Grade : VIII

Lesson 4. Material: Metals and Non-Metals

Basic concepts – A Flow Chart

	Metals	Non- Metals
Physical Properties		
Malleability Ductility Sonority Conduction of electricity	Malleable Ductile Sonorous Good conductor	Non-malleable Non-ductile Non-sonorous Poor conductor (Except Graphite)
Chemical Properties		
Reaction with Oxygen	Form metal oxides which are basic in nature.	Form acidic oxides or neutral oxides.
Reaction with water	Produce a metal oxide along with hydrogen gas.	Generally do not react with water.
Reaction with Acids	Produce hydrogen gas that burn with a pop.	Generally do not react with acids.
Reaction with Bases.	Produce hydrogen gas.	Reaction with bases are complex.
Displacement Reactions	A more reactive metal can displace a less reactive metal from its compound in solution or molten state.	Do not take place.
Uses	• Metals being good conductors of heat are use for making cooking utensils • Gold, Silver and platinum are used to make jewellery. • Iron, copper and aluminum are used to make cokking utensils, fittings. • Copper and aluminum are used to make wires to conduct electricity. • Mercury is used in the construction of buildings. • Aluminum and zinc are used in coating iron to prevent its rusting.	• Chlorine is used as a disinfectant and for water purification. • Phosphorus is used in manufacturing phosphoric acid and superphosphate fertilizer. • Sulphur is used for making suphuric acid which in turn is used for making plastic, dyes, durgs, detergents, explosives and fertilizers. • Phosphorus is used in the preparation of fireworks and smoke screens. • Powdered graphite is used as a dry lubricant.

Know the Terms

- **Displacement Reactions:** When in a chemical reaction, a more active metal displaces less active metals from their solutions, it is called displacement reaction.
- **Activity Series** : Metals are arranged in the order of their decreasing activity. This arrangement is called the activity series.
- **Alloys** : An alloy is a solid mixture of two or more metals or metal and non-metal.
- **Elements** : The substances which are made up of similar kind of particles are called elements.

Objective Type Questions

(1 Mark each)

I. Multiple Choice Questions

1. Which is not a property of non-metal?

(a) Ductility (b) Solid state (c) Can be conductors (d) All

2. Metals can be cut with a knife :

(a) Sodium and iron (b) Potassium and copper

(c) Copper and iron (d) Sodium and potassium.

3. Sulphurous acid turns blue litmus paper into :

(a) Blue (b) Red (c) Neutral (d) No reaction

4. Sodium metal is stored in :

(a) Oil (b) Petrol (c) Kerosene (d) Diesel

5. Some metals react with bases to produce gas :

(a) Oxygen (b) Nitrogen (c) Hydrogen (d) Carbon dioxide

6. Which statement is not correct for non-metals?

(a) Non-metals do not react with acids (b) Non-metals are not ductile

(c) Non-metals are not sonorous (d) Non-metals can be drawn into wires

7. Metals are not used in making :

(a) Machinery (b) An antiseptic (c) Satellite (d) Utensils

1. (a)	2. (d)	3.(b)	4. (c)	5. (c)	6. (d)	7• (b)

I. Multiple Choice Questions

1. The most reactive metal is

a. Iron b. Gold c. Zinc d. Potassium

2. The liquid metal at room temperature is

a. Mercury b. Bromine c. Sodium d. Gold

3. Non-metals are generally

a. Liquids b. Gases c. Solids and gases d. All of these

4. The metal which is stored in kerosene

a. Phosphorus b. Magnesium c. Sodium d. Zinc

5. The non-metal which is liquid at room temperature is

a. Carbon b. Iodine c. Bromine d. Chlorine

6. Materials around us can be classified into

a. Elements and compounds b. Metals and non-metals

c. Acids and bases d. None of these

7. All metals are solids except

a. Sodium b. Calcium c. Mercury d. Hydrogen

8. The nature of metal oxides is

a. Acidic b. Basic c. Neutral d. All of these

9. The metal which can be cut with a knife

a. Sodium and potassium b. Barium and calcium

c. Sodium and mercury d. Potassium and calcium

10. When non-metal react with water then

a. Hydrogen gas is formed b. Carbon dioxide gas is formed

c. Non-metals do not react with water d. None of these

1. d	2. a	3. d	4. c	5. c	6. b	7. c	8. b	9. a	10. c

I. Fill in the blanks

1. Generally metals are good conductors of _____ and _____.

2. Solutions of non-metallic oxides turn blue litmus paper into _____

3. Metals react with sodium hydroxide to produce _____gas.

4. Non-metal is used in _____

5. Non-metals are used in the purple coloured solutions that are applied on_____ as an _____.

6. A more reactive _____can replace a _____ metal.

7. _____ are lustrous whereas _____ have no luster.

8. On burning, metals react with oxygen to produce _____ that are _____in nature.

9. _____ catches fire if exposed to air.

10. _____ are used to wrap food items.

1. Heat, electricity	2. Red	3. Hydrogen
4. Crackers	5. Wounds, antiseptic	6. Metal, less reactive
7. Metals, non-metals	8. Metallic oxides, basic	9. Phosphorus
10. Aluminium foils		

II. Fill in the blanks

1. The nature of metallic oxides is _____.

2. The oxides produced by the reaction of non-metal with oxygen _____ in nature.

3. _____ litmus paper turns _____ when it is dipped in a basic solution.

4. The only liquid metal is _____.

5. The only liquid non-metal is _____

6. All metals are hard but _____ and _____ are soft.

7. _____ are used in making machinery.

8. Metals give _____ when they react with acids.

9. Materials can be classified into _____ and _____.

1. Basic	2. Acidic	3. Red, blue	4. Mercury	5. Bromine
6. Sodium , Potassium	7. Metals	8. hydrogen	9. Metals , Non-metals	

I. Match the following.

I. Column A		Column B	
(i)	Metallic oxide	(a)	Liquid metal
(ii)	Non-metallic oxide	(b)	Kept in kerosene
(iii)	Basic solution	(c)	Kept in water
(iv)	Mercury	(d)	Basic in nature
(v)	Sodium	(e)	Acidic in nature
(vi)	Phosphorus	(f)	Turns red litmus into blue

(i). (d)	(ii). (e)	(iii) . (f)	(iv) . (a)	(v) . (b)	(vi). (c)

II. Column A		Column B	
(i)	Liquid metal	(a)	Soft metals
(ii)	Metallic oxide	(b)	Non-metal
(iii)	Sodium and potassium	(c)	Bromine
(iv)	Chlorine	(d)	Mercury
(v)	A liquid non-metal	(e)	Basic in nature

(i). (d)	(ii). (e)	(iii) . (a)	(iv) . (b)	(v) . (c)

II. Match the following.

Column I	Column II
1. Iron	a. Non-metal
2. Sodium	b. Metallic hydroxide
3. Phosphorus	c. Metal
4. Calcium hydroxide	d. Rust
5. Lustre	e. Kerosene
6. Mercury	f. Thermometers

1. d	2. e	3.a	4. b	5. c	6. f

III. Match the following.

Column A	Column B
a. Oxygen	i. For making crackers
b. Copper	ii. For disinfecting water
c. sulphur	iii. All living beings inhale during breathing
d. Iron	iv. For making electric wires
e. Chlorine	v. For making rails

a. iii	**b. iv**	**c. i**	**d.v**	**e.ii**

I. True or False

1. Metals are good conductors of electricity but poor conductors of heat. **(NCERT Exemplar)**
2. Some metals react with sodium hydroxide to produce hydrogen gas. **(NCERT Exemplar)**
3. When metals react with acid, they form oxygen gas.
4. Metals show displacement reaction whereas Non-metals do not show any displacement reaction.
5. The Non-metallic oxides turns red litmus into blue.
6. Mercury is the only metal which is found liquid at room temperature.
7. Sulphite of iron is rust.
8. Non-metals are essential for our life.
9. Metals are not essential for our life.
10. A more reactive metal can replace a less active metal.
11. Reaction of non-metals with bases are complex.

