CBSE Class 10 Science
Important Questions
Chapter 3
Metals and Non-Metals

1 Marks Questions

1. A mineral is known as ore if metal
(a) Cannot be produced from it
(b) Can be produced from it
(c) Can be extracted from it profitably
(d) Is very costly

Ans. (c) Can be extracted from it profitably

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2. The earthy impurities associated with mineral used in metallurgy are called
(a) Slag
(b) Flux
(c) Gangue
(d) Ore

Ans. (c) Gangue

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3. A basic lining is given to a furnace by using
(a) Calcined dolomite
(b) Copper sulphate
(c) Haematite
(d) Silica

Ans. (a) Calcined dolomite

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4. Malachite is an are of:
(a) Iron
(b) Copper

(c) Mercury
(d) Zinc

Ans. (b) Copper

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5. Metal always found in free state is:
(a) Gold
(b) Silver
(c) Copper
(d) Sodium

Ans. (a) Gold

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6. A process employed for the concentration of sulphide ore is
(a) Froth floatation
(b) Roasting
(c) electrolysis
(d) bessemerisation

Ans. (a) Froth floatation

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7. The slag obtained during the extraction of copper pyrites is composed mainly of
(a) Cu_2S
(b) $FeSiO_3$
(c) $CuSiO_3$
(d) SiO_2

Ans. (b) $FeSiO_3$

8.The common method for extraction of metals from the oxide ore is
(a) Reduction with carbon
(b) reduction with hydrogen
(c) reduction with aluminium

(d) electrolytic method

Ans. (a) Reduction with carbon

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9. An iron nail was suspended in $CuSO_4$ solution and kept for a while the solution is

(a) Remained blue and coating was found on the nail.

(b) turned green and a coating was formed on the nail

(c) remained blue and no coating was formed on the nail

(d) turned green and no coating was formed on the nail

Ans. (b) turned green and a coating was formed on the nail

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10. The sulphide ore among the following is

(a) haematite

(b) bauxite

(c) argentite

(d) zinc blende

Ans. (d) zinc blende

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11. Chemically rust is

(a) Hydrated ferrous oxide

(b) Hydrated ferric oxide

(c) only ferric oxide

(d) none of these

Ans. (b) Hydrated ferric oxide

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12. Heating pyrites to remove sulphur is called

(a) Smelting

(b) Calcination

(c) Liquation

(d) Roasting

Ans.(d) Roasting

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13. Setting of Plaster of Paris takes place due to
(a) Solder
(b) Bronze
(c) Brass
(d) Bell metal

Ans. (a) Solder

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14. Some crystals of $CuSO_4$ were dissolved in water. The color of the solution obtained would be
(a) Green
(b) Red
(c) Blue
(d) Brown

Ans. (c) Blue

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15. Most abundant metal on the surface of the earth
(a) Iron
(b) Aluminium
(c) Calcium
(d) Sodium

Ans. (b) Aluminium

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16. Zone refining is used for the
(a) concentration of an ore
(b) Reduction of metal oxide
(c) Purification of metal
(d) Purification of an ore

Ans. (c) Purification of metal

17. Which of the following processes is used for the concentration of Bauxite $(Al_2O_3 \cdot 2H_2O)$

(a) Froth floatation

(b) Leaching

(c) Liquation

(d) Magnetic separation

Ans. (b) Leaching

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18. During smelting, an additional substance is added which combines with impurities to form a fusible product. It is known as

(a) Slag

(b) Mud

(c) Gangue

(d) Flux

Ans. (d) Flux

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19. The lustre of a metal is due to

(a) its high density

(b) its high polishing

(c) its chemical inertness

(d) Presence of free electrons.

Ans. (d) Presence of free electrons.

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20. In the thermite process, the reducing agent is

(a) Nickel

(b) Zinc

(c) Sodium

(d) Aluminium

Ans. (d) Aluminium

21. In addition to iron, stainless steel contains:

(a) nickel and chromium

(b) Copper and tin

(c) aluminium and magnesium

(d) Carbon and magnesium

Ans. (a) nickel and chromium

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22. The correct decreasing order of the metals in the activity series is:

(a) Ca, Mg, Ni, Fe

(b) Ni, Ca, Mg, Fe

(c) Ca, Mg, Fe, Ni

(d) Mg, Ca, Fe, Ni

Ans. (c) Ca, Mg, Fe, Ni

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23. Which of the following oxides is amphoteric in nature?

(a) Na_2O

(b) Mgo

(c) CaO

(d) Al_2O_3

Ans. (d) Al_2O_3

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24. A student adds one big iron nail each in four test tubes containing solution of zinc sulphate, aluminium sulphate, copper sulphate and iron sulphate. A reddish brown coating was observed only on the surface of iron nail which was added in the solution of:

(a) Zinc sulphate

(b) Iron sulphate

(c) copper sulphate

(d) Aluminium sulphate

Ans. (c) copper sulphate

25. Iron nail clipped in a solution kept in a test tube. After half an hour it was observed that the colour of the solution was changed. The solution in test tube was that of:
(a) Zinc sulphate
(b) Copper sulphate
(c) Iron sulphate
(d) Aluminium sulphate

Ans. (b) Copper sulphate

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

Ans. Gold and Platinum

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

Ans. A metal is obtained from its oxide by the process of reduction.

