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METAL AND NON-METAL

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Chapter: 3



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CLASS: 10TH

Chapter: 3

Metal and Non-metal

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Q1:- Give an example of a metal which

- (i) is a liquid at room temperature.
- (ii) can be easily cut with a knife.
- (iii) is the best conductor of heat.
- (iv) is a poor conductor of heat.

Ans:

- (i) Mercury
- (ii) Sodium
- (iii) Silver
- (iv) Graphite

Q2:- Explain the meanings of malleable and ductile.

Ans: **Malleable** - It is the property of metals by which metals can be beaten into sheets.

Example – Sheets of iron , copper etc.

Ductile - It is a property of metals by which metals can be drawn into thin and long wires.

Example – Wires of copper , iron etc.

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Q1:- Why is sodium kept immersed in kerosene oil?

Ans: Sodium metal is highly reactive . If it is kept open, it can catch fire to react with air and moisture . To prevent this it is kept immersed in kerosene.

Q2:- Write equations for the reactions of

- (i) iron with steam
- (ii) calcium and potassium with water.

Ans:





Q3:- Samples of four metals A, B, C and D were taken and added to the following solution one by one. The results obtained have been tabulated as follows.

Metal	Iron(II) sulphate	Copper(II) sulphate	Zinc sulphate	Silver nitrate
A	No reaction	Displacemnt		
B	Displacemnt		No reaction	
C	No reaction	No reaction	No reaction	Displacement
D	No reaction	No reaction	No reaction	No reaction

Use the Table above to answer the following questions about metals A, B, C and D.

- Which is the most reactive metal?
- What would you observe if B is added to a solution of Copper(II) sulphate?
- Arrange the metals A, B, C and D in the order of decreasing reactivity.

Ans:

- B is most reactive, because no other metals can replace metal from (iron sulphate).
- Cu will be displaced.
- B>A>C>D.

Q4:- Which gas is produced when dilute hydrochloric acid is added to a reactive metal? Write the chemical reaction when iron reacts with dilute H_2SO_4 .

Ans: Hydrogen gas.



Q5:- What would you observe when zinc is added to a solution of iron(II) sulphate? Write the chemical reaction that takes place.

Ans: Zinc will displace iron from iron(II) sulphate.



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Q1:- (i) Write the electron-dot structures for sodium, oxygen and magnesium.

(ii) Show the formation of Na₂O and MgO by the transfer of electrons.

(iii) What are the ions present in these compounds?