1. False	2. True	3. False	4. True	5. False	6. True
7. False	8. True	9. False	10. True	11. True	

II. True or False

1. Metals react with water.
2. Non-metal can be converted into wires.
3. Bromine is the only liquid metal.

4. The property of heating metals into thin sheets is called malleability.

5. Metals produce basic oxide with oxygen.

6. Metals are solid except mercury.

7. Non-metals are found in all the three states, namely, solid, liquid, gas.

8. Sodium and potassium are kept in water.

9. Sodium is such a hard metal, that is cannot be cut with a knife.

10. Chlorine is a very reactive emetal.

1. True	2. False	3. False	4. True	5. True	6. True	7. True	8. False	9. False	10.False

NCERT Corner

Intext Questions

1. Why do copper utensils get greenish deposition on their surface on standing for long?

After a long standing, the copper of utensils, reacts with oxygen of air and forms its oxides which are greenish in nature. That is why, the copper utensils get greenish deposition on their surface on long standing.

2. I have understood the reactions taking place in beakers A and B. But I am still confused why there is no change in beakers C, D and E. There could be displacement of zinc by copper in beaker C and by Iron in beaker E. Similarly iron could be displaced by copper in beaker D.

The rule is that zinc is more reactive than copper and iron, and a more reactive metal can replace a less reactive metal, but a less reactive one cannot replace a more reactive metal. That is why there are no displacement reactions in beakers D and E.

3. Paheli : I heard that magnesium is found in plants. In what form is it found in them?

Magnesium oxide.

4. Bhoojho : Doctor reported iron deficiency in my body. Where is iron in my body?

Iron is present in the blood.

Textbook Questions

1. Which of the following can be beaten into thin sheets?

(a) Zinc **(b) Phosphorus** **(c) Sulphur** **(d) Oxygen**

(a) Zinc can be beaten into thin sheets because zinc is a metal, while phosphorus, sulphur and oxygen are non-metals.

2. Which of the following statements is correct?

(a) All metals are ductile.

(b) All non-metals are ductile.

(c) Generally, metals are ductile.

(c) Generally, metals are ductile.

3. Fill in the blanks:

(i) Phosphorus is very _____ non-metal.

(ii) Metals are conductors of heat and _____

(iii) Iron is _____ reactive than copper.

(iv) Metals react with acids to produce _____gas.

(i) reactive	(ii) good, electricity	(iii) more	(iv) hydrogen

4. Mark 'T' if the statement is true and 'F' if it is false.

(i) Generally, non-metals react with acids.

(ii) Sodium is a very reactive metal.

(iii) Copper displaces zinc from zinc sulphate solution.

(iv) Carbon can be drawn into wires.

(i) False	(ii) True	(iii) False	(iv) False

5. Some properties are listed in the following table. Distinguish between metals and non-metals on the basis of their properties.

S.No.	Properties	Metals	Non-metals
	(1) Appearance		
	(2) Hardness		
	(3) Malleability		
	(4) Ductility		
	(5) Heat conduction		
	(6) Conduction of electricity		

Metals are shiny in appearance, hard, malleable, ductile and good conductors of heat and electricity.

Non-metals are dull in appearance, soft, non-malleable, non-ductile and bad conductors of heat and electricity.

6. Give the reasons for the following :

(i) Aluminium foils are used to wrap food items.

(ii) Immersion rods are made up of metallic substances.

(iii) Copper cannot displace zinc from its salt solution.

(iv) Sodium and potassium are stored in Kerosene.

(i) Aluminium is comparatively more malleable metal than others, so, the sheets of aluminium can be drawn easily. So, aluminium foils are used to wrap food items.

(ii) Metals are good conductors of heat and electricity. In immersion rods, electrical energy converts into heat energy. So, immersion rods are made up of metallic substances.

(iii) Zinc is more reactive than copper and a more reactive metal can replace a less reactive metal, but a less reactive one cannot replace a more reactive metal. That is why copper cannot displace zinc from its salt solution.

(iv) Sodium and potassium are very reactive and they start to burn when they come in contact with air. So, to prevent burning, sodium and potassium are stored in kerosene.

7. Can you store acidic food stuffs in aluminium utensils? Explain.

As aluminium reacts very fast with acidic solutions, so we cannot store acidic food stuffs in aluminium utensils.

8. In the following table some substances are given in Column I. In Column II some uses are given. Match the items in column I with those in Column II.

Column I	Column II
1. Gold	(a) Thermometers
2. Iron	(b) Electric wire
3. Aluminium	(c) Wrapping food
4. Carbon	(d) Jewellery
5. Copper	(e) Machinery
6. Mercury	(f) Fuel

1. (d)	2. (e)	3. (c)	4. (f)	5. (b)	6. (a)

9. What happens when :

(i) Sulphuric acid is poured on copper plate

(ii) Iron nails are placed in copper sulphate solution. Write word equations of the reactions involved.

(i) Copper plate reacts with sulphuric acid and forms copper sulphate and hydrogen gas and a blue colour of copper sulphate appears.

Cu	+	H_2SO4	→	$CuSO_4$	+	H_2
Copper		Sulphuric Acid		Copper Sulphate (Blue colour)		Hydrogen gas

(ii) When iron nails are placed in copper nulphate solution, displacement reaction takes place in which iron displaces copper as iron is more reactive than copper.

$CuSO_4$	+	Fe	→	$CuSO_4$	+	Cu
Copper Sulphate		Iron		Iron		Copper

10. Saloni took a piece of burning charcoal and collected the gas evolved in a test tube.

(i) How will she find the nature of the gas?

(ii) Write down word equations of all reactions taking place in this process.

(i) When charcoal is burnt, carbon dioxide gas is produced. This gas turns lime water milky. The nature of the gas can be tested by using moist red and blue litmus paper. No effect on red litmus but the gas turns blue litmus to red, so it is acidic in nature.

(ii) Equations of all the reactions are :

C	+	O_2	→	CO_2
Carbon		Oxygen		Carbon dioxide

Carbon dioxide + Lime water → Milky

Carbon dioxide + Blue Litmus → Red

12. One day Reeta went to a jeweller's shop with her mother. Her mother gave old jewellery to the goldsmith to polish. Next day, when they brought the jewellery back, they found that there was a slight loss in its weight. Can you suggest a reason for the loss in weight?

Gold is a metal which is washed or polished in acidic solution. During the process of polishing, some gold dissolves in acid to form oxide. This causes the loss of gold from the jewellery.

I. Very Short Answer Type Questions.

1. How many types of materials are there?

There are two types of materials;

(i) Metals (ii) Non-metals

2. You are given following materials. Classify them into metals and non-metals;

Iron , Coal , Sulphur , Aluminium and Copper.

Iron , aluminium and copper are the metals.

Coal , sulphur are non-metals.

3. How can you distinguish metals form non-metals?

Metals can be distinguished from non-metals on the basis of their physical and chemical properties.

4. Name two physical properties.

(i) Lustre (ii) Hardness

5. What do you mean by malleability?

The property of metals by the virtue of which they can be beaten into thin sheets is called malleability.

6. Coal and pencil lead do not show the property of malleability. Can we call them metal?

No, they are not metals.

7. What do you mean by conductivity?

The metals allow the electricity to pass through them. This property of metals is called conductivity.

8. What is ductility?

The property of metals by the virtue of which they can be drawn into wires is called ductility.

9. What do you mean by sonority?

The property of metal, to produce ringing sound is called sonority.

10. **Why are metals called sonorous?**

Since metals produce ringing sounds, they are called sonorous.

11. **Which materials are called non-metals?**

The materials which are not sonorous and are poor conductor of heat and electricity are called non-metals.

12. **Name two metals which can be cut with a knife.**

Sodium and Potassium

13. **Write the name of a metal which is found in liquid state at room temperature.**

Mercury

14. **What is rust chemically known?**

The rust is chemically known as Iron (III) oxide.

15. **What happens when a metal reacts with oxygen?**

Metal oxide is formed when metal reacts with oxygen.

Metal + Oxygen → Metal oxide

16. **What is the nature of metal oxide?**

Metal oxide are basic in nature.

17. **What happens when a solution of metal oxide is test with (i) blue litmus and (ii) red litmus?**

(i) No change in the colour of blue litmus.

