3. Metal and Non-Metal

Very Short Answer Type Questions-Pg-131

1. Question

Name one metal and one non-metal which exist in liquid state at room temperature.

Answer

A metal which exist in liquid form at room temperature is Mercury, and a non metal which exist in liquid state at room temperature is Bromine.

2. Question

Why are metals called electropositive elements whereas non-metals are called electronegative elements?

Answer

By losing electrons positive ions are formed in case of metal so they are called electropositive. But in case of Non metals, by gaining electrons they form negative ions so they are called electronegative elements.

3 A. Question

Name the most abundant metal in the earth's crust.

Answer

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

3 B. Question

Name the most abundant non- metal in the earth's crust.

Answer

The most abundant non- metal in the earth's crust is Oxygen.

4. Question

Name one metal which has a low melting point.

Answer

Cesium is the metal with the lowest melting point

5. Question

Name the metal which is the poorest conductor of heat.

Answer

Lead is the poorest conductor of heat.

6. Question

State whether the following statement is true or False:

Non-metals react with dilute acids to produce a gas which burns with a ‘pop’ sound.

Answer

False.

Non-metals do not react with dilute acids to produce a gas which burns with a ‘pop’ sound.

7. Question

From amongst the metals sodium, calcium, aluminium, copper and magnesium, name the metal:

(i) which reacts with water only on boiling, and

(ii) another which does not react even with steam.

Answer

(i)Aluminium only react with water on boiling.

(ii)Copper does not even react with steam.

8. Question

What changes in the colour of iron nails and copper sulphate do you observe after keeping the iron nails dipped in copper sulphate solution for about 30 minutes?

Answer

A red brown coating of copper metal will cover the iron nails.the copper sulphate solution will gradually fade its blue colour.

9. Question

What is aqua-regia ? Name two special metals which are insoluble in comman reagents but dissolve in aqua-regia.

Answer

A freshly prepared mixture of one part of concentrated nitric acid and 3 parts of concentrated hydrochloric acidis known as aqua-regia. The two special metals which are insoluble in comman reagents but dissolve in aqua-regia are Gold and Platinum.

10. Question

Give the names and formulae of (a) two acidic oxides, and (b) two basis oxidics.

Answer

(a) Carbon dioxide and sulphur dioxide are the name of two acidic oxides. And the formulas are CO_2 and SO_2.

(b) the name of two basic oxides are Sodium oxide and magnesium oxide.

11. Question

What name is given to those metal oxides which show basis as well as acidics behavior ?

Answer

Amphoteric oxide is the name given to those metal oxides which show basis as well as acidic behavior.

12. Question

Name two metals which form amphoteric oxides.

Answer

two metals which form amphoteric oxides are:-

Aluminium and Zinc.

13. Question

A copper coin is kept immersed in a solution of silver nitrate for some time. What will happen to the coin and colour of the solution ?

Answer

When a copper coin is kept immersed in a solution of silver nitrate for some time then the Copper coin will get the coating of silver metal. The solutions colour will turn to blue.This is a displacement reaction where a more reactive metal displaces less reactive metal in this copper displaces silver

14. Question

Which property of copper and aluminium makes them suitable:

(a) For making cooking utensils and boilers?

(b) for making electric wires?

Answer

(a) for making cooking utensils and boilers high thermal conductivity is the property of metal required.

(b) For making electric wires high electrical conductivity is the required property of the metal.

15. Question

Write the names and formulae of (a) a metal hydride, and (b) a non-metal hydride.

Answer

The names and formulae of (a) a metal hydride, and (b) a non-metal hydride are Sodium hydride (NaH), Hydrogen sulphide (H_2S) respectively.

16. Question

Name the metal which has been placed:

(a) at the bottom of the reactivity series

(b) at the top of the reactivity series.

(c) just below copper in the reactivity series

Answer

(a) At the bottom of the reactivity series the metal which has been placed is Gold.

(b) At the top of the reactivity series the metal which has been placed is Potassium.

(c) Just below copper in the reactivity series the metal which has been placed is Mercury.

17. Question

Which of the two metals is more reactive: copper or silver ?

Answer

Copper is the most reactive metal among copper and silver.

18 A. Question

Name one metal which is stored in kerosene oil.

Answer

One metal which is stored in kerosene oil is Sodium.

18 B. Question

Name one non-metal which is stored under water.

Answer

One non-metal which is stored under water is White phosphorus.

19. Question

Write equation for the reaction of:

(a) sodium with oxygen

(b) magnesium with oxygen

Answer

(a) $4Na + O_2 \rightarrow 2Na_2O$

(b) $2Mg + O_2 \rightarrow 2MgO$

20. Question

Name two metals which are used:

(a) for making electric wires.

(b) for making domestic utensils and factory equipment.

(c) for making jewelry and to decorate sweets.

Answer

(a) For making electric wires, two metals used are Aluminium and Copper.

(b) For making domestic utensils and factory equipment the two metals used are Copper and Aluminium.

(c) For making jewelry and to decorate sweets the two metals used are Gold and Silver.

21. Question

Which metal foil is used for packing some of the medicine tablets ?

Answer

The metal foil is used for packing some of the medicine tablets is Aluminium foil.

22. Question

Name the non-metal which is used:

(a) to convert vegetable oil into vegetable ghee (solid fat).

(b) as a rocket fuel (in liquid form).

(c) to make electrodes of dry cells.

(d) to preserve food materials.

(e) in the valcanisation of rubber.

Answer

(a) To convert vegetable oil into vegetable ghee (solid fat) the non-metal which is used is Hydrogen.

(b) As a rocket fuel (in liquid form) the non-metal which is used is Hydrogen.

(c) To make electrodes of dry cells the non-metal which is used is Carbon (as Graphite).

(d) To preserve food materials the non-metal which is used is Nitrogen.

(e) In the valcanisation of rubber the non-metal which is used is Sulphur.

23. Question

Name one property which is characteristic of (a) metals, and (b) non-metals.

Answer

The one property which is the characteristic of metal is malleability. And the one property of non-metal is non-malleability.

24. Question

What is meant by “brittleness” ? which type of elements usually show brittleness : metals or non-metals ?

Answer

Being brittle is the property of metals called brittleness. Non-metals are the elements which generally shows brittleness.

25. Question

What will happen if a strip of zinc is kept immersed in a solution of copper sulphate ?

Answer

If a strip of zinc is kept immersed in a solution of copper sulphate, then the blue colour of copper sulphate solution fades gradually and red brown coating of copper is deposited on zinc strip.

26. Question

What will happen if a strip of copper is kept immersed in a solution of silver nitrate ($AgNO_3$)?

Answer

If a strip of copper is kept immersed in a solution of silver nitrate ($AgNO_3$), then the solution gradually becomes blue and a shining greyish-white deposit of silver metal is formed on copper strip.

27. Question

What happens when iron nails are put into copper sulphate solution ?

Answer

When iron nails are put into copper sulphate solution, a red brown copper metal is formed as the colour of blue copper sulphate fades gradually.

28. Question

How would you show that silver is chemically less reactive than copper ?

Answer

silver is chemically less reactive than copper can be seen when a strip of silver metal is kept immersed in copper sulphate solution for some time then the silver is not able to displace copper from copper sulphate solution (to form a red-brown coating on silver strip).

29. Question

Give reasons for the following:

Blue colour of copper sulphate solution is destroyed when iron filings are added to it.

Answer

Blue colour of copper sulphate solution is destroyed when iron filings are added to it that's because iron displaces copper from copper sulphate solution as iron is more reactive than copper.

30. Question

Name a non-metal having a very high melting point.

Answer

Diamond is a non-metal having a very high melting point.

31. Question

Which property of graphite is utilized in making electrodes ?

Answer

Graphite is utilized in making electrodes because they are good conductor of electricity.

32. Question

Name two non-metals which are both brittle and non-ductile.

Answer

Two non-metals which are both brittle and non-ductile are Sulphur and Phosphorus.

33. Question

Explain why, the surface of some of some metals acquires a dull appearance when exposed to air for a long time.

Answer

Dull appearance is acquired by the surface of some metals when exposed to air for a long time because a thin layer of oxides, carbonates or sulphide is formed on the metal surface. This can be seen by the action of various gases present in air.

34. Question

Complete and balance the following equations:

(a) $Na + O_2 \longrightarrow$

(b) $Na_2O + H_2O \longrightarrow$

(c) $fe(s) + H_2O(g) \xrightarrow{Readheat}$

(d) $Cu(NO_3)_2(aq) + Zn(s) \longrightarrow$

Answer

(a) $4Na(s) + O_2 \rightarrow 2Na_2O(s)$

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

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

(d) $2Cu(NO_3)_2(aq) + Zn(s) \rightarrow Zn(NO_3)_2 + 2Cu$

35. Question

Fill in the following blanks with suitable words:

(a) Magnesium liberates _____ gas on reacting with hot boiling water.

(b) The white powder formed when magnesium ribbon burns in oxygen is of _____

(c) Ordinary aluminium strips are not attacked by water because of the presence of a layer of _____ on the surface of aluminium.

(d) A metal having low melting point is _____ but a non-metal having very high melting point is _____

(e) Calcium is a _____ reactive metal than sodium.

Answer

(a) Hydrogen gas is liberated when magnesium react with hot boiling water.

(b) When magnesium ribbon burns in oxygen is of magnesium oxide, the white powder is formed.

(c) Ordinary aluminium strips are not attacked by water because of the presence of a layer of aluminium oxide on the surface of aluminium.

(d) A metal having low melting point is Sodium but a non-metal having very high melting point is Dimond.

(e) Calcium is a less reactive metal than sodium.

Short Answer Type Questions-Pg-133

36 A. Question

What is metal by saying that the metals are malleable and ductile ?Explain with examples.

Answer

By saying that metals are malleable, it means metals can be beaten into thin sheets with a hammer. It can be seen in Aluminium.

Ductility of metal means they can be drawn into thin wires. It can be seen in Copper.

36 B. Question

Name two metals which are both malleable and ductile.

Answer

Aluminium and copper are the two metals which are both malleable and ductile.

36 C. Question

Which property of iron metal is utilized in producing iron sheets required for making buckets?

Answer

Malleability is the property of iron metal which is utilized in producing iron sheets required for making buckets.

36 D. Question

Which property of copper metal is utilized in making thin wires?

Answer

Ductility is the property of copper metal which is utilized in making thin wires.

37. Question

Name two metals which react violently with cold water. Write any three observations you would make when such a metal is dropped into water. How would you identify the gas evolved, if any, during the reaction?

Answer

Two metals which react violently with cold water are Sodium and Potassium. The three observation made during that time are:-

1) Little explosions takes place on the surface of water and ultimately catches fire as the metal moves to the surface of water.

2) A pop sound is produced indicating that it is hydrogen.

38 A. Question

With the help of examples, describe how metal oxides differ from non-metal oxides.

Answer

The metal oxides differ from non-metal oxides as they are basic in nature and turn red litmus blue. For example:- magnesium oxide, it turn the red litmus blue.

Whereas non-metals are acidic in nature. That is why they turn blue litmus red. For example: carbon dioxide when tested on litmus paper they turn blue litmus red.

38 B. Question

Which of the following elements would yield:

(i) an acidic oxide,

(ii) a basic oxide, and

(iii) a neutral oxide?

Answer

(i) The element which yield an acidic oxide are S,C.

(ii) The element which yield a basic oxide are Na,K.

(iii)The element which yield a neutral oxide is H.

Na, S, C, K, H

39 A. Question

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

Answer

Amphoteric oxide are those metals which acidic as well as basic behavior. The two examples of amphoteric oxides are Aluminium Oxide and Zinc Oxide.

39 B. Question

Choose the acidic oxides, basic oxides and neutral oxides from the following:

Na_2O; CO_2; CO; SO_2; ; N_2O; H_2O.

Answer

CO_2, CO, SO_2, and N_2O are the acidic oxides.

Na_2O, and MgO are basic oxides.

H_2O is the neutral oxide.

39 C. Question

Which of the following are amphoteric oxides:

MgO, ZnO, P_2O_3, Al_2O_3, NO_2

Answer

ZnO, Al_2O_3 are the amphoteric oxides among the given.

40 A. Question

What is the nature of the oxide SO_2 ? What happens when it is dissolved in water? Write the chemical equation of the reaction involved.

Answer

The oxide SO_2 is acidic in nature. When the oxide SO_2 get dissolved in water it produces Sulphurous acid.

40 B. Question

What is the nature of the oxide Na_2O? What happens when it is dissolved in water? Write the chemical equation of the reaction involved.

Answer

The oxide of Na_2O is basic in nature. When Na_2O is dissolved in water an alkali is formed which is known as Sodium Hydroxide.

41 A. Question

What type of oxides are formed when non-metals react with oxygen? Explain with an example.

Answer

When metal reacts with Oxygen the oxides formed are acidic or neutral in neutral in nature.

Example: Carbon Dioxide which is acidic in nature is formed when Carbon reacts with Oxygen. A neutral Oxide is formed by the reaction of Hydrogen and Oxygen which is known as water.

41 B. Question

What type of oxides are formed when metals combine with oxygen? Explain with the help of an example.

Answer

The oxides formed when metal react with oxygen is basic in nature.

Example: when Sodium reacts with Oxygen then it forms Sodium Oxide which is basic in nature.

