecule of O

1.1.2 Balanced Chemical Equations

Recall the law of conservation of mass that you studied in Class IX; mass can neither be created nor destroyed in a chemical reaction. That is, the total mass of the elements present in the products of a chemical reaction has to be equal to the total mass of the elements present in the reactants.

In other words, the number of atoms of each element remains the same, before and after a chemical reaction. Hence, we need to balance a skeletal chemical equation.

chemical Equation

Unbalance Equ^n

Balanced Equ^n

$Mg + O_2 \longrightarrow MgO$

$2Mg + O_2 \longrightarrow 2MgO$

→ There are some steps to balance Equ^n -

Step I: To balance a chemical equation, first draw boxes around each formula. Do not change anything inside the boxes while balancing the equation.

$$\boxed{Fe} + \boxed{H_2O} \rightarrow \boxed{Fe_3O_4} + \boxed{H_2} \qquad (1.5)$$

Step II: List the number of atoms of different elements present in the unbalanced equation (1.5).

Element	Number of atoms in reactants (LHS)	Number of atoms in products (RHS)
Fe	1	3
H	2	2
O	1	4

Step III: It is often convenient to start balancing with the compound that contains the maximum number of atoms. It may be a reactant or a product. In that compound, select the element which has the maximum number of atoms. Using these criteria, we select Fe_3O_4 and the element oxygen in it. There are four oxygen atoms on the RHS and only one on the LHS.

Atoms of oxygen	In reactants	In products
(i) Initial	1 (in H_2O)	4 (in Fe_3O_4)
(ii) To balance	1×4	4

Step IV: Fe and H atoms are still not balanced. Pick any of these elements to proceed further. Let us balance hydrogen atoms in the partly balanced equation.

Atoms of hydrogen	In reactants	In products
(i) Initial	8 (in 4 H_2O)	2 (in H_2)
(ii) To balance	8	2 × 4

$$\boxed{Fe} + 4\,\boxed{H_2O} \rightarrow \boxed{Fe_3O_4} + 4\,\boxed{H_2}$$

So on - - - -

1.2 TYPES OF CHEMICAL REACTIONS

1. Why should a magnesium ribbon be cleaned before burning in air?
2. Write the balanced equation for the following chemical reactions.
   (i) Hydrogen + Chlorine → Hydrogen chloride
   (ii) Barium chloride + Aluminium sulphate → Barium sulphate + Aluminium chloride
   (iii) Sodium + Water → Sodium hydroxide + Hydrogen
3. Write a balanced chemical equation with state symbols for the following reactions.
   (i) Solutions of barium chloride and sodium sulphate in water react to give insoluble barium sulphate and the solution of sodium chloride.
   (ii) Sodium hydroxide solution (in water) reacts with hydrochloric acid solution (in water) to produce sodium chloride solution and water.

Q1

A magnesium ribbon should be cleaned before burning **because it forms a layer of magnesium oxide that prevents it from burning**. This layer is white and does not burn.

* Removing layer from mg ribbon.

Q2

$$H_2 + 2\,Cl \rightarrow 2\,HCl$$

$$3\,BaCl_2 + Al\,2\,(SO_4)_3 \rightarrow 3\,BaSO_4 + 2\,AlCl_3$$

$$2\,Na + 2\,H_2O \rightarrow 2\,NaOH + H_2$$

1.2 TYPES OF CHEMICAL REACTIONS

There are 5 types of chemical reaction

- Combination reaction
- Decomposition reaction
  - Endothermic reaction
  - Exothermic reaction
- Displacement reaction
- Double Displacement reaction
- Redox reaction
  - Oxidation reaction
  - Reduction reaction

1.2.1 Combination Reaction

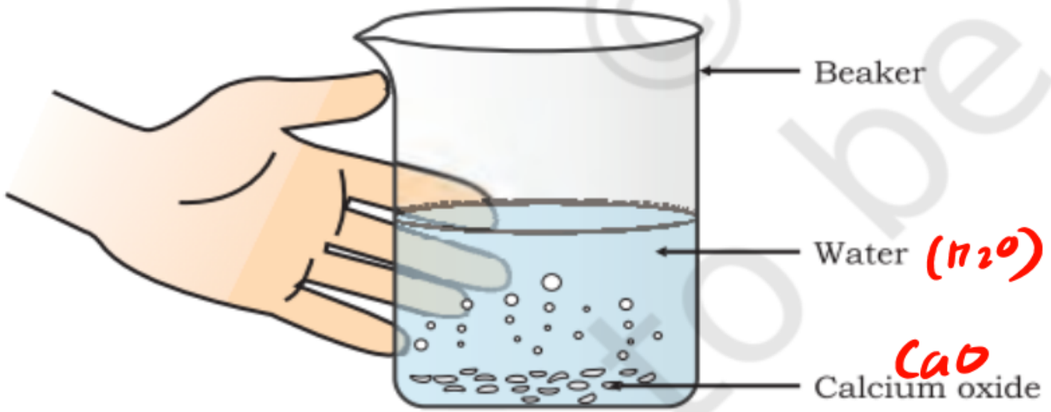


Figure 1.3
Formation of slaked lime by the reaction of calcium oxide with water

Activity 1.4

- Take a small amount of calcium oxide or quick lime in a beaker.
- Slowly add water to this.
- Touch the beaker as shown in Fig. 1.3.
- Do you feel any change in temperature?

Calcium oxide reacts vigorously with water to produce slaked lime (calcium hydroxide) releasing a large amount of heat.

$$\underset{\text{(Quick lime)}}{CaO(s)} + H_2O(l) \rightarrow \underset{\text{(Slaked lime)}}{Ca(OH)_2(aq)} + \text{Heat} \qquad (1.13)$$

$CaO + H_2O \rightarrow Ca(OH)_2 + \text{heat}$

Exothermic reaction

Do You Know?

A solution of slaked lime produced by the reaction 1.13 is used for whitewashing walls. Calcium hydroxide reacts slowly with the carbon dioxide in air to form a thin layer of calcium carbonate on the walls. Calcium carbonate is formed after two to three days of whitewashing and gives a shiny finish to the walls. It is interesting to note that the chemical formula for marble is also $CaCO_3$.

$$Ca(OH)_2(aq) + CO_2(g) \rightarrow CaCO_3(s) + H_2O(l) \quad (1.14)$$

(Calcium hydroxide) (Calcium carbonate)

$$CaO + H_2O \longrightarrow Ca(OH)_2 + Heat$$

$$Ca(OH)_2 + CO_2 \longrightarrow CaCO_3 + H_2O$$

Let us discuss some more examples of combination reactions.

(i) Burning of coal

$$C(s) + O_2(g) \rightarrow CO_2(g) \qquad (1.15)$$

(ii) Formation of water from $H_2(g)$ and $O_2(g)$

$$2H_2(g) + O_2(g) \rightarrow 2H_2O(l) \qquad (1.16)$$

In simple language we can say that when two or more substances (elements or compounds) combine to form a single product, the reactions are called combination reactions.

In Activity 1.4, we also observed that a large amount of heat is evolved. This makes the reaction mixture warm. Reactions in which heat is released along with the formation of products are called exothermic chemical reactions.

Other examples of exothermic reactions are –

(i) Burning of natural gas

$$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g) \qquad (1.17)$$

(ii) Do you know that respiration is an exothermic process?

We all know that we need energy to stay alive. We get this energy from the food we eat. During digestion, food is broken down into simpler substances. For example, rice, potatoes and bread contain carbohydrates. These carbohydrates are broken down to form glucose. This glucose combines with oxygen in the cells of our body and provides energy. The special name of this reaction is respiration, the process of which you will study in Chapter 6.

occurs in photo synthesis

$$\underset{\text{(Glucose)}}{C_6H_{12}O_6(aq)} + 6O_2(aq) \rightarrow 6CO_2(aq) + 6H_2O(l) + \text{energy} \qquad (1.18)$$

(iii) The decomposition of vegetable matter into compost is also an example of an exothermic reaction.

Identify the type of the reaction taking place in Activity 1.1, where heat is given out along with the formation of a single product.