(ii) The red litmus changes into blue colour.

18. **Give a chemical equation when iron reacts with oxygen.**

Iron (Fe) + Oxygen (O_2) → Fe_2O_3 (Iron oxide)

19. **Name the product formed by the reaction of sulphur and oxygen.**

Sulphur dioxide gas.

20. **Write the balanced chemical equation when sulphur dioxide is dissolved in water.**

Sulphur dioxide (SO_2) + Water (H_2O) → Sulphurous acid (H_2SO_3)

21. **What is the effect of sulphurous acid on blue litmus?**

Blue litmus turns red.

22. **What is the nature of non-metal oxides?**

Mostly non-metallic oxides are acidic in nature.

23. **What happens when sodium reacts with water?**

Sodium is highly reactive metal. It starts to burn in water to form sodium hydroxide.

24. Write a balanced chemical equation the reaction that takes place between water and sodium.

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

25. Why is sodium stored in kerosene?

Sodium reacts very vigorously with oxygen and water and catch fire. Therefore, it is stored in kerosene.

26. Name a non-metal which is kept in water.

Phosphorous is stored in water.

27. What happens when a metal reacts with acids?

Metal generally reacts with acids to give hydrogen gas.

28. What happens when a non-metal reacts with acid?

Non-metals generally do not react with acids.

29. Does metal also react with bases?

Metals also react with some bases like sodium hydroxide and produce hydrogen gas.

30. What do you mean by displacement reaction?

The reaction in which a more reactive metal can replace a less reactive metal, but a less reactive metal cannot replace a more reactive metal is called displacement reaction.

31. Give one example of displacement reaction.

When copper sulphate solution reacts with zinc, then it displaces copper.

$CuSO_4$ (Copper sulphate) + Zn (Zinc) $\rightarrow$ $ZnSO_4$ (Zinc sulphate) + Cu (Copper)

32. Write the name of two most malleable metals.

Gold and Silver.

33. Name two most ductile metals.

Gold and Silver

34. Write the name of non metal, which is most essential for life.

Oxygen gas

35. What are the essential conditions is for rusting?

(i) Presence of moisture (water)

(ii) Presence of air (oxygen)

II. Very Short Answer Type Questions.

1. Name two soft metals which can be cut with a knife. **(NCERT Exemplar)**

Metals which can be easily cut with a knife

(i) Sodium (ii) Potassium

These are soft metals.

2. Which non-metal is essential for our life and all living beings inhale it during breathing? **(NCERT Exemplar)**

Oxygen gas is essential for our life.

3. Name two major non-metals which are present in fertilizers and enhance the growth of plants. **(NCERT Exemplar)**

(i) Nitrogen (ii) Phosphorus

4. Which non-metal is used to disinfect water? **(NCERT Exemplar)**

Chlorine is used in water purification plants because chlorine has the power to kill germs.

5. A purple coloured non-metal forms a brown solution in alcohol which is applied on wounds as antiseptic. Name the non-metal. **(NCERT Exemplar)**

Iodine solution is used as antiseptic.

6. Zinc sulphate forms a colourless solution in water. Will you observe any colour on adding copper turning in it? **(NCERT Exemplar)**

No, displacement reaction does not take place because copper is less reactive than zinc.

7. Why are bells made of metals? (NCERT Exemplar)

Metals are sonorous. So, bells are made of metals.

8. Which of the following metals can displace the other two metals from their salt solution?

Zinc, Iron, Copper so, zinc can replace the other two. **(NCERT Exemplar)**

Among these zinc is most reactive while copper is least reactive. Reactivity of Iron is in between Zinc and copper. So, zinc can replace the other two.

9. Name the property of metal by, which it can be drawn into wires.

Ductility.

10. Name the materials that are not sonorous and are poor conductors of heat and electricity.

Non-metals.

11. Name the metal that is found in liquid state at room temperature.

Mercury.

12. How are metal oxides formed?

Metal oxides are formed when metals react with oxygen.

13. Write two physical properties of metals.

Ductility, sonority.

14. Why is immersion rod used for heating liquids made of metallic substances?

(NCERT Exemplar)

It is because metallic substances are good conductors of electricity.

15. Why are Sodium and potassium stored in kerosene? **(NCERT Exemplar)**

It is because they react vigorously with oxygen and water.

16. Why copper cannot displace zinc from its salt solution? **(NCERT Exemplar)**

It is because zinc is more reactive than copper.

III. Very Short Answer Type Questions.

1. Name two soft metals which can be cut with a knife.

a. Sodium b. Potassium

2. Which non-metal is essential for our life and all living beings inhale it during breathing?

Oxygen

3. Name two major non-metals which are present in fertilizers and enhance the growth of plants.

a. Nitrogen b. Phosphours

4. Mark 'T' if the statements is true and 'F' if it is false.

a. Generally, non-metals react with acids

b. Sodium is a vary reactive metal.

c. Copper displaces zinc from zinc sulphate solution.

d. Coal can be drawn into wires.

a. F b. T c. F d. F

5. A purple coloured non-metal forms a brown solution in alcohol which is applied on wounds as an antiseptic. Name the non-metal.

Iodine

6. Zinc sulphate forms a colourless solution in water. Will our observe any colour on adding copper turning in it?

No, because displacement reaction does does not take place.

7. Define malleability.

The property of metals by which they can be beaten into thin sheets.

8. What is ductility?

The property of metal by which it can be drawn into wires is called ductility.

9. Why sodium metal is kept is Kerosene oil?

Sodium metal is very reactive, it reacts vigorously with oxygen and water and catches fire, so it is stored in kerosene oil.

10. What is an alloy?

Alloy is a homogeneous mixture of two or more metals, one metal or one non-metal.

11. Why are bells made of metals?

Metals are sonorous.

12. Which liquid metal is used for making thermometers?

Mercury.

13. Which of the following metals can displace the other two metals form their salt solutions?

Zinc, iron, copper

Zinc

I. Short Answer Type Questions.

1. Paheli bought a statue made of copper. To her surprise it acquired a dull green coating after a couple of months. Explain the reason.

The green material is a mixture of copper hydroxide and copper carbonate formed due to reaction of copper with moist air (water, oxygen, and carbon dioxide)

2. In the figure given below you find the at the bulb glows when an iron nail is placed between two ends or wire .complete the following sentences on the basis of this fact.

a. _____. Is a metal.

b. Metals are good _____ of electricity.

a. Iron

b. conductors

3. If in the above figure iron nail is replaced by a wooden stick, will the bulb glow of not? Justify your Answer.

The bulb will not glow as wood is not a good conductor of electricity.

4. Paheli prepared a blue coloured solution of copper sulphate in beaker A and placed an iron nail in it. Booojho prepared a yellowish green solution of ferrous sulphate in beaker B and placed a copper wire in it. What changes will they observe in the two beakers after an hour?

In breaker A, a reddish brown layer of copper will deposit deposit on the iron nail and the blue coloured solution will become yellowish green.

5. A doctor prescribed a tablet to a patient suffering from iron deficiency. The tablet does not look like iron explain.

The tablet is not made of iron metal, instead it contains a salt of iron.

II. Short Answer Type Questions.

1. Complete the following table on the basis of appearance and hardness of the materials.

Object/ Material	Appearance (Shiny/Dull)	Hardness (Very hard/not very hard)
Iron Coal Sulphur Aluminium Copper		

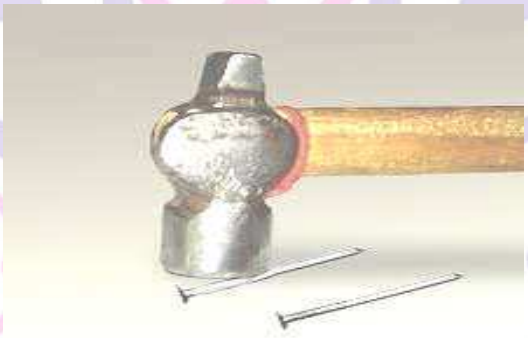
Object/ Material	Appearance (Shiny/Dull)	Hardness (Very hard/not very hard)
Iron	Shiny	Very hard
Coal	Dull	Not very hard

Sulphur	Dull	Soft
Aluminium	Shiny	Hard
Copper	Shiny	Very hard

2. Have you ever seen a blacksmith beating an iron piece? Do you find a change in the shape of these pieces on beating? Would you expect a similar change in wood long on beating?

