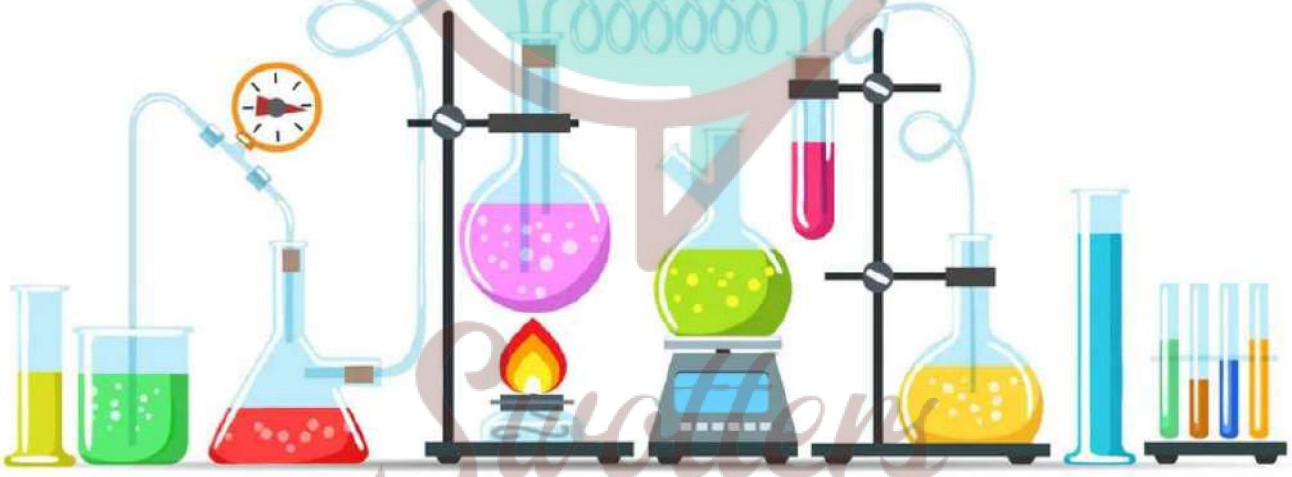
SCIENCE

(Chemistry)



Important Questions

➢ Multiple Choice Questions:

1. Aluminium is used for making cooking utensils. Which of the following properties of aluminium are responsible for the same?

(i) Good thermal conductivity
(ii) Good electrical conductivity
(iii) Ductility
(iv) High melting point

(a) (i) and (ii)
(b) (i) and (iii)
(c) (ii) and (iii)
(d) (i) and (iv)

2. The most abundant metal in the earth's crust is

(a) Iron
(b) Aluminium
(c) Calcium
(d) Sodium

3. The poorest conductor of heat among metals is

(a) Lead
(b) Mercury
(c) Calcium
(d) Sodium

4. Which property of metals is used for making bells and strings of musical instruments like Sitar and Violin?

(a) Sonorousness
(b) Malleability
(c) Ductility
(d) Conductivity

5. $Al_2O_3 + 2NaOH \rightarrow + H_2O$

(a) $Al(OH)_3$
(b) Na_2O
(c) $NaAlO_2$
(d) $AlNaO_2$

6. Which of the following is the correct arrangement of the given metals in ascending order of their reactivity?

Zinc, Iron, Magnesium, Sodium

(a) Zinc > Iron > Magnesium > Sodium
(b) Sodium > Magnesium > Iron > Zinc
(c) Sodium > Zinc > Magnesium > Iron
(d) Sodium > Magnesium > Zinc > Iron

7. Which of the following pairs will give dis-placement reactions?

(a) $FeSO_4$ solution and Copper metal
(b) $AgNO_3$ solution and Copper metal
(c) $CuSO_4$ solution and Silver metal
(d) NaCl solution and Copper metal

8. Non-metals form covalent chlorides because

(a) they can give electrons to chlorine
(b) they can share electrons with chlorine
(c) they can give electrons to chlorine atoms to form chloride ions
(d) they cannot share electrons with chlorine atoms