42 A. Question

Explain why, metals usually do not liberate hydrogen gas with dilute nitric acid.

Answer

Nitric acid is strong oxidizing agent so metals do not liberate Hydrogen gas when they reacts with metals. That is why when Hydrogen gas is liberated during the reaction of dilute nitric acid and any metal, they get oxidized to form water. So they usually do not liberate hydrogen gas.

42 B. Question

Name two metals which can, however, liberate hydrogen gas from very dilute nitric acid.

Answer

The metals which can, however, liberate hydrogen gas from very dilute nitric acid are Magnesium and Manganese.

43 A. Question

How do metals react with hydrogen? Explain with an example.

Answer

Hydrogen do not generally react with any metals. However only few very reactive metals reacts with Hydrogen to form metal hydrides. For example: Sodium Hydride is formed when Hydrogen gas is passed over heated sodium.

43 B. Question

How do non-metals react with hydrogen? Explain with an example.

Answer

Covalent hydrides is formed when Hydrogen react with non-metal. For example: hydrogen sulphide is formed when sulphur combines with hydrogen.

44 A. Question

What happens when calcium reacts with chlorine? Write an equation for the reaction which takes place.

Answer

An ionic chloride is formed when calcium vigorously reacts with chlorine. And this ionic chloride is known as calcium chloride.

44 B. Question

What happens when magnesium reacts with very dilute nitric acid? Write an equation for the reaction involved.

Answer

Magnesium nitrate and hydrogen gas is formed when Magnesium reacts with very dilute nitric acid.

45 A. Question

Arrange the following metals in order of their chemical reactivity, placing the most reactive metal first: Magnesium, Copper, Iron, Sodium, Zinc, Lead, Calcium.

Answer

Sodium > Calcium > Magnesium > Zinc > Iron > Lead > Copper

45 B. Question

What happens when a rod of zinc metal is dipped into a solution of copper sulphate? Give chemical equation of the reaction involved.

Answer

The blue colour of copper sulphate solution fades gradually and red brown coating of copper is deposited on the zinc strip when the strip of Zinc metal is dipped in to the solution of copper sulphate.

46. Question

A copper plate was dipped in AgN03 Solution. After certain time, silver from the solution was deposited on the copper plate. State the reason why it happened. Give the chemical equation of the reaction involved.

Answer

Deposition of silver on the copper plate will occur when copper plate will be dipped in $AgNO_3$ Solution. This happens because copper is more reactive in nature then that of the silver, so copper displaces silver from silver nitrate Solution.

47. Question

State five uses of metals and five of non-metals.

Answer

The five uses of metals are as follow:-

1) for making car batteries lead metal is used.

2) To protect iron from rusting galvanization is used with the help of Zinc metal.

3) To make utensils Iron, copper and aluminium metals are used.

4) To make electrical wires metals like copper and aluminium are used.

5) For packaging of materials aluminium foil is being used and they are of aluminium metal.

Five uses of non-metals are:-

1) for the hydrogenation of vegetable oil is done with the use of hydrogen.

2) To make the electrodes of electric cells and dry cell carbon is used.

3) In the manufacturing of ammonia, nitric acid and fertilizers nitrogen is used.

4) As a rocket fuel liquid hydrogen is being used.

5) For the production of sulphuric acid sulphur is used.

48. Question

State one use each of the following metals: Copper, Aluminium, Iron, Silver, Gold, Mercury

Answer

Copper:- copper is used for making electric wire to carry electric current.

Aluminium:- for the packaging of food aluminium foil is used.

Iron:- utensils are manufactured by the iron.

Silver:- to make jewelry silver is being used.

Gold:- for the purpose of jewelry making gold is used.

Mercury:- in thermometers mercury is being used.

49 A. Question

State one use each of the following non-metals: Hydrogen, Carbon (as Graphite), Nitrogen, Sulphur

Answer

Hydrogen:- for the hydrogenation of vegetable oils hydrogen is used.

Carbon (as graphite):- for the making of electrodes of the electric cell and dry cell carbon (as graphite) is used.

Nitrogen:- In the manufacturing of ammonia, nitric acid and fertilizers nitrogen is used.

Sulphur:- to prepare sulphuric acid sulphur is used.

49 B. Question

Name the metal which is used in making thermometers.

Answer

The metal which is used in making of thermometers is Mercury.

50 A. Question

Why does aluminium not react with water under ordinary conditions?

Answer

A thin layer of aluminium oxide is there on the surface of aluminium. This Layer of aluminium oxide prevent aluminium to react with water under ordinary condition.

50 B. Question

Name two metals which can displace hydrogen from dilute acids.

Answer

Sodium and Magnesium are the metals which can displace hydrogen from dilute acids.

50 C. Question

Name two metals which cannot displace hydrogen from dilute acids.

Answer

The two metals which cannot displace hydrogen from dilute acids are copper and silver.

51 A. Question

Why is sodium kept immersed in kerosene oil?

Answer

As we know sodium is very reactive metal and reacts vigorously with oxygen which is present in air which eventually lead to fire. So to sodium is kept in kerosene to avoid any kind of reaction with oxygen, moisture, carbon dioxide of the air and also to avoid any accidental fire.

51 B. Question

Why is white phosphorus kept immersed under water?

Answer

Phosphorous which is also very reactive in nature kept immersed in water because when it comes in contact with oxygen in the air it shows a spontaneous reaction to form phosphorous pentaoxide but do not react with water. So to avoid any kind of reaction of phosphorous with the oxygen present in air it is kept immersed in water.

51 C. Question

Can we keep sodium immersed under water? Why?

Answer

No, we cannot keep sodium immersed in water. Because sodium reacts with water to form sodium hydroxide and hydrogen.

52 A. Question

Describe the reaction of potassium with water. Write the equation of the reaction involved.

Answer

Potassium hydroxide and hydrogen gas is formed by the vigorous reaction of potassium with cold water.

52 B. Question

Write an equation of the reaction of iron with steam. Indicate the physical states of all the reactants and products.

Answer

An equation of the reaction of iron with steam is:-

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

52 C. Question

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

Answer

When dilute hydrochloric acid is added to a reactive metal the gas produced is hydrogen.

53 A. Question

Give one example, with equation, of the displacement of hydrogen by a metal from an acid.

Answer

Magnesium when reacts with acid it displaces hydrogen.

53 B. Question

Name two metals (other than zinc and iron) which can displace hydrogen from dilute hydrochloric acid?

Answer

The name of two metals (other than zinc and iron) which can displace hydrogen from dilute hydrochloric acid are magnesium and aluminium.

54. Question

What is the action of water on

(a) sodium

(b) magnesium, and

(c) aluminium? Write equations of the chemical reactions involved.

Answer

(a) Sodium vigorously reacts with cold water to form sodium hydroxide and hydrogen gas.

(b) When magnesium reacts with hot water it gives magnesium hydroxide and hydrogen gas.

(c) Aluminium reacts with the steam to give aluminium oxide and also produces hydrogen gas.

55. Question

You are given samples of three metals-sodium, magnesium and copper. Suggest any two activities to arrange them in order of their decreasing reactivities.

Answer

1) When sodium, magnesium and copper are left in air, sodium reacts instantly with oxygen to form sodium oxide as it is a very reactive metal, magnesium reacts with oxygen to form magnesium oxide only on heating, whereas copper does not burn in air even on strong heating. It reacts only when the heating is done for a long time. By this we can say that sodium is most reactive, then magnesium and copper is the least reactive among the given three.

2) When Sodium reacts instantly with cold water it forms sodium hydroxide and hydrogen, magnesium does not react with cold water but it reacts with hot water to form magnesium hydroxide and hydrogen gas but on the other hand copper do not react even with steam. This shows that sodium is highly reactive; magnesium is less reactive than sodium and copper is the least reactive among the three.

56 A. Question

Write one reaction in which aluminium oxide behaves as a basic oxide and another in which it behaves as an acidic oxide.

Answer

When aluminium reacts with acid to form salt and water then in that type of reaction aluminium oxide behaves like a basic oxide.

Whereas, on the other hand, aluminium oxide behaves as an acidic oxide because it reacts with a base to form salt and water.

56 B. Question

What special name is given to substances like aluminium oxide.

Answer

Amphoteric oxide is the name given to the substance like aluminium oxide.

56 C. Question

Name another metal oxide which behaves like aluminium oxide.

Answer

The another metal oxide which behaves like aluminium oxide is zinc oxide.

57 A. Question

What happens when calcium reacts with water ? Write the chemical equation of the reaction of calcium with water.

Answer

calcium hydroxide and hydrogen gas are formed during the reaction of calcium and cold water.

57 B. Question

Write the chemical equation of the reaction which takes place when iron reacts with dilute sulphuric acid. What happens when the gas produced is ignited with a burning matchstick?

Answer

When iron reacts with dilute sulphuric acid, it forms iron sulphate and hydrogen gas. When hydrogen gas is ignited with a burning matchstick, it produces a 'pop' sound.

58. Question

You are given a dry cell, a torch bulb with holder, wires and crocodile clips. How would you use them to distinguish between samples of metals and non-metals?

Answer

to create an apparatus we would use a dry cell, a torch bulb which should be fitted in a holder and some connecting wires with the help of crocodile clips and join them to make an electric circuit. Now when we insert a piece of sulphur between the crocodile clips then the bulb does not light up at all. Which means that sulphur is not allowing electric current to pass through it. If we do the same by putting copper wire in place of sulphur then the bulb starts to glow. By the help of this experiment we can say that metal (ex- copper) conduct electricity but non-metal (ex-sulphur) do not.

59. Question

State any five physical properties of metals and five physical properties of non-metals.

Answer

Five physical properties of metals are:-

1) metals are malleable, which mean metals can be beaten into thin sheets.

2) Property of ductility, which mean metals can be drawn into thin wires.

3) Metals are lustrous.

4) Property of hardness.

5) Property of conductivity, metals are good conductor of electricity and heat.

Five property of non-metals.

1) Generally non-metals are soft in nature.

2) Non-metals are bad conductor of heat and electricity, as they do not allow the flow of electricity or heat through them

3) Non-metals are not ductile in nature.

4) Non-metals cannot be beaten into thin sheets.

5) Non-metals do not have the property of luster.

60 A. Question

Name two physical properties each of sodium and carbon in which their behaviour is not as expected from their classification as metal and non-metal respectively.

Answer

The property of sodium metal is unlikely the property of other metals as it is soft in nature. On the other hand carbon is a non-metal but it has the property of metals as it allows the flow of electricity through it in case of graphite and in case of diamond it shows the metals property of hardness.

60 B. Question

Name two metals whose melting points are so low that they melt when held in the hand.

Answer

Gallium and Cesium are two metals whose melting points are so low that they melt when held in hand.

61. Question

Metals are said to be shiny. Why do metals generally appear to be dull? How can their brightness be restored?

Answer

when metals are exposed to air to a very long period of time then they loses their shininess and appears dull. That is because of the formation of oxide, carbonate or sulphides thin layer on the top of the metal due to the various actions of the gasses present in the air. The brightness of the metals can be restored by rubbing the surface of the metals with the help of sand paper, because by doing show the outer layer gets removed and the metal become shiny and bright again.

Long Answer Type Questions-Pg-134

62 A. Question

What are metals? Name five metals.

Answer

the element with the ability of conducting heat and electricity and also have the property of malleability, ductility, etc. are known as metal. Some of the examples of the metals are:- Silver, gold, copper etc.

62 B. Question

Name a metal which is so soft that it can be cut with a knife.

Answer

The metal which is soft and can be cut with knife is Sodium.

62 C. Question

Name the metal which is the best conductor of heat and electricity.

Answer

the metal which is best conductor of heat and electricity is Silver.

62 D. Question

What happens when a metal reacts with dilute hydrochloric acid? Explain with the help of an example.

Answer

metal chloride and hydrogen gas is formed when a metal reacts with dilute hydrochloric acid.

Example:- Magnesium chloride and hydrogen gas are formed when the metal magnesium react with dilute hydrochloric acid.

62 E. Question

Write the equations for the reactions of:

(i) Magnesium with dilute hydrochloric acid

(ii) Aluminium with dilute hydrochloric acid

(iii) Zinc with dilute hydrochloric acid

(iv) Iron with dilute hydrochloric acid

Answer

(i) the product formed by the reaction of magnesium and hydrochloric acid are magnesium chloride and hydrogen.

(ii)the product formed by the reaction of aluminium with hydrochloric acid are aluminium chloride and hydrogen.

(iii)the product formed by the reaction of Zinc with dilute hydrochloric acid are zinc chloride and hydrogen.

(iv)the product formed by the reaction of Iron with dilute hydrochloric acid are Iron chloride and hydrogen.

Name the products formed in each case. Also indicate the physical states of all the substances involved.

63 A. Question

Define non-metals. Give five examples of non-metals.

Answer

The elements which do not allow the conduction of heat and electricity and are neither malleable nor ductile are known as non-metals. Example: Carbon, sulphur, phosphorus, silicon and oxygen.

63 B. Question

Name a non-metal which conducts electricity.

Answer

A non-metal which conducts electricity is carbon.

63 C. Question

Name a non-metal having luster (shining surface).

Answer

A non-metal having luster (shining surface) is Iodine.

63 D. Question

Name a non-metal which is extremely hard.

Answer

a non-metal which is extremely hard is diamond which is a form of carbon.