Yes, we have seen blacksmith beating the iron pieces. We have seen the changes in the shape on beating. It increases in size and it does not break. If a wood long is beaten, it does not change its shape, but it breaks into pieces.

3. What happens when some materials are beaten> Explain with the help of an activity and write your observations in a table.



Take a small iron nail, coal piece, aluminium wire and a pencil lead. Beat these materials with a hammer, one by one. Record your observation in the following table.

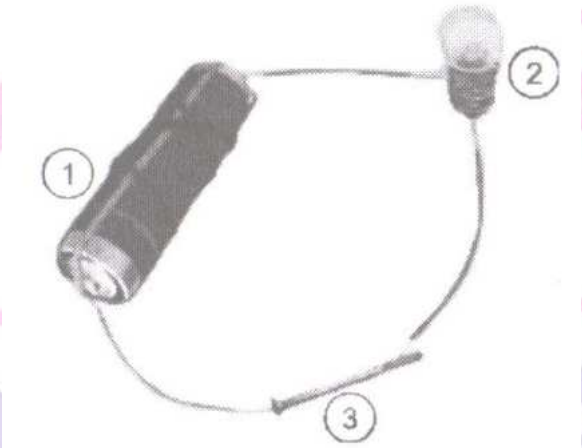
Object/Material	**Change in Shape (Flatten/Breaks into pieces)**
Iron nail	Flatten
Coal piece	Breaks into pieces
Aluminium wire	Flatten
Pencil lead	Breaks into small pieces

4. What is malleability? Name two most malleable metals.

We see that the shape of iron and aluminium and other metals changes on beating. This property of metals due to which they can be beaten into thin sheets is called malleability. Silver and gold are the most malleable metals.

5. Explain how metals are good conductors electricity, with the help of an activity.

Prepare an electric circuit as shown in the figure. This circuit is used to test, whether electricity can pass through a material or not. Repeat this activity with different material shown in the table.



Observe and group these materials into good conductors and poor conductors;

Electrical Conductivity of Materials

S.No	Materials	Good Conductor/Poor Conductor
1	Iron rod /nail	Good conductor
2	Sulphur	Poor conductor
3	Coal piece	Poor conductor
4	Copper wire	Good conductor

We see that iron nail and copper wire are made of metals and are good conductors. So we can say that metals are good conductors.

6. List some physical properties of metals.

Physical properties of metals;

(i) Hardness (ii) Lustrous

(iii) Malleable (iv) Ductile

(v) Sonorous (vi) Good conductor of heat and electricity

7. Write some physical properties of non-metals.

(i) Dull appearance (ii) Softness

(iii) Non sonorous (iv) Poor conductor of heat and electricity

(v) Brittle

8. What happens, when a magnesium ribbon is heated in presence of air?

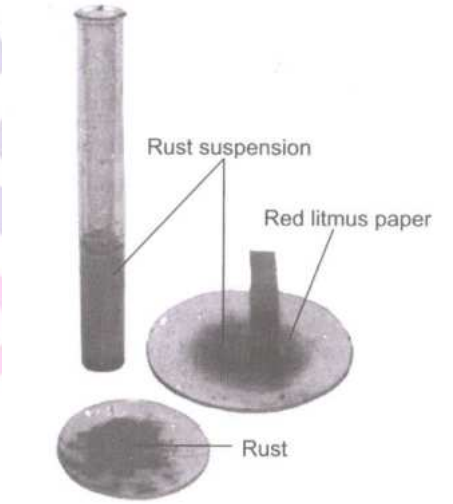
When a magnesium ribbon is heated in presence of air on a burner flame, after some time, it starts burning with a white flame and white powder is formed which is called magnesium oxide.

Mg + O2 → MgO

(Magnesium) (Oxygen) (Magnesium Oxide)

9. Explain an activity to test the nature of rust.

Collect some amount of rust after the reaction between iron, oxygen and water. Dissolve it in little amount of water. Shake the mixture of rust and water. Test the solution with the red and blue litmus papers. We observe that red litmus paper turns blue. It shows that the nature of rust is basic.



10. What happens when a copper vessel is exposed to moist air?

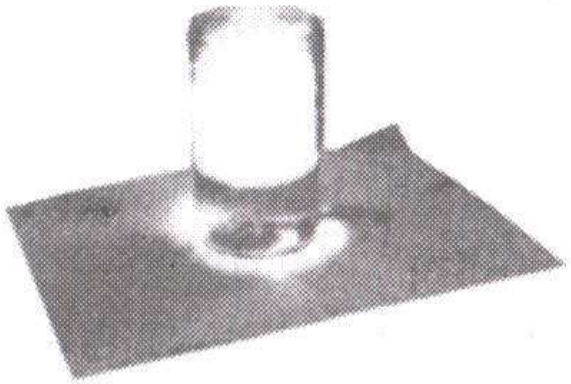
When a copper vessel is exposed to moist air for a long time, it acquires a dull green coating. The green substance is the mixture of copper hydroxide [$Cu(OH)_2$] and copper carbonate ($CuCO_3$)

$$2Cu + \underbrace{H_2O + CO_2 + O_2}_{\text{(moist air)}} \rightarrow \underbrace{Cu(OH)_2 + CuCO_3}_{\text{(green coating)}}$$

11. Explain the reaction of sodium and water with the help of an activity.

Take a beaker, fill it half with water. Cut a small piece of sodium metal. Dry it using filter paper and wrap it in a small piece of cotton. Put the piece of sodium, wrapped in cotton into the beaker. We observe that beaker becomes hot. We test the solution with red and blue litmus papers. It turns red litmus into blue. This activity indicates that sodium is highly reactive

and it reacts vigorously with water. A lot of heat is generated in the reaction to form basic solution of sodium hydroxide.

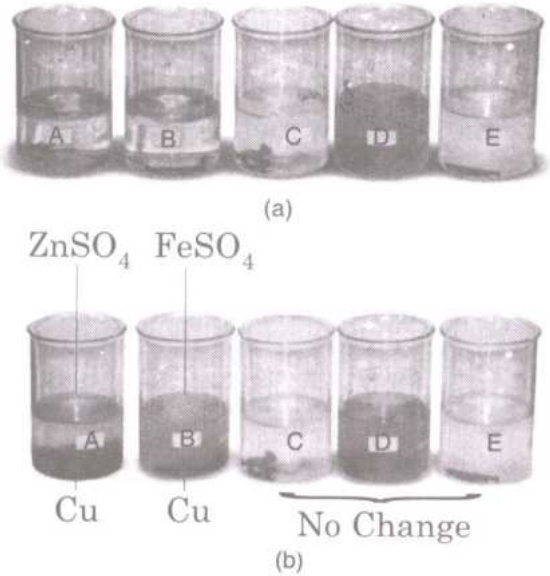


12. What happens when samples of metals and non-metals are mixed with acids?

We observe that non-metals do not react with acids but metals react with acids and produces hydrogen gas, that burns with a pop sound. Copper does not react with sulphuric acid.

13. Explain displacement reaction with the help of an activity.

Take five beakers of 100 mL and label them A , B , C , D and E. Take about 50 mL of water in each beaker. Dissolve a teaspoon full of copper sulphate ($CuSO_4$) in beakers A and B; and zinc sulphate ($ZuSO_4$) and iron sulphate ($FeSO_4$) in beakers C, E and E; respectively. Put zinc granule (Zn), iron nail (Fe), copper turnings (Cu); copper turning (Cu) and iron nail (Fe) in the beakers respectively. Observe the changes we see that in beakers A and B colour is changed, while in beakers C , D , E , there is no change of colour. Beakers A and B show the displacement reaction.