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28. Which of the following pairs will give displacement reactions?
(a) NaCl solution and copper metal
(b) $MgCl_2$ solution and aluminum
(c) $FeSO_4$ solution and silver metal
(d) $AgNO_3$ solution and copper

Ans. (d) $AgNO_3$ solution and copper

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29. Which of the following method is suitable for preventing an iron fry pan from rusting?
(a) Applying grease
(b) applying paint
(c) Applying coating of zinc
(d) All of the above

Ans. (c) Applying coating of zinc

30. 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

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31. Food cans are coated with tin and not zinc because

(a) Zinc is costlier than tin

(b) Zinc has higher melting point

(c) Zinc is more reactive than tin

(d) Zinc is less reactive than tin

Ans. (c) Zinc is more reactive than tin

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32. What types of oxides are formed when non-metals combine with oxygen?

Ans. Acidic oxides are formed when non-metals combine with oxygen.

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33. Royal water is prepared by mixing two acids 'A' and 'B'. It can dissolve gold and platinum. It is highly corrosive and fuming liquid. Identify 'A' and 'B'. What is the ratio in which 'A' and 'B' are mixed.

Ans. $3HCl + HNO_3$

2 Marks Questions

1. Which Gas is produced when a metal reacts with dilute hydrochloric acid? Write the chemical reaction when iron reacts with dilute H_2SO_4.

Ans. Hydrogen gas $(H)_2$ is produced when a metal reacts with dilute hydrochloric acid. Iron and dilute H_2SO_4 react as follows:

$$Fc(s) + H_2SO_4(dil) \rightarrow FcSO_4(aq) + H_2(g)$$

Hydrogen gas is evolved in this reaction also.

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2. What would you observe when Zinc is added to a solution of Iron (II) sulphate? Write chemical reaction that taken place.

Ans. The green colour of solution will slowly disappear. Zinc will gradually dissolve and iron will get precipitated at the bottom of the beaker.

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

(Dissolves) (Precipitated)

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3. Why do ionic compounds have high melting points?

Ans. In the formations of ionic compounds, positive ions (cations) and negative ions (anions) participate. These are cloudy packed and the ionic compounds exist as crystalline solids. They have strong inter-ionic process of attraction and have high melting and forces of attraction and have high melting and boiling points.

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4. Why sodium is kept immersed in kerosene oil?

Ans. Sodium reacts both with air and water. It is therefore kept in kerosene oil in order to avoid contact with both air and water.

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

Ans. (i) By applying a coating of grease or paint
(ii) By depositing a layer of Zinc on the surface of iron.

6. What type of oxide ore is formed when nonmetals combine with oxygen?

Ans. The oxides so formed are acidic is nature which when dissolved is water, their solutions change blue litmus red for ex- $C + O_2 \xrightarrow{heat} CO_2$

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7. What are amphoteric oxides? Give examples?

Ans. Amphoteric oxides are the oxides which can act both as acids and bases for eg → Aluminium oxide (Al_2O_3) and Zinc oxide (ZnO)

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8. Name two metals which can displace hydrogen from dilute acids and two metals which cannot do so?

Ans. Sodium calcium can displace hydrogen from dilute acids.
Copper and silver cannot displace hydrogen from dilute acid.

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9. Give reason why platinum, gold and silver are used to make jewellary.

Ans. Platinum, Gold and silver are placed at the bottom of the activity series and are very little reactive in nature and are known as noble metals. They are not even affected by air, water and even by chemicals. Since they have bright lusture, we can use them for making jewellary.

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10. Why copper is used to make hot water tanks and not steel?

Ans. Since copper is used to make hot water tanks because it is good conductor of heat than steel.

11. Can all minerals of a metal act as ores? Justify.

Ans. No, all minerals of a metal cannot act as ores but only those minerals can act as ores from which a metal can be conveniently and profitably extracted.

12. How does Galvanisation check rusting of iron?

Ans. Galvanisation means coating the surface of iron metal with zinc. Since in activity series zinc lies abore iron so it sacrifices itself for the sake of iron and prevents iron from rusting.

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13. Metals are arranged in the reactivity series. Why hydrogen is kept in the series though it is not a metal?

Ans. Hydrogen is a non metal but still it is placed in the reactivity series because it behaves as an electropositive elements like metals i.e can loose electrons to form positive ions.

$H^+ + e^- \rightarrow$

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14. Why are metals generally lustrous?

Ans. Metals are generally lustrous because they have a shining surface and when light falls on the surface of metal electrons absorbs photons of light and releases energy as light.

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15. Corrosion of metals is not always harmful. Illustrate.

Ans. Corrosion is a very harmful process resulting in slow eating up of a metal but corrosion of aluminium is useful as a layer of aluminium oxide (Al_2O_3) formed as result of chemical reaction and gets deposited on the surface of metal. It forms a protective coating on the surface and prevents the attacks of water, air, acids or alkalis.

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16. Why does copper not liberate hydrogen on reacting with dilute sulphuric acid?

Ans. Copper is placed below hydrogen in the activity series. It cannot loose electrons to H^+ ions of the acid.
Therefore, hydrogen gas is not evolved when copper reacts with dilute acid (H_2So_4).