9. Which of the following oxide(s) of iron would be obtained on prolonged reaction of iron with steam?

(a) FeO
(b) Fe_2O_3
(c) Fe_3O_4
(d) Fe_2O_3 and Fe_2O_4

10. Which of tire following are not ionic compounds?

(i) KCl
(ii) HCl
(iii) CCl_4
(iv) NaCl

(a) (i) and (ii)
(b) (ii) and (iii)
(c) (iii) and (iv)
(d) (i) and (iii)

➢ Very Short Question:

1. Name the metal which is most abundant in earth's crust.

2. What is the difference between calcination and roasting ?

3. What is the chemical formula of rust?

4. Name the process used for the enrichment of sulphide ore.

5. Out of zinc and iron, which evolves hydrogen more readily on reacting with dilute HCl?

6. How do alloys brass and bronze differ in composition?

7. Does german silver contain silver in it?

8. Write the chemical formulae of the main ores of iron and aluminium.

9. Name the non-metal which can conduct electricity.

10. Write the names of two neutral oxides.

➢ Short Questions:

Which important properties of aluminium are responsible for its great demand in industry?

2. Name an alloy of

- Aluminium used in construction of air crafts.
- Lead in joining metals for electric welding.
- Copper used in household vessels.

3. All ores are minerals but all minerals are not ores. Justify.

4. (a) An iron knife kept in blue copper sulphate solution turns the blue solution into light green. Explain.

(b) An athlete won a bronze medal in a race competition. After some days, he found that the medal had lost its lustre due to the formation of a greenish layer on it. Name the metals present in the medal. What is the reason for the appearance of a greenish layer on its surface?

5. Why is titanium called a strategic metal? Mention two of its properties which make it so special.

6. 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.

On placing a piece of zinc metal in a solution of mercuric chloride, it acquires a silvery surface but when it is placed in a solution of magnesium sulphate, no change is observed. State the reason for the behaviour of zinc metal.

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

- The ore has higher density particles mixed with a large bulk of low density impurities.
- The ore consists of copper sulphide intermixed with clay particles. Give an example of amalgam.

➢ Long Questions:

When the powder of a common metal is heated in an open china dish, its colour turns black. However, when hydrogen gas is passed over the hot black substance formed, it regains its original colour. Based on this information, answer the following questions:

- What type of chemical reaction takes place in each of the two given steps ?
- Name the metal initially taken in the powder form. Write balanced chemical equations for both these reactions.

2. (a) Which of the following metals would give hydrogen when added to dilute hydrochloricacid?

- iron
- copper
- magnesium

(b) Explain why do surfaces of some metals acquire a dull appearance when exposed to air for a long lime.

3. How will your demonstrate that the ionic compounds do not conduct electricity in the solid state and can do so in solution.

➢ Assertion Reason Questions:

1. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Sele the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

   a. Both A and R are true, and R is correct explanation of the assertion.
   b. Both A and R are true, but R is not the correct explanation of the assertion.
   c. A is true, but R is false.
   d. A is false, but R is true.

Assertion: Aluminium oxide and zinc oxide are acidic in nature.

Reason: Amphoteric nature means that substances have both acidic and basic character.

2. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Sele the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

   a. Both A and R are true, and R is correct explanation of the assertion.
   b. Both A and R are true, but R is not the correct explanation of the assertion.
   c. A is true, but R is false.
   d. A is false, but R is true.

Assertion: C and N do not react with dil. HCl and dil. H_2SO_4.

Reason: Metals do not react with dil. HCl and dil. H_2SO_4.