Beaker A : Copper sulphate ($CuSO_4$) + Zinc granule (Zn)

Beaker B : Copper sulphate ($CuSO_4$) + Iron nail (Fe)

Beaker C : Zinc sulphate ($ZnSO_4$) Copper turning (Cu)

Beaker D : Iron sulphate ($FeSO_4$) + Copper turning (Cu)

Beaker E : Zinc sulphate ($ZnSO_4$) + Iron nail (Fe)

Reactions :

A : $CuSO_4$ + Zn → ZnSO4 + Cu

B : $CuSO_4$ + Fe → FeSO4 + Cu

C : $ZnSO_4$ + Cu → No change

D : $FeSO_4$ + Cu → No change

E : $ZnSO_4$ + Fe → No change

In these reactions, we have seen that only more reactive metal displaces the less reactive metal, but the less reactive metal does not do so.

14. Sodium metal is kept in kerosene but not water. Why?

Sodium metal is highly reactive metal, when exposed in air, it starts to burn to form oxide. In the same way, it form hydroxide with water. It does not react with kerosene. So, to prevent it, it is kept in kerosene, and not in water.

15. Phosphorus is kept in water. Why?

Generally, non-metal do not react with water, but they may very reactive in air. Such non-metals are stored in water; phosphorus is a very reactive non-metal. It catches fire, if exposed in air. To prevent this, it is kept in water.

III. Short Answer Type Questions-I

1. The doctor reported iron deficiency in the body. Where is iron present in our body?

(NCERT Exemplar)

Iron is present in our blood. Red blood cells (RBCs) of blood contain a respiratory pigment known as hemoglobin. Each molecule of hemoglobin contains iron atom as it's important component.

2. A doctor prescribed a tablet to a patient suffering from iron deficiency. The tablet does not look like iron. Explain.

Iron is a metal but the tablet is not made up of iron metal. It is made up of a salt of iron. So, it does not look like iron.

3. In what form is magnesium found in plants? (NCERT Exemplar)

Magnesium is found in plants in the form of ionic salts in chlorophyll. Due to its deficiency, plants are unable to produce enough chlorophyll and as a result, leaves develop yellowish colour.

4. Sodium metal is kept in kerosene but not in water. Why?

Sodium metal is highly reactive metal, when exposed in air, it starts to burn to form oxide. In the same way, it forms hydroxide with water. It does not react with kerosene. So, to prevent it, it is kept in kerosene not in water.

5. Write the chemical reaction that shows rusting of iron.

Fe	+	O_2	+	H_2O	→	$Fe_2O_3 .xH_2O$
Iron		Oxygen		Water		Hydrated Iron oxide (Rust)

6. What happens when magnesium ribbon is burnt in air? How will you test for its acidic/basic nature?

A white coloured ash of magnesium oxide is obtained on burning ribbon. When white ash (Magnesium oxide) is dissolved, on testing, it turns red litmus paper to blue. Hence, it is basic in nature.

$$2Mg + O_2 \rightarrow 2MgO$$

7. Complete the following chemical reaction. Sulphur dioxide SO_2 + Water (H_2O) → ? Is it an acid/base?

$SO_2 + H_2O \rightarrow H_2SO_3$(Sulphurous add)

It is an acid.

8. Why is phosphorus stored in water?

Phosphorus is a very reactive non-metal. It catches fire if exposed to air. To prevent contact of phosphorus with atmospheric oxygen it is stored in water.

9. Drop a piece of aluminium in freshly prepared solution of sodium hydroxide. Bring a matchstick near the mouth of test tube. A pop-up sound is heard.

(i) What does this pop-up sound indicate?

(ii) What do you conclude from this reaction?

(i) This 'pop-up' sound indicates the presence of hydrogen gas.

(ii) We conclude that metal reacts with sodium hydroxide to produce hydrogen gas.

10. Write the different uses of metals.

Metals are used in making machinery, automobiles, aeroplane, trains, satellites, industrial gadgets, cooking utensils, water boilers etc.

11.

Copper sulphate ($CuSO_4$) + Zinc (Zn) → Zinc sulphate ($znSO_4$) + Copper (Cu)

(Blue) (Colourless) Red

(i) What is this reaction called?

(ii) Is it a reversible chemical reaction? Why? Why not?

This reaction is called displacement reaction. It is not a reversible reaction because copper is less reactive metal than zinc. It is unable to replace zinc from zinc sulphate solution.

12. Why are aluminium foils used to wrap food items?

Aluminium can be converted into thin sheets that can be folded into any shape. Further, it is available at affordable cost.

13. Write characteristics of metals.

Or

Write characteristics of non-metals.

Characteristics of metals :

(1) Metals can be hammered into sheets (malleable).

(2) Metals can be drawn into wires (ductile).

(3) Metals give ringing sound (sonorous).

(4) Metals are good conductors of heat and electricity.

OR

Characteristics of non-metals :

(1) Non-metals are brittle.

(2) They can be broken into pieces on heating. (non-malleable, non-ductile)

(3) Non-metals are poor conductors of heat and electricity.

(4) They are non-sonorous.

III. Short Answer Type Questions-II

1. Paheli bought a statue made up of copper. To her surprise, it acquired a dull green coating after a couple of months. Explain the reason. (NCERT Exemplar)

The green material is a mixture of copper hydroxide [$Cu(OH)_2$] and copper carbonate [$CuCO_3$] formed due to the reaction of copper with moist air.

$$2Cu + \underbrace{H_2O + CO_2 + O_2}_{\text{Moist air}} \rightarrow \underbrace{Cu(OH)_2 + CuCO_3}_{\text{Green Coating}}$$

2. Paheli prepared a blue coloured solution of copper sulphate in beaker A and placed an iron nail in it. Boojho prepared a yellowish green solution of ferrous sulphate in beaker B and placed a copper wire in it. What changes will be observed in the two beakers, after an hour?

In beaker A, a reddish brown layer of copper will deposit on the iron nail and blue coloured solution of copper sulphate will become yellowish green due to the formation of iron sulphate. This is because iron is more reactive than copper and it displaces copper from its salt solution. In beaker B, no change is observed because copper being less reactive does not displace iron (more reactive) from ferrous sulphate solution.

3. Write an activity to test whether sulphur solution is acidic or basic in nature.

Activity to test whether sulphur solution is acidic or basic in nature:

(i) Take a small amount of powdered sulphur in a deflagrating spoon and heat it.

(ii) As sulphur starts burning introduce it into a gas jar.

(iii) Cover the gas jar so that gas produced does not escape.

(iv) Remove spoon after some time, add a small quantity water.

(v) Shake it well. Sulphur solution is ready.

(vi) Test it with red and blue litmus papers.

(vii) It turns blue litmus paper red. Hence it is acidic in nature.

4. What do you understand by displacement reactions? What happens when copper sulphate reacts with zinc? Explain this reaction also.

When a more reactive element displaces a less reactive element or molecule from its salt, such reactions are called displacement reactions. These reactions can be well explained in metals. When in copper sulphate solution zinc granules are added, the blue colour of copper

sulphate disappears and a powdery red mass of copper is deposited at the bottom of the beaker. The reaction can be represented as follows :

$CuSO_4$	+	Zn	→	$ZnSO_4$	+	Cu
(Blue)				(Colourless)		(Red)

5. Write three important uses of non-metals.

Important uses of non-metals :

(i) Non-metals are essential for our life as all living beings inhale oxygen and breath out carbon dioxide during breathing.

(ii) They are used in fertilizers to enhance the growth of plants.

(iii) Non-metal is used in the purple coloured solution that is applied on wounds as an antiseptic.

(iv) Non-metals are used in crackers.

6. How are acids and bases formed?

Acids : Acids are formed when non-metals react with oxygen and form non-metallic oxides. These oxides when dissolved in water, form acids, e.g.,

S	+	O_2	→	SO_2
Sulphur		Oxygen		Sulphur dioxide

SO_2	+	H_2O	→	H_2SO_3
Sulphur dioxide		Water		Sulphurous acid

Bases : Bases are formed when metals react with oxygen and form metallic oxides. These oxides when dissolved in water, form bases, e.g.,

2Na	+	O_2	→	Na_2O
Sodium		Oxygen		Sodium oxide
Na_2O	+	H_2O	→	2NaOH
Sodium oxide		water		Sodium Hydroxide

7. Discuss all the physical properties of metals.

Physical properties of metals :

(i) Metals are good conductors of heat and electricity.