63 E. Question

How do non-metals react with oxygen? Explain with an example. Give equation of the reaction involved.

What is the nature of the product formed? How will you demonstrate it?

Answer

Acidic oxide or neutral oxide are formed by the reaction of non-metal with oxygen. when carbon burns in air to form carbon dioxide then the nature of the product formed is acidic. For example when carbon dioxide dissolve in water it forms carbonic acid. when we dip a litmus paper in it turns the blue litmus blue to red. This shows the acidic behavior.

64 A. Question

What is meant by the reactivity series of metals? Arrange the following metals in an increasing order of their reactivity towards water:

Zinc, Iron, Magnesium, Sodium

Answer

when the metals are arranged in a vertical column of decreasing order of reactivity then that arrangement is known as reactivity series of metals. . Increasing order of reactivity: Iron < zinc < magnesium < sodium

64 B. Question

Hydrogen is not a metal but still it has been assigned a place in the reactivity series of metals. Why?

Answer

it is very true that hydrogen is not a metal but it has been placed in the reactivity series of metals due to the fact that like metals, hydrogen also loses electrons and forms positive ions.

64 C. Question

Name one metal more reactive and another less reactive than hydrogen.

Answer

Lead is more reactive than hydrogen and copper is less reactive than hydrogen is the example of one metal more reactive and another less reactive than hydrogen.

64 D. Question

Name one metal which displaces copper from copper sulphate solution and one which does not.

Answer

Solution||| the one metal which displaces copper from copper sulphate solution is zinc. Zinc displaces copper fro the solution of copper sulphate Solution.The one metal which do not do so is mercury. As mercury do not displace copper from copper sulphate.This is because , Zinc is more reactive than Copper. On the other hand, Copper is more reactive than Mercury.

64 E. Question

Name one metal which displaces silver from silver nitrate solution and one which does not.

Answer

one metal which displaces silver from the silver nitrate solution is copper and again the other metal which do not do so is gold.

65 A. Question

State any three differences between the physical properties of metals and non-metals.

Answer

the three differences between the physical properties of metals and the non-metals are:-

Property of metal:-

1) Metals are malleable i.e. they can be beaten into thin sheets with a hammer.

2) Metals are ductile i.e. they can be drawn into thin wires.

3) Metals are good conductors of heat and electricity.

Property of non-metal:-

1) Non-metals are non-malleable i.e. they cannot be beaten into thin sheets with a hammer.

2) Non-metals are non-ductile i.e. they cannot be drawn into thin wires.

3) Non-metals are bad conductors of heat and electricity.

65 D. Question

State three reasons (of which at least one must be chemical) for believing that sulphur is a non- metal.

Answer

Three reasons (of which at least one must be chemical) for believing that sulphur is a non- metal are:-

1) sulphur is brittle and non-ductile in nature.

2) Sulphur is a non-conductor of electricity.

3) Sulpher forms acidic oxides.

65 E. Question

Which non-metal has been placed in the reactivity series of metals?

Answer

hydrogen is a non-metal which has been placed in the reactivity series of metals.

Multiple Choice Questions (MCQs)-Pg-135

66. Question

The elements whose oxides can turn phenolphthalein solution pink are: A. Na and K

B. K and C

C. Na and S

D. K and P

Answer

The elements whose oxides can turn phenolphthalein solution pink are Na and K.

67. Question

"Is malleable and ductile". This best describes: A. a metal

B. a compound

C. a non-metal

D. a solution

Answer

A metal is "Is malleable and ductile".

68. Question

One of the following is not a neutral oxide. This is: A. CO

B. H_20

C. N_20

D. Na_2O

Answer

Na2O is not a neutral oxide.

69. Question

A basic oxide will be formed by the element: A. K

B. S

C. p

D. Kr

Answer

A basic oxide will be formed by the element K.

70. Question

An acidic oxide is produced by the element: A. Na

B. C

C. Ca

D. H

Answer

An acidic oxide is produced by the element C.

71. Question

You are given a solution of AgN03. Which of the following do you think cannot displace Ag from AgN03 solution? A. Magnesium

B. Zinc

C. Gold

D. Copper

Answer

Gold, cannot displace Ag from AgN03 Solution

72. Question

Out of aluminium, copper, calcium and tin, the most reactive metal is: aluminium

B. copper

C. tin

D. calcium

Answer

Out of aluminium, copper, calcium and tin, the most reactive metal is calcium.

73. Question

The least reactive metal among the following is: A. sodium

B. silver

C. copper

D. lead

Answer

Silver is the least reactive metal among the given one.

74. Question

An element X reacts with hydrogen, when heated, to form a covalent hydride H_2X. If H_2X has a smell of rotten eggs, the element X is likely to be: A. carbon

B. sulphur

C. chlorine

D. phosphorus

Answer

An element X reacts with hydrogen, when heated, to form a covalent hydride H2X. If H2X has a smell of rotten eggs, the element X is likely to be Sulphur.

75. Question

Out of the following oxides, the amphoteric oxide is: A. Fe_20_3

B. Al_20_3

C. P_2O_5

D. N_2O

Answer

The amphoteric oxide Al2O3 among the given.

76. Question

The metals which can produce amphoteric oxides are: A. sodium and aluminium

B. zinc and potassium

C. calcium and sodium

D. aluminium and zinc

Answer

The metals which can produce amphoteric oxides are aluminium and zinc.

77. Question

An element X forms two oxides XO and XO_2. The oxide XO is neutral but XO_2 is acidic in nature. The element X is most likely to be : A. sulphur

B. carbon

C. calcium

D. hydrogen

Answer

An element X forms two oxides XO and XO2. The oxide XO is neutral but XO2 is acidic in nature. The element X is most likely to be carbon.

78. Question

The elements whose oxides can turn litmus solution blue are: A. carbon and sulphur

B. sodium and carbon

C. potassium and magnesium

D. magnesium and sulphur

Answer

The elements whose oxides can turn litmus solution blue are potassium and magnesium.

79. Question

The elements whose oxides can turn litmus solution red are : A. lithium and sodium

B. copper and potassium

C. carbon and hydrogen

D. phosphorus and sulphur

Answer

The elements whose oxides can turn litmus solution red are phosphorus and sulphur.

80. Question

Zinc oxide is a metal oxide. Which of the following term best describes the nature of zinc oxide : A. an acidic oxide

B. a basic oxide

C. an amphoteric oxide

D. a neutral oxide

Answer

Zinc oxide is a metal oxide the term best describes the nature of zinc oxide is an amphoteric oxide.

81. Question

A metal less reactive and another metal more reactive than hydrogen are : A. aluminium and lead

B. iron and magnesium

C. copper and tin

D. copper and mercury

Answer

A metal less reactive and another metal more reactive than hydrogen are copper and tin.

82. Question

An element E reacts with water to form a solution which turns phenolphthalein solution pink. The element E is most likely to be : A. S

B. Ca

C. C

D. Ag

Answer

An element E reacts with water to form a solution which turns phenolphthalein solution pink. The element E is most likely to be Ca.

83. Question

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

Answer

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 calcium.

84. Question

Which one of the following four metals would be displaced from the solution of its salt by the other three metals? A. Zn

B. Ag

C. Cu

D. Mg

Answer

Ag would be displaced from the solution of its salt by the other three given metals.

85. Question

An element is soft and can be cut with a knife. It is very reactive and cannot be kept open in the air. It reacts vigorously with water. The element is most likely to be: A. Mg

B. S

C. P

D. Na

Answer

An element is soft and can be cut with a knife. It is very reactive and cannot be kept open in the air. It reacts vigorously with water. The element is most likely to be Na.

86. Question

Which of the following metal exists in the liquid state? A. Na

B. Ag

C. Cr

D. Hg

Answer

Hg metal exists in the liquid state.

87. Question

Which of the following non-metal is a liquid? A. carbon

B. sulphur

C. bromine

D. iodine

Answer

Bromine is the non-metal which is a liquid.

88. Question

Which of the following pair of reactants can undergo a displacement reaction under appropriate conditions? A. $MgSO_4$ + Fe

B. $ZnSO_4$ + Fe

C. $MgSO_4$ + Pb

D. $CuSO_4$ + Fe

Answer

CuSO4+Fe is the pair of reactants can undergo a displacement reaction under appropriate conditions.

Questions Based on High Order Thinking Skills (HOTS)-Pg-136

89. Question

An element E forms an oxide E_2O. An aqueous solution of E_2O turns red litmus paper blue.

(a) What is the nature of the oxide E_2O?

(b) State whether element E is a metal or a non-metal.

(c) Give one example of an element like E.

Answer

(a) An element E forms an oxide E_2O. An aqueous solution of E_2O turns red litmus paper blue. The nature of the oxide E_2O is basic.

(b) Element E is a metal.

(c) One example of an element like E is sodium (Na).

90. Question

Metal A burns in air, on heating, to form an oxide A_2O_3 whereas another metal B burns in air only on strong heating to form an oxide BO. The two oxides A_2O_3 and BO can react with hydrochloric acid as well as sodium hydroxide solution to form the corresponding salts and water.

(a) What is the nature of oxide A_2O_3?

(b) What is the nature of oxide BO?

(c) Name one metal like A.

(d) Name one metal like B.

Answer

(a) Amphoteric oxide is the nature of oxide A_2O_3.

(b) The nature of oxide BO is amphoteric.

(c) One metal like A is aluminium (Al).

(d) One metal like B is Zinc (Zn).

91. Question

An element X forms two oxides XO and XO_2. The oxide XO has no action on litmus solution but oxide XO_2 turns litmus solution O red.

(a) What is the nature of oxide XO ?

(b) What is the nature of oxide XO2?

(c) Would you call element X a metal or a non-metal? Give reason for your choice.

Answer

(a) Neutral oxide is the nature of oxide XO.

(b) The nature of oxide XO2 is acidic.

(c) Element X is a non-metal as it also forms an acidic oxide.

92. Question

State and explain the reactions, if any, of the following metals with a solution of copper sulphate:

(a) Gold

(b) Copper

(c) Zinc

(d) Mercury

Solution|||

(a) no displacement reaction will take place with the solution of copper sulphate, as gold is less reactive then the copper.

(b) there will not be any reaction between copper and copper sulphate.

(c) copper will be replaced by zinc from the copper sulphate

Answer

This is because zinc is more reactive then copper and the solution formed will be zinc sulphate and also there will be a formation of copper metal.

(d) in case of mercury no displacement reaction will take place as mercury is less reactive then copper.

93 A. Question

Give the names and formulae of one metal chloride and one non- metal chloride.

Answer

The name of a metal chloride is sodium chloride and its formula is NaCl.

The name of a non-metal chloride is carbon tetrachloride and its formula is CCl.

93 B. Question

State an important property in which these metal chloride and non-metal chloride differ.

Answer

The main difference in the property of the sodium chloride and carbon tetrachloride is the property of conductivity of electricity. Sodium chloride do but Cl do not.

93 C. Question

Why do they differ in this property?

Answer

ionic compound (here which is sodium chloride) conduct electricity where as carbon tetrachloride is a covalent compound so it does not conduct electricity.

94. Question

In a solution of lead acetate, a strip of metal M was dipped. After some time, lead from the solution was deposited on the metal strip. Which metal is more reactive, M or lead?

Answer

In a solution of lead acetate, a strip of metal M was dipped. After some time, lead from the solution was deposited on the metal strip. This shows that M is more reactive then lead.

95. Question

$CuSO_4$ (aq) + Fe (s) → $FeSO_4$ (aq) + Cu (s)

$FeSO_4$ (aq) + Zn (s) → $ZnSO_4$ (aq) + Fe (s)

On the basis of the above reactions, indicate which is most reactive and which is least reactive metal out of zinc, copper and iron.

Answer

On the basis of the above reactions we can say that zinc is most reactive metal then copper and iron. On the other hand copper is least reactive then that of the zinc and iron.

96. Question

Which of the following reactions will not occur ? Why not?

(a) $MgSO_4$ (aq) + Cu (s) → $CuSO_4$ (aq) + Mg (s)

(b) $CuSO_4$ (aq) + Fe (s) → $FeSO_4$ (aq) + Cu (s)

(c) $MgSO_4$ (aq) + Fe (s) → $FeSO_4$ (aq) + Mg (s)

Answer

(a) $MgSO_4$ (aq) + Cu (s) $CuSO_4$ (aq) + Mg (s), will not occur. Because copper is less reactive then Mg.

(c) $MgSO_4$ (aq) + Fe (s $FeSO_4$ (aq) + Mg (s), will also not occur. Because Fe is less reactive then Mg. (in both case more reactive metal is being displaced by a less reactive metal, which is not possible).

97. Question

In nature, metal A is found in a free state while metal B is found in the form of its compounds. Which of these two will be nearer to the top of the activity series of metals?

Answer

Element B will be nearer to the top of the activity series of metals, if in nature, metal A is found in a free state while metal B is found in the form of its compounds.

98. Question

If A, B1 C, D, E, F, G, H, I, J and K represent metals in the decreasing order of their reactivity, which one of them is most likely to occur in a free state in nature?

Answer

If A, B1 C, D, E, F, G, H, I, J and K represent metals in the decreasing order of their reactivity, then K is most likely to occur in a free state in nature.

99 A. Question

Name a metal for each case:

(i) It does not react with cold as well as hot water but reacts with steam.