1.2.2 Decomposition Reaction

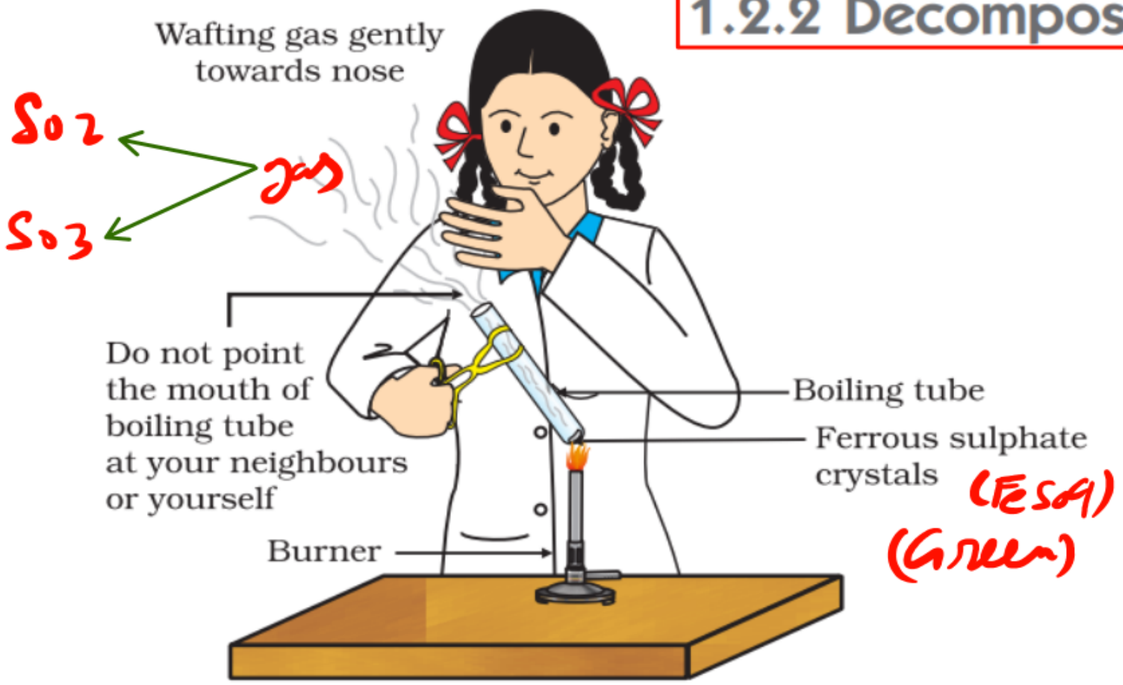


Figure 1.4
Correct way of heating the boiling tube containing crystals of ferrous sulphate and of smelling the odour

Activity 1.5

- Take about 2 g ferrous sulphate crystals in a dry boiling tube.
- Note the colour of the ferrous sulphate crystals.
- Heat the boiling tube over the flame of a burner or spirit lamp as shown in Fig. 1.4.
- Observe the colour of the crystals after heating.

Have you noticed that the green colour of the ferrous sulphate crystals has changed? You can also smell the characteristic odour of burning sulphur.

$$2FeSO_4(s) \xrightarrow{\text{Heat}} Fe_2O_3(s) + SO_2(g) + SO_3(g) \quad (1.19)$$

(Ferrous sulphate) (Ferric oxide)

↑ trioxide
↳ Dioxide

$$2FeSO_4(s) \xrightarrow{\text{Heat}} Fe_2O_3(s) + SO_2(g) + SO_3(g) \quad (1.19)$$

(Ferrous sulphate) (Ferric oxide)

Decomposition reaction —

Ex-1

In this reaction you can observe that a single reactant breaks down to give simpler products. This is a decomposition reaction. Ferrous sulphate crystals ($FeSO_4 . 7H_2O$) lose water when heated and the colour of the crystals changes. It then decomposes to ferric oxide (Fe_2O_3), sulphur dioxide (SO_2) and sulphur trioxide (SO_3). Ferric oxide is a solid, while SO_2 and SO_3 are gases.

Ex-2

Decomposition of calcium carbonate to calcium oxide and carbon dioxide on heating is an important decomposition reaction used in various industries. Calcium oxide is called lime or quick lime. It has many uses – one is in the manufacture of cement. When a decomposition reaction is carried out by heating, it is called thermal decomposition.

CaCO3 → CaO → CO2

$$CaCO_3(s) \xrightarrow{\text{Heat}} CaO(s) + CO_2(g) \quad (1.20)$$

(Limestone) (Quick lime)

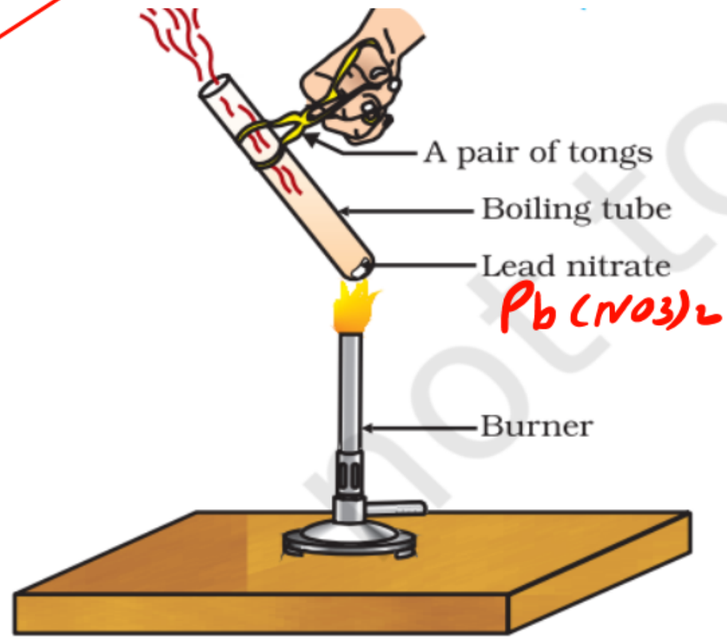


Figure 1.5
Heating of lead nitrate and emission of nitrogen dioxide

Another example of a thermal decomposition reaction is given in Activity 1.6.

Activity 1.6

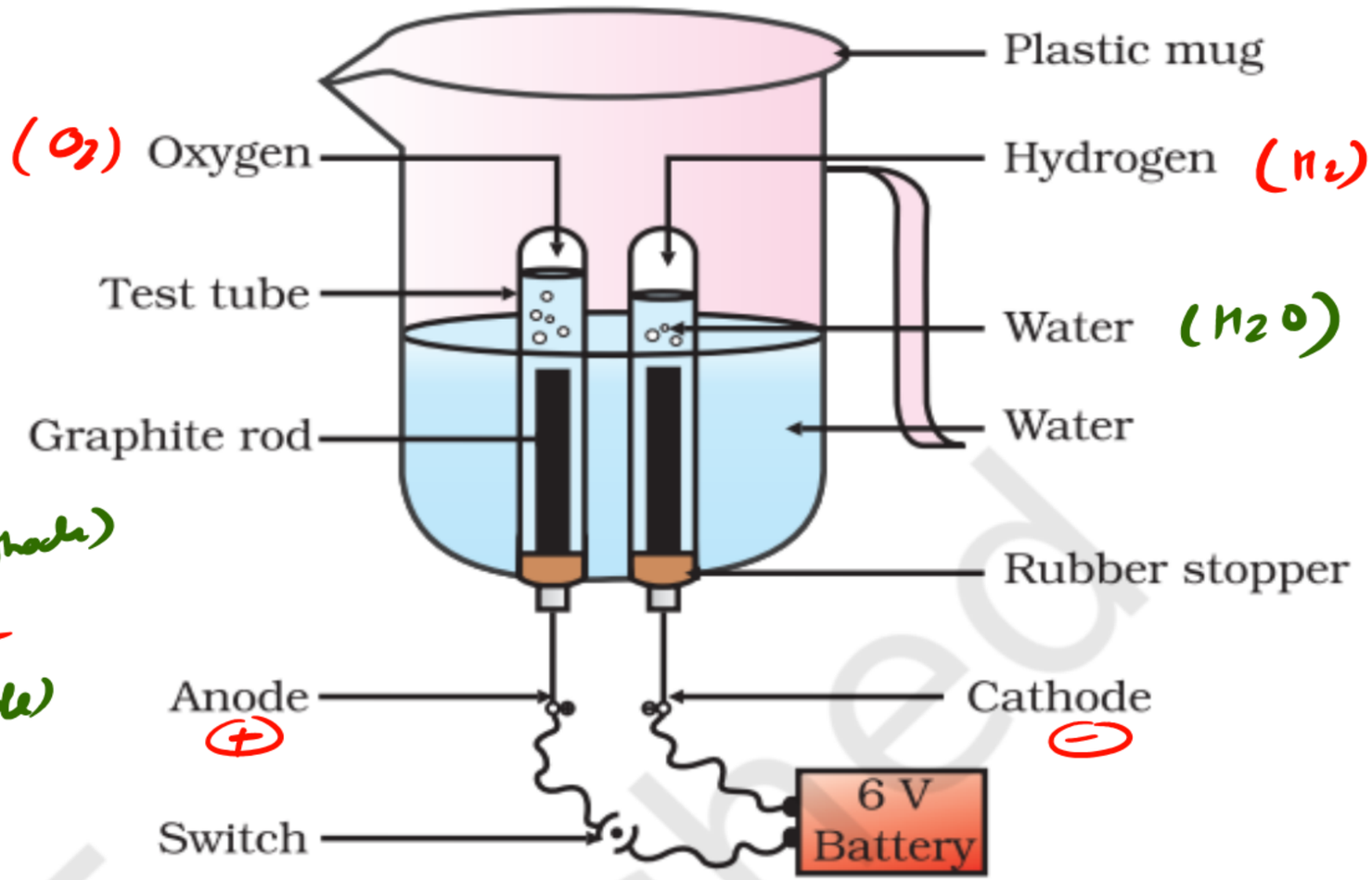
- Take about 2 g lead nitrate powder in a boiling tube.
- Hold the boiling tube with a pair of tongs and heat it over a flame, as shown in Fig. 1.5.
- What do you observe? Note down the change, if any.