(ii) Metals are malleable and ductile.

(iii) They are lustrous and can be polished.

(iv) Generally they are solid at room temperature except mercury.

(v) Metals generally have high melting and boiling points. (Any three)

8. What happens when :

(i) Dilute sulphuric acid is poured on a copper plate?

(ii) Iron nails are placed in copper sulphate solution?

Write word equations of the reactions involved.

(i) When dilute sulphuric add is poured on a copper plate, copper reacts with acid to give copper sulphate and hydrogen.

H_2SO_4 + Cu → $CuSO_4$ + H_2

Sulphuric acid Copper Copper Sulphate Hydrogen

(ii) When iron nails are placed in copper sulphate solution, displacement reaction takes place in which iron displaces copper.

CuSO4 + Fe → FeSO4 + Cu

Copper Sulphate Iron Iron Sulphate Copper

9. Take a piece of burning charcoal and collect the gas evolved in a test-tube.

(i) Find the nature of gas.

(ii) Write down word equations of all the reactions taking place in this process.

(i) Charcoal produces carbon dioxide on burning. This gas turns lime water milky and its solution turns blue litmus to red. Hence, it is acidic.

(ii) C + O_2 → CO_2

Carbon Oxygen Carbon dioxide

10. (i) Why does an aluminium vessel lose its shining soon after use?

(ii) Can we store lemon pickle in aluminium utensils? Explain.

(i) Aluminium is a reactive metal. As it comes in contact with air, it forms a dull layer of aluminium oxide on its surface and hence loses its shine.

(ii) No, we cannot store the lemon pickle in aluminium utensils because aluminium is a metal and lemon is acidic. The acid reacts with metal to give hydrogen which would spoil the food and make it unfit to use.

I. Long Answer Type Questions.

1. Iron is more reactive than copper. Can you write an activity to show this?

(NCERT Exemplar)

Take about 50 ml of water in a beaker and dissolve 5 g of copper sulphate in it to obtain copper sulphate solution (which is blue in colour). Put a clean iron nail in this solution and keep the beaker undisturbed for some time. We will find that the blue colour of copper sulphate solution starts fading gradually and the iron nail gets covered with a red brown layer of copper metal. It is because iron is more reactive than copper, so it displaces copper metal from its solution of copper sulphate. The copper metal sets free from its compound which forms a red-brown layer on the surface of iron nail. This shows that iron is more reactive than copper.

Copper sulphate	+	Iron	→	Iron sulphate	+	Copper
Blue Solution		Grey		Greenish Solution		Red-Brown

2. Discuss all the chemical properties of (a) Metals and (b) Non-metals.

(a) Chemical properties of metals :

(i) Metals react with oxygen to produce oxides which are alkaline in nature. e.g.,

Mg	+	O_2	→	2MgO
Magnesium		Oxygen		Magnesium oxide

(ii) Metallic oxides produce bases by reacting with water differently.

Na_2O	+	H_2O	→	2NaOH
Sodium oxide		Water		Sodium hydroxide

(iii) Metals react with acid to produce hydrogen gas.

2HCI	+	2Na	→	2NaC1	+	H_2
Hydrochloric acid		Sodium		Sodium chloride		Hydrogen

(iv) More reactive metals displace the less reactive metals from their compounds in an aqueous solution.

$CuSO_4$	+	Zn	→	$ZnSO_4$	+	Cu
Copper Sulpahte		Zinc		Zinc Sulphate		Copper

(b) Chemical properties of Non-metals :

(i) Non-metals react with oxygen to produce oxides which are acidic in nature.

S	+	O_2	→	SO_2
Sulphur		Oxygen		Sulphur dioxide

SO_2 + H_2O → H_25O_3

Sulphur dioxide Water Sulphurous Acid

(ii) Non-metals do not react with water.

(iii) Non-metals do not show displacement reactions.

3. Write the difference between metals and non-metals on the basis of their physical properties.

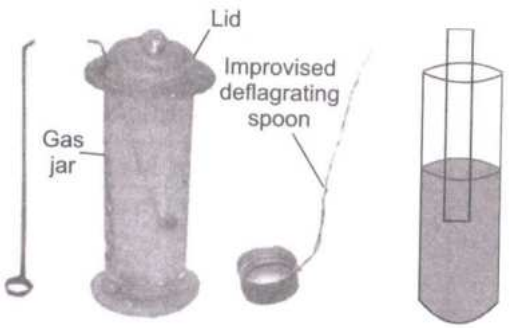
S.No	Metals	Non-Metals
(i)	Metals are good conductors of heat and electricity.	Non-metals are poor conductors of heat and electricity.
(ii)	Metals are malleable and ductile.	Non-metals are neither malleable nor ductile.
(iii)	Metals are lustrous and can be polished.	Non-metals are non-lustrous and cannot be polished.
(iv)	Metals are solids except mercury.	Non-metals can exist in all states.
(v)	Metals have generally have low melting and boiling points.	Non-metals generally high melting and boiling points.

II. Long Answer Type Questions.

1. Explain the reaction of non-metals with oxygen with the help of an activity.

Take some amount of powdered sulphur in a deflagrating spoon and heat it. As soon as sulphur starts burning, introduce the spoon into a gas jar or glass tumbler with a lid to ensure that the gas produced does not escape. Add some amount of water into the tumbler and quickly replace the lid. Shake well. Test the solution with red and blue litmus papers.

We observe that solution changes the colour of blue litmus paper into red. It shows that, non-metallic oxides are acidic in nature.



2. Name the acids and bases which you use in laboratory. Identify the metals or non-metals present in them, which form oxides with oxygen.

Metals and non-metals in Acids and Bases

S.No	Name of the base	Metal	Name of the acid	Non-metal
1	Calcium hydroxide	Calcium	Sulphuric acid	Sulphur and oxygen
2	Magnesium hydroxide	Magnesium	Hydrochloric acid	Chlorine
3	Potassium hydroxide	Potassium	Nitric acid	Nitrogen and oxygen
4	Sodium hydroxide	Sodium	Carbonic acid	Carbon and oxygen
5	Zinc hydroxide	Zinc	Sulphurous acid	Sulphur and oxygen

3. Explain the reaction of metals and non-metals with acids, with the help of an activity.

Take samples of metals and non-metals in separate test tubes and label them A , B , C , D , E and F. With the help of a dropper, add 5 ml of dilute hydrochloric acid to each test tube, one by one. Observe the reaction carefully. If no reaction occurs in the cold solution, warm the test tube gently. Bring a burning matchstick near the mouth of each test tube. Repeat the same activity using dilute sulphuric acid in place of dilute hydrochloric acid. Record your observation in a table.

Table : Reaction of Metals and Non-metals with Acids

Test tube label	Metal/ Non-metal	Reaction with Dilute Hydrochloric Acid		Reaction with Dilute Sulphuric Acid	
		Room Temperature	Warm	Room Temperature	Warm
A	Magnesium (Ribbon)	Reacts to give hydrogen	Rapid reaction	Reacts to give hydrogen	Rapid reaction
B	Aluminium (Foil)	Reacts to give hydrogen	Rapid	Reacts to give hydrogen	Rapid
C	Iron (filings)	Reacts to give hydrogen	Rapid	Reacts to give hydrogen	Rapid

D	Copper (peeled flexible wire)	No reaction at all	No reaction	No reaction	Reacts to give hydrogen
E	Charcoal (Powder)	No reaction at all	No reaction	No reaction	No reaction
F	Sulphur (Powder)	Does not react at all	No reaction	No reaction	No reaction

4. Write the uses of metals and non-metals.

S.No	Uses of Metals	Uses of Non-metals
1	Metals are used in making machinery	Non-metal like oxygen is essential for our life, which all living beings inhale during breathing
2	Metals are used in making auto-mobiles, aeroplanes and trains.	They are used in fertilizers
3	They are used in making satellites	They are used in medicines as antiseptic
4	They are used in making industrial gadgets, cooking utensils and water boilers	They are used in crackers