➢ Case Study Questions:

1. Read the following and answer any four questions from (i) to (v).

An element is a pure substance made up of same kind of atoms. At present, nearly 118 elements are known but all of them do not occur free in nature, some of them have been

synthesized by artificial methods. Based on their properties, they are mainly classified as metals and non-metals. Metals are those elements which lose electrons and form positive ions i.e., they are electropositive in nature. They are generally hard, good conductors of heat and electricity, malleable, ductile and have striking luster. They have a significant role to play in our daily life.

i. Metals which are of vital importance to the national Défense, energy and industry sector are called strategic metals. Which of the following is a strategic metal?

   a. Titanium.
   b. Zirconium.
   c. Manganese.
   d. All of these.

ii. Which metal is the best conductor of electricity?

   a. Silver.
   b. Platinum.
   c. Nickel.
   d. Iron.

iii. Which of the following metals is not a coinage metal?

   a. Copper.
   b. Silver.
   c. Iron.
   d. Gold.

iv. Which of the following are the most malleable metals?

   I. Sodium.
   II. Gold.
   III. Potassium.
   IV. Silver.

      a. (I) and (IV)
      b. (II) and (III)
      c. (III) and (IV)
      d. (II) and (IV)

v. Identify the correct statement(s).

   I. The wires that carry current in our homes have a coating of PVC or a rubber like material.
   II. School bells are made of metals.
   III. Metals do not conduct electricity.
   IV. Metals which produce a sound on striking a hard surface are said to be non-sonorous

      a. (I) and (III)

b. (I) and (II)
c. (III) and (IV)
d. Only (II)

2. Read the following and answer any four questions from (i) to (v).

Ionic compound is a chemical compound in which ions are held together by ionic bonds. An ionic bond is the type of chemical bond in which two oppositely charged ions are held through electrostatic forces. We know that metal atoms have loosely bound valence electrons in their valence shell and non-metal atoms need electrons in their valence shell to attain noble gas configuration. The metal atom loses the valence electrons while non-metal atom accepts these electrons. By losing electrons, metal atoms change to cations and by accepting electrons, non-metals form anions. Ionic compounds are generally solid and exist in the form of crystal. They have high melting and boiling points.

i. Which of the following can change to a cation?

a. Fluorine.
b. Oxygen.
c. Potassium.
d. Neon.

ii. Which of the following can change to an anion?

a. Iodine.
b. Magnesium.
c. Calcium.
d. Xenon.

iii. Ionic compounds are soluble in _____.

a. Kerosene.
b. Petrol.
c. Water.
d. None of these.

iv. Which of the following statements is correct about ionic compounds?

I. They conduct electricity in solid state.
II. They conduct electricity in solutions.
III. They conduct electricity in molten state.

a. I only.
b. II only.
c. III only.
d. II and III only.

v. Select the incorrect statement.

a. Ionic compounds are generally brittle.

b. Ions are the fundamental units of ionic compounds.
c. Formation of ionic bonds involve sharing of electrons.
d. NaCl is an ionic compound.

Answer Key-

➢ Multiple Choice Answers:

1. (d) (i) and (iv)
2. (b) Aluminium
3. (a) Lead
4. (a) Sonorousness
5. (b) $NaAlO_2$
6. (c) Sodium > Magnesium > Zinc > Iron
7. (b) $AgNO_3$ solution and Copper metal
8. (c) they can share electrons with chlorine
9. (d) Fe_3O_4
10. (b) (ii) and (iii)

➢ Very Short Answers:

1. Answer: Aluminium (Al) is the most abundant metal in the earth's crust and is present to the extent of 8-1 per cent by mass.
2. Answer: Calcination is carried in the absence of air while roasting is done in excess of air.
3. Answer: Rust is hydrated ferric oxide and its chemical formula is $Fe_2O_3.xH_2O$.
4. Answer: The process is called Froth Floatation process.
5. Answer: Zinc evolves hydrogen more readily than iron on reacting with dilute HCl because it is placed above iron in the reactivity series.
6. Answer: Constituents of brass are copper and zinc while those of bronze are copper and tin.
7. Answer: German silver is an alloy of copper, zinc and nickel. It does not contain any silver in it.
8. Answer: The main ore of iron is haematite (Fe_2CO_3) while that of aluminium is bauxite ($Al_2O_3.2H_2O$).
9. Answer: Graphite, an allotropy form of carbon conducts electricity.
10. Answer: Two neutral oxides are: carbon monoxide (CO) and nitrous oxide (N_2O).

