In-text questions set 1

Page number 40

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?

Solution:

(i) Mercury is the metal which is liquid at room temperature

(ii) Sodium and potassium are the metals which can be cut with a knife

(iii) Silver is the best conductor of heat

(iv) Mercury is poor conductor of heat.

2. Explain the meanings of malleable and ductile.

Solution:

i. Metals which can be beaten to sheets are said to be malleable
ii. Metals which can be drawn into thin wires are said to be ductile

In-text questions set 2

Page number 46

1. Why is sodium kept immersed in kerosene oil?

Solution: Sodium is a reactive metals, if kept open it will react with oxygen to explore and catch fire. Sodium metal is kept immersed in kerosene to prevent their reaction with oxygen, moisture and carbon dioxide of air.

2. Write equations for the reactions of

(i) iron with steam

(ii) calcium and potassium with water

Solution: (i) Iron reacts with steam to form a magnetic oxide of Fe with the liberation of H_2.

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

(ii) Calcium reacts with water to form calcium hydroxide and hydrogen.

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

Potassium reacts with cold water violently immediately with evolution of H2 which catches fire.

$2K(s) + 2H_2O(I) \rightarrow 2KOH(aq) + 2H_2(g)$

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	-	-	-
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.

Solution:

(i) Metal B is the most reactive as it gives displacement reaction with iron (II) sulphate.

(ii) When metal B is added to copper (II) sulphate solution, a displacement reaction will take place because of which the blue colour of copper (II) sulphate solution will fade and a red-brown deposit of copper will be formed on metal B.

(iii)Metal B is the most reactive because it displaces iron from its salt solution. Metal A is less reactive because it displaces copper from its salt solution. Metal C is still less reactive because it can displace only silver from its salt solution and metal D is the least reactive because it cannot displace any metal from its salt solution. Hence, the decreasing order of reactivity of the metals is B > A > C > D.

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.

Solution: Hydrogen gas is liberated when dilute HCl is added to a reactive metal.

$Fe(s) + H_2SO_4(aq) \rightarrow FeSO_4(aq) + H_2(g)$

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

Solution: Zinc is more reactive (more electro positive) than iron. Therefore Zinc displaces Iron from its salt solution. The colour of ferrous sulphate is pale green, which turns colourless.

$FeSO_4 + Zn \rightarrow ZnSO_4 + Fe_{(s)}$
Light green Zinc sulphate(Colourless)

In-text questions set 3 **Page number 49**

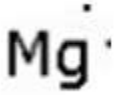
1. (i) Write the electron-dot structures for sodium, oxygen and magnesium.

(ii) Show the formation of Na_2O and MgO by the transfer of electrons.
(iii)What are the ions present in these compounds?

Solution: (i) Sodium:

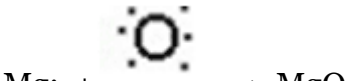
Oxygen:

Magnesium:



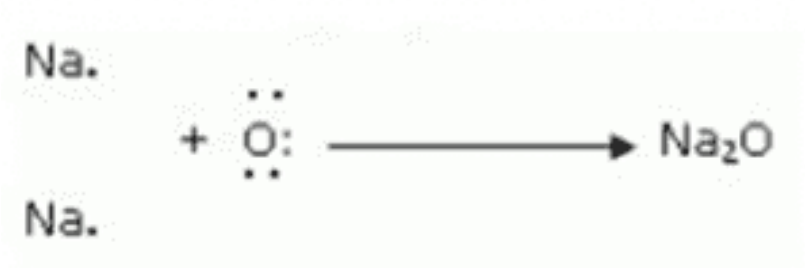
(ii) Formation of Magnesium oxide:

When magnesium reacts with oxygen, the magnesium atom transfers its two outermost electrons to an oxygen atom. By losing two electrons, the magnesium atoms form a magnesium ion (Mg^{2+}) and by gaining two electrons, the oxygen atom forms an oxide ion (O^{2-}).



Formation of Sodium oxide:

Two sodium atoms transfer their 2 outermost electrons to an oxygen atom. By losing two electrons, the two sodium atoms form tow sodium ions ($2Na^{+}$). And by gaining two electrons, the oxygen atom forms an oxide ion (O^{2-}).