5. Write the difference between metals and non-metals on the basic of their physical properties.

S.No	Metals	Non-metals
1	Metals are good conductors of heat and electricity	Non-metals are poor conductors of heat and electricity
2	Metals are malleable and ductile	Non-metals are neither malleable nor ductile
3	Metals are lustrous and can be polished	Non-metals are usually non-lustrous and cannot be polished

4	Metals are solid, except mercury	Non-metals can exist in all states
5	Metals have generally high melting points and boiling points	Non-metals generally have low melting points and boiling points

6. Compare the metals and non-metals on the basis of their chemical properties.

S.No	Metals	Non-metals
1	Metals react with oxygen to produce oxides which are alkaline in nature	Non-metals react with oxygen to produce oxides which are basic in nature
2	Metals react with water differently to produce oxides and hydroxide	Non metals generally do not react with water
3	Metals react with acids to produce hydrogen gas	Non-metals generally do not react with acids
4	More reactive metals displace the less reactive metals from their compounds in an aqueous solution	Non-metals do not show any such action

III. Long Answer Type Questions.

1. Some of the following statements are incorrect. Find the incorrect statements and correct them.

a. The property of metals by virtue of which they can be drawn into wires is called ductility.

b. Metals are good conductors of electricity but poor conductors of heat.

c. Oxides made of metals produce ringing sound when struck hard.

e. A less reactive metal replaces a more reactive metal form its salt solution in water.

a. Statements b, d and e are not correct.

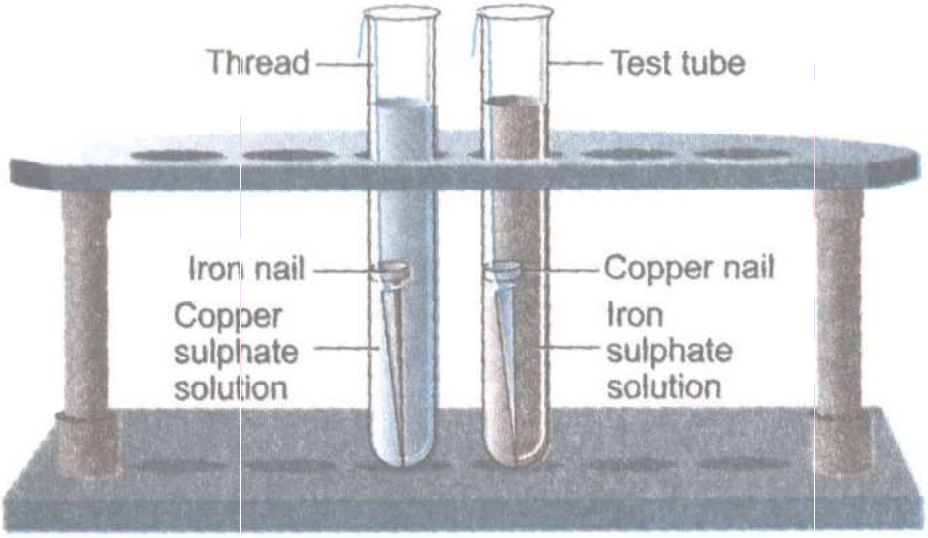
b. metals are good conductors of electricity and also good conductors of heat

c. A more reactive metal replaces a less reactive metal form its salt solution in water.

2. Iron is more reactive than copper. Can you write an activity to show this/

Testing reactivity of metals

- Set up the two test tubes as shows in the figure
- Take a clean copper nail and an iron nail.
- Place the copper wire in a solution of iron sulphate and the iron nail in a solution of copper sulphate.
- Write your observations after sometime.
- In which test tube do you find that a reaction has occurred?



Your will observe that the reaction has occurred in the test tube containing iron nail and copper sulphate solution. Iron takes the sulphate away from copper. You see that a reaction takes place and copper is left itself. Now we can say that iron has displaced copper from copper sulphate.

Copper sulphate + iron ⟶ Iron sulphate + copper

In such a reaction, the more reactive metal displaces the lese reactive metal. Thus, the above activity show that iron is more reactive than copper.

3. Fill in the blanks to complete the following paragraph.

The name of the product formed in the reaction of sulphur and _____ sulphur dioxide gas. When sulphur dioxide is dissolved in _____, sulphurous acid is formed. The sulphurous acid turns. _____. Litmus paper to _____ generally oxides of _____ are acidic in nature.

After completing the paragraph write two questions which you can raise on the basis of this information.

Oxygen, water, blue, red, non-metals.

Questions may be

a. Which gas is formed when sulphur reacts with oxygen?

b. What is the nature of oxides of non- metals?

I. High Order Thinking Skills (HOTS) Questions.

1. If you put one end of a rod of a metal in hot water, you feel hot at the other rod. What does it mean? What is this property of metals called?

The given observation means that heat is transmitted from one end to the other. This property of metals is called conductivity.

2. A substance was burnt in air. The white residue obtained was added to water. This water solution turned red litmus into blue. State whether the substance is a metal or a non-metal.

The substance is a metal.

3. What happens when a metal reacts with oxygen?

Metal oxide is formed when metal reacts with oxygen :

Oxygen : Metal + Oxygen → Metal oxide

4. What happens when a solution of metal oxide is tested with (i) blue litmus and (ii) red litmus?

(i) No change in the colour of blue litmus.

(ii) The red litmus changes into blue colour.

5. We should not store food stuff in container which is made up of metals such as copper, zinc, aluminium etc. Why?

Some food stuffs which have acidic nature such as citrus fruits, lemon pickles and curd should not be stored in container made up of metals such as copper, zinc, aluminium and iron. This is because acid present in food stuffs reacts with these metals to produce toxic compounds which cause food poisoning.

6. Explain why zinc metal can displace copper from copper sulphate solution but copper cannot displace zinc from zinc sulphate solution.

Zinc metal can displace copper from copper sulphate solution as zinc is more reactive than copper. But copper cannot displace zinc from zinc sulphate solution because copper is less reactive than Zinc.

7. If a blacksmith beats an iron piece with hammer, do you think, it will change its shape? If yes, would you expect a similar change in wood log on beating?

Yes, iron piece will change its shape as it is a metal. It increases in size and does not break. If a wood log is beaten it does not change its shape but it breaks into pieces.

8. Aluminium is a highly reactive metal, yet it is used to make utensils for cooking. Give reasons.

Aluminium is a good conductor of heat. When it is exposed to air, its surface gets covered with thin layer of oxide which prevents metal underneath from further corrosion.

9. A more reactive metal displaces the less reactive metal from its salt solution. What do you mean by this reaction?

In a chemical reaction, when a more reactive metal displaces the less reactive metal from its salt solution, it is called displacement reaction,e.g., zinc can displace copper from its copper sulphate solution as zinc is more reactive than copper.

Less reactive metal cannot displace the more reactive metal from its salt solution e.g., copper cannot displace zinc from its solution zinc sulphate as copper is less reactive than zinc.

II. High Order Thinking Skills (HOTS) Questions.

1. An element X burns in air to form an oxide. This neutralizes dilute sulphuric acid to form a salt. Is X a metal or a non- metal?

The oxide of elements X neutralize acid, it means it is a basic oxide. So, X is a metal because the oxides of metals are basic in nature.

2. Do you think iron is present in our body? If yes, where?

About 70% of our body's iron is found in red blood cells of our blood called haemoglobin and in muscle cells called myoglobin.

3. Discuss the role of magnesium in plants.

Magnesium has important role in photosynthesis because it forms the central atom of chlorophyll. Plants begin to degrade the chlorophyll in old leaves without sufficient amounts of magnesium.

Value Based Questions

1. Corrosion is a serious problem. Every year an enormous amount of money is spent to replace damaged iron. What steps can be taken to prevent this damage?

The wasting of iron objects due to rusting causes a big loss to the country's economy, so it must be prevent by following methods :

(i) By painting : Paint is applied to the surface of an iron object, then air and moisture cannot come in contact of iron and hence no rusting occurs.

(ii) By applying grease or oil : Tools and machine parts made of iron and steel are smeared with grease or oil to prevent their rusting.

(iii) By galvanization : Galvanization is done by dipping an iron object in molten zinc metal. This thin layer of zinc metal on the surface of iron objects protects them from rusting.

