Metals and Non-Metals: In-Text Question

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Q.1 Take samples of iron, copper, aluminium and magnesium. Note the appearance of each sample.
Sol. They appear shiny.

Q.2 Clean the surface of each sample by rubbing them with sand paper and note their appearance again.
Sol. They appear shinier.

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Q.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?
Sol.
(i) Mercury
(ii) Sodium and sodium
(iii) Silver
(iv) Astatine and lead are the poo conductor of heat among all metals.

Q.2 Explain the meanings of malleable and ductile.
Sol. Malleable is the property of a substance which can be beaten into thin sheets. Metals have this property.
Ductile is the property of substance which can be drawn into thin wires. Metals have also this property.

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Q.1 Why is sodium kept immersed in kerosene oil?
Sol. Sodium is very reactive element. It reacts vigorously with oxygen and moisture present in atmosphere. But, it neither react nor dissolve in kerosene. So, sodium is kept immerse in kerosene oil.

Q.2 Write equations for the reactions of
(i) iron with steam;
(ii) Calcium and potassium with water.
Sol.
(i) $2Fe(s) + 4H_2O(g) \rightarrow Fe_3O_4 + 4H_2(g)$
(ii) $Ca(s) + 2H_2O(l) \rightarrow Ca(OH)_2 + H_2(g)$
$2K(s) + 2H_2O(l) \rightarrow 2KOH(aq.) + H_2 + \text{Heat energy}$

Q.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 reactivity.
Sol.
(i) Metals B is most reactive because it displaces the iron from iron sulphate solution and give displacement reaction.
(ii) Displacement reaction will take place. Since metal B is most reactive because it displace iron from its salt iron sulphate.
(iii) **Arrangement of the metals A, B, C and D in the order of reactivity:**
Metal B > Metal A > Metal C > Metal D

Q.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.
Sol. When dilute hydrochloric acid (HCl) is added to a reactive metal, *metal salt and* hydrogen gas is produced.

$$Fe + H_2CO_4 \rightarrow FeSO_4 + H_2$$

Q.5 What would you observe when zinc is added to a solution of iron (II) sulphate? Write the chemical reaction that takes place.
Sol. Zinc is more reactive than iron. Zinc will displace iron from it salt iron (II) sulphate.

$$Zn + FeSO4 \rightarrow ZnSO_4 + Fe$$

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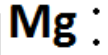
Q.1 (i) Write the electron-dot structures for sodium, oxygen and magnesium.
(ii) Show the formation of Na_2O and MgO by the transfer of electrons.
(iii) What are the ions present in these compounds?
Sol.
(i) Electron Dot Structure:

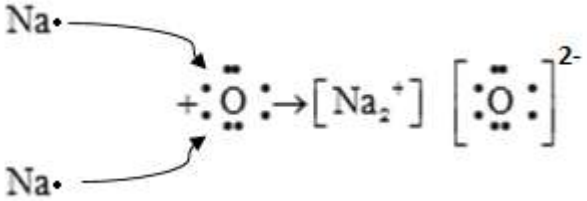
Sodium: 

Oxygen: 

Magnesium: 

(ii) The formation of compounds:
Sodium oxide:
Na ----------> $Na^+ + e^-$
2, 8, 1 2, 8

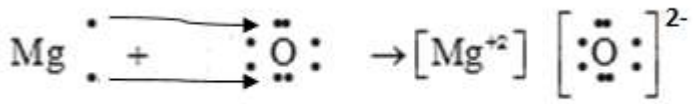
$O + 2e^-$ ----------> O^{2-}
2, 6 2, 8



Magnesium oxide:
Mg ----------> $Mg^{+2} + 2e^-$

2, 8, 2 2, 8

$O + 2e^- \text{----------} > O^{2-}$
2, 6 2, 8



(iii) **The ions present in these compounds are:**
$Na_2O \rightarrow Na^+$ and O^{2-}
$MgO \rightarrow Mg^{2+}$ and O^{2-}

Q.2 Why do ionic compounds have high melting points?
Sol. Ionic compounds have both positive and negative ions. These are ions are bounded by strong electrostatic force. That' why they have high melting points.

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Q.1 Define the following terms:
(i) Mineral (ii) Ore (iii) Gangue
Sol.
(i) Mineral: Minerals are the elements or compounds which are found naturally in the earth's crust are known as minerals. Example: Alums, $K_2SO_4.Al_2(SO_4)_3.H_2O$ etc.
(ii) Ore: Ores are minerals from which metal can be extracted very easily. Example: Bauxite $Al_2O_3.2H_2O$ is the ore of Al etc.
(iii) Gangue: Ores mined from the earth are contaminated with large amounts of impurities such as soil, sand, etc. These impurities are called gangue.

Q.2 Name two metals which are found in nature in the Free State.
Sol. Two metals which are found in nature in the Free State is Gold, platinum.

Q.3 What chemical process is used for obtaining a metal from its oxide?
Sol. Reduction method by carbon is used for obtaining a metal from its oxide.
Example: Zinc oxide is reduced to obtain zinc metal by Heating with carbon.
$ZnO + C \rightarrow Zn + CO$

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Q.1 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?
Sol.

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

Q.2 Which metals do not corrode easily?
Sol. Metals of low reactivity like gold, silver, and platinum etc. do not corrode easily.

Q.3 What are alloys?
Sol. An alloy is a homogeneous mixture of two or more metals, or a metal and a non-metal.
Example: bronze is an alloy of copper and tin etc.