➢ Short Answer:

1. Answer:

The properties of aluminum metal responsible for its great demand in industry are:

- The metal is a good conductor of electricity.
- The metal is not attacked by water.
- The metal is a powerful reducing agent.

2. Answer:
   - The alloy is duralumin: A1 (93%), Cu (4%), Mg (0.5%), Mn (0.5%).
   - The alloy is solder: Pb (50%), Sn (50%)
   - The alloy is brass: Cu (80%), Zn (20%)
3. Answer: In the earth's crust, metals are present in the form of minerals and there are more than one mineral for a particular metal. However, metal may not be extracted from all of them. The mineral from which a metal can be profitably and conveniently extracted is known as ore. This clearly means that all ores are minerals but all minerals are not ores. For example, the different minerals of iron are:

   Haematite: FeO_3;

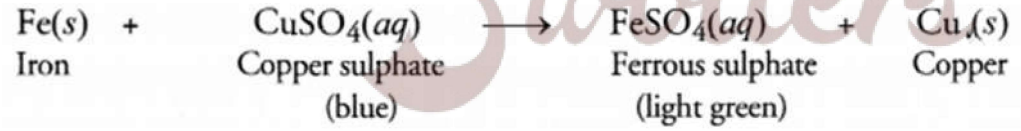
   Limonite: $Fe_2O_3.3H_2O$;

   Siderite: $FeCO_3$;

   Iron pyrites: FeS_2

   Iron is extracted from haematite (Fe_2CO_3). Haematite mineral is the ore of iron while other minerals are not the ores.
4. Answer:

   (a) Iron lies above copper in the activity series. This means that iron or iron knife will displace copper from copper sulphate solution. As a result of the reaction, ferrous sulphate will be formed and the solution will be light green in colour.



   (b) The bronze medal is an alloy and the constituting metals are copper and tin. The loss of lustre by the medal is due to the formation of a coating of green layer. This layer is at basic copper carbonate.
5. Answer: Titanium is called strategic metal because it is used for making certain war equipments. The properties which make the metal so special are:

   It is light in weight but at the same time stronger than the other metals.

   It is not affected by corrosion even if kept in the open for a very long time.
6. Answer: Copper lies above silver in the activity series. This means that copper is more

reactive than silver. Therefore, copper had replaced silver from $AgNO_3$ solution. Silver got deposited on the copper plate and changed to black after sometime because silver and also some salts of silver are sensitive to light. They readily become blackish on standing or on exposure to air.

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

7. Answer: Zinc lies above mercury in the activity series and can easily replace it from mercuric chloride solution. Mercury formed in the reaction gets deposited on the surface of zinc to give it a silvery look.

$$Zn(s) + HgCl_2(aq) \longrightarrow ZnCl_2(aq) + Hg(s)$$

But zinc is placed below magnesium in the activity series. Therefore, no chemical reaction occurs between zinc and magnesium sulphate solution.

8. Answer:
   - The concentration of ore can be done by gravity separation method.
   - 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.

➢ Long Answer:

1. Answer:

   The available information suggests the metal is copper. In open air, its is oxidised to form copper (II) oxide which is black in colour. The reaction is known as oxidation reaction. On passing hydrogen gas over the hot substance, the original colour of the metal is regained. It is an example of reduction reaction.