(iv) By tin plating and chromium-plating : When a thin layer of tin metal is deposited on iron and steel objects by electroplating then the iron and steel objects are protected from rusting.

(v) By alloying it to make stainless steel : When iron is alloyed with chromium and nickel, stainless steel is obtained, which does not rust at all.

2. Mercury is the only metal found in liquid state. It is largely used in thermometers to measure the temperature. But mercury is a very dangerous metal as its density is very high. What two precautions would you take while handling the equipments containing mercury?

Precautions while handling the equipments containing mercury are as follows :

(i) Mercury, a liquid metal with high density, can corrode the skin if it drops over it. Hence, the vessel should be closed or tightly packed.

(ii) It should not be heated directly.

3. Rakhi bought new flower vase made of copper. After few months, she found that copper vase had lost its lustre and there was a greenish deposit on its surface. Rakhi was confused that it was not of pure copper but her friend Leena advised her to wash it with tamarind or lemon juice to get the lustre back. She followed the advice and got lustre of copper vase back. Read the above passage and answer the following questions:

(i) Why does copper vase lose shine so soon after use?

(ii) Does copper vessel also get rusted? Explain.

(iii) What values are exhibited by Leena?

(i) The copper objects lose their shine after some time due to the formation of green coating of basic copper carbonate on its surface. When a copper object remains in damp air for a considerable time, then copper reacts slowly with the carbon dioxide, water and air, it gives a dull appearance.

(ii) Yes, copper vessels also get rusted. The formation of this green coating on the surface of a copper object corrods it. The green material is a mixtrure of copper hydroxide, $Cu(OH)_2$ and copper carbonate ($CuCO_3$). The following is the reaction.

$$2Cu + \underbrace{H_2O + CO_2 + O_2}_{\text{Moist air}} \rightarrow Cu(OH)_2 + CuCO_3$$

(iii) The values exhibited by Leena are awareness, helpfulness and being knowledgeable.

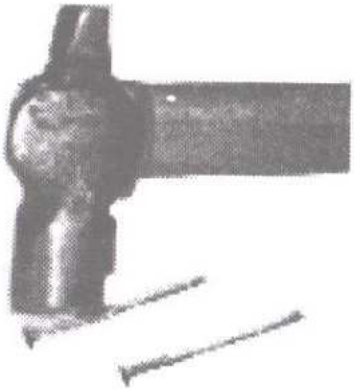
Skill Based Question

1. Observe the given figure and answer the following questions.

(a) Which property of metal is shown by this figure?

(b) Name the articles shown in figure.

(c) Name two metals which show this property to maximum extent.



(a) This figure shows the malleability of metals.

(b) (i) Hammer (ii) Iron nail

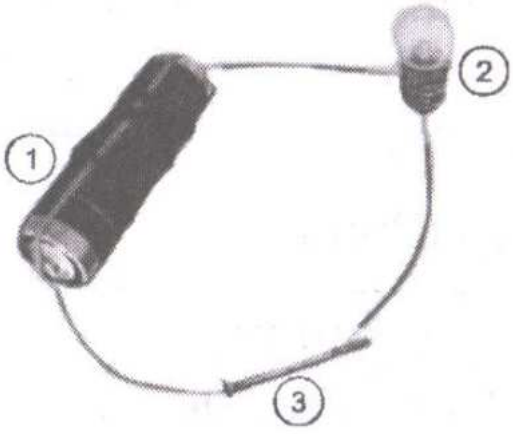
(c) Gold and Silver

2. Observe the given figure and answer the following questions.

(a) Label the marks (1) , (2) (3)

(b) Which property of metals is shown by this figure?

(c) Name two metals which show this property to maximum extent.

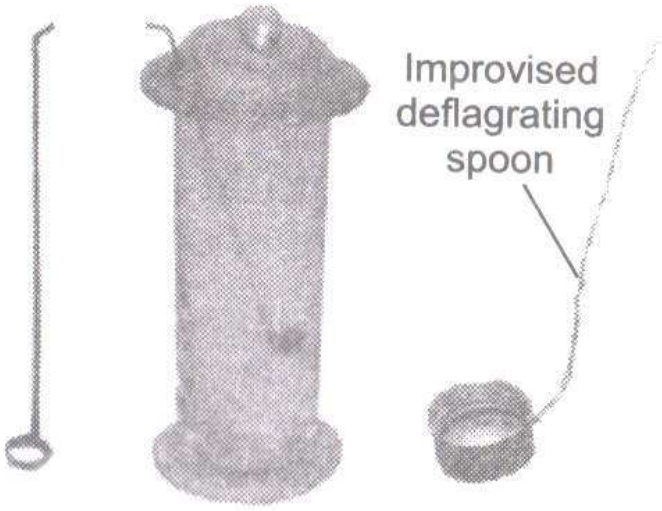


(a) (1) Cell (2) Bulb (3) Iron nail

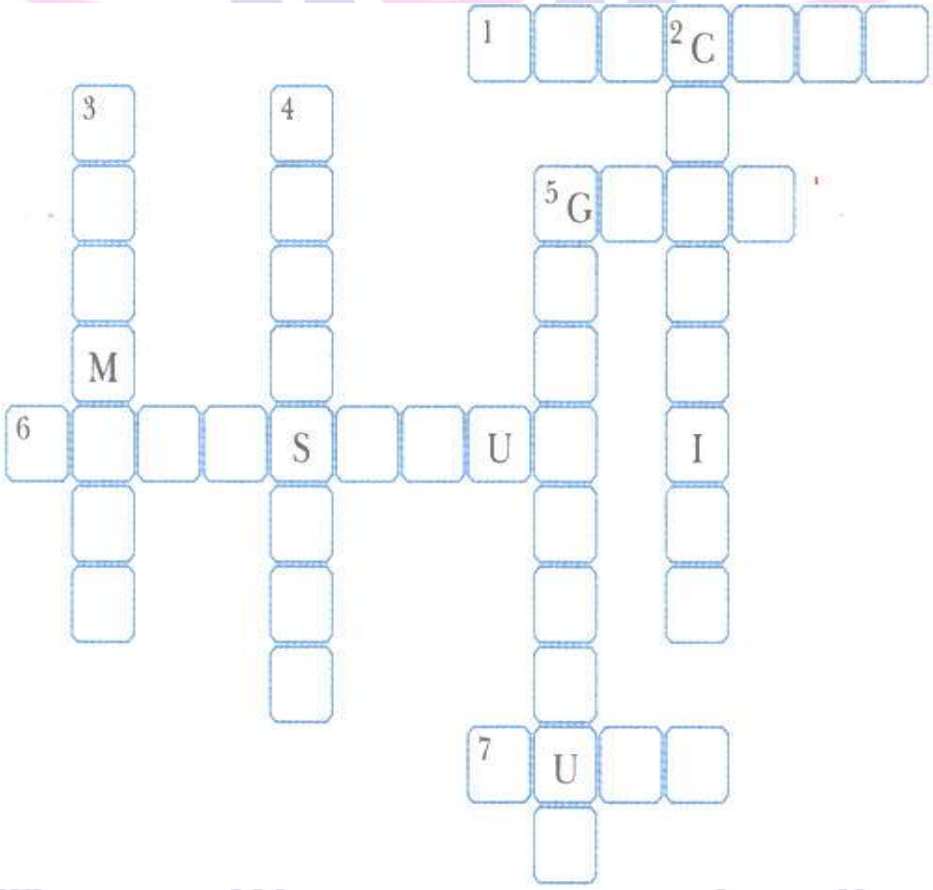
(b) This figure shows the property of conductivity of metals.

(c) Copper and Silver

3. Draw a diagram to show the burning of sulphur powder.



Cross word Puzzle



Across

1. The only liquid metal at room temperature

5. A noble metal which is also the most ductile

6. Most reactive metal in the reactivity series

7. Reddish brown formation on iron

Down

2. A non-metal used as a disinfectant

3. The hardest natural substance known to man

4. Sodium and potassium are kept in this

5. A metalloid

Across	Down
1. Mercury	2. Chlorine
5. Gold	3. Diamond
6. Potassium	4. Kerosene
7. Rust	