(iii) The ions present in sodium oxide compound (Na_2O) are sodium ions ($2Na^{+}$) and oxide ions (O^{2-}).

The ions present in Magnesium oxide compound (MgO) are magnesium ions Mg^{2+} and oxide ions (O^{2-}).

2. Why do ionic compounds have high melting points?

Solution: Ionic compounds are the ones which has both positive and negative charges. Hence there will be strong force of attraction between them. This make expenditure of lot of heat to break this force of attraction hence ionic compounds have high melting points.

In-text questions set 4

Page number 53

1. Define the following terms.

(i) Mineral

(ii) Ore

(iii) Gangue

Solution:

(i) Minerals are compounds (also known as elements) which are found naturally in the earth's crust. E.g. Alums, $K_2SO_4.Al_2(SO_4)_3.24H_2O$, etc.

(ii) Ores are minerals from which metal can be extracted Ex: Bauxite $Al_2O_3.2H_2O$ is the ore of Al, copper pyrite $CuFeS_2$.All minerals are not considered as ores but all ores are also minerals.

(iii) Ores mined from the earth are naturally contaminated with sand, rocky materials. There are impurities present in the ore which are known as gangue.

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

Solution: Gold and platinum are the two metals found in Free State in nature.

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

Reduction method is used to obtain metal from its oxide. Ex: Zinc oxide is reduced to metallic zinc by Heating with carbon.

$ZnO + C \rightarrow Zn + CO$

Ex: Lead oxide is reduced to lead by heating with carbon

$PbO + C \rightarrow Pb + CO$

In-text questions set 5

Page number 55

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

Metal	**Zinc**	**Magnesium**	**Copper**
Zinc Oxide			
Magnesium Oxide			
Copper Oxide			

Solution:

A more reactive metal can displace a less reactive metal from its oxide. Among Zinc, Magnesium, and Copper metals, magnesium is the most reactive, copper is the least reactive metal and zinc is less reactive .The displacement reaction will take place in the following cases

Metal	Zinc	Magnesium	Copper
Zinc Oxide	-	Displacement	-
Magnesium Oxide	-	-	-
Copper Oxide	Displacement	Displacement	-

2. Which metals do not corrode easily?

Solution: Gold and platinum are the metals which do not corrode easily

3. What are alloys?

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

Exercise questions

Page number 56-57

1. Which of the following pairs will give displacement reactions?

(a) NaCl solution and copper metal
(b) $MgCl_2$ solution and aluminium metal
(c) $FeSO_4$ solution and silver metal
(d) $AgNO_3$ solution and copper metal

Solution: Option d i.e $AgNO_3$ solution and copper is correct answer. Copper displace the silver cations (reducing them to the elemental metal), in the process copper itself being oxidised to Copper II cations (Cu_{2+}) and going into solution. So silver metal precipitating out and a copper II nitrate solution will be remaining.

$Cu(s) + 2AgNO_3\ (aq) \rightarrow Cu(NO_3)_2\ (aq) + 2Ag\ (s)$

2. 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**

Solution: Answer is (c) Applying a coat of Zinc

Though applying grease and applying paint prevents iron from rusting but we cannot apply these methods on frying pan hence applying a coat of Zinc is most appropriate method to prevent an iron pan from rusting.

3. 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

Solution: Correct answer is option (a) i.e Calcium.

Calcium reacts with oxygen to give calcium oxide. Calcium oxide is soluble in water to give Calcium Hydroxide.

Carbon forms carbon-oxide with oxygen which is gas hence option B is wrong

Silicon reacts with oxygen and forms silicon dioxide. This is insoluble in water. So option C is not correct.

Iron reacts with oxygen and forms Iron dioxide. This is insoluble in water. So option D is not correct.

4. 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.

Solution: Answer is c. Food cans are coated with tin and not with zinc because Zinc is more reactive that is electro positive than tin.

5. 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.

Solution:

(a) Metals are malleable and can be easily drown into sheets by hitting with hammer. On the other hand if we beat non-metals they break down and they cannot be drawn into sheets as they are non-malleable. Metals of good conductors of electricity hence they

make bulb when you connect metals with a battery, wire and bulb. Similarly If non-metals are bad conductors of electricity chance they fail to lit up the bulb on connecting with wire and battery.