17. Why does copper not liberate hydrogen on reaching with dilute sulphuric acid?

Ans. Copper is placed below hydrogen in the activity series. It can not lose electrons to H^+ ions of the acid. Therefore, hydrogen gas is not evolved when copper react reacts with dilute sulphuric acid.

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18. Why are non-metals gaseous at room temperature?

Ans. In the molecular from, non-metals exit as single molecules e.g. hydrogen (H_2), Oxygen (O_2), nitrogen (N_2), Carbon dioxide (CO_2) and ammonia (NH_3) etc. the attractive forces in these molecules are quite weak. Therefore, they exist as gases at room temperature.

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19. Both calcium and magnesium are heavier than water but still float over it. Explain.

Ans. The densities of metal Calcium and Magnesium are 1.74g/cc and 1.55g/cc respectively while that of water is 1.0g/cc at room temperature. However, both of them float over water surface. Actually hydrogen gas is evolved when these metals reacts with water. It is in the form of bubbles which stick on metal surface. Therefore, they float over water.

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20. What is thermit reaction?

Ans. Thermit reaction is the reduction of certain metal oxides such as MnO_2, Cr_2O_3 and Fe_2O_3 etc. by aluminium metal upon strong heating. It is highly exothermic in nature. For example

$$Fe_2O_3(s) + 2Al(s) \xrightarrow{Heat} Al_2O_3(s) + 2Fe(l) + heat$$

Aluminium oxide

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21. Why is sodium kept immersed in kerosene oil?

Ans. Sodium reacts so vigorously with oxygen that it catches fire when kept in the opens. Hence, to protect accidental fires, it is kept immersed in kerosene oil.

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22. Write equation for the reaction of

(i) Iron with steam

(ii) Calcium and potassium with water

Ans. (i) $3Fe + 4H_2O \rightarrow Fe_3O4 + H_2$

(ii) $Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$

$2K + 2H_2O \rightarrow 2KOH + H_2$

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23. Which gas is produced when dilute hydrochloric acid is added to reactive metal?

Ans. Hydrogen gas is produced when dilute hydrochloric acid is added to a reactive metal.

$Fe + H_2SO_4 \rightarrow FeSO_4 + H_2$

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

Ans. As zinc is more reactive than iron, displacement reaction will take place

$Zn + FeSO_4 \rightarrow ZnSO_4 + Fe$

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25. Why do ionic compounds have high melting points?

Ans. There are strong forces of attraction between oppositely charged ions in ionic compounds. Considerable amount of energy is required to break strong inter-ionic force of attraction. Therefore, they have high melting points.

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26. Which metals do not corrode easily?

Ans. Metals which are placed at the bottom of activity series like silver, gold, platinum do not corrode easily.

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27. What are alloys?

Ans. An alloy is homogenous mixture of two or more metals or metal and non-metal. It is obtained by first melting primary metal and then dissolving the other element in it in

definite proportion.

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

Ans. Metal oxides which show both acidic as well as basic behavior are called amphoteric oxides. Such metal oxides react with both acids and bases.
Example: Aluminum oxide, zinc oxide

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

Ans. Magnesium and zinc metals displace hydrogen from dilute acids. Copper and silver do not displace hydrogen from dilute acids.

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

Ans. Impure metal M is made the anode, thin strips of pure metal M as cathode and a salt solution of metal M as electrolyte.

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

Ans. Rusting of iron can be prevented by
(i) By applying grease or paint.
(ii) By galvanizing

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32. A metal acts as a good reducing agent. It reduces Fe and Mn0 The reaction with Fe is used for welding broken railway tracks. Identify & the metal and write all the chemical reactions.

Ans. Aluminum

$$3MnO_2(s) + 4Al(s) \rightarrow 3Mn(l) + 2Al_2O_3(s) + Heat$$

$$Fe_2O_3(s) + 2Al(s) \rightarrow 2Fe(l) + Al_2O_3(s) + Heat$$

33. A yellow colored powder 'X' is soluble in carbon disulfide. It burns with a blue flame fanning suffocating smelling gas which turns moist blue litmus red. Identify 'X' and gives chemical reaction. Identify & it i metal or nonmetal.

Ans. 'X' is sulphur

s+0 S0

It is non metal.

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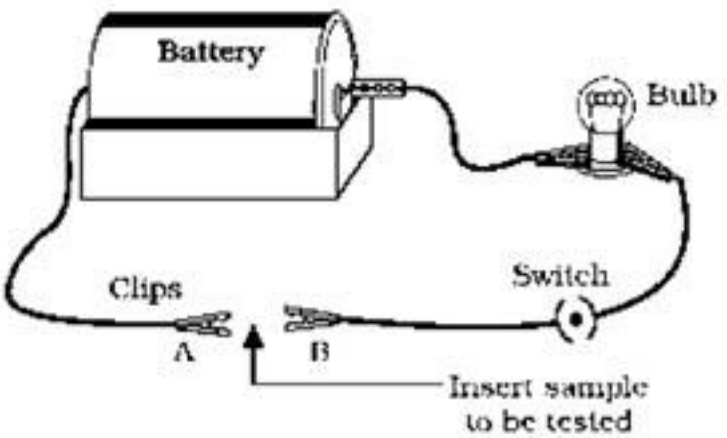
34. A student set up an electric circuit as shown in Fig. He placed the metal to be tested in the circuit between terminals A and B as shown.