(ii) It does not react with any physical state of water.

Answer

(i) iron do not react with cold as well as hot water but reacts with steam

(ii) Copper do not react with any physical state of water.

99 B. Question

When calcium metal is added to water, the gas evolved does not catch fire but the same gas evolved on adding sodium metal to water catches fire. Why is it so?

Answer

when sodium metal reacts with water more amount of heat is evolved at the time of reaction due to which hydrogen gas catches fire. While on the other hand during the reaction of calcium and water the evolved heat is not that much so that it may cause the hydrogen gas to burn.

100. Question

A zinc plate was kept in a glass container having CuS04 Solution. On examining it was found that the blue colour of the solution is getting lighter and lighter. After a few days, when the zinc plate was taken out of the solution, a number of small holes were noticed in it. State the reason and give chemical equation of the reaction involved.

Answer

Copper is less reactive then zinc. Some of the zinc metal of zinc plate dissolves and displaces copper from copper sulphate. This dissolving of zinc metal forms tony holes in zinc plate. Due to the formation of colorless zinc sulphate solution the blue colour of copper sulphate solution gets lighter and lighter.

Very Short Answer Type Questions-Pg-167

1. Question

What is the name of the chemical bond formed:

(a) by the sharing of electrons between two atoms?

(b) by the transfer of electrons from one atom to another?

Answer

(a) The name of the chemical bond formed by the sharing of electrons between two atoms is covalent bond.

(b) The name of the chemical bond formed by the transfer of electrons from one atom to another is known as ionic bond.

2. Question

Name a carbon containing molecule which has two double bonds.

Answer

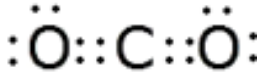
Carbon dioxide, CO_2 is a carbon containing molecule which has two double bonds.

3. Question

What would be the electron-dot structure of carbon dioxide which has the formula CO_2?

Answer

The electron-dot structure of carbon dioxide which has the formula CO_2 is like



4. Question

What type of chemical bond is formed between:

(a) potassium and bromine?

(b) carbon and bromine?

Answer

(a) The chemical bond which is formed between potassium and bromine is ionic bond.

(b) The chemical bond which is formed between carbon and bromine covalent bond.

5 A. Question

What do we call those particles which have more or less electrons than the normal atoms?

Answer

We call those particles which have more or less electrons than the normal atoms as ions.

5 B. Question

What do we call those particles which have more electrons than the normal atoms ?

Answer

We call those particles which have more electrons than the normal atoms as anions.

5 C. Question

What do we call those particles which have less electrons than the normal atoms?

Answer

We call those particles which have less electrons than the normal atoms as cations.

6 A. Question

The atomic number of sodium is 11. What is the number of electrons in Na+?

Answer

The atomic number of sodium is 11. The number of electrons in Na+ is 10.

6 B. Question

The atomic number of chlorine is 17. What is the number of electrons in CI-?

Answer

The atomic number of chlorine is 17. The number of electrons in CI- is 18.

7. Question

The atomic number of an element X is 8 and that of element Y is 12. Write downthe symbols of the ions you would expect to be formed from their atoms.

Answer

The atomic number of an element X is 8 and that of element Y is 12. The X will form X^{2-}, Y will form Y^{2+}.

8 B. Question

Write down the electronic configuration of

(i) magnesium atom, and

(ii) magnesium ion. (At. No. of Mg = 12)

Answer

i) The electronic configuration of magnesium atom is 2, 8, 2.

ii) The electronic configuration of magnesium ion is 2, 8.

8 B. Question

Write down the electronic configuration of

(i) sulphur atom, and

(ii) sulphide ion. (At. No. of S = 16)

Answer

i) The electronic configuration of sulphur atom is 2, 8, 6.

ii) The electronic configuration of sulphide ion 2, 8, 8.

9. Question

What type of chemical bonds are present in a solid compound which has a high melting point, does not conduct electricity in the solid state but becomes a good conductor in the molten state ?

Answer

Ionic bonds are chemical bonds are present in a solid compound which has a high melting point, does not conduct electricity in the solid state but becomes a good conductor in the molten state.

10. Question

State whether the following statement is true or false:

The aqueous solution of an ionic compound conducts electricity because there are plenty of free electrons in the

Answer

False.

The aqueous solution of an ionic compound conducts electricity because there are plenty of free ions in the Solution.

11. Question

What type of bonds are present in hydrogen chloride and oxygen?

Answer

Covalent bonds are present in hydrogen chloride and oxygen.

12. Question

Write the electron-dot structures for the following molecules:

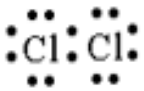
(i) NaCl

(ii) Cl_2

Answer

i) The electron-dot structure of NaCl is

ii) The electron-dot structure of Cl_2 is



13. Question

What type of bonds are present in water molecule? Draw the electron- dot structure of water (H_2O).

Answer

the type of bonds which are present in water molecule is covalent bond.

14. Question

What type of Bonds are present in methane (C) and sodium chloride (NaCl)?

Answer

The type of Bonds are present in methane (C) is covalent bond. And The type of Bonds are present in sodium chloride (NaCl) is ionic bond.

15. Question

State one major difference between covalent and ionic bonds and give one example each of covalent and ionic compounds.

Answer

One major difference between covalent and ionic bonds is, ionic compound conduct electricity when dissolved in water or melted on the other hand covalent compound do not conduct electricity. the example of ionic compound is NaCl whereas the example of covalent compound is CO_2.

17. Question

Which inert gas electron configuration do the Cl atoms in Cl_2 molecule resemble ? What is this electron configuration?

Answer

argon is the inert gas electron configuration do the Cl atoms in Cl_2. Its electronic configuration is 2, 8, 8.

18. Question

Which of the following compounds are ionic and which are covalent?

Urea, Cane sugar, Hydrogen chloride, Sodium chloride, Ammonium chloride, Carbon tetrachloride, Ammonia, Alcohol, Magnesium chloride.

Answer

The ionic compounds are:-

Sodium chloride, Ammonium chloride, Magnesium chloride.

The covalent compounds are:-

Urea, Cane sugar, Hydrogen chloride, Carbon tetrachloride, Ammonia, Alcohol.

19. Question

Give one example each of the following:

(i) A molecule containing a single covalent bond

(ii) A molecule containing a double covalent bond

(iii) A molecule containing a triple covalent bond

(iv) A compound containing an ionic bond

Answer

(i) one example of a molecule containing a single covalent bond is hydrogen.

(ii) one example of a molecule containing a double covalent bond is oxygen.

(iii) one example of a molecule containing a triple covalent bond is nitrogen.

(iv) one example of a molecule containing an ionic bond is sodium chloride.

20. Question

Fill in the blanks in the following sentences:

(i) Two atoms of the same element combine to form a molecule. The bond between them is known as ..... bond.

(ii) Two chlorine atoms combine to form a molecule. The bond between them is known as .....

(iii) In forming oxygen molecule, ... electrons are shared by each atom of oxygen.

(iv) In forming N_2 molecule, ... electrons are shared by each atom of nitrogen.

(v) The number of single covalent bonds in C_2H_2 molecule are .....

(vi) Melting points and boiling points of ionic compounds are generally .....than those of covalent compounds.

Answer

(i) Two atoms of the same element combine to form a molecule. The bond between them is known as covalent bond.

(ii) Two chlorine atoms combine to form a molecule. The bond between them is known as covalent.

(iii) In forming oxygen molecule, two electrons are shared by each atom of oxygen.

(iv) In forming N_2 molecule, three electrons are shared by each atom of nitrogen.

(vi) The number of single covalent bonds in C_2H_2 molecule are two.

(vi) Melting points and boiling points of ionic compounds are generally higher than those of covalent compounds.

Short Answer Type Questions-Pg-168

21 A. Question

What is a covalent bond? What type of bond exists in (i) CCl_4, and (ii) $CaCl_2$?

Answer

when two atoms share electrons between them then the chemical bond formed by them is known as covalent bond.

21 B. Question

What is an ionic bond? What type of bond is present in oxygen molecule?

Answer

An ionic bond is formed by the attraction of oppositely charged atoms or groups of atoms. When an atom (or group of atoms) gains or loses one or more electrons, it forms an **ion**. Ions have either a net positive or net negative charge. Positively charged ions are attracted to the negatively charged 'cathode' in an electric field and are called **cations**. **Anions** are negatively charged ions named as a result of their attraction to the positive 'anode' in an electric field.

Every ionic chemical bond is made up of at least one cation and one anion.

Double bond is present in oxygen.

22 A. Question

What is an ion? Explain with examples.

Answer

An ion is an electrically charged atom formed when a neutral atom loses or gains electrons. There are two types of ions: cations and anions.

Example: Sodium ion Na^+, Chlorine ion Cl^-.

21 B. Question

What is the nature of charge on (i) a cation, and (ii) an anion?

Answer

i) Cations are positively charged.

ii) Anions are negatively charged.

22 C. Question

Name the cation and anion present in $MgCl_2$ Also write their symbols.

Answer

Cation: Mg^{2+}, Anion: Cl^-

23 A. Question

What type of chemical bond is present in chlorine molecule? Explain your answer.

Answer

Covalent bond is present in chlorine molecule. This is because when two atoms of same elements combine to form a molecule a covalent bond is formed.

23 B. Question

Explain the formation of a chlorine molecule on the basis of electronic theory of valency.

Answer

The electronic configuration of chlorine is 2, 8, 7. So the atomic number of the chlorine is 17. chlorine requires 1 electron to complete its octet as chlorine has 7 electrons in its outer most shell. It gains this electron by sharing with other chlorine atom. so each atom share there one free electron with each other to complete there octet. So two chlorine atom share there one electron so the fore of attraction between them is very high. This fore of attraction is known as covalent bond. Now, each chlorine atom in the chlorine molecule has the electronic configuration 2,8,8 resembling its nearest inert gas argon. Since the chlorine atoms in a chlorine molecule have inert gas electron arrangements, therefore, a chlorine molecule is more stable than two separate chlorine atoms.

24 A. Question

Giving one example each, state what are (i) ionic compounds, and (ii)covalent compounds.

Answer

(a) (i) ionic compounds are those compounds which contain ionic bonds.ionic bonds are formed by the transfer of electrons from one atom to other. Example: sodium chloride, NaCl.

(ii) those compounds which have covalent bonds are known as covalent compound. These compounds are formed by sharing of electrons between atoms. For example: methane, CH_4.

24 B. Question

Compare the properties of ionic compounds and covalent compounds.

Answer

the properties of ionic compound and covalent compounds are.

Ionic compound covalent compound

(i) Ionic compounds are usually crystalline solids.	(i) Covalent compounds are usually liquids or gases.
(ii) Ionic compounds have high melting and boiling points.	(ii) Covalent compounds have low melting and boiling points.
(iii) Ionic compounds are usually soluble in water.	(iii) Covalent compounds are usually insoluble in water.

25 A. Question

Explain why: covalent compounds have generally low melting points.

Answer

the covalent compounds are made up of electrically neutral molecules. So, the force of attraction between the molecules of a covalent compound is very weak. Hence, only a small amount of heat energy is required to break these weak molecular forces so covalent compounds have generally low melting point

25 B. Question

Explain why:ionic compounds have generally high melting points.

Answer

There is a strong force of attraction between the oppositely charged ions, so a lot of heat energy is required to break this force of attraction and melt or boil the ionic compound. Due to this, ionic compounds have high melting points. The ionic compounds are made up of positive and negative ions.

26 A. Question

Give two general properties of ionic compounds and two those of covalent compounds.

Answer

two general properties of ionic compounds are:-

1) the melting and boiling points of ionic compounds are very high.

2) Ionic compounds are soluble in water.

Two properties of covalent bonds are:-

1) Covalent compounds have low melting points.

2) Covalent compounds do not dissolve in water.

26 B. Question

State one test by which sodium chloride can be distinguished from sugar.

Answer

sodium chloride when dissolved in water they conduct electricity through it but on the other hand sugar solution does not show any conductivity to electricity.

27 A. Question

Explain why, ionic compounds conduct electricity in solution whereas covalent compounds do not conduct electricity.

Answer

Ionic compounds are made of electrically charged ions so these electrically charged ions are responsible for conduction of electricity but on the other hand covalent compounds are made up of electrically neutral molecules so they do not conduct electricity.

27 B. Question

Which of the following will conduct electricity and which not?

$MgCl_2$, CCl_4, NaCl, CS_2, Na_2S Give reasons for your choice.

Answer

Electricity conductor:-

$MgCl_2$, NaCl, Na_2S (Ionic compounds)

Non-conductor of electricity:-

CCl_4, CS_2 (Covalent compounds).

28 A. Question

Name one ionic compound containing chlorine and one covalent compound containing chlorine.

Answer

Ionic compound containing chlorine:- Sodium chloride, NaCI

Covalent compound containing chlorine:- Carbon tetrachloride, CCI_4

28 B. Question

How will you find out which of the water soluble compound A or B is ionic?

Answer

If any of the compound either A or B is soluble in water and conduct electricity through the solution then that compound is ionic compound.

29. Question

Explain why, a solution of cane sugar does not conduct electricity but a solution of common salt is a good conductor of electricity.

Answer

A solution of cane sugar does not conduct electricity but a solution of common salt is a good conductor of electricity. Because common salt is an ionic compound containing ionic bonds whose ions are responsible for the conduction of electricity through the solution whereas cane sugar is covalent compound which do not conduct electricity.