(b) These experiments can be helpful to demonstrate the malleability and electric conductivity of the metals and non-metals

6. What are amphoteric oxides? Give two examples of amphoteric oxides

Solution: Oxides that react with both acids and bases to form salt and water are known as amphoteric oxides. Examples: PbO and Al_2O_3.

Amphoteric oxides are the one which reacts with both acids and bases to form salt and water. Examples: Lead oxide - PbO and Aluminium oxide - Al_2O_3.

7. Name two metals which will displace hydrogen from dilute acids, and two metals which will not.

Solution: Zinc (Zn) and Magnesium (Mg) are the two metals which will displace Hydrogen from dilute acids as they are very reactive metals. Gold (Au) and Silver (Ag) are the metals which will not replace Hydrogen from dilute acids as these metals are less reactive.

8. In the electrolytic refining of a metal M, what would you take as the anode, the cathode and the electrolyte?

Solution: In the process of electrolytic refining of metal called 'M', An impure and thick block of metal M. is considered as anode, Thin strip or wire of pure metal M is taken as anode A suitable salt solution of metal M is considered as the electrolyte.

9. 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.

Solution: a) When sulphur powder is burnt in the air sulphur-di-oxide is formed.

(i) Sulphur-di-oxide does not have any effect on dry litmus paper.

(ii) Sulphur-di-oxide turn the moist litmus paper from blue to red as contact of SO_2 with water turns to sulfurous acid.

(b) $S(s) + O_2(g) \rightarrow SO_2(g)$

$SO_2(g) + H_2O \rightarrow H_2SO_3$

10. State two ways to prevent the rusting of iron.

Solution:

1. Iron can be prevented from rusting by coating the surface of the iron with rust proof paints
2. By applying Oil/grease on the surface of iron objects as it will prevent the iron surface to get in contact with air consisting of moisture.

11. What type of oxides are formed when non-metals combine with oxygen?

Solution: When non-metals combine with oxygen it forms either acidic or neutral oxides. Ex: N_2O_5 or N_2O_3 is an acidic oxide; CO is a neutral oxide.

12. 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

Solution:

(a) Platinum, gold and silver are used to make jewellery for these metals are very less reactive hence they are not affected by air, water or most chemicals. These metals have a lot of lustre and they are malleable and ductile in nature.

(b) Sodium, potassium and lithium readily reacts with water to produce a lot of heat. As a result Hydrogen evolved in the reaction results in fire. On exposure to water they react with moisture (water droplets) present in the atmosphere, In order to prevent contact with water hence these metals are stored under oil.

13. 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.

Solution: Tarnished copper vessels being cleaned with lemon or tamarind because these sour substance contains acids which dissolve the coating of copper oxide or basic copper carbonate present on the surface or tarnished copper vessels. This makes them shining red-brown again. Hence they are very effective in cleaning tarnished copper vessels.

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

Solution:

Metals	**Non-metals**
When metals are heated with oxygen, they form ionic oxides which are basic in nature and form bases on dissolving with water. This turn red litmus paper to blue.	When non-Metals are heated with oxygen, they form covalent oxides which are acidic in nature which form acid on dissolving with water. This turn blue litmus paper to red.
They are electro positive, lose electrons readily and become a positive ion.	They are electro negative, gain electrons and become negative ions.
Metals are lustrous.	Non-metals are non-lustrous; graphite is the exception

Reducing agents.	Good oxidizing agents.
Metals are the good conductors of electricity and heat.	Non-metals are non-conductors of electricity and heat; graphite is the exception
All metals are solids except mercury.	Non-metals are in solid-liquid and gaseous states

15. 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?

Solution: Goldsmith used the solution called Aqua regia which is called as royal water in Latin. . It is the mixture of concentrated Hydrochloric acid and concentrated nitric acid in the ratio of 3:1. Aqua regia is capable of dissolving noble metals like gold and platinum. When upper-layer of dull gold ornament is dissolved they lose their weight.

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

Solution: Copper is used to make hot water tanks and not steel (an alloy of iron) because copper does not reacts with either water or steam whereas iron reacts with steams to corrode the tank.