(i) Does the bulb glow? What does this indicate?

(ii) Why are electric wires coated with rubber like materials?

Ans. (i) Yes the bulb glows, this indicates that metal is a good conductor of electricity

(ii) Rubber like substance is a bad conductor of electricity

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35. A, B and C are 3 elements which undergo chemical reactions according to following equations:

a) $A_2O_3 + 2B \longrightarrow B_2O_3 + 2A$

b) $3CSO_4 + 2B \longrightarrow B_2(SO_4)_3 + 3C$

c) $3CO + 2A \longrightarrow A_2SO_3 + 3C$

Answer of the following:

i) Which element is most reactive?

ii) Which element is least reactive?

Ans. (i) Most reactive element is B as it has replaced both A and C from their compounds.
(ii) Element C is least reactive as it has been replaced both by A and B.

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36. An element X on reacting with 02 forms X Oxide dissolves in water and turns blue litmus paper red. Predict the nature of element whether it is a metal or a non metal.

Ans. The oxide is acidic in nature as it has turned blue litmus to red. Hence X is a non metal.

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37. An element E combines with 02 to form an oxide E which is a good conductor of electricity. Answer the following:

(i) How many electrons will be present in the outer most shell of E?

(ii) Write the formula of the compound formed when it combines with Chlorine.

Ans. (i) Valency of the element B is l. This means that it has only one electron in the valence shell.
(ii) $E^{+} + Cl^{-} \rightarrow ECl$
Valency of Cl is 1 and Valency of B is also l. Therefore, the formula will be E

3 Marks Questions

1. Arrange the following metals in decreasing order of their reactivity:

(1) Cu, Ca, Mg, Na, Zn

(2) **You are provided with three metals: sodium, magnesium and copper, Using only water as the reactant, how will you identify each of them**

(3) **Which metal listed in (1) is most likely to occur in the native state?**

(2) (a) The metal which reacts violently with cold water and catches fire is sodium

(b) The metal which evolves hydrogen gas upon heating with water is magnesium

(c) The metal which does not react with water even on strong heating is copper

(3) Copper is most likely to occur in the native (or free) state to a very small event

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2. Which method of concentration of an ore is preferred in the following cases and why?

(1) The ore has higher density particles mixed with a large bulk of low density impurities

(2) The ore consists of copper sulphide intermixed with clay particles Give an example of amalgam

Ans. (1) The concentration of ore can be done by gravity separation method

(2) The concentration of ore is done by froth floatation process An amalgam of mercury with silver or gold called dental alloy is used to fill cavities in the teeth

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3. (a) Why is ZnO called a amphoteric oxide? Name another amphoteric oxide

(b) What are alkali's? Give one example of alkali

Ans. (a) Zinc oxide (ZnO) is called amphoteric oxide as it behaves bath as acidic oxide and basic oxide

$$ZnO + 2HCl \rightarrow ZnCl_2 + H_2O$$

(Basic oxide) (Acid) Zinc chloride

$$ZnO + 2NaOH \rightarrow Na_2ZnO_2 + H_2O$$

(Acidic oxide) (Base) (Sodium *zincate*)

Aluminum oxide (Al_2O_3) is another amphoteric oxide

(b) Water soluble hydroxides of metals are known as alkalies. For example $Na\ OH$

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4. You are given a hammer a battery, a bulb, wires and switch

(a) How could you use them to distinguish between samples of metals and non metals?

(b) Assess the usefulness of these tests to distinguish between metals and non-metals

Ans. (a) With the help of the things provided try to convert metals and non metals in the form of thin rods Metals will readily form into thin rods being malleable and non metals being brittle will break Now if we construct a cell using these rods or plates the circuit which consists of metallic rod conducts whereas non metallic rod will not conduct

(b) From these tests we can say

(i) Metals are malleable whereas nonmetals are not

(ii) Metals are good conductors of electricity while non metals are not

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5. Name an alloy of

(i) Aluminium used is construction of aircrafts

(ii) lead in joining metals for electric work

(iii) copper used is house hold vessels

Ans. (i) Alloy is duralumin $Al(95\%)\ Cu(4\%)\ Mg(0.5\%),\ Mn(0.5\%)$

(ii) Solder $Pb(50\%)\ Sn(50\%)$

(iii) Brass $Cu(80\%)\ Zn(20\%)$

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6. White three important properties of aluminium which are responsible for its great demand in industry?

Ans. (i) It is a good conductor of electricity

(ii) It is not attacked by water

(iii) It is a powerful reducing agent

7. Which of the following metals would give hydrogen when added to dilute HCl
(1) iron
(2) copper and
(3) magnesium

Ans. Both iron (Fe) and magnesium (Mg) will evolve hydrogen on reacting with dil HCl. These are active metals and are placed above hydrogen in the activity series As copper is placed below hydrogen in the series, if will not evolve hydrogen

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8. Define an alloy and an amalgam State the main constituents of the following alloys

Stainless steel, Bronze In which property, each of them is different from its main constituent

Ans. As alloy is a homogeneous mixture of two or more metals or non- metals An alloy is which mercury is one of the constituents is called amalgam.
Stainless steel- An alloy of iron, chromium, carbon and nickel It does not get rusted whereas iron is easily rusted.