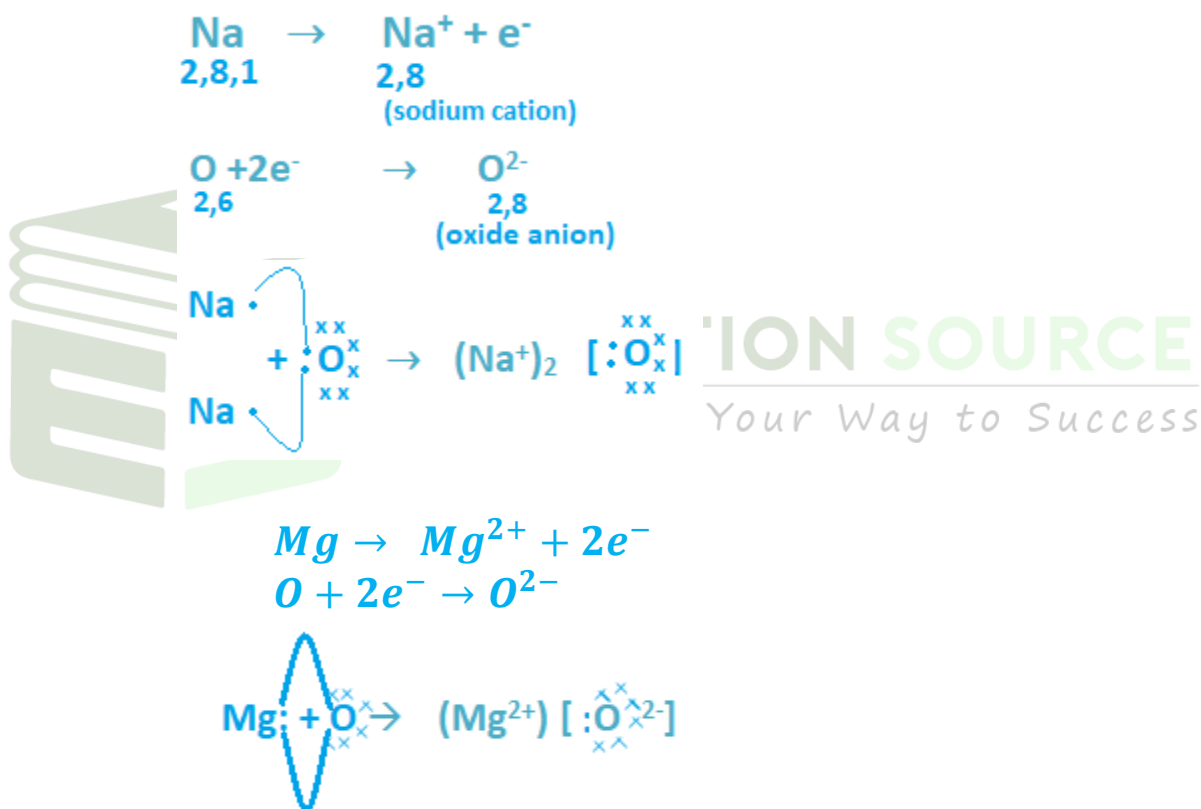
Ans –

(i) Sodium(2,8,1) = $\dot{N}a$

Oxygen(2,6) = $:\ddot{O}:$

Magnesium(2,8,2) = $\ddot{M}g$

(ii)



(iii) The ions present in the compound Na₂O are Na⁺ and O²⁻
The ions present in the compound MgO are Mg²⁺ and O²⁻

Q2:- Why do ionic compounds have high melting points?

Ans: The molecules of ionic compounds are bounded by strong electrostatic force .

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Q1:- Define the following terms.

(i) Mineral (ii) Ore (iii) Gangue

Ans: Minerals – The elements or compounds which occur naturally in the earth's crust are known as minerals.

Ore – Those minerals from which metals can be extracted profitably are called ores.

Gangue – The impurities of sand and rocky materials present in the ore is called Gangue.

Q2:- Name two metals which are found in nature in the free state.

Ans: Gold and Silver

Q3:- What chemical process is used for obtaining a metal from its oxide?

Ans: Reduction process.

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Q1:- Metallic oxides of zinc, magnesium and copper were heated with the following metals.

Metal	Zinc	Magnesium	Copper
Zinc oxide			
Magnesium oxide			
Copper oxide			

In which cases will you find displacement reactions taking place?

Ans:

Metal	Zinc	Magnesium	Copper
Zinc oxide	No reaction--	Yes	No
Magnesium oxide	No	No	No
Copper oxide	Yes	Yes	No

Q2:- Which metals do not corrode easily?

Ans: Gold and Silver.

Q3:- What are alloys?

Ans: An alloy is a homogeneous mixture of two or more metals, or a metal and a non – metal.

Exercises

Q1:- Which of the following pairs will give displacement reactions?

- (a) NaCl solution and copper metal
- (b) MgCl₂ solution and aluminium metal
- (c) FeSO₄ solution and silver metal
- (d) AgNO₃ solution and copper metal

Ans: (d) AgNO₃ solution and copper metal

Q2:- Which of the following methods is suitable for preventing an iron frying pan from rusting?

- (a) Applying grease
- (b) Applying paint
- (c) Applying a coating of zinc
- (d) All of the above.

Ans: (d) All of the above.

Q3:- An element reacts with oxygen to give a compound with a high melting point. This compound is also soluble in water. The element is likely to be

- (a) calcium
- (b) carbon
- (c) silicon
- (d) iron.

Ans: (a) calcium

Q4:- Food cans are coated with tin and not with zinc because

- (a) zinc is costlier than tin.
- (b) zinc has a higher melting point than tin.
- (c) zinc is more reactive than tin.
- (d) zinc is less reactive than tin.

Ans: (c) zinc is more reactive than tin.

Q5:- You are given a hammer, a battery, a bulb, wires and a switch.

- (a) How could you use them to distinguish between samples of metals and non-metals?
- (b) Assess the usefulness of these tests in distinguishing between metals and non-metals.

Ans: To distinguish between samples-of- metals and non-metals one can use hammer to beat the given material into sheets, if it breaks it is non-metal but if it is beaten into thin sheets it is a metal.

One can also use battery, wires, bulb and switch to make a circuit and use the given material to complete the circuit one by one, if the electric current flows and the bulb glows then it is metal and if not then it is non-metal.

(b) Though these tests gives us rough ideas in distinguishing between metals and non-metals but they are not reliable because both in metals & non-metals there are exceptions. For example Na metal is brittle and graphite can show conductivity.

Q6:- What are amphoteric oxides? Give two examples of amphoteric oxides.

Ans: Those metal oxides which show basic and acidic character are called amphoteric oxides.

