Question 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.

Answer 1:

(i) Metal that exists in liquid state at room temperature → Mercury
(ii) Metal that can be easily cut with a knife → Sodium, Potassium
(iii) Metal that is the best conductor of heat → Silver, Gold
(iv) Metals that are poor conductors of heat → Mercury and lead

Question 2:

Explain the meanings of malleable and ductile.

Answer 2:

Malleable:

Substances that can be converted into thin sheets by beating are called malleable. Most of the metals are malleable. Gold and Silver are most malleable metals.

Ductile:

Substances that can be drawn into thin wires are called ductile. Most of the metals are ductile. Gold is the most ductile metal.

Question 1:
Why is sodium kept immersed in kerosene oil?

Answer 1:
Metals such as potassium and sodium react so vigorously that they catch fire if kept in the open. Hence, to protect them and to prevent accidental fires, they are kept immersed in kerosene oil.

Question 2:
Write equations for the reactions of
(i) iron with steam
(ii) calcium and potassium with water

Answer 2:
(i) Iron react with steam to form the metal oxide and hydrogen.

$$3Fe(s) + 4H_2O(g) \rightarrow Fe_3O_4(s) + 4H_2(g)$$

(ii) The reaction of calcium with water is exothermic but the heat evolved is not sufficient for the hydrogen to catch fire.

$$Ca(s) + 2H_2O(l) \rightarrow Ca(OH)_2(aq) + H_2(g)$$

Calcium starts floating because the bubbles of hydrogen gas formed stick to the surface of the metal.

Potassium react violently with cold water and its reaction is so violent and exothermic that the evolved hydrogen immediately catches fire.

$$2K(s) + 2H_2O(l) \rightarrow 2KOH(aq) + H_2(g) + \textit{heat energy}$$

Question 3:

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	Displacement		
B	Displacement		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.

(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.

Answer 3:

(i) As per reactivity series, Iron is most reactive metal among Iron, Silver and Copper. Since B can displace Iron from its sulphate, so B is the most reactive metal.

(ii) As B is more reactive than Iron (As discussed in answer (i)), so it will displace Copper from its Copper Sulphate solution.

(iii) B is most reactive as discussed in part (i) and D is the least reactive metal as unable to displace any of the solutions. Copper is more reactive than Silver and metal A can displace Copper, so A is more reactive than C.

Hence, the order of decreasing reactivity is B > A > C > D.

Question 4:

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.

Answer 4:

When reactive metals react with dilute hydrochloric acids, gives a salt and hydrogen gas

$$Metal + Dilute\ acid \rightarrow Salt + Hydrogen$$

Reaction between Iron and H_2SO_4:

$$Fe + H_2SO_4 \rightarrow FeSO_4 + H_2$$

Question 5:

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

Answer 5:

Zinc is more reactive than Iron. When Zn is added to Iron (II) Sulphate, Zinc displaces Iron from its solutions and Zinc sulphate is formed.

$$Zn(s) + FeSO_4(aq) \rightarrow ZnSO_4(aq) + Cu(s)$$

Question 1:

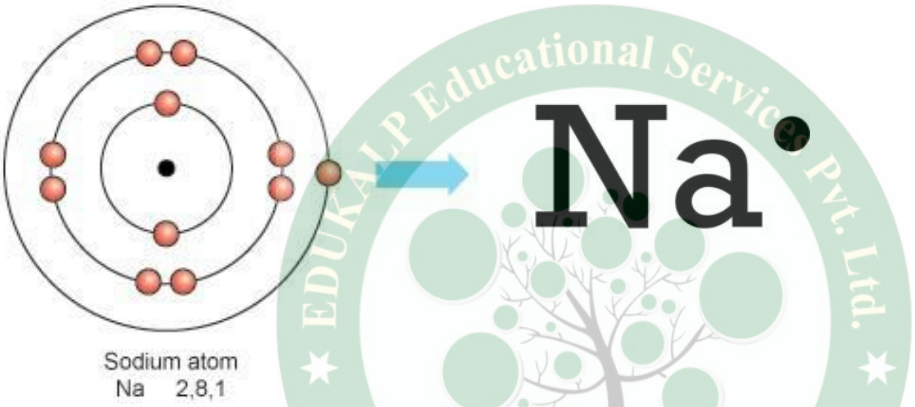
(i) Write the electron-dot structures for sodium, oxygen and magnesium.

(ii) Show the formation of Na_2O and MgO by the transfer of electrons.

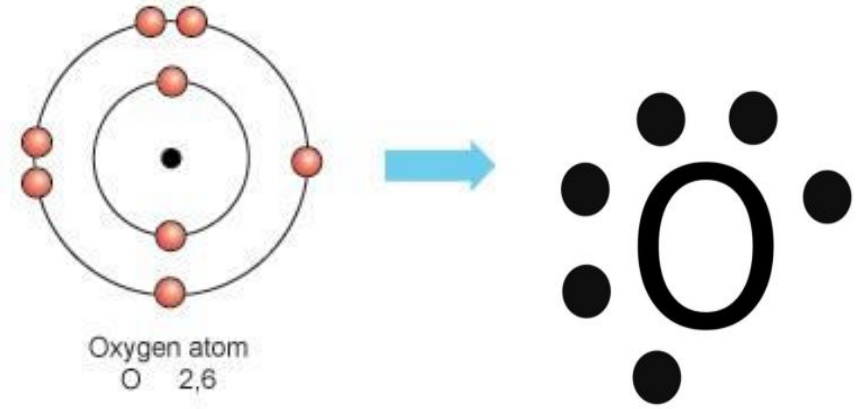
(iii) What are the ions present in these compounds?