30. Question

Give the formulae of the compounds that would be formed by the combination of the following pairs of elements:

(a) Mg and N_2

(b) Al and Cl_2

(c) Li and O_2

(d) K and H

Answer

(a) Mg_3N_2. Is the formula for Mg and N_2 combination.

(b) $AlCl_3$. Is the formula of Al and Cl_2 combination.

(c) Li_2O is the formula obtained by the combination of Li and O_2.

(d) KH is the formula obtained by the combination of K and H.

31 A. Question

What are noble gases ? What is the characteristic of the electronic configuration of noble gases?

Answer

The some of the element of the 18^{th} group of the periodic table which do not combine with other elements. Those elements of the 18^{th} group are helium, neon, argon, krypton, xenon and radon. These elements of the 18^{th} group is known as the noble gas or inert gas and this is because of the reason that they do not react at all. If we look at the electronic configuration of noble gases, we would notice that except helium, all other inert gases have 8 electrons (helium has 2) in their outermost shells. This is considered to be the most stable arrangement of electrons.

31 B. Question

What is the cause of chemical bonding (or chemical combination) of atoms of elements?

Answer

The cause of chemical bonding of atoms of the elements is because atoms form chemical bonds to achieve stability by acquiring the inert gas electron configuration.

32. Question

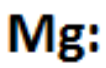
(i) Write electron-dot structures for magnesium and oxygen.

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

(iii) What are the ions present in this compound?

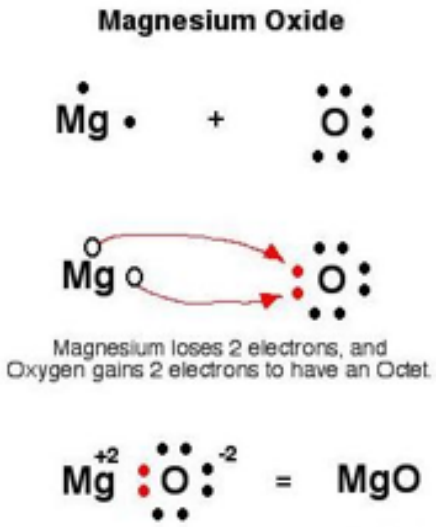
Answer

(i) The electron-dot structure of the magnesium is likely to be



The electron-dot structure of the oxygen is likely to be

(ii) the formation of MgO by the transfer of electrons can be shown by



(iii)The ions present in this compound are both negative as well as positive ions which are O^{2-} and Mg^{2+}.

33. Question

Draw the electron-dot structure of a hydrogen chloride molecule:

(i) Which inert gas does the H atom in HCl resemble in electron arrangement?

(ii) Which inert gas does the Cl atom in HCl resemble in electron arrangement?

Answer

(i) The H atom in HCl resemble helium in electron arrangement.

(ii) The Cl atom in HCl resembles argon in electron arrangement.

34. Question

What type of bonding would you expect between the following pairs of elements ?

(i) Calcium and Oxygen

(ii) Carbon and Chlorine

(iii) Hydrogen and Chlorine

Answer

(i) Calcium and Oxygen shares ionic bonding.

(ii) Carbon and Chlorine shares the covalent bonding.

(iii) Hydrogen and Chlorine shares covalent bonding.

35. Question

Describe how sodium and chlorine atoms are changed into ions when they react with each other to form sodium chloride, NaCl. What is the name given to this type of bonding? (At. No of sodium = 11; At. No. of chlorine = 17)

Answer

The name given to this type of bonding ionic bonding. This is because both the atoms share there electrons to gain the electronic configuration.

36. Question

What is the difference between a cation and an anion ? How are they formed ? Give the names and symbols of one cation and one anion.

Answer

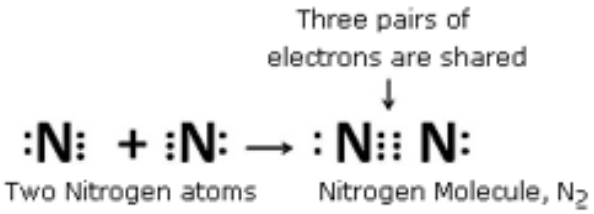
The difference between a cation and an anion can be understood by, a positively charged ion is known as cation. A cation is formed by the loss of one or more electrons by an atom. For example: sodium loses 1 electron to form a sodium ion, Na+, which is a cation. A negatively charged ion is known as anion. An anion is formed by the gain of one or more electrons by an atom. For example: A chlorine atom gains (accepts) 1 electron to form a chloride ion, Cl^-, which is an anion.

37. Question

Using electron-dot diagrams which show only the outermost shell electrons, show how a molecule of nitrogen, N2, is formed from two nitrogen atoms. What name is given to this type of bonding? (Atomic number of nitrogen is 7)

Answer

The number of electrons in the outer most shell of the nitrogen is 5 so, to achieve the 8-electron structure of an inert gas, it needs 3 more electrons and hence combines with another nitrogen atom to form a molecule of nitrogen gas.



This type of bonding is called covalent bonding.

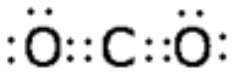
38. Question

Draw the electron-dot structures of the following compounds and state the type of bonding in each case:

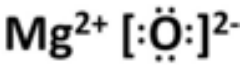
(i) $C0_2$ (ii) MgO (iii) H_20 (iv) HCl (v) $MgCl_2$

Answer

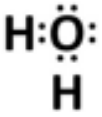
(i) CO^{2-} Covalent bond



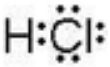
(i) MgO^- Ionic bond



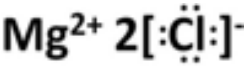
(ii) H_2O - Covalent bond



(iii) HCl - Covalent bond



(iv) $MgCl^{2-}$ Ionic bond

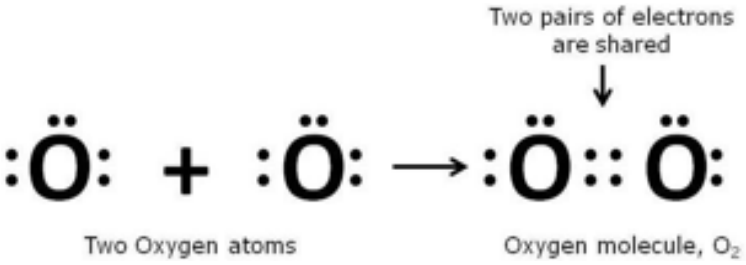


39. Question

Using electron-dot diagrams which show only the outermost shell electrons, show how a molecule of oxygen, 02, is formed from two oxygen atoms. What name is given to this type of bonding? (At. No. of oxygen= 8)

Answer

As we know that the oxygen atom has 6 electrons in its outermost shell so, it needs 2 more electrons to achieve the stable 8-electron inert gas configuration. That is why, it combines with another oxygen atom and forms a molecule of oxygen.



This type of bonding is called a double covalent bond.

40. Question

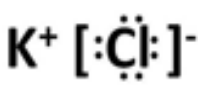
Draw the electron-dot structures of the following compounds and state the type of bonding in each case:

(i) KCl (ii) NH_3 (iii) CaO (iv) N_2 (v) $CaCl_2$

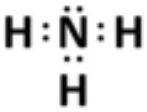
Answer

The dot structure and the bond type of the above given compounds can be shown as

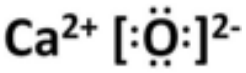
(i) KCl - Ionic bond



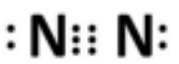
(ii) NH_3 - Covalent bond



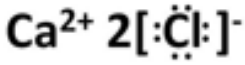
(i) CaO - Ionic bond



(ii) N_2 - Covalent bond



(iii) $CaCl_2$ - Ionic bond



41. Question

Explain why, a salt which does not conduct electricity in the solid state becomes a good conductor in molten state.

Answer

A salt which does not conduct electricity in the solid state becomes a good conductor in molten state because, in the solid ionic compound, the ions are held together in fixed positions by strong electrostatic forces and cannot move freely as a result of the attractive forces acting between them. But on the other hand, when we dissolve the ionic solid in water or melt it, the crystal structure is broken down and ions become free to move and conduct electricity. Thus, an aqueous solution of an ionic compound conducts electricity because there are plenty of free ions in the solution which are able to conduct electric current.

Long Answer Type Questions-Pg-169

42 A. Question

Write down the electronic configuration of (i) sodium atom, and (ii) chlorine atom.

Answer

the electronic configuration of the sodium atom and the chlorine atom can be given as

(i) Sodium - 2, 8, 1 (ii) Chlorine - 2, 8, 7

42 B. Question

|How many electrons are there in the outermost shell of (i) a sodium atom, and (ii) a chlorine atom?

Answer

i) There is 1 electron is in the outer shell of the sodium atom,

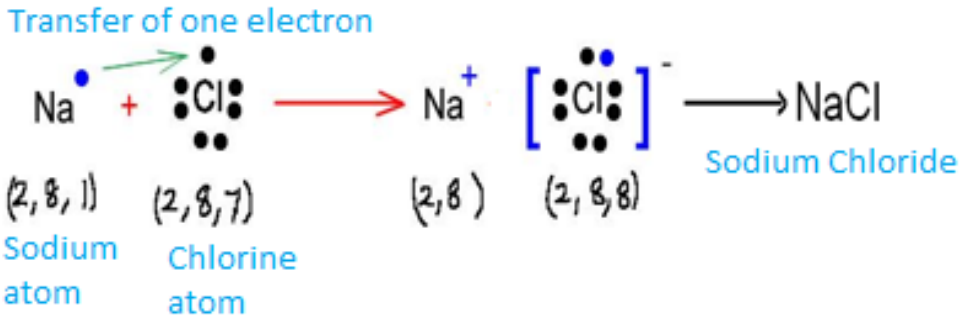
ii) there are 7 electrons in the outer most shell of chlorine atom.

42 C. Question

Show the formation of NaCl from sodium and chlorine atoms by the transfer of electron(s).

Answer

The information has been shown with the help of digram



42 D. Question

Why has sodium chloride a high melting point?

Answer

the reason behind sodium having a high melting point is that, sodium chloride is an ionic compound and these compounds are made of up of positive and negative ions. There is a strong force of attraction between the oppositely charged ions, so, a lot of heat energy is required to break this force of attraction and melt or boil the ionic compound.

42 E. Question

Name the anode and the cathode used in the electrolytic refining of impure copper metal.

Answer

Thick block of impure copper metal is the name of the anode used in the electrolytic refining of impure copper metal. Whereas, Thin strip of pure copper metal is used for the cathode for electrolytic refining of impure copper metal.

43 A. Question

Write the electron arrangement in (i) a magnesium atom, and (ii) an oxygen atom.

Answer

1) A magnesium atom has the electron arrangement like 2, 8, 2.

2) An oxygen atom has the electron arrangement like 2, 6.

43 B. Question

How many electrons a re there in the valence shell of (i) a magnesium atom, and (ii) an oxygen atom?

Answer

1) a magnesium atom has 2 electrons in its valance shell.

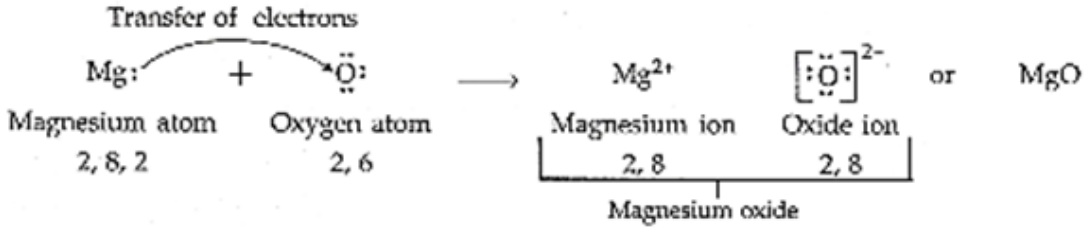
2) an oxygen atom has 6 electrons in its valance shell.

43 C. Question

Show on a diagram the transfer of electrons between the atoms in the formation of MgO.

Answer

The transfer of electrons between the atoms in the formation of MgO can be shown by diagram like



43 D. Question

Name the solvent in which ionic compounds are generally soluble.

Answer

The solvent in which ionic compounds are generally soluble is water.

43 E. Question

Why are aqueous solutions of ionic compounds able to conduct electricity?

Answer

The free ions in the solution which are able to conduct electric current is responsible for the conduction of electricity through the aqueous solutions of ionic compounds.

44 A. Question

What is the electronic configuration of (i) a sodium atom, and (ii) an oxygen atom ?

Answer

i) The electronic configuration of a sodium atom is 2, 8, 1.

ii) The electronic configuration of an oxygen atom is like 2, 6.

44 B. Question

What is the number of outermost electrons in (i) a sodium atom, and (ii) an oxygen atom?

Answer

i) The number of outermost electrons in a sodium atom is 1.