You will observe the emission of brown fumes. These fumes are of nitrogen dioxide (NO_2). The reaction that takes place is –

$$2Pb(NO_3)_2(s) \xrightarrow{\text{Heat}} 2PbO(s) + 4NO_2(g) + O_2(g)$$

(Lead nitrate) (Lead oxide) (Nitrogen dioxide) (Oxygen)

Electrolysis of water (H_2O)



$H_2O \rightarrow H^{2+}$ (cathode)

$H_2O \rightarrow O^{2-}$ (anode)

Anode → Oxygen

Cathode → Hydrogen

} Decomposition reaction

Activity 1.8

- Take about 2 g silver chloride in a china dish.
- What is its colour?
- Place this china dish in sunlight for some time (Fig. 1.7).
- Observe the colour of the silver chloride after some time.

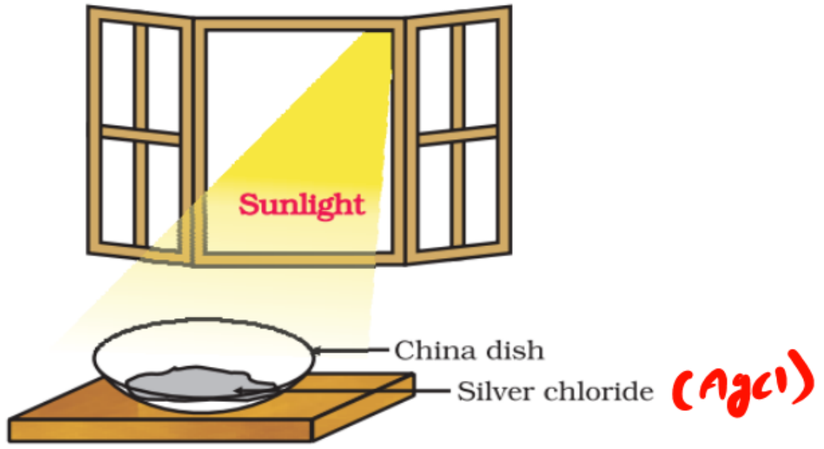


Figure 1.7
Silver chloride turns grey in sunlight to form silver metal

You will see that white silver chloride turns grey in sunlight. This is due to the decomposition of silver chloride into silver and chlorine by light.

$$2AgCl(s) \xrightarrow{\text{Sunlight}} 2Ag(s) + Cl_2(g) \qquad (1.22)$$

Silver bromide also behaves in the same way.

$$2AgBr(s) \xrightarrow{\text{Sunlight}} 2Ag(s) + Br_2(g) \qquad (1.23)$$

The above reactions are used in black and white photography. What form of energy is causing these decomposition reactions?

We have seen that the decomposition reactions require energy either in the form of heat, light or electricity for breaking down the reactants. Reactions in which energy is absorbed are known as endothermic reactions.

QUESTIONS

1. A solution of a substance 'X' is used for whitewashing.
   (i) Name the substance 'X' and write its formula.
   (ii) Write the reaction of the substance 'X' named in (i) above with water.
2. 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.

① X → soln

X → calcium hydroxide

$Ca(OH)_2$

↳ $CaO + H_2O \rightarrow Ca(OH)_2$

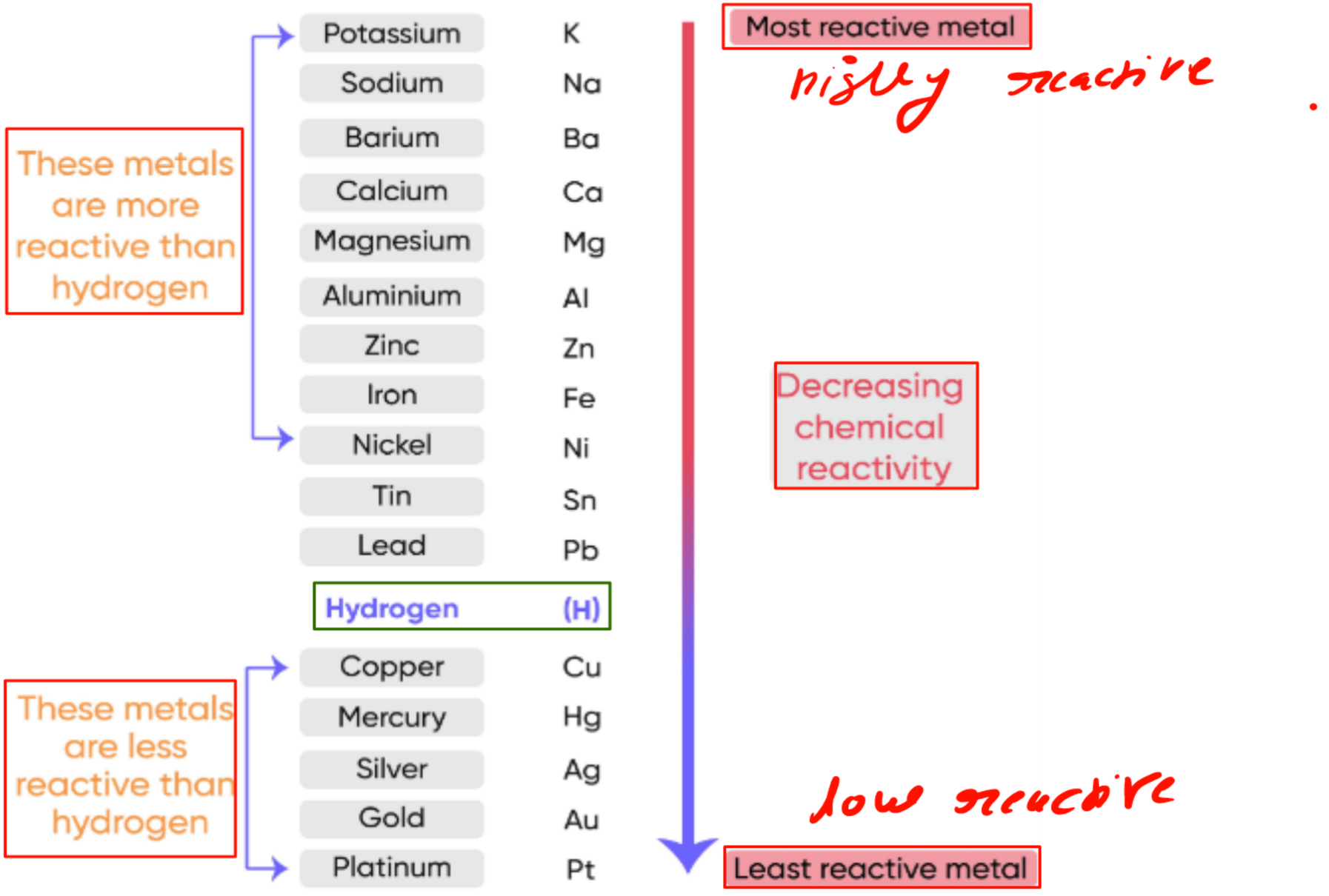
(calcium oxide)