   The balanced chemical equations for the reactions are:

$$2Cu(s) + O_2(g) \xrightarrow{\text{heat}} 2CuO(s)$$
(Metal) Copper (II) oxide (Black)

$$CuO(s) + H_2(g) \xrightarrow{\text{heat}} Cu(s) + H_2O(g)$$

2. Answer:

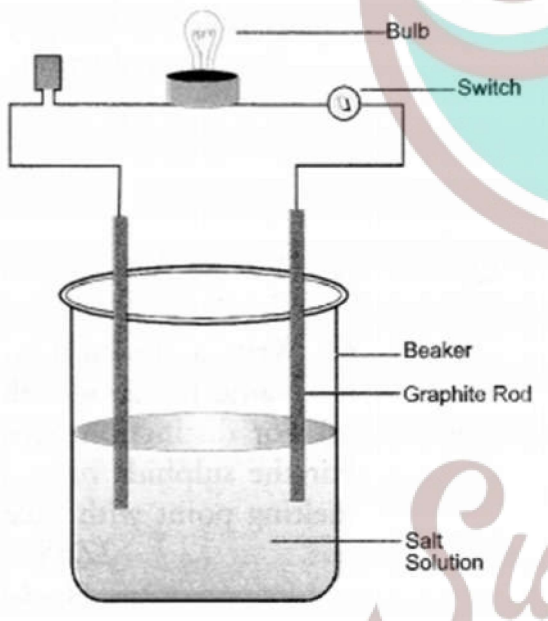
   (a) Both iron (Fe) and magnesium (Mg) will evolve hydrogen on reacting with dilute hydrochloric acid. These are active metals and are placed above hydrogen in the activity series. As copper is placed below hydrogen in the series, it will not evolve hydrogen.

   (b) Surfaces of some metals acquire a dull appearance when exposed to air for a long time and they lose their lustre. This is due to the formation of layer of oxides, hydroxides,

carbonates etc. on the surface For example, surface of aluminium metal becomes dull white due to the formation of coating oi aluminium oxide ($Al2O_3$). Similarly, the surface of copper acquires a greenish colour since a layer oi basic copper carbonate with the formula $Cu(OH)_2CuCO_3$ is deposited on the surface.

3. Answer:

- In a glass beaker, take small amount of solid sodium chloride.
- Dip two graphite rods (electrodes) in the solution.
- Connect these rods to a battery through a bulb and a switch.
- Switch on the battery. The bulb will not glow. This show that no current has passed through the solid sodium chloride.
- Now, add some water to the salt so that it may dissolve.
- Repeat the operation. The bulb will immediately glow showing that current has passed through the salt solution.



Explanation: Sodium chloride (NaCl) is a crystalline solid and the current is carried by the mobility (movement) of ions. Since the ions do not move in the solid state, the salt is not conducting. In aqueous solution, both Na^+ and Cl^- ions can move and the salt will be conducting in the solution. That is why the bulb glows.

➢ Assertion Reason Answer:

1. (d) A is false, but R is true.

Explanation:

Aluminium and zinc oxides are amphoteric in nature.

2. (c) A is true, but R is false.

Explanation:

Metals react with dilute HCl and dil. H_2SO_4. Non-metals do not react with dilute acids.

➢ Case Study Answer:

1. i (d) All of these.

Explanation:

Titanium, zirconium, and manganese are used in Défense equipment's as they are light and durable and therefore, are called strategic metals.

ii. (a) Silver.

iii. (c) Iron.

Explanation:

Copper, silver and gold are called coinage metals because they are used in making coins, jewellery etc.

iv. (d) (II) and (IV)

v. (b) (I) and (II)

Explanation:

Metals conduct electricity. Metals which produce a sound on striking a hard surface are sai to be sonorous.

2. i (c) Potassium.

Explanation:

Potassium, being a metal, can change to cation by losing its valence electron.

ii. (a) Iodine.

Explanation:

Iodine, being a non-metal, can change to anion by gaining electron.

iii. (c) Water.

Explanation:

Ionic compounds are generally soluble in water and insoluble in kerosene and petrol.

iv.(d) II and III only.

Explanation:

Ionic compounds do not conduct electricity in solid state, as ions are very closely packed ar are free to move.

v.(c) Formation of ionic bonds involve sharing of electrons.

Explanation:

Formation of ionic bonds involve complete transfer of electrons from metal atom to non-metal atom.