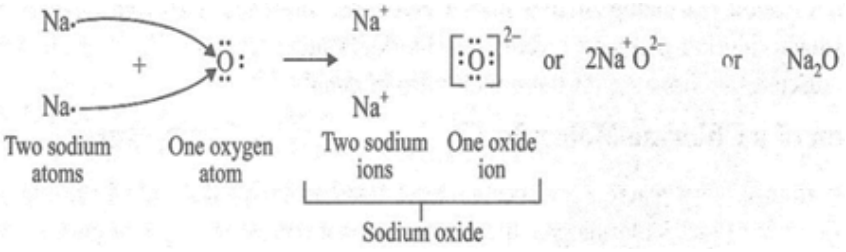
ii) an oxygen atom has 6 electrons in the outer most shell.

44 C. Question

Show the formation of Na_20 by the transfer of electrons between the combining atoms.

Answer

This can be shown through a diagram given below



44 D. Question

Why are ionic compounds usually hard?

Answer

the ionic compounds are made of oppositely charged ions so the force of attraction between is very high which is why the ionic compounds are usually hard.

44 E. Question

How is it that ionic compounds in the solid state do not conduct electricity but they do so when in molten state?'

Answer

The ionic compounds in the solid state do not conduct electricity but they do so when in molten state because, in the solid ionic compound the ions are held together in fixed positions by strong electrostatic forces and cannot move freely. However, when we dissolve the ionic solid in water or melt it, the crystal structure is broken down and ions become free to move and conduct electricity. Thus, an aqueous solution of an ionic compound conducts electricity because there are plenty of free ions in the solution which are able to conduct electric current.

45 A. Question

Write down the electron arrangement in (i) a magnesium atom, and (ii) a chlorine atom.

Answer

i) The electron arrangement in a magnesium atom is like 2, 8, 2.

ii) The electron arrangement in a chlorine atom is like 2, 8, 7.

45 B. Question

How many electrons are there in the valence shell of (i) a magnesium atom, and (ii) a chlorine atom ?

Answer

i) There are 2 electrons in the valence shell of a magnesium atom.

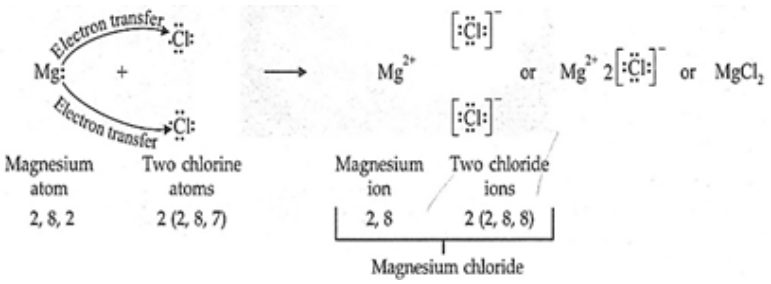
ii) there are 7 electrons in the valence shell of a chlorine atom.

45 C. Question

Show the formation of magnesium chloride from magnesium and chlorine by the transfer of electrons.

Answer

The information is shown in the fig.



45 D. Question

State whether magnesium chloride will conduct electricity or not. Give reason for your answer.

Answer

The magnesium chloride is an ionic compound so magnesium chloride will conduct electricity.

45 E. Question

Why are covalent compounds generally poor conductors of electricity?

Answer

ions are responsible for the conductivity of electricity but in case of covalent compounds there are no free ions. So, covalent compounds are poor conductor of electricity.
Tagging|||Chemistry||Metals and Non Metals||Reaction of Metals and Non Metals

Multiple Choice Questions (MCQs)-Pg-169

46. Question

The atomic number of an element X is 19. The number of electrons in its ion X^+ will be: 18

B.19

C. 20

D. 21

Answer

When the atomic number of an element X is 19. The number of electrons in its ion X+ will be 18.

47. Question

The atomic number of an element Y is 17. The number of electrons in its ion y^- will be : A. 17

B. 18

C. 19

D. 20

Answer

When the atomic number of an element Y is 17. The number of electrons in its ion y- will be 18.

48. Question

The atomic numbers of four elements A, B, C and D are 6, 8, 10 and 12 respectively. The two elements which can react to form ionic bonds (or ionic compound) are: A. A and D

B. B and C

C. A and C

D. B and D

Answer

When the atomic numbers of four elements A, B, C and D are 6, 8, 10 and 12 respectively. The two elements which can react to form ionic bonds (or ionic compound) are A and C.

49. Question

The atomic numbers of four elements P, Q, R and S are 6, 10, 12 and 17 respectively. Which two elements can combine to form a covalent compound ? A. P and R

B. Q and S

C. P and S

D. R and S

Answer

When the atomic numbers of four elements P, Q, R and S are 6, 10, 12 and 17 respectively. The two elements can combine to form a covalent compound are P and S.

50. Question

The solution of one of the following compounds will not conduct electricity. This compound is: A. NaCl

B. CCl_4

C. $MgCl_2$

D. $CaCl_2$

Answer

The solution of the compound which will not conduct electricity through it is CCl.

51. Question

The electronic configurations of three elements X, Y and Z are :

X : 2 Y : 2, 8, 7 Z : 2, 8, 2

Which of the following is correct regarding these elements ?

A. X is a metal

B. Y is a metal

C. Z is a non-metal

D. Y is a non-metal and Z is a metal

Answer

The electronic configurations of three elements X, Y and Z are : X : 2 Y : 2, 8, 7 Z : 2, 8, 2 The correct one is Y is a non-metal and Z is a metal.

52. Question

Which one of the following property is generally not exhibited by ionic compounds ? A. solubility in water

B. electrical conductivity in solid state

C. high melting and boiling points

D. electrical conductivity in molten state

Answer

Electrical conductivity in solid state is generally not exhibited by ionic compounds.

53. Question

The electrons present in the valence shell of a noble gas atom can be : A. 8 only

B. 2 only

C. 8 or 2

D. 8 or 4

Answer

The electrons present in the valence shell of a noble gas atom can be 8 or 2.

54. Question

The atomic number of an element X is 16. The symbol of ion formed by an atom of this element will be : A. X^{2+}

B. X^{3+}

C. X^{2-}

D. x^{-}

Answer

When the atomic number of an element X is 16. The symbol of ion formed by an atom of this element will be X2-.

55. Question

The number of protons in the nucleus of one atom of an element Y is 5. The symbol of ion formed by an atom of this element will be: A. y^{3-}

B. y^{2+}

C. y^{2-}

D. y^{3+}

Answer

When the number of protons in the nucleus of one atom of an element Y is 5. The symbol of ion formed by an atom of this element will be y3+.

56. Question

Out of KCl, HCl, CCl_4 and NaCl, the compounds which are not ionic are: A. KCl and HCl

B. HCl and CCl_4

C. CCl_4 and NaCl

D. KCl and CCl_4

Answer

Out of KCl, HCl, CCl4 and NaCl, the compounds which are not ionic are HCl and CCl4

57. Question

Element X reacts with element Y to form a compound Z. During the formation of compound Z, atoms of X lose one electron each whereas atoms of Y gain one electron each. Which of the following property is not shown by compound Z? A. high melting point

B. low melting point

C. occurrence as solid

D. conduction of electricity in molten state

Answer

When element X reacts with element Y to form a compound Z. During the formation of compound Z, atoms of X lose one electron each whereas atoms of Y gain one electron each. low melting point property is not shown by compound Z.

58. Question

One of the following compounds is not ionic in nature. This compound is: A. Lithium chloride

B. Ammonium chloride

C. Calcium chloride

D. Carbon tetrachloride

Answer

Carbon tetrachloride is a compound which is not ionic in nature.

58. Question

The rechargeable battery used in a mobile phone hand set is usually: A. lead ion battery

B. sodium ion battery

C. hydrogen ion battery

D. lithium ion battery

Answer

The rechargeable battery used in a mobile phone hand set is usually lithium ion battery.

60. Question

The number of protons in one atom of an element X is 8. What will be the number of electrons in its ion x^{2-}? A. 8

B. 9

C. 10

D. 11

Answer

The number of protons in one atom of an element X is 8 the number of electrons in its ion x2- 10.

61. Question

If the number of protons in one atom of an element Y is 20, then the number of electrons in its ion Y^{2+} will be: A. 20

B. 19

C. 18

D. 16

Answer

When the number of protons in one atom of an element Y is 20, then the number of electrons in its ion Y2+ will be 18.

62. Question

The noble gas having only two electrons in its valence shell is: A. Ar

B. Ne

C. He

D. Kr

Answer

The noble gas having only two electrons in its valence shell is He.

63. Question

A covalent molecule having a double bond between its atoms is: A. Hydrogen

B. Oxygen

C. water

D. ammonia

Answer

Oxygen is a covalent molecule having a double bond between its atoms.

64. Question

The molecules having triple bond in them are: A. oxygen and ethyne

B. carbon dioxide and ammonia

C. methane and ethene

D. nitrogen and ethyne

Answer

The molecules having triple bond in them are nitrogen and ethyne.

65. Question

One of the following contains a double bond as well as single bonds. This is: A. $C0_2$

B. 0_2

C. C_2H_4

D. C_2H_2

Answer

C2H4 contains a double bond as well as single bonds.

66. Question

Which of the following has a triple bond as well as single bonds ? A. ethene

B. methane

C. ethyne

D. nitrogen

Answer

Ethyne has a triple bond as well as single bonds.

Questions Based on High Order Thinking Skills (HOTS)-Pg-171

67 A. Question

Two non-metals combine with each other by the sharing of electrons to form a compound X.
(a) What type of chemical bond is present in X?

Answer

Ionic bond is present in X.

67 B. Question

State whether X will have a high melting point or low melting point.

Answer

X will have a low melting point.

67 C. Question

Will it be a good conductor of electricity or not?

Answer

It will not be a good conductor of electricity.

67 D. Question

Will it dissolve in an organic solvent or not?

Answer

It will dissolve in an organic solvent.

68. Question

A metal combines with a non-metal by the transfer of electrons to form a compound Y.

(i) State the type of bonds in Y.

(ii) What can you say about its melting point and boiling point ?

(iii) Will it be a good conductor of electricity?

(iv) Will it dissolve in an organic solvent or not ?

Answer

(i) The type of bonds in Y is ionic.

(ii) It has a high melting and boiling point.

(iii) Yes it will be a good conductor of electricity.

(iv) No it will not dissolve in an organic solvent.

69. Question

The electronic configurations of three elements X, Y and Z are as follows:

X 2, 4

y 2, 7

z 2, 1

(a) Which two elements will combine to form an ionic compound?

(b) Which two elements will react to form a covalent compound ? Give reasons for your choice.

Answer

(a) Ionic bond is formed by Y and Z because an ionic bond is formed when one of the atoms can donate electrons to achieve the inert gas configuration, and the other atom needs electrons to achieve the inert gas configuration. Here also Y has 7 and Z has 1 electron in their outermost shell, they would form an ionic bond.

(b) The two elements which will react to form a covalent compound are Y and Z.this is because a covalent bond is formed when both the reacting atoms need electrons to achieve the inert gas electron arrangement.

70. Question

An element A has 4 valence electrons in its atom whereas element B has only one valence electron in its atom. The compound formed by A and B does not conduct electricity. What is the nature of chemical bond in the compound formed ? Give its electron-dot structure.

Answer

Since covalent compounds are non-conductor of electricity so the formed bond will be covalent. Its electron dot structure can be shown by

71. Question

In the formation of a compound XY_2 atom X gives one electron to each Y atom. What is the nature of bond in XY_2 ? Give two properties of XY_2

Answer

In the formation of a compound XY_2 atom X gives one electron to each Y atom. the nature of bond in XY_2 is ionic. The two properties of XY_2 are

1) when it is dissolved in water it will conduct electricity.

2) It would have higher melting point as well as boiling.

73. Question

The electronic configurations of two elements A and B are given below:

A 2, 6

B 2, 8, 1

(a) What type of chemical bond is formed between the two atoms of A?

(b) What type of chemical bond will be formed between the atoms of A and B?

Answer

(a) The type of chemical bond which is formed between the two atoms of A is covalent bond.

(b) The type of chemical bond which will be formed between the atoms of A and B is ionic bond.

74. Question

Four elements A, B, C and D have the following electron arrangements in their atoms:

A 2, 8, 6

B 2, 8, 8

C 2, 8, 8, 1

D 2, 7

(a) What type of bond is formed when element C combines with element D?

(b) Which element is an inert gas?

(c) What will be the formula of the compound between A and C?

Answer

(a) Ionic bond is formed when element C combines with element D

(b) The element B is an inert gas as it has complete octet configuration.

(c) The formula of the compound between A and C will be C_2A. This is because A needs two electrons to complete its octet.

75. Question

An element X of atomic number 12 combines with an element Y of atomic number 17 to form a compound XY_2. State the nature of chemical bond in XY_2 and show how the electron configurations of X and Y change in the formation of this compound.

Answer

When an element X of atomic number 12 combines with an element Y of atomic number 17 to form a compound XY_2. The nature of chemical bond in XY_2 is ionic. The electronic configuration of X changes from 2, 8, 2 to 2, 8; The electronic configuration of Y change from 2, 8, 7 to 2, 8, 8.

76. Question

The electronic configurations of three elements A, B and C are as follows:

A 2, 8, 1

B 2, 8, 7

C 2, 4

(a) Which of these elements is a metal?

(b) Which of these elements are non-metals?

(c) Which two elements will combine to form an ionic bond?

(d) Which two elements will combine to form a covalent bond?

(e) Which element will form an anion of valency 1?

Answer

(a) Element A is a metal.

(b) Elements B and C are non-metal.