② $H_2O \xrightarrow{\text{Electrolysis}} H_2 + O_2$

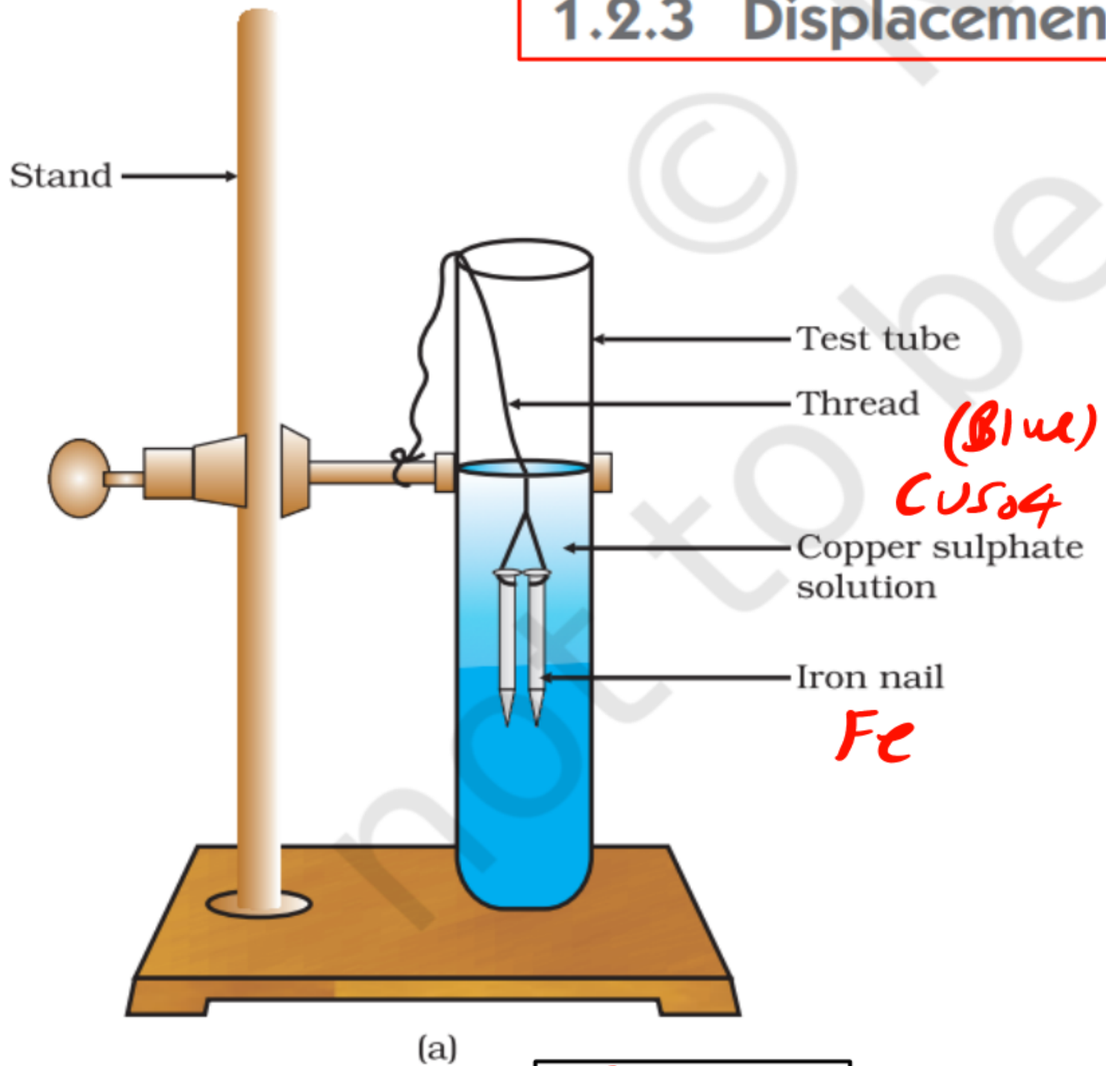
→ hydrogen

→ oxygen

Reactivity Series -



1.2.3 Displacement Reaction



(Blue)
CuSo4
Fe
Fe > Cu

Figure 1.8
(a) Iron nails dipped in copper sulphate solution

Activity 1.9

- Take three iron nails and clean them by rubbing with sand paper.
- Take two test tubes marked as (A) and (B). In each test tube, take about 10 mL copper sulphate solution.
- Tie two iron nails with a thread and immerse them carefully in the copper sulphate solution in test tube B for about 20 minutes [Fig. 1.8 (a)]. Keep one iron nail aside for comparison.
- After 20 minutes, take out the iron nails from the copper sulphate solution.
- Compare the intensity of the blue colour of copper sulphate solutions in test tubes (A) and (B) [Fig. 1.8 (b)].
- Also, compare the colour of the iron nails dipped in the copper sulphate solution with the one kept aside [Fig. 1.8 (b)].

$Fe + CuSO_4 \rightarrow FeSO_4 + Cu$

Why does the iron nail become brownish in colour and the blue colour of copper sulphate solution fades?

The following chemical reaction takes place in this Activity–

Eqn 1

$$\underset{\text{(Copper sulphate)}}{Fe(s) + CuSO_4(aq)} \rightarrow \underset{\text{(Iron sulphate)}}{FeSO_4(aq)} + Cu(s) \quad (1.24)$$

In this reaction, iron has displaced or removed another element, copper, from copper sulphate solution. This reaction is known as displacement reaction.

Other examples of displacement reactions are

Eqn 2

$$\underset{\text{(Copper sulphate)}}{Zn(s) + CuSO_4(aq)} \rightarrow \underset{\text{(Zinc sulphate)}}{ZnSO_4(aq)} + Cu(s) \quad (1.25)$$

Eqn 3

$$\underset{\text{(Copper chloride)}}{Pb(s) + CuCl_2(aq)} \rightarrow \underset{\text{(Lead chloride)}}{PbCl_2(aq)} + Cu(s) \quad (1.26)$$

Zinc and lead are more reactive elements than copper. They displace copper from its compounds.

1.2.4 Double Displacement Reaction

Activity 1.10

- Take about 3 mL of sodium sulphate solution in a test tube.
- In another test tube, take about 3 mL of barium chloride solution.
- Mix the two solutions (Fig. 1.9).
- What do you observe?

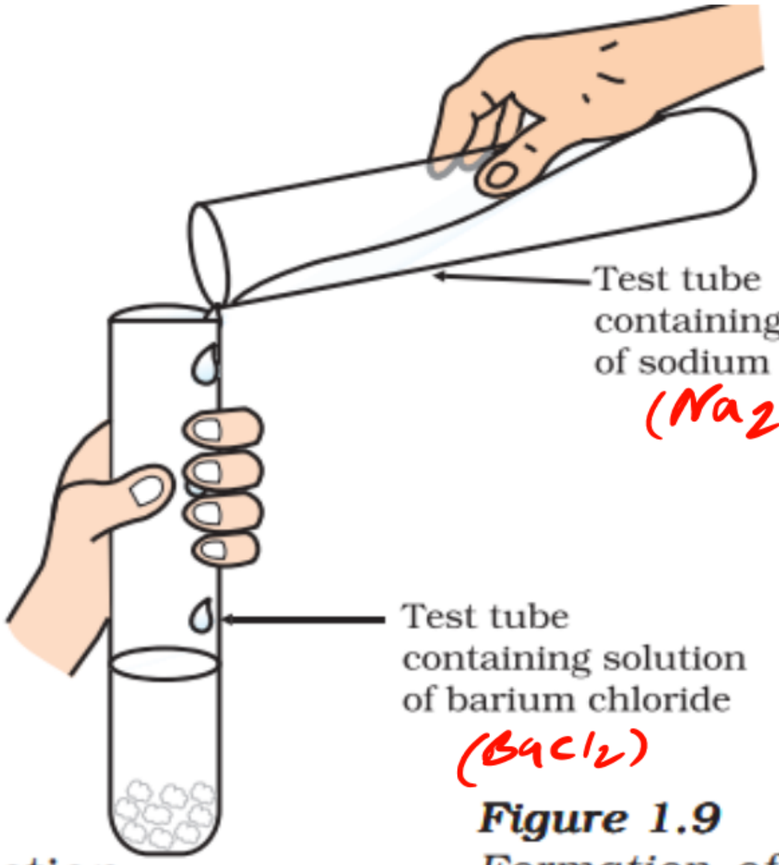


Figure 1.9 *Formation of barium sulphate and sodium chloride*

→ NaCl

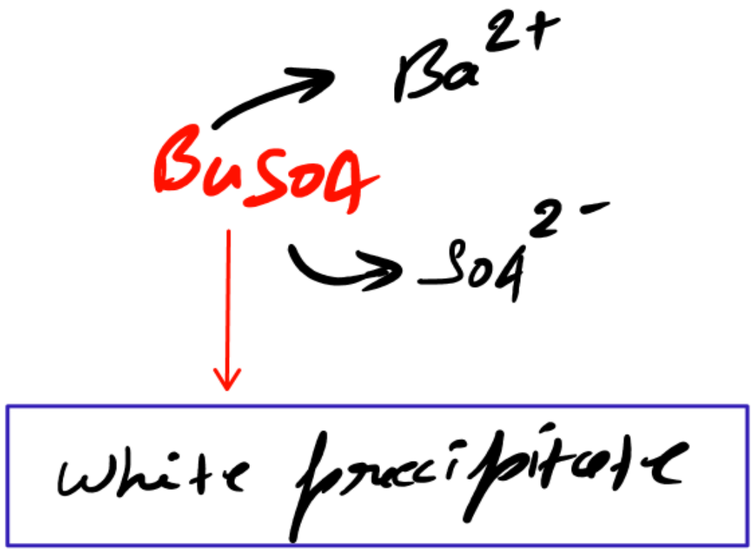
You will observe that a white substance, which is insoluble in water, is formed. This insoluble substance formed is known as a precipitate. Any reaction that produces a precipitate can be called a precipitation reaction.