Bronze- An alloy of copper and tin, It is less malleable than copper and is used for making coins, statues etc.

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9. A group of a students looked at different metals and metal sulphate solutions given is a tabular form From the data, answer the following:

Metal	Metal sulphate solution	Colour
1) Chromium	Chromium sulphate	Green
2) Cobalt	Cobalt sulphate	Pink
3) Copper	Copper sulphate	Blue
4) Magnesium	Magnesium sulphate	Colourless

(a) Which metal reacted with all other sulphate solution?

(b) Which metal did not react with any other metal sulphate solution?

(c) Arrange the metals in decreasing order of reactivity

Ans. (a) Magnesium (Mg)

(b) Copper (Cu)

(c) Decreasing order of reactivity Mg>Cr>Co>Cu

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10. (1) A metal that gets covered with a protective film of its oxide (Al, Cu, Ag)

(2) A metal which burns in air with golden flame (Zn, K, Na)

(3) A metal which can displace hydrogen from boiling water as well as steam (K, Zn, Fe)

Ans. (1) Aluminium (Al)

(2) Sodium (Na)

(3) Zinc (Zn)

(4) Magnesium (Mg)

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11. Write one point of difference between electrolytic reduction and reduction with carbon Give one example of each

Ans. The electrolytic reduction takes places at the cathode by the gain of electrons in electrolysis At the same time carbon reduction is carried by heating a metal oxide with coke For example

$$NaCl\ (molten) \xrightarrow{(Electrolysis)} Na^{+} + Cl^{-}$$

(Reduction by gain of electrons)

$$Na^{+} + e^{-} \rightarrow Na$$

$$ZnO + C \rightarrow Zn + Co$$

(Coke)(Heat) (Reduction by carbon)

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12. (a) Arrange the following metals in decreasing order of their reactivity Cu, Ca, Mg, Na, Zn.

(b) You are provided with three metals: sodium, magnesium and copper Using only water as the reactant how will you identify each of them?

(c) Which metal listed in (i) is most likely to occur in the native state

Ans. (a) Na>Ca>Mg>Zn>Cu

(b) (1) Metal reacts violently with cold water and catch fire is sodium
(2) Metal which evolves H_2 gas upon heating with water is magnesium
(3) Metal which does not react with water on strong heating is copper

(c) Copper is found in native state

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13. Write the equation for the reaction of

(a) Iron with steam

(b) Calcium with water

(c) Potassium with water

Ans. (a) $3Fe(s) + 4H_2O(steam) \rightarrow Fe_3O_4(s) + 4H_2(g)$
(b) $Ca(s) + 2H_2O(l) \rightarrow Ca(OH)_2(s) + H_2(g)$
(c) $2K(s) + 2H_2O(l) \rightarrow 2KOH(aq) + H_2(g)$

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14. Define the following terms:

(a) Minerals

(b) Ores

(c) Gangue

Ans. Minerals- These are combined state of metals generally with non-metals

Ores- The minerals from which metals can be conveniently extracted are called an ore

Gangue- It represents the earthy impurities such as mud, sand and day.

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15. Pratyush took sulphur powder on a spatula and heated it He collected the gas evolved by inverting a test tube over it
What will be the action of gas in
(1) Dry litmus paper?
(2) Moist litmus paper?
Write a balanced chemical equation for the reaction taking place?

Ans. (1) The gas is sulphurdioxide It will not react with litmus paper

(2) The gas will bleach moist litmus paper The balanced of chemical equation is

$S + O_2 \xrightarrow{heat} SO_2$

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16. Write any three differences between metals and non-metals on the basis of chemical properties?

Ans. Difference between metals and non-metals are-

	Metals	**Non- Metals**
(1)	**Oxides of metals are generally basic in nature**	**Oxides of non-metals are mostly acidic in nature**
(2)	**The compounds of metals are mostly ionic in nature**	**Compounds of non-metals are mostly covalent although there are many exceptions**
(3)	**Metals act as reducing agents as their atoms loose electrons** **For e g:- Na ® $Na^+ + e^-$**	**Non-metals are oxidizing agents as their atoms accept electrons** **For e g:- $Cl + e^- ® Cl^-$**

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17. Why is titanium metal called as strategic metal? Mention two of its properties which makes it so special

Ans. Tritanium is called strategic metal because it is used for making certain war equipments

(1) It is light in weight but stronger

(2) It is not affected by corrosion even if kept open for a very long time

18. (a) What is corrosion?