Answer 1:

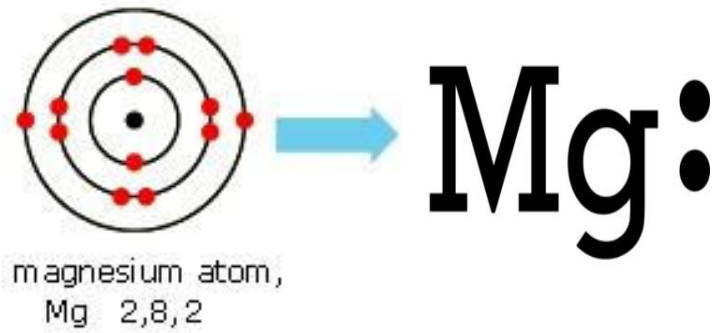
(i) Electron – dot structure for Sodium:



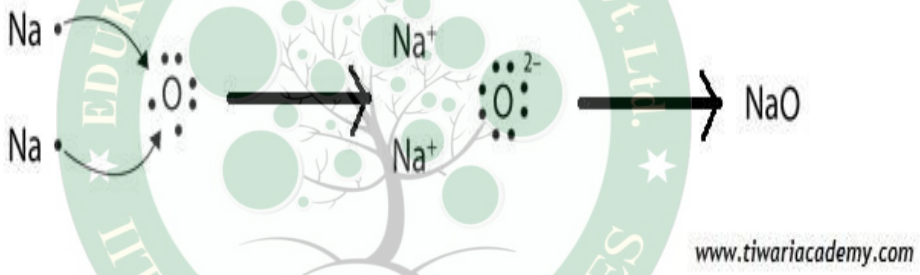
Electron – dot structure for Oxygen:



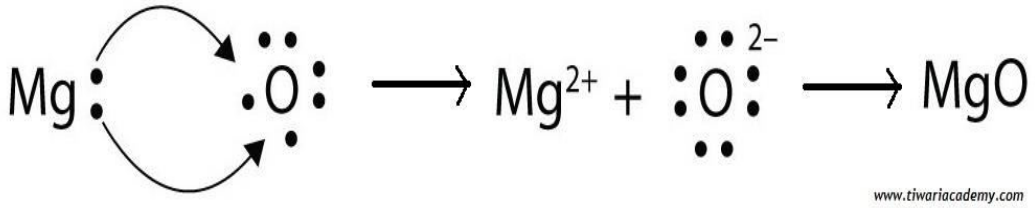
Electron – dot structure for Magnesium:



(ii). Formation of Na_2O by transfer of electron:



Formation of Na_2O by transfer of electron:



(iii). Ions present in these compounds are Mg^{2+}, O^{2-} and Na^{+}.

Question 2:

Why do ionic compounds have high melting points?

Answer 2:

Ionic compounds have high melting and boiling points. Because ionic compounds are formed by the attraction force of two opposite ions and a considerable amount of energy is required to break this strong inter-ionic attraction.

Question 1:

Define the following terms.

(i) Mineral

(ii) Ore

(iii) Gangue.

Answer 1:

(i) Mineral:

The elements or compounds, which occur naturally in the earth's crust, are known as minerals.

(ii). Ore:

If minerals contain a very high percentage of a particular metal and the metal can be profitably extracted from it. These minerals are called ores.

(iii). Gangue:

Ores mined from the earth are usually contaminated with large amounts of impurities such as soil, sand, etc., called gangue.

Question 2:

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

Answer 2:

The metals which are the least reactive, they are often found in a free state.

For example:

Gold, silver, platinum and copper are found in the free state.

Question 3:

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

Answer 3:

- Metals low in the activity series are very unreactive. The oxides of these metals can be reduced to metals by heating alone.

$$2HgO(s) \xrightarrow{Heat} 2Hg(l) + O(g)$$

- The metals in the middle of the activity series such as iron, zinc, lead, copper, etc., are moderately reactive. These metal oxides are reduced to the corresponding metals by using suitable reducing agents

$$ZnO(s) + C(s) \longrightarrow Zn(s) + CO(g)$$

- The metals high up in the reactivity series are very reactive. They are separated from their oxides by electrolysis process.

Question 1:

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

Metal	Zinc	Magnesium	Copper
Zinc oxide			
Magnesium oxide			
Copper oxide			

Answer 1:

Magnesium is the most reactive among these three metals and Zinc is more reactive than Copper. So, Magnesium will displace Zinc oxide and Copper oxide whereas Zinc will displace Copper oxide only.

Metal	Zinc	Magnesium	Copper
Zinc oxide	No Reaction	Displacement Reaction	No Reaction
Magnesium oxide	No Reaction	No Reaction	No Reaction
Copper oxide	Displacement Reaction	Displacement Reaction	No Reaction

Question 2:

Which metals do not corrode easily?

Answer 2:

The metals which are the least reactive, do not corrode easily.

For example:

Gold, silver, platinum and copper.

Question 3:

What are alloys?

Answer 3:

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

For example:

- *Stainless steel* is an alloy of Nickel and Chromium.
- *Amalgam* is an alloy of Mercury.
- *Brass* is an alloy of Copper and Zinc.
- *Bronze* is an alloy of Copper and Tin.
- *Solder* is an alloy of Lead and Tin.