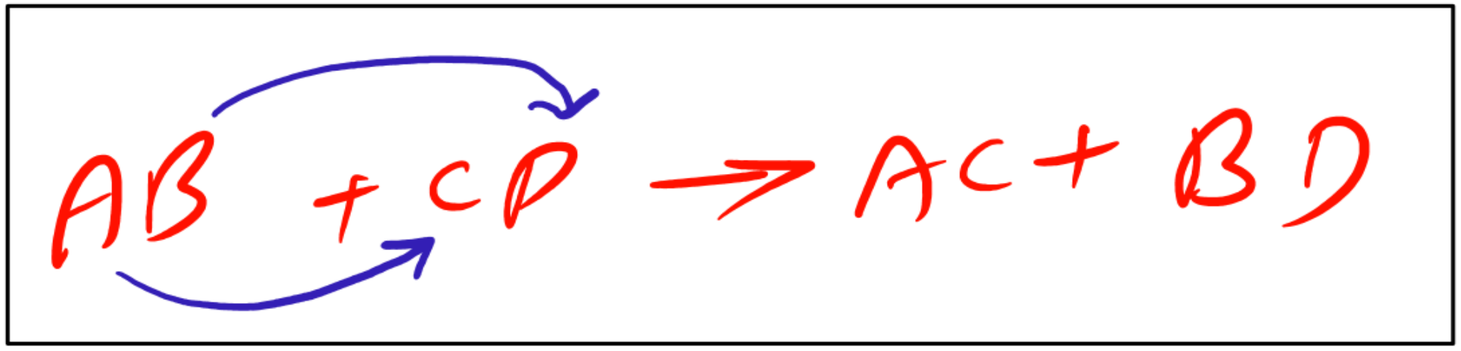
$$Na_2SO_4(aq) + BaCl_2(aq) \rightarrow BaSO_4(s) + 2NaCl(aq) \quad (1.27)$$

(Sodium sulphate) (Barium chloride) (Barium sulphate) (Sodium chloride)

Note – Insoluble substance formed is known as a Precipitate

What causes this? The white precipitate of $BaSO_4$ is formed by the reaction of SO_4^{2-} and Ba^{2+}. The other product formed is sodium chloride which remains in the solution. [Such reactions in which there is an exchange of ions between the reactants are called double displacement reactions.]





1.2.5 Oxidation and Reduction

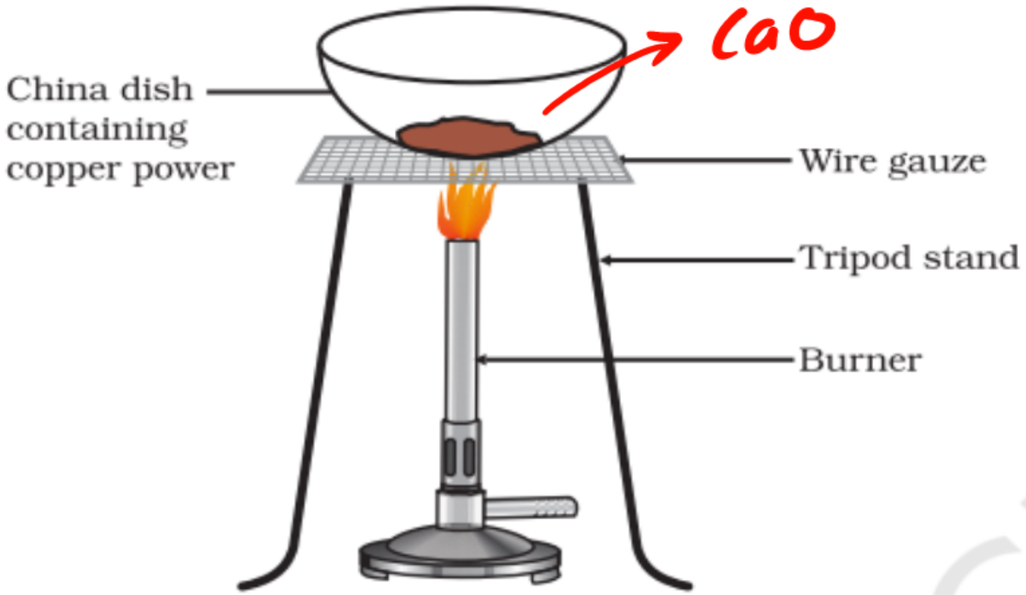


Figure 1.10
Oxidation of copper to copper oxide

Activity 1.11

- Heat a china dish containing about 1 g copper powder (Fig. 1.10).
- What do you observe?

The surface of copper powder becomes coated with black copper(II) oxide. Why has this black substance formed?

This is because oxygen is added to copper and copper oxide is formed.

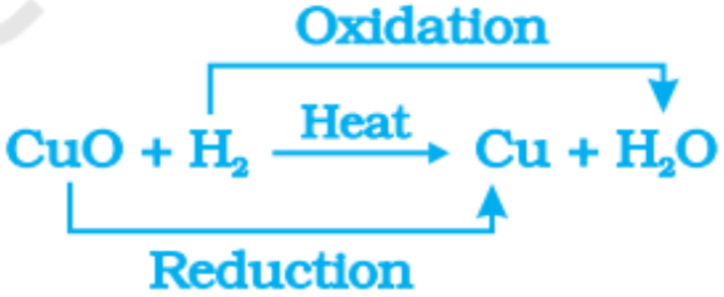
$$2Cu + O_2 \xrightarrow{\text{Heat}} 2CuO \qquad (1.28)$$

If hydrogen gas is passed over this heated material (CuO), the black coating on the surface turns brown as the reverse reaction takes place and copper is obtained.

$$CuO + H_2 \xrightarrow{\text{Heat}} Cu + H_2O \quad (1.29)$$

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

During this reaction (1.29), the copper(II) oxide is losing oxygen and is being reduced. The hydrogen is gaining oxygen and is being oxidised. In other words, one reactant gets oxidised while the other gets reduced during a reaction. Such reactions are called oxidation-reduction reactions or redox reactions.



(1.30)

* Oxidation - Reduction → Redox reaction
* loss of e^- → Reduction
* gain of e^- → oxidation

Some other examples of redox reactions are:

$$ZnO + C \rightarrow Zn + CO \quad (1.31)$$

$$MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2 \quad (1.32)$$

1.3 HAVE YOU OBSERVED THE EFFECTS OF OXIDATION REACTIONS IN EVERYDAY LIFE?

1.3.1 Corrosion

You must have observed that iron articles are shiny when new, but get coated with a reddish brown powder when left for some time. This process is commonly known as rusting of iron. Some other metals also get tarnished in this manner. Have you noticed the colour of the coating formed on copper and silver? When a metal is attacked by substances around it such as moisture, acids, etc., it is said to corrode and this process is called corrosion. The black coating on silver and the green coating on copper are other examples of corrosion.

Corrosion causes damage to car bodies, bridges, iron railings, ships and to all objects made of metals, specially those of iron. Corrosion of iron is a serious problem. Every year an enormous amount of money is spent to replace damaged iron. You will learn more about corrosion in Chapter 3.