(b) How is corrosion caused

(c) Complete the reaction $2Fe+\frac{3}{2}O_2+xH_2O\rightarrow$

Ans. (a) The eating up of the surface of metal if kept open for a long time is called corrosion

(b) It is caused due to the eating of metals by the gasses and water vapours present in air due to the formation of certain chemical compound

For example: surface of copper acquires a green coating due to the formation of basic copper carbonate $Cu\ (OH)_2\ CuCO_3$

$2Cu+H_2O+CO_2+O_2\rightarrow Cu(OH)_2CuCO_3$

Component of air

$2Fe+\frac{3}{2}O_2+xH_2O\rightarrow Fe_2O_3.xH_2O$

Hydrated ferric oxide (rust)

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19. (1) Choose metal from the reactivity series which will not react with steam

(2) Choose one metal which will safely react with dilute sulphuric acid

(3) Name the salt formed when metal chosen in (2) reacts with sulphuric acid

Ans. (1) Gold (Au)

(2) Zinc (Zn)

(3) The salt formed is $ZnSO_4$ and is colourless

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20. A copper plate was dipped into a solution of $AgNO_3$ After sometime a black layer was deposited on the copper plate State the reason for it Write the chemical equation for the reaction involved

Ans. Copper lies above silver in the activity series This means that copper in more reactive

than silver Therefore copper had replaced silver from $AgNo_3$ solution

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

(Black)

Silver got deposited on the copper plate and changed to black after sometime because silver and also same salts of silver are sensitive to light They readily become blackish on standing or on exposure to air

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21. Give an example of metal which

(i) is a liquid at room temperature

(ii) can be easily cut with knife

(iii) is best conductor of heat

(iv) is poor conductor of heat

Ans. (i) Mercury

(ii) Sodium

(iii) Silver

(iv) Lead

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22. Explain the meaning of malleable and ductile

Ans. A substance that can be beaten into thin sheets is said to be malleable For example iron, copper etc.

A substance that can be drawn into wires is called ductile For example gold, silver etc

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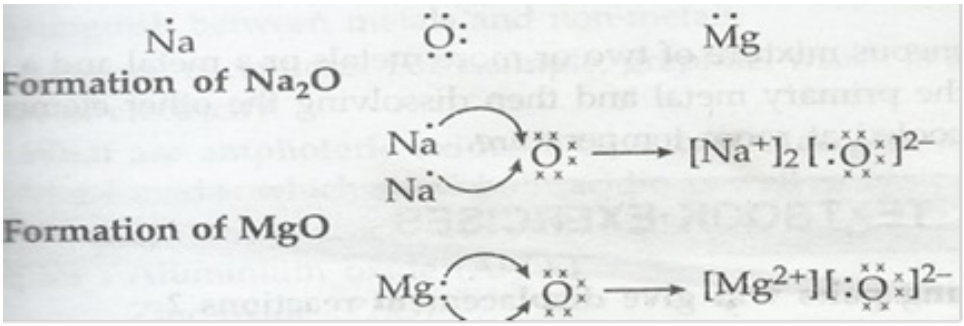
23. (i) Write the electro-dot structures for sodium, oxygen, and magnesium

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

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

Ans. (i) Electron-dot structure for sodium, oxygen and magnesium are

(ii)



(iii) Ions present in Na_2O are Na^+ and O^{2-}

Ions present in MgO are Mg^{2+} and O^{2-}

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24. Define the following terms:

(i) Minerals

(ii) Ores and

(iii) Gangue

Ans. (i) Minerals- the element or compounds which occur naturally in the earth crest are known as minerals

(ii) Ores- Minerals from which metal can be extracted profitably and easily are called ores

(iii) Gangue- Impurities such as soil and sand which are present in the minerals are called gangue

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25. Metallic oxide of zinc, magnesium and copper were heated with following metals:

Metal	**Zinc**	**Magnesium**	**Copper**
Zinc oxide			
Magnesium oxide			

In which case will you find displacement reactions taking place?

Ans. Based on the activity series of metals, the displacement reactions will take place as below:

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

26. 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. Copper, on keeping in air reacts with atmospheric carbon dioxide to form a green layer of copper carbonate Copper carbonate reacts with citric acid present in lemon or tartaric acid present in tamarind to form soluble copper citrate or copper tartarate The vessels are thus cleaned using water.

27. A man went door to door posing as a goldsmith He promised to bring back the glitter of the old and dull 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. Aqua regia, which is a mixture of 3 parts concentrated HCl and part of concentrated nitric acid dissolves gold The man put the gold bangles in this solution The outer dirty layer of gold bangles dissolved in aqua regia bring out the shining bangles.

As the outer layer of bangles dissolved in aqua regia, the weight was reduced drastically

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

Ans. Electrical conductivity of a metal is decreased when it is alloyed with another metal or non-metal Thus, the electrical conductivity of steel is much less than that of pure That is why copper is used to make hot water tanks and not steel.

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

Ans. Metals and non-metals can be differentiated on the basis of following chemical properties

Metals	Non-metals
1. Metals displace hydrogen from water 2. Metals are basic oxide 3. Metals displace hydrogen from dilute acids 4. Metals form ionic chlorides with chlorine	1. Non-metal do not displace hydrogen from water 2. Non-metals are acidic oxides 3. Non-metals displace hydrogen from dilute acids 4. Non-metals form covalent chlorides with chlorine

30. An element reacts with oxygen to form an oxide which dissolves in dilute hydrochloric acid The oxide fanned also turns a solution of red litmus blue Is the element a metal or non-metal? Explain with the help of a suitable example

Ans. It is metal

$$4NA(S)\ O_2 \rightarrow\ 2Na_2O(s)$$

$$Na_2O(s) + H_2O(l) \rightarrow 2NaOH(aq)$$

$$Na_2O(s) + 2HCl(dil)\ \rightarrow\ 2NaCl(aq) + H2O(s)$$

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31. Nikita took Zn, Al, Cu, Fe, M& Na metals & put each metal in cold water and then hot water She reacted the metal with steam

(i) Name the metal which reacts with cold water

(ii) Which of the above metals react with steam?