(c) Element A and B will combine to form an ionic bond.

(d) Covalent bond is formed by the combination of elements B and C.

(e) Element B will form an anion with valency 1 since it needs only 1 electron to complete its octet.

77. Question

The electric configurations of four particles A, B, C and D are given below

A 2, 8, 8

B 2, 8, 2

C 2, 6

D 2, 8

Which electronic configuration represents:

(i) magnesium atom?

(ii) oxygen atom?

(iii) sodium ion?

(iv) chloride ion?

Answer

(i) magnesium atom has atomic number 12 so the answer is B.

(ii) C will be the desired answer as atomic number of oxygen atom is 8.

(iii) D represents the sodium ion, as it has E.C of 2,8.

(iv) A represents chloride ion because it has E.C of 2, 8, 8.

78. Question

The atomic number of an element X is 12.

(a) What must an atom of X do to attain the nearest inert gas electron configuration?

(b) Which inert gas is nearest to X?

Answer

(a) To attain the nearest inert gas configuration the element X should must loses 2 electrons to gain the E.C of 2,8.

(b) Neon is the inert gas which is nearest to X.

79. Question

The atomic number of an element Y is 16.

(a) What must an atom of Y do to achieve the nearest inert gas electron arrangement?

(b) Which inert gas is nearest to Y?

Answer

(a) An atom of Y should must gain two electrons to attain the nearest gas electron configuration (2,8).

(b) Argon is the inert gas nearest to Y.

80. Question

you can buy solid air-freshners in shops. Do you think these substance are ionic or covalent? why ?

Answer

The air-freshener which is solid show covalent bond as they are volatile in nature.

81. Question

Give the formulae of the chlorides of the elements X and Y having atomic numbers of 3 and 6 respectively.

Will the properties of two chlorides be similar or different? Explain your answer.

Answer

the chloride of X element have the formula XCl. Whereas the chloride of Y element have the formula YCl_4. The properties of the chlorides of X and Y element will be different from each other because XCl is an ionic chloride on the other hand YCl_4 is a covalent chloride.

Very Short Answer Type Questions-Pg-191

1. Question

A zinc ore gave CO_2 on treatment with a dilute acid. Identify the ore and write its chemical formula.

Answer

When a zinc ore gave CO_2 on treatment with a dilute acid then the ore should must be calamine and its chemical formula is $ZnCO_3$.

2. Question

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

Answer

Reduction process is used for obtaining a metal from its oxide.

3. Question

State two ways to prevent the rusting of iron.

Answer

The two ways to prevent the rusting of iron are :-

1) by painting it,

2) prevention can also be done by applying grease or oil over it.

4. Question

What is meant by galvanization ? Why is it done?

Answer

Galvanization is a process of depositing a thin layer of zinc metal on iron objects. This is done to prevent iron fro rusting.

5. Question

Name the metal which is used for galvanising iron.

Answer

The metal which is used for galvanizing iron is zinc.

6. Question

Explain why, iron sheets are coated with zinc.

Answer

To prevent iron from corrosion we coat it with zinc. This so because, Zinc is a quite reactive metal. The action of air on zinc metal forms a very thin coating of zinc oxide all over it, which is hard and impervious to air and hence prevents the further corrosion of zinc metal as well as the iron below it.

7. Question

Why do we apply paint on iron articles?

Answer

we apply paint on iron articles in order to prevent it from rusting which occurs when iron is exposed to air for a duration of time. But the layer of paint prevent iron to come in contact with air and moisture.

8. Question

Give reason for the following:

Carbonate and sulphide ores are usually converted into oxides during the process of extraction of metals.

Answer

Carbonate and sulphide ores are usually converted into oxides during the process of extraction of metals because it is easier to obtain metals from their oxides (by reduction) than from carbonates or sulphides.

9. Question

Name a reducing agent that may be used to obtain manganese from manganese dioxide.

Answer

A reducing agent that may be used to obtain manganese from manganese dioxide is aluminium powder.

10. Question

Name an alloy of lead and tin.

Answer

An alloy of lead and tin is Solder.

11. Question

Give the composition of an alloy called solder. State its one property and one use.

Answer

The alloy solder is composition of lead(Pb) and tin (Sn). Both the element is in 50-50 ratio. Low melting point is one of its property and it is used soldering electrical wires together.

12. Question

What is an amalgam?

Answer

An amalgam is an alloy of mercury metal with one or more other metal.

13. Question

How many carats is pure gold? Why is pure gold not suitable for making ornaments?

Answer

24 carats is pure gold. Pure gold not suitable for making ornaments because eit is very soft in nature.

14. Question

Name one method for the refining of metals.

Answer

Electrolytic refining is one method for refining of metals.

15. Question

State two conditions for the rusting of iron.

Answer

The two conditions for the rusting of iron are:-

1) Presence of air (oxygen),

2) Presence of water (or moisture).

16. Question

In one method of rust prevention, the iron is not coated with anything. Which is this method?

Answer

The one method of rust prevention by which the iron is not coated with anything is alloying iron with chromium and nickel to make stainless steel.

17. Question

Name two alloys of iron. What elements are present in these alloys?

Answer

The two alloys of iron are steel- Iron and carbon. Stainless steel - Iron, chromium and nickel.

18. Question

Give reason for the following: Silver, gold and platinum are used to make jewellery.

Answer

Silver, gold and platinum are used to make jewelry because all of these metals have a property of a bright shiny surface and are resistant to corrosion.

19. Question

Which metal becomes black in the presence of hydrogen sulphide gas in air?

Answer

Silver metal become black in the presence of hydrogen sulphide gas in air.

20. Question

Name the gas in air which tarnishes silver articles slowly.

Answer

The gas in air which tarnishes silver articles slowly is hydrogen sulphide.

21. Question

Silver metal does not combine easily with oxygen but silver jewellery tarnishes after some time. How?

Answer

Silver metal does not combine easily with oxygen but silver jewellery tarnishes after some time because there is a presence of hydrogen sulphide in the air which is responsible to form a black layer of silver sulphide on the surface. The tarnishing of the silver objects is due to this silver sulphide coating on the object's surface.

22. Question

Write the composition of the alloy called bronze. Give two uses of bronze.

Answer

the alloy called bronze is a composition of copper and tin. It has 90% copper and 10% tin.it is very useful in manufacturing of statues and coins.

23. Question

Why does a new aluminium vessel lose shine so soon after use?

Answer

A new aluminium vessel lose shine so soon after use due to the corrosion of aluminium metal when exposed to moist air. This happens because the oxygen of air reacts with aluminium to form a thin, dull layer of aluminium oxide all over the vessel.

24. Question

Why do gold ornaments look new even after several years of use?

Answer

When exposed to atmosphere gold does not get corroded even after its several years of use. This is so because gold is very least reactive metal so it remains unaffected by air, water, and other gases present in the atmosphere. That is why, Gold ornaments look new even after several years of use.

25. Question

Name two metals which are highly resistant to corrosion.

Answer

The two metals which have resistance to corrosion are aluminium and zinc.

26. Question

Which property of 'solder' alloy makes it suitable for welding electrical wires?

Answer

the solder alloys has a very unique property of low melting point, and this property makes it very suitable for making welding wires.

27. Question

Explain why, carbon cannot reduce oxides of sodium or magnesium.

Answer

Carbon is less reactive than magnesium or sodium. On the other hand Carbon, which is a non-metal, is more reactive than zinc and can be placed just above Zn in the reactivity series. Hence, carbon can reduce the oxides of zinc and all other metals below zinc to form metals but it cannot reduce oxides of sodium or magnesium.

28. Question

Why are the metals like Na, K, Ca and Mg never found in their free state in nature?

Answer

Na, K, Ca and Mg are very highly reactive metal and have their position among the reactive metals in the reactive series. This is the reason why, they cannot exist free in nature.

29. Question

Name one metal each which is extracted by:

(a) reduction with carbon.

(b) electrolytic reduction.

(c) reduction with aluminium

(d) reduction with heat alone.

Answer

(a) Zinc is extracted by reduction with carbon.

(b) Sodium is extracted by electrolytic reduction.

(c) Manganese is extracted by reduction with aluminium

(d) Mercury is extracted by reduction with heat alone.

30. Question

Fill in the following blanks with suitable words:

(a) The corrosion of iron is called .....

(b) ..... and ..... are necessary for the rusting of iron.

(c) The process of depositing a thin layer of zinc on iron articles is called.....

(d) Tiffin boxes are electroplated with ..... but car bumpers are electroplated with ..... to protect them from rusting.

(e) The corrosion of copper produces a ..... coating of basic copper carbonate on its surface.

(f) Brass is an alloy of copper and .....

(g) Bronze is an alloy of copper and .....

(h) The non-metal present in steel is .....

(i) The alloy in which one of the metals is mercury is called an.....

(j) The electrical conductivity and melting point of an alloy is ..... than that of pure metals.

(k) The rocky material found with ores is called.....

Answer

(a) The corrosion of iron is called rusting.

(b) Air and Water are necessary for the rusting of iron.

(c) The process of depositing a thin layer of zinc on iron articles is called galvanization.

(d) Tiffin boxes are electroplated with tin but car bumpers are electroplated with chromium to protect them from rusting.

(e) The corrosion of copper produces a green coating of basic copper carbonate on its surface.

(f) Brass is an alloy of copper and zinc.

(g) Bronze is an alloy of copper and tin.

(h) The non-metal present in steel is tin.

(i) The alloy in which one of the metals is mercury is called an amalgam.

(j) The electrical conductivity and melting point of an alloy is less than that of pure metals.

(k) The rocky material found with ores is called gangue.

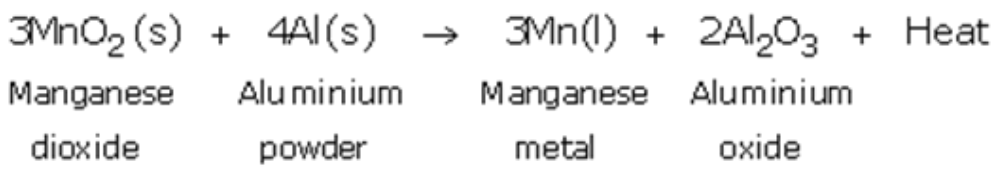
Short Answer Type Questions-Pg-192

31. Question

How is manganese extracted from manganese dioxide, Mn02? Explain with the help of an equation.

Answer

Manganese metal is extracted by the process of reduction of its oxide with aluminium powder as the reducing agent. That is why, when manganese dioxide is heated with aluminium powder, then manganese metal is formed.



32. Question

What is a thermite reaction? Explain with the help of an equation. State one use of this reaction.

Answer

A thermite reaction is the reduction of a metal oxide to form metal by using aluminium powder as a reducing agent.

33. Question

Which one of the methods given in column I is applied for the extraction of each of the metals given in column II:

Column I

(i) Electrolytic reduction

(ii) Reduction with Carbon

(iii) Reduction with Aluminium

Column II

(a) Aluminium

(b) Zinc

(c) Sodium

(d) Iron

(e) Manganese

(f) Tin

Answer

Electrolytic reduction: Aluminium and Sodium; Reduction with carbon: Zinc, Iron and Tin; Reduction with aluminium: Manganese

34 A. Question

Give reason why copper is used to make hot water tanks but steel (an alloy of iron) is not.

Answer

copper is used to make hot water tanks but steel (an alloy of iron) is not because Copper does not corrode easily in the presence of water but steel rusts in the presence of water.

34 B. Question

Explain why, the surface of some metals acquires a dull appearance when exposed to air for a long time.

Answer

The surface of some metals acquires a dull appearance when exposed to air for a long time because oxide layer is formed on the surface of metals as they react with moisture, air and any other gases.

35 A. Question

Why does aluminium not corrode right through?

Answer

Aluminium is more reactive than iron and it forms a layer of aluminium oxide as soon as it comes in contact with moist air. This aluminium oxide layer is very tough and prevents the aluminium underneath from corroding that is why aluminium does not corrode right through.

35 B. Question

What is meant by 'anodising'? Why is it done?

Answer

Anodising is the process of thickening of aluminium oxide layer on the surface of aluminium objects by electrolysis. It is done to prevent aluminium objects from further corrosion.

36 A. Question

Why is an iron grill painted frequently?

Answer

To prevent the iron from rusting, it is painted frequently.

36 B. Question

Explain why, though aluminium is more reactive than iron, yet there is less corrosion of aluminium when both are exposed to air.

Answer

Though aluminium is more reactive than iron, yet there is less corrosion of aluminium when both are exposed to air because, there is less corrosion in aluminium than iron when both are exposed to air because aluminium forms a layer of aluminium oxide on its surface as soon as it comes in contact with moist air. This aluminium oxide is very tough and prevents it from corroding right through.

37 A. Question

Name the method by which aluminium metal is extracted.

Answer

The method by which aluminium metal is extracted is known as Electrolytic reduction.

37 B. Question

Give the name and chemical formula of one ore of copper.

Answer

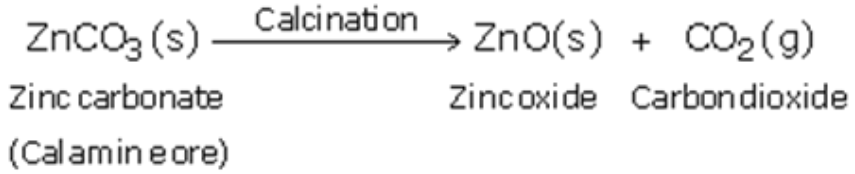
Copper glance (Cu_2S) is the name and chemical formula of one ore of copper.