1.3.2 Rancidity

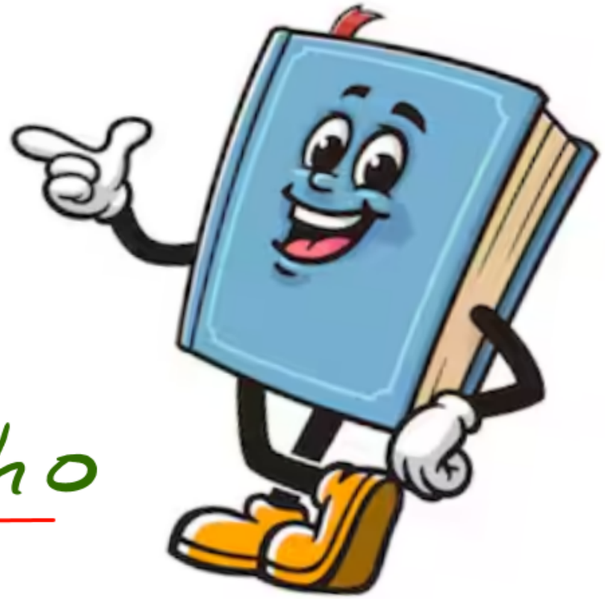
Have you ever tasted or smelt the fat/oil containing food materials left for a long time?

When fats and oils are oxidised, they become rancid and their smell and taste change. Usually substances which prevent oxidation (antioxidants) are added to foods containing fats and oil. Keeping food in air tight containers helps to slow down oxidation. Do you know that chips manufacturers usually flush bags of chips with gas such as nitrogen to prevent the chips from getting oxidised ?

QUESTIONS

1. Why does the colour of copper sulphate solution change when an iron nail is dipped in it?
2. Give an example of a double displacement reaction other than the one given in Activity 1.10.
3. Identify the substances that are oxidised and the substances that are reduced in the following reactions.
   (i) $4Na(s) + O_2(g) \rightarrow 2Na_2O(s)$
   (ii) $CuO(s) + H_2(g) \rightarrow Cu(s) + H_2O(l)$

- The End



Hello mere Pyare baccho

How are you?

Sabhi Topic ko acche se ek bar Study karni hai aur notebook complete karni hai....

Let Start — MCQs

1. A solution of substance X is used for white washing. Here X is:

(a) CaO

(b) CaO_2

(c) $NaCl$

(d) KCl

2. Which of the following statements about the reaction below are incorrect?

$$2PbO(s) + C(s) \longrightarrow 2Pb(s) + CO_2(g)$$

1. Lead is getting reduced.
2. Carbon dioxide is getting oxidised.
3. Carbon is getting oxidised.
4. Lead oxide is getting reduced.

(a) 1 and 2

(b) 1 and 3

(c) 1, 2 and 3

(d) all of the above

3. $Fe_2O_3 + 2Al \longrightarrow Al_2O_3 + 2Fe$

The above reaction is an example of a

(a) combination reaction.

(b) double displacement reaction.

(c) decomposition reaction.

(d) displacement reaction.

4. 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.

5. Identify the substances that is oxidized and the substances that is reduced in the following reactions:

$$4Na(s) + O_2(g) \longrightarrow 2Na_2O(s)$$

(a) Na, O_2
(b) Na, Na
(c) O_2, Na
(d) O_2, O_2

6. Identify the substances that is oxidized and the substances that is reduced in the following reactions:

$$CuO(s) + H_2(g) \longrightarrow Cu(s) + H_2O(l)$$

(a) H_2, CuO
(b) H_2, H_2O
(c) H_2, Cu
(d) Cu, H_2

Translate the following statement into the chemical equation and choose the correct option "Hydrogen gas combines with nitrogen to form ammonia."

(a) $3H_2(g) + N_2(g) \longrightarrow 2NH_3(g)$

(b) $H_2(g) + N_2(g) \longrightarrow NH_2(g)$

(c) $2H(g) + N_2(g) \longrightarrow 2NH_3$

(d) None of these

A shiny brown coloured element X on heating in air becomes black in colour. Here X is:

(a) Copper

(b) Silver

(c) Aluminium

(d) Mercury

Which of the following statement is correct regarding to physical changes?

(a) In physical change, new substance is formed.

(b) In physical change, no new substance is formed.

(c) In physical change, chemical composition of substance is changed.

(d) None of these

$FeS + H_2SO_4 \longrightarrow FeSO_4 + H_2S \uparrow$.

In the above equation $\uparrow$ indicates:

(a) gas evolved

(b) insoluble substance formed

(c) reactive element

(d) element is not useful in chemical equation

Which of the following is not a chemical reaction?

(a) Souring of milk

(b) Dissolution of sugar in water

(c) Rusting of iron

(d) Digestion of food in the body

$$\mathrm{CaO\,(s) + H_2O\,(l) \longrightarrow} X\mathrm{(s) +}\ \text{Heat} + \text{Hissing sound.}$$

Here X is:

(a) $\mathrm{Cu(OH)}$

(b) $\mathrm{Cu(OH)_2}$

(c) $\mathrm{2CaOH}$

(d) $\mathrm{Ca_2OH}$

The balancing of chemical equation is based on:

(a) Law of conservation of energy

(b) Law of conservation of mass

(c) Law of conservation of heat

(d) None of these

$Na_2CO_3 + XHCl \longrightarrow 2NaCl + CO_2 + H_2O$

In above reaction, the value of X is:

(a) 1

(b) 2

(c) 3

(d) 4

When white silver chloride is left exposed to sunlight, it colours becomes:

(a) Gray

(b) Yellow

(c) Green

(d) Red

$$PCl_5(s) + XH_2O(l) \longrightarrow YH_3PO_4(aq) + ZHCl(aq).$$

The value of X, Y and Z are:

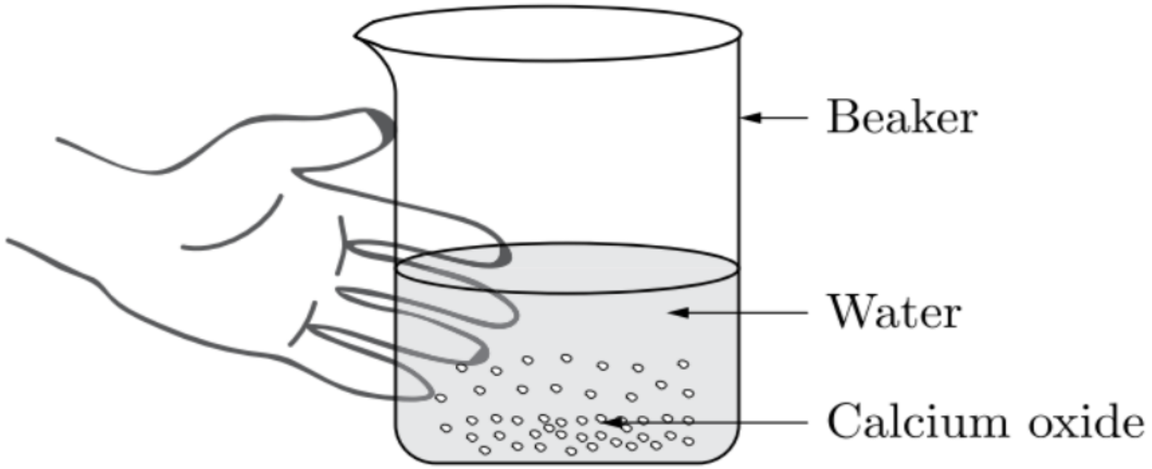
(a) X-4, Y-3, Z-3

(b) X-4, Y-1, Z-5

(c) X-1, Y-2, Z-3

(d) X-5, Y-1, Z-2

Calcium oxide reacts vigorously with water.



Identify the incorrect statements.

1. It is an endothermic reaction.
2. Slaked lime is produced.
3. Quick lime is produced.
4. It is an exothermic reaction.
5. It is a combination reaction.

(a) 1 and 2
(b) 3 and 4
(c) 1 and 3
(d) 2, 4 and 5

$CuO + H_2 \longrightarrow Cu + H_2O$

Which of the following pair is correct regarding to oxidation and reduction?