(iii) Name the metal which reacts with hot water

(iv)Arrange these metals in order of increasing reactivity

Ans. (i)Na

(ii)Al, Zn, Fe

(iii) Mg

(iv) Na>Mg>Al>Zn>Fe>Cu

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32. A student was given Mg, Zn, Fe, and Cu metals He put each of them in dil HCI contained in different test tubes Identify which of them

(i) will not displace 112 from dli HCI

(ii) forms a pale green substance
(iii) will give 112 with 5% 11N0

(iv)will be displaced from its salt solution by all other metals

Ans. (i)Cu

(ii)Fe

(iii) Cu

(iv) Cu

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33. A metal 'X' is found in the form of filings which bums vigorously when sprinkle on flame When these filings are treated with sulphur a black colured compound 'Y' is formed which is not attracted by magnet 'X' reacts with dil HCI to liberate hydrogen gas 'X' reacts with steam to form 'Z' along with hydrogen gas Identify 'X', 'Y', and 'V Write the reaction involved

Ans. $Fe + S \rightarrow FeS$

'X' 'Y'

$Fe + HCl \rightarrow FeCl_2 + H_2$

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

'Z'

5 Marks Questions

1. (a) Name a metal which does not stick to glass?

(b) Name a non-metal which is good conductor of electricity?

(c) Name the metal which is commonly used in thermit welding?

(d) What gets deposited at the cathode, a pure or impure metal?

(e) What is the nature of Zinc oxide?

Ans.(i) Mercury

(ii) Graphite

(iii) Aluminum

(iv) A pure metal is always deposited at the cathode

(v) Zinc oxide (ZnO) is an amphoteric oxide.

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2. Name three common forms in which metals occur is nature. Explain the interaction between metals and dilute acid?

Ans. The three common forms is which metals occur in nature are

Sulphide form – copper pyrite $(CuFeS_2)$

Oxide form – Bauxite $(Al_2O_3\ 2H_2O)$

Carbonate form – Calamine $(ZnCO_3)$

Active metals generally interact with dil HCl or dil H_2SO_4 to evolve hydrogen gas. For eg-

$$Zn(s)+2Hcl(aq)\rightarrow Zncl_2(aq)+H_2(g)$$

$$Mg(s)+2Hcl(aq)\rightarrow Mgcl_2(aq)+H_2(g)$$

The metals which lie below hydrogen is the activity series do not interact with dilute acid.

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3. Sample pieces of five metals A, B, C, D and E were added to the tabulated solutions separately. The results observed are shown in the table:

Metal	$FeSO_4$	$CuSO_4$	$ZuSO_4$	$AgNO_3$	$Al(SO_4)$
A	**No Change**	**No Change**	**No Change**	**Coating on metal**	**No Change**
B	**Grey Deposit on metal**	**Brown Coating on metal**	**No Change**	**Coating on metal**	**No Change**
C	**No Change**	**No Change**	**No Change**	**No Change**	**No Change**
D	**No Change**	**----------**	**No Change**	**Coating on metal**	**No Change**
E	**----------**	**Brown coating**	**New coating**	**New coating**	**No Change**

Based on the observations recorded in the table, answer the following:

(1) Which is the most reactive metal?

(2) Which is the least reactive metal?

(3) What would be observed if metal D were added to a solution of copper (II) sulphate?

(4) What would be observed if metal E were added to a solution of iron (II) sulphate?

(5) Arrange the metals A, B, C, D and E in decreasing order to their reactivity?

Ans. (a) Na>Ca>Mg>Zn>Cu

(b) (1) Metal reacts violently with cold water and catch fire is sodium.

(2) Metal which evolves H_2 gas upon heating with water is magnesium.

(3) Metal which does not react with water on strong heating is copper.

(c) Copper is found in native state.

---

4. (1) Write electron dot structure for sodium, magnesium and oxygen?

(2) Show formation of Na_2O and MgO by the transfer of electrons?