Example : Al_2O_3 is an amphoteric oxide



Q7:- Name two metals which will displace hydrogen from dilute acids, and two metals which will not.

Ans: Metals that displace hydrogen : Magnesium ,Zinc.

Metals that do not displace hydrogen : Copper , Gold.

Q8:- In the electrolytic refining of a metal M, what would you take as the anode, the cathode and the electrolyte?

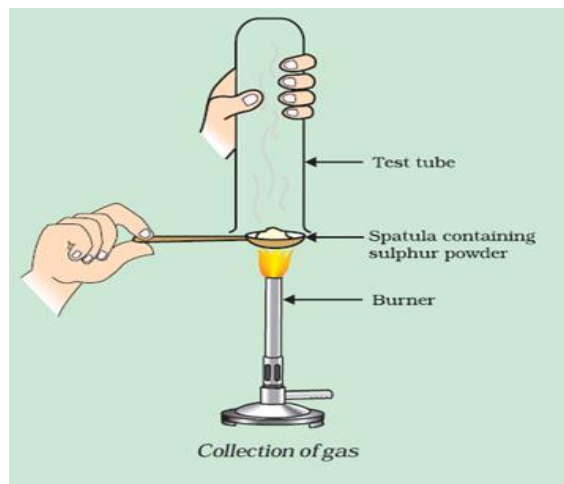
Ans: Anode – Thick plate of impure metal M.

Cathode – Thin plate of pure metal M.

Electrolyte – Electrolyte used is soluble salt of metal M.

Q9:- Pratyush took sulphur powder on a spatula and heated it. He collected the gas evolved by inverting a test tube over it, as shown in figure below.

- (a) What will be the action of gas on
 (i) dry litmus paper?
 (ii) moist litmus paper?
 (b) Write a balanced chemical equation for the reaction taking place.



Ans: a)

- (i) No effect on dry litmus paper .
 (ii) Turns blue litmus red in moist state .
 b) $S + O_2 \rightarrow SO_2$.

Q10:- State two ways to prevent the rusting of iron.

Ans:

- (i) Painting – In this method , a coating of paint on the iron article.
 (ii) Galvanisation – In this method , a coating of Zinc is given on the iron article.

Q11:- What type of oxides are formed when non-metals combine with oxygen?

Ans: The oxides formed on reaction of non-metal with oxygen are either acidic or neutral.

- CO_2 and SO_2 are acidic Oxides.
 CO , N_2O and H_2O are neutral oxides.

Q12:- Give reasons

- (a) Platinum, gold and silver are used to make jewellery.
 (b) Sodium, potassium and lithium are stored under oil.
 (c) Aluminium is a highly reactive metal, yet it is used to make utensils for cooking.
 (d) Carbonate and sulphide ores are usually converted into oxides during the process of extraction.

Ans: a) Platinum , gold and silver are very less reactive and do not corrode. They also have lustre property. So , they are used in jewellery.

b) These metals are very high reactive elements and they can catch fire if kept in the open . Hence , to protect them . they are kept immersed in kerosene oil.

c) Aluminium does not corrode and is a very good conductor of heat.

d) It is easier to obtain a metal from its oxide, as compared to its sulphides and carbonates.

Q13:- You must have seen tarnished copper vessels being cleaned with lemon or tamarind juice. Explain why these sour substances are effective in cleaning the vessels.

Ans: In tarnished copper vessel there is layer formed due to corrosion which is basic in nature which is dissolved in the lemon or tamarind juice which are acidic in nature . Thus the vessel get throughly cleaned.

Q14:- Differentiate between metal and non-metal on the basis of their chemical properties.

Ans:

Metals

Non-Metals

1. It forms positive ions .

1. It forms negative ions.

2. It forms basic oxides.

2. It forms acidic oxides.

3. It reacts with water.

3. It does not react with water .

Q15:- A man went door to door posing as a goldsmith. He promised to bring back the glitter of old and dull gold ornaments. An unsuspecting lady gave a set of gold bangles to him which he dipped in a particular solution. The bangles sparkled like new but their weight was reduced drastically. The lady was upset but after a futile argument the man beat a hasty retreat. Can you play the detective to find out the nature of the solution he had used.

Ans: The solution he had used was aqua regia. Aqua regia contain Hydrochloric acid and nitric acid in the ratio 3:1 . Gold is soluble in aquaregia that is why weight of bangles was reduced drastically.

Q16:- Give reasons why copper is used to make hot water tanks and not steel (an alloy of iron).

Ans: Hot iron reacts with steam formed by boiling water. But, copper does not react with water.



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