	Oxidation	**Reduction**
(a)	CuO	H_2
(b)	H_2	CuO
(c)	H_2O	H_2
(d)	H_2	H_2O

The physical change is:

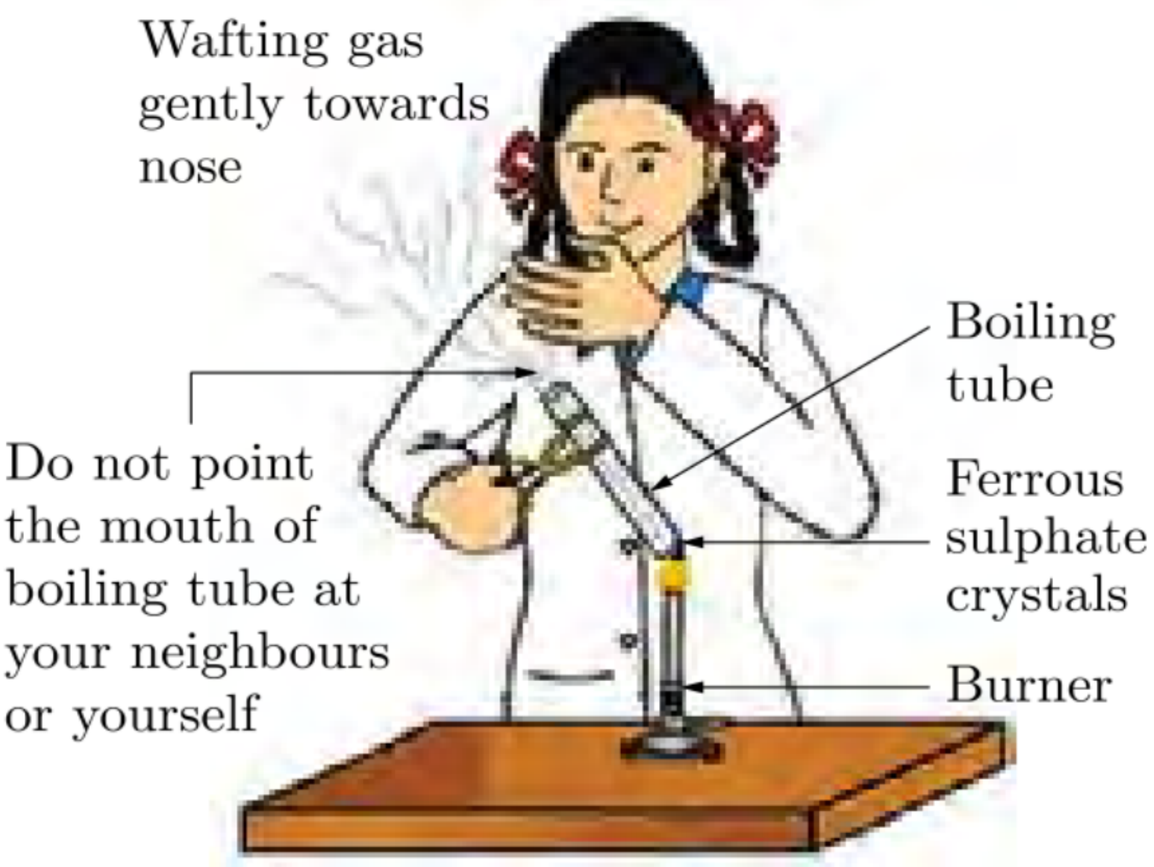
(a) melting of butter

(b) burning of paper

(c) digestion of food

(d) bursting of crackers

Sunita takes about 2 g ferrous sulphate crystals in dry boiling tube and heat the boiling tube over the flame of a burner or spirit lamp as shown in the figure.



The colour of crystals after heating is:

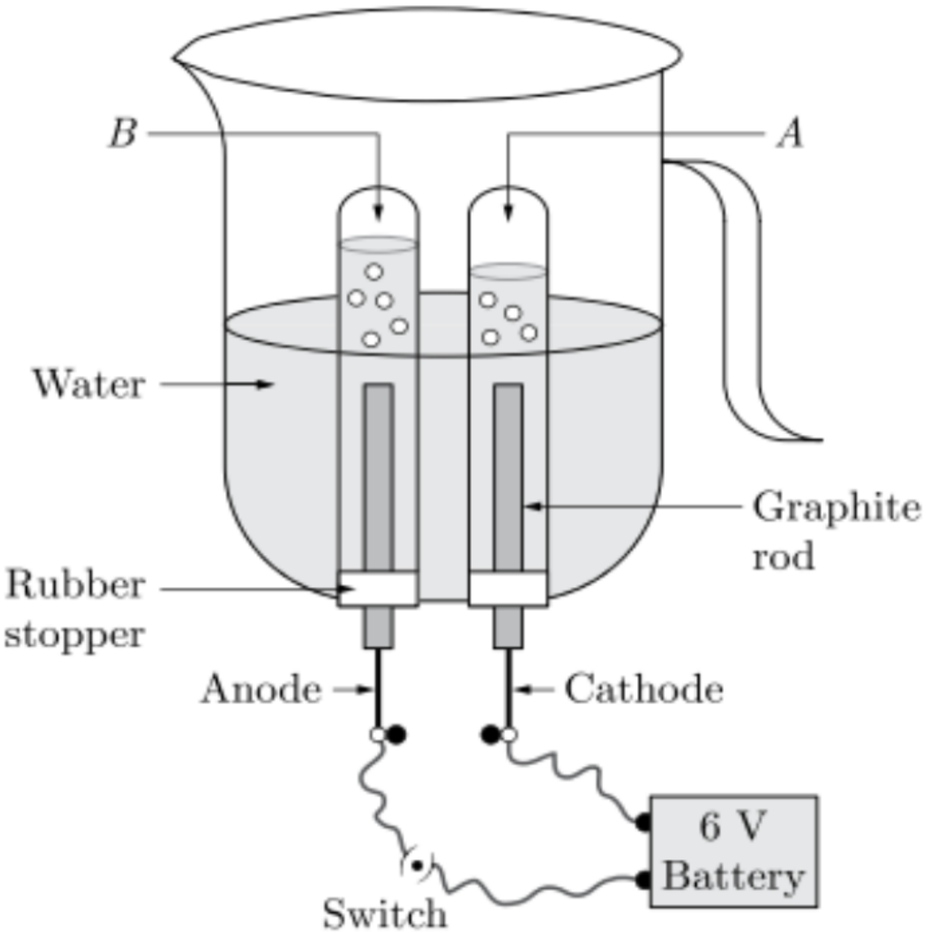
(a) Black

(b) Brown

(c) Green

(d) Orange

A experimental arrangement of formation of gas is shown in the figure:



Which gas is present in tube A?

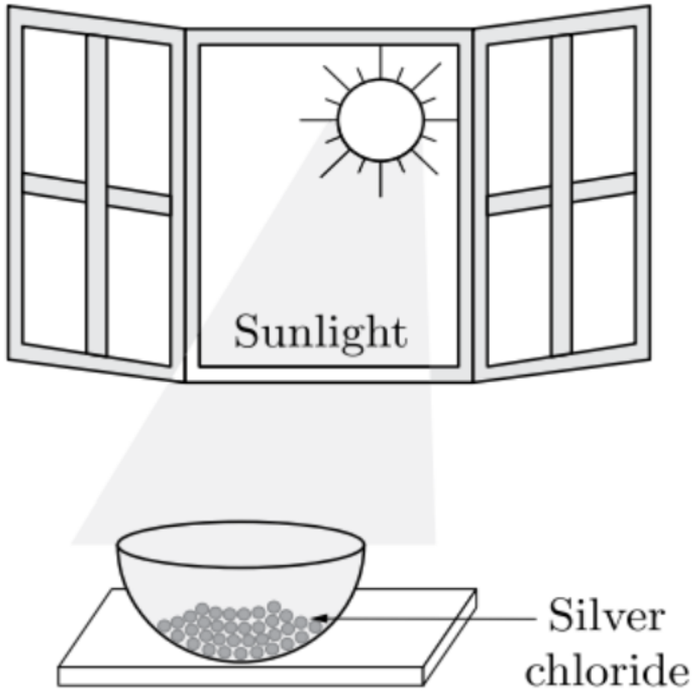
(a) Oxygen

(b) Hydrogen

(c) Helium

(d) Nitrogen

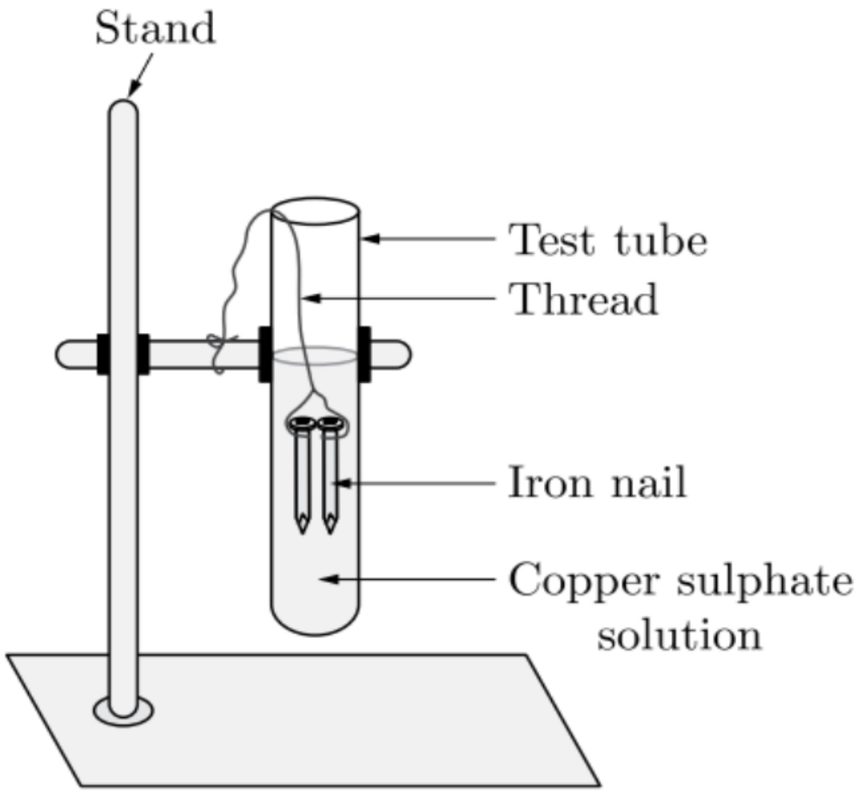
The silver chloride placed under the sunlight as shown in the figure:



The colour of silver chloride after some time is:

(a) Black
(b) Green
(c) Gray
(d) Yellow

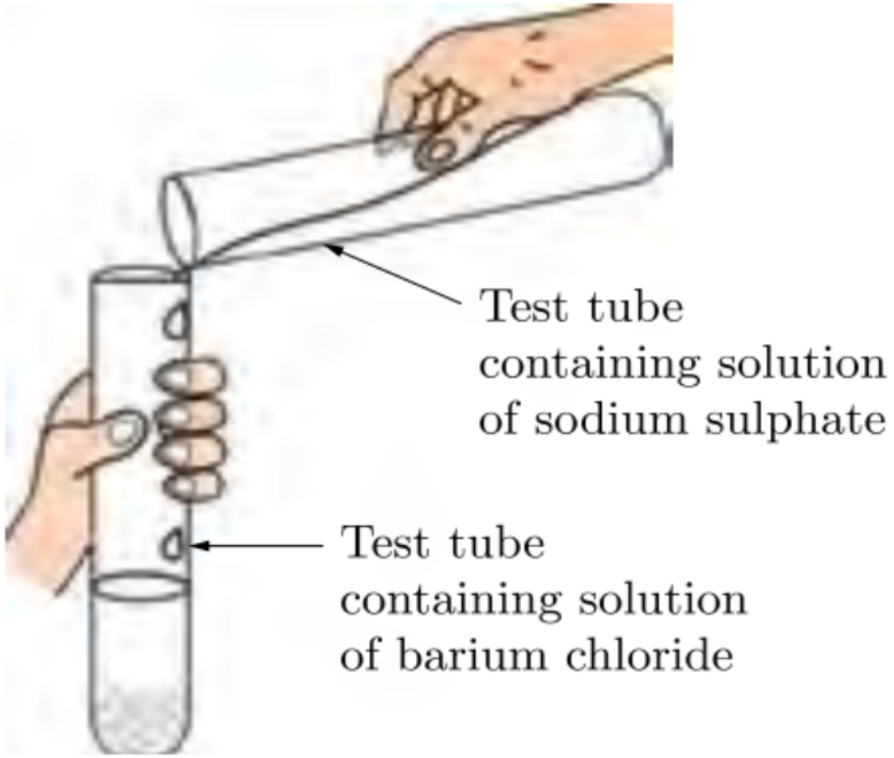
One day Mohan was performing an experiment in the laboratory. By mistake he leaves the iron mail in the copper sulphate solution for one week.



After one week, the colour of sulphate solution is:

(a) Green
(b) Yellow
(c) Red
(d) Colourless

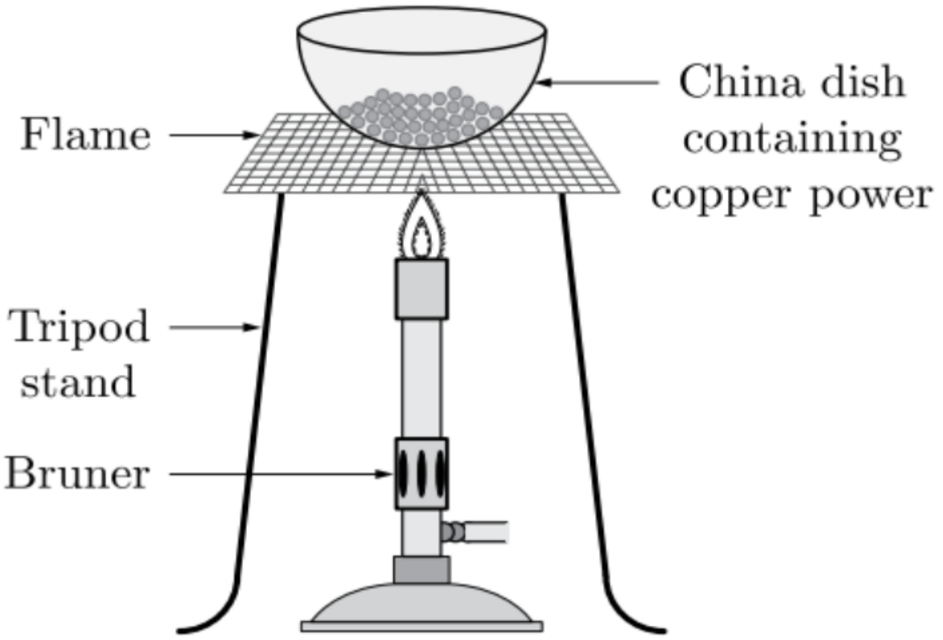
Sodium sulphate and barium chloride mixed together as shown in the figure.



Which colour substance is formed in the test tube?

(a) White
(b) Black
(c) Green

A small amount of copper power is heated as shown in the figure.



Which reaction shows the above process?

(a) $2Cu + O_2 \longrightarrow 2CuO$

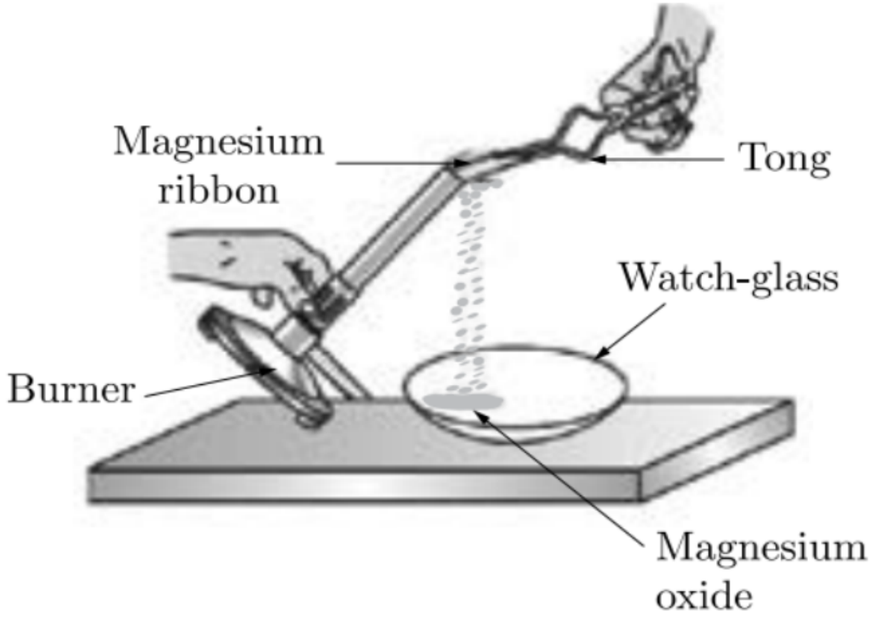
(b) $CuO + H_2 \longrightarrow Cu + H_2O$

(c) $Cu + O_2 \longrightarrow 2CuO$

(d) $CuO + N_2 \longrightarrow Cu + N_2O$

The science teacher ordered to Mohit done the following practical step with magnesium ribbon:

1. Clean a magnesium ribbon about 3-4 cm long by rubbing it with sandpaper.
2. Hold it with a pair of tongs. Burn it using a spirit lamp or burner and collect the ash so formed in a watch-glass as shown in Figure. Burn the magnesium ribbon keeping it away as far as possible from your eyes.



Which of the following reaction is take place here?

(a) $2Mg + O_2 \longrightarrow 2MgO$

(b) $2Mg + H_2 \longrightarrow 2MgH$

(c) $2Mg + N_2 \longrightarrow 2MgN$

(d) $2Mg + He_2 \longrightarrow 2MgHe$

most Important - Q/A