Ans. (1) Atomic No. of Na Z=11

K L M

$\dot{Na}$

2 8 1

electron dot structure

(2) Mg Z=12

K L M

$Mg:$

2 8 2

electron dot structure

(3) O Z=8

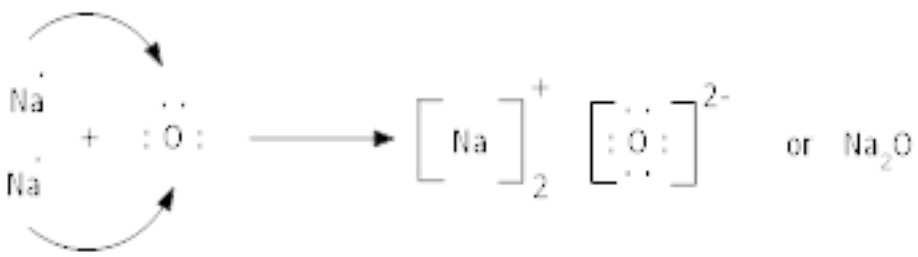
K L

$:\ddot{O}:$

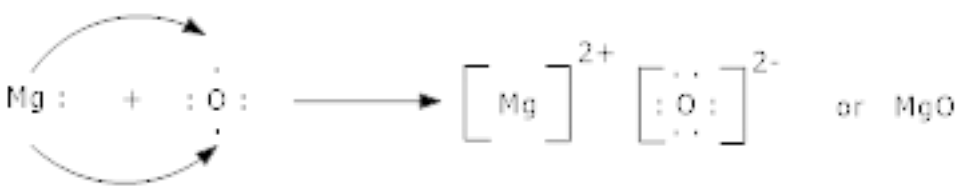
2 6

electron dot structure

(4) Formation of sodium oxide (Na_2O)



Formation of magnesium oxide (MgO)



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5. Hydrogen gas is evolved by reacting a piece of magnesium ribbon with water:

(1) Describe how it could be shown that the gas collected is hydrogen.

(2) Write a chemical equation for the reaction taking place between magnesium and water using symbols.

(3) Suggest how the appearance of magnesium would change after a week.

(4) A few drops of universal indicator solution were added to water in the beaker. What colour would expect to see and what pH would this colour indicate?

Ans. (1) If we bring a lighted splint near the gas, it will burn very brightly, accompanied by explosion along with a 'pop sound' this show that the gas evolved is hydrogen.

(2) The symbol equation for the reaction is:

$$Mg + 2H_2O \rightarrow Mg(OH)_2 + H_2$$

(3) After a week's time, magnesium will lose all its shine and a deposit of magnesium hydroxide will be formed on the surface of the metal.

(4) The indicator will acquire blue colour indicating that the solution is basic. The pH of the solution is expected to be more than seven.

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)suphate	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 given 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 order of decreasing reactivity.

Ans.

(i) B is the most reactive metal

(ii)If B is added to a solution of copper (II) sulphate, displacement reaction will take place. Blue colour of copper sulphate will fade and red –brown copper will settle down.

(iii) The decreasing order of reactivity is:

B> A> C >D

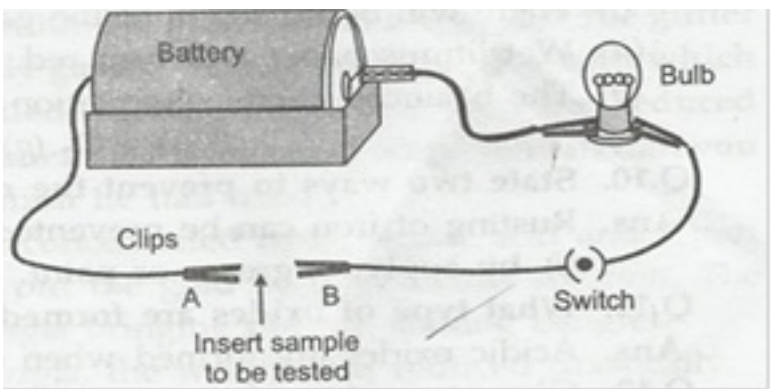
7. You are given a hammer, a battery, a bulb, wires and switch.

(a) How could you use them to distinguish between samples of metals and non- metals?

(b) Asses the usefulness of these tests in distinguishing between metals and non-metals?

Ans. (a)Place the sample on an iron block. Strike with hammer. If the sample takes the shape of a sheet, it is a metal. If it breaks into pieces, it is a non-metal.

Set up the arrangement by using a bulb, a battery, wires and switch. Insert the samples of metals and non-metals in the clips one by one and turn the switch on. If the bulb glows, the sample is a metal, if not, then the sample is non-metal.



(b)The above two methods can, in general, be used to distinguish between metals and non-metals.

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8. Give reasons:

(a) Platinum, gold and silver are used to make jewellery.

(b) Sodium, potassium and lithium are stored under oil.

(c) Aluminum is highly reactive metal, yet it is used to make utensils for cooking.

(d) Carbonate and sulphides ores are usually converted into oxides during the process of extraction.

Ans. (a) These metals are un-reactive. They do not react with oxygen and other gases present in air and with moisture. Thus, their shine is maintained. That is why these metals are used to make jewellery.

(b) Reaction of sodium, potassium and lithium with oxygen is so violent that they catch fire. To prevent accidental fire, they are stored under kerosene oil.

(c) This is because aluminum is a good conductor of heat. Aluminum forms a layer of aluminum oxide at high temperature which is prevent the further corrosion.

(d) It is easier to reduce oxide than the carbonates and sulphide to the metals.

9. Four metals A, B, C and D are, in turn, added to the following solutions one by one. The observations made are tabulated below:

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

Answer the following questions based on above information.

(i) Which is the most active metal and why?

(ii) What would be observed if B is added to a solution of copper (II) sulphate and Why?

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

(iv) Container of which metal can be used to store both zinc sulphate solution and silver nitrate solution.

(v) Which of the above solutions can be easily stored in a container made up of any of these metals?

Ans. (i) B

(ii) Displacement reaction. Because B is more reactive than Cu.

(iii) B.>A>CD

(iv) DI

(v) Zn