

Board – CBSE

Class – 10th

Topic – Metals and Non Metals

1. 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) Metal that exists in liquid state at room temperature → Mercury

(ii) Metal that can be easily cut with a knife → Sodium

(iii) Metal that is the best conductor of heat → Silver

(iv) Metals that are poor conductors of heat → Mercury and lead

2. Explain the meanings of malleable and ductile.

Ans. Malleable- substances that can be beaten into thin sheets are called malleable. For example, most of the metals are malleable.

Ductile- Substances that can be drawn into thin wires are called ductile. For example, most of the metals are ductile.

3. Why is sodium kept immersed in kerosene oil?

Ans. Sodium and potassium are very reactive metals and reacts explosively with air as well as water. Hence, they catch fire if kept in open. Therefore, to prevent accidental fires and accidents, sodium is stored in kerosene oil.

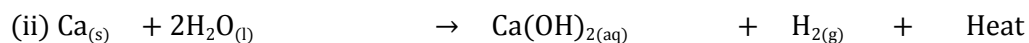
4. Write equations for the reactions of

(i) iron with steam

(ii) calcium and potassium with water



Iron Steam Iron(II,III)oxide Hydrogen



Calcium/ Water Calcium Hydroxide/ Hydrogen

Potassium Potassium hydroxide

5. 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 is evolved when dilute hydrochloric acid is added to a reactive metal.

When iron reacts with dilute H_2SO_4 , iron (II) sulphate with the evolution of hydrogen gas is formed.



6. 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	Cooper(II) sulphate	Zinc sulphate	Silver nitrate
A.	No reaction	Displacement		
B.	Displacement		No reaction	
C.	No reaction	No reaction	No reaction	Displacement
D.	No reaction	No reaction	No reaction	Displacement

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

(i) Which is the most reactive metal?

(ii) What would you observe if B is added to a solution of copper (II) sulphate?

(iii) Arrange the metals A, B, C and D in the order of decreasing reactivity.

Ans. Explanation

$\text{A} + \text{FeSO}_4 \rightarrow$ No reaction, i.e., A is less reactive than iron

$\text{A} + \text{CuSO}_4 \rightarrow$ Displacement, i.e., A is more reactive than copper

$\text{B} + \text{FeSO}_4 \rightarrow$ Displacement, i.e., B is more reactive than iron

$\text{B} + \text{ZnSO}_4 \rightarrow$ No reaction, i.e., B is less reactive than zinc

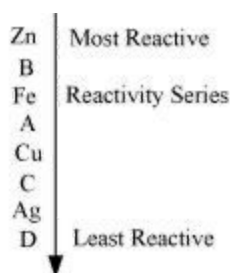
$\text{C} + \text{FeSO}_4 \rightarrow$ No reaction, i.e., C is less reactive than iron

$\text{C} + \text{CuSO}_4 \rightarrow$ No reaction, i.e., C is less reactive than copper

$\text{C} + \text{ZnSO}_4 \rightarrow$ No reaction, i.e., C is less reactive than zinc

$\text{C} + \text{AgNO}_3 \rightarrow$ Displacement, i.e., C is more reactive than silver

$\text{D} + \text{FeSO}_4/\text{CuSO}_4/\text{ZnSO}_4/\text{AgNO}_3 \rightarrow$ No reaction, i.e., D is less reactive than iron, copper, zinc, and silver



From the above equations, we obtain.

- (i) B is the most reactive metal.
- (ii) If B is added to a solution of copper (II) sulphate, then it would displace copper.
 $B + \text{CuSO}_4 \rightarrow \text{Displacement}$
- (iii) The arrangement of the metals in the order of decreasing reactivity is.



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

Ans. Zinc is more reactive than iron. Therefore, if zinc is added to a solution of iron (II) sulphate, then it would displace iron from the solution.

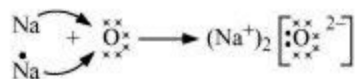


8. (i) Write the electron-dot structures for sodium, oxygen and magnesium.
 (ii) Show the formation of Na_2O and MgO by the transfer of electrons.
 (iii) What are the ions present in these compounds?

Ans. (i) The representation of elements with valence electrons as dots around the elements is referred to as electron-dot structure for elements.

- (a) Sodium (2,8,1) = $\text{Na} \cdot$
- (b) Oxygen (2,6) = $\cdot\ddot{\text{O}}\cdot$
- (c) Magnesium (2,8,2) = $\cdot\ddot{\text{Mg}}\cdot$

(ii)



(iii) The ions present in Na_2O are Na^+ and O^{2-} ions and in MgO are Mg^{2+} and O^{2-} ions.

9. Why do ionic compounds have high melting points?

Ans. Ionic compounds have strong electrostatic forces of attraction between the ions. Therefore, it requires a lot of energy to overcome these forces. That is why ionic compounds have high melting points.

10. Define the following terms.

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

Ans. (i) Mineral: Most of the elements occur in nature as in combined state as minerals. The chemical composition of minerals is fixed.

(ii) Ore: Minerals from which metals can be extracted profitably are known as ores.

(iii) Gangue. The impurities (sand, silt, soil, gravel, etc.) present in the ore are called gangue.

11. Name two metals which are found in nature in the free state.

Ans. The metals at the bottom of the reactivity series are mostly found in free state. For example- gold, silver, and platinum.

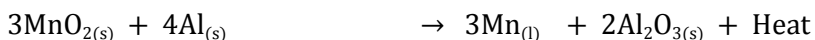
12. What chemical process is used for obtaining a metal from its oxide?

Ans. The chemical process used for obtaining a metal from its oxide is reduction. In this process, metal oxides are reduced by using suitable reducing agents such as carbon or by highly reactive metals to displace the metals from their oxides.

For example, zinc oxide is reduced to metallic zinc by heating with carbon.



Manganese dioxide is reduced to manganese by treating it with aluminium powder. In this case, aluminium displaces manganese from its oxide.



Oxides of more reactive metals are reduced by electrolysis.

13. 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	Displacement	No reaction
Magnesium oxide	No reaction	No reaction	No reaction
Copper oxide	Displacement	Displacement	No reaction

14. Which metals do not corrode easily?

Ans. More reactive metal is, more likely it is to be corroded. Therefore, less reactive metals are less likely to get corroded. This is why gold, platinum provides high resistance to corrosion.

15. What are alloys?

Ans. Alloys are homogeneous mixtures of two or more elements. The elements could be two metals, or a metal and a non-metal. An alloy is formed by first melting the metal, dissolving the other elements in it, and then solidifying them into alloy. For example, steel is an alloy of iron and carbon.