37 C. Question

How is zinc extracted from its carbonate ore (calamine)? Explain with equations.

Answer

Zinc is extracted from its carbonate ore (calamine), when calamine ore is heated strongly in the absence of air i.e. calcined, it decomposes to form zinc oxide and carbon dioxide.



Then, zinc oxide is heated with carbon and zinc metal is produced.

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

Zinc oxide Carbon Zinc metal Carbon monoxide

38 A. Question

Name two metals which occur in nature in free state as well as in combined state.

Answer

The two metals which occur in nature in free state as well as in combined state are Copper and Silver.

38 B. Question

Name one ore of manganese. Which compound of manganese is present in this ore ? Also write its chemical formula.

Answer

Pyrolusite is an ore of manganese. Manganese dioxide is the compound of manganese is present in this ore. The chemical formula of this ore is MnO_2.

38 C. Question

A zinc ore on heating in air forms sulphur dioxide. Describe briefly any two stages involved in the conversion of this concentrated ore into zinc metal.

Answer

The two stages involved in the conversion of this concentrated ore into zinc metal are roasting and reduction. 1) Now roasting is a process when zinc sulphide (zinc blende ore) is strongly heated in air (roasted), it forms zinc oxide and sulphur dioxide. 2) Reduction is the process in which Zinc oxide obtained is heated with carbon to form zinc metal. In this way zinc is abstracted from its ore.

39. Question

How does the method used for extracting a metal from its ore depend on the metal's position in the reactivity series? Explain with examples.

Answer

Extracting of metals can be done in various ways and by using different methods belonging to category of highly reactive metals, moderately reactive metals and less reactive metals. This is because the extraction of a metal from its concentrated ore is essentially a process of reduction of the metal compound present in the ore. For example: Manganese metal is obtained by the reduction of its oxide with aluminium powder and not carbon. This is because carbon is less reactive than manganese. Carbon, which is a non-metal, is more reactive than zinc and it can be placed just above Zn in the reactivity series. Hence, carbon can reduce the oxides of zinc and all other metals below zinc to form metals.

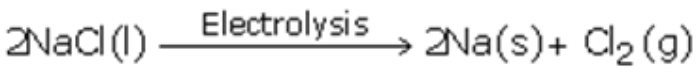
40. Question

Explain giving one example, how highly reactive metals (which are high up in the reactivity series) are extracted.

Answer

To extract a highly reactive metal (which are high up in the reactivity series) the process of extraction is done by the electrolytic reduction of their molten chlorides or oxides.

Example: Sodium metal is extracted by the electrolytic reduction of molten sodium chloride. When electric current is passed through molten sodium chloride, it decomposes to form sodium metal and chlorine gas.



41. Question

Describe with one example, how moderately reactive metals (which are in the middle of reactivity series) are extracted.

Answer

The extraction of moderately reactive metals (which are in the middle of reactivity series) is done by the process of reduction of their oxides with carbon, aluminium, sodium or calcium.

For example:- When Zinc sulphide (zinc blende ore) is strongly heated in air (roasted), it forms zinc oxide and sulphur dioxide. This process is called roasting. Then, zinc oxide is heated with carbon to form zinc metal. This process is termed as reduction.

42. Question

How are the less reactive metals (which are quite low in the reactivity series) extracted ? Explain with the help of an example.

Answer

The process used for extracting the less reactive metals (which are quite low in the reactivity series) is known as the reduction of their oxides by heat alone.

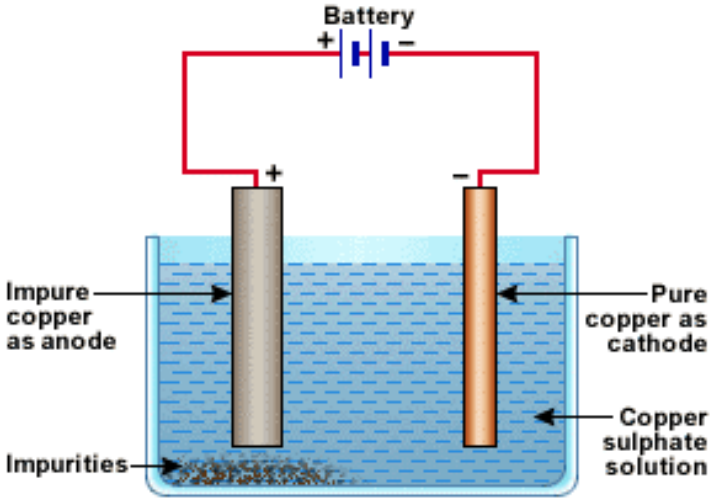
For example:- Mercury (II) sulphide ore is roasted in air when mercury (II) oxide is formed. When this mercury (II) oxide is heated to about 300oC, it decomposes to form mercury metal.

43. Question

What is meant by refining of a metal ? Name the most widely used method for the refining of impure metals obtained by various reduction processes. Describe this method with the help of a labelled diagram by taking the example of any metal.

Answer

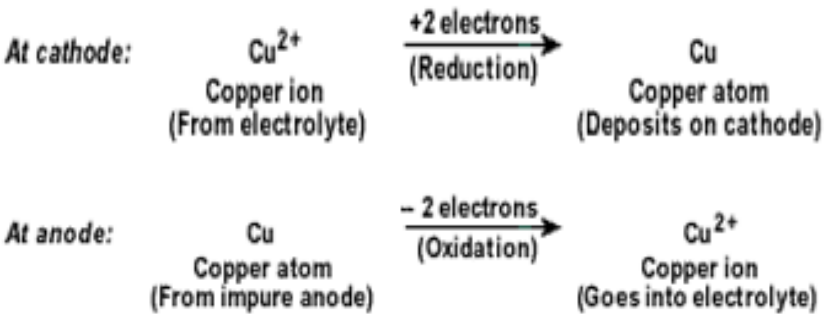
The process of purifying impure metals is called refining of metals. Electrolytic refining is the most widely used method for the refining of impure metals obtained by various reduction processes. In an electrolytic tank, acidified copper sulphate ($CuSO_4$ + dilute $H2O_4$) solution forms the electrolyte. A block of impure copper is made into an anode by connecting the positive terminal of a power supply (battery). A thin strip of highly pure copper metal is the cathode of the cell. The negative terminal of the power supply is connected to it.



Experimental set up for the electrolytic refining of copper.

A small electric current is passed through the cell. Atoms from the anode enter the electrolyte. The copper from the anode gets converted into copper sulphide. An equal number of copper atoms from the solution get deposited on the cathode. This is to keep the concentration of the solution constant. Impurities from the anode block either remain in solution or collect below the anode, as they are unable to displace copper from the sulphate Solution. The insoluble impurities remain in the electrolyte and are called anode mud.

Copper sulphate solution contains ions of Cu++ and SO4--. The following reactions take place at the anode and cathode when an electric current is passed.



Pure copper is scraped or removed from the cathode. Anode becomes thinner as the electrolysis process proceeds. Some important metals like gold and silver are present in the anode mud. These can be recovered separately.

44 A. Question

Define the terms (i) mineral (ii) ore, and (iii) gangue.

Answer

(i) Minerals - The natural materials in which the metals or their compounds are found in earth are called minerals. (ii) Ores - Those minerals from which the metals can be extracted conveniently and profitably are called ores. (iii) Gangue - The unwanted impurities like sand, rocky material, earthy particles etc., present in an ore are called gangue.

44 B. Question

What is meant by the 'concentration of ore'?

Answer

Before extracting metal from an ore, it is necessary to remove these impurities (gangue) from it. By removing the gangue, we get a concentrated ore containing a much higher percentage of metal. This is called concentration of ore; also known as enrichment of ore.

44 C. Question

Name one ore of copper (other than cuprite). Which compound of copper is present in this ore? Also, write its chemical formula.

Answer

One ore of copper is Copper glance. Copper (I) sulphide is present in this ore. And the chemical formula is Cu_2S.

45. Question

Explain how, a reduction reaction of aluminium can be used for welding cracked machine parts of iron.

Write a chemical equation for the reaction involved.

Answer

A reduction reaction of aluminium can be used for welding cracked machine parts of iron, A mixture of Iron (III) oxide and aluminium powder is ignited with a burning magnesium ribbon. Aluminium reduces iron oxide to produce iron metal with the evolution of lot of heat. Due to this heat, iron metal is produced in the molten state. This molten iron is poured between broken iron parts of the machine to weld them (to join them).

The chemical equation for the reaction involved is

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

46 A. Question

What is corrosion ?

Answer

Corrosion is the process by which the eating up of metals by the action of air, moisture or a chemical (such as an acid) on their surface takes place.

46 B. Question

Name any two metals which do not corrode easily.

Answer

The two metals which do not corrode easily are Gold and Platinum.

46 C. Question

What is the corrosion of iron known as?

Answer

The corrosion of iron known as rusting.

46 D. Question

Explain why, aluminium is a highly reactive metal, still it is used to make utensils for cooking.

Answer

Aluminium begins to corrode quickly when it comes in contact with moist air. The action of moist air on aluminium metal forms a thin layer of aluminium oxide all over the metal. This aluminium oxide is very tough and prevents the metal underneath from further corrosion. Therefore, aluminium is used for making utensils irrespective of its highly reactive property as its corrosion leads to the non-corrosion of the metal in the longer run.

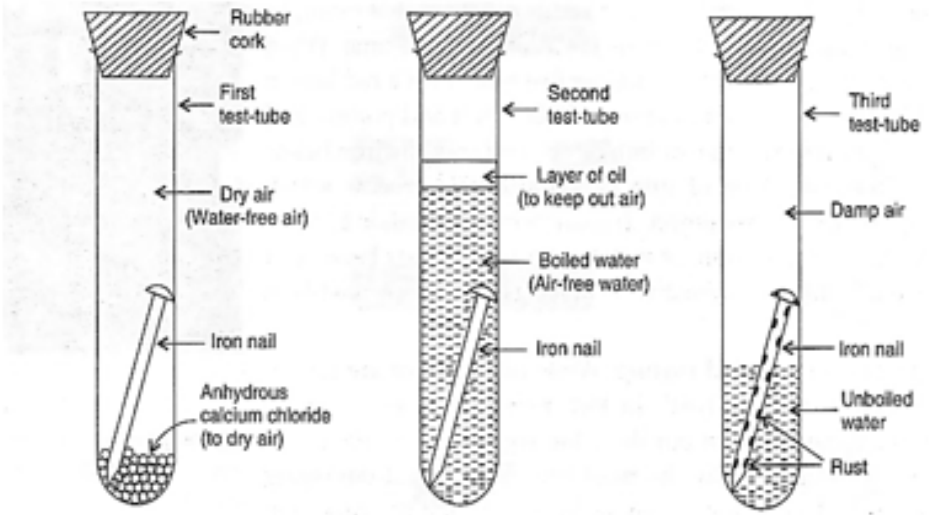
47. Question

What is meant by 'rusting of iron'? With the help of labelled diagrams, describe an activity to find out the conditions under which iron rusts.

Answer

Rusting of iron is known for the process in which an iron object is left in damp air (or water) for a considerable time, it gets covered with a red-brown flaky substance called rust.

Experiment to show that rusting of Iron requires both, air and water: We take three test-tubes and put one clean iron nail in each of the three test-tubes:



(a) Only air : No rusting (b) Only water : No rusting (c) Air and water together : Rusting takes place

In the first test-tube containing iron nail, we put some anhydrous calcium chloride and close its mouth with a tight cork. Anhydrous calcium chloride absorbs water moisture from the damp air present in the test-tube and make it dry. In this way, the iron nail in the first test-tube is kept in dry air (having no water vapour in it).

2) In the second test-tube containing iron nail, we put boiled distilled water. Boiled water does not contain any dissolved air (or oxygen) in it (this is because the process of boiling removes all the dissolved air from it). A layer of oil is put over boiled water in the test-tube to prevent the outside air from mixing with boiled water. In this way, the iron nail in the second test-tube is kept in air free boiled water.

3) In the third test-tube containing an iron nail, we put unboiled water so that about two-thirds of nail is immersed in water and the rest is above the water, exposed to damp air. In this way, the iron nail in the third test-tube has been placed in air and water together.

The mouth of all three test tubes is closed with a cork and it is kept aside for about one week.

After one week, we observe the iron nails kept in all the three test-tubes, one by one. We find that (i) No rust is seen on the surface of iron nail kept in dry air (water-free air) in the first test-tube. This tells us that rusting of iron does not take place in air alone.

(ii) No rust is seen on the surface of iron nail kept in air-free, boiled water in the second test-tube. This tells us that rusting of iron does not take place in water alone.

(iv) Red-brown rust is seen on the surface of iron nail kept in the presence of both air and water together the third test-tube. This tells us that rusting of iron takes place in the presence of both air and water together.

48 A. Question

What is an alloy ? How is an alloy made?

Answer

An alloy is a homogeneous mixture of two or more metals (or a metal and small amount of non-metals). It is being prepared by mixing the various metals in molten state in required proportions, and then cooling their mixture to the room temperature.

48 B. Question

What elements are present in steel? How are the properties of steel different from those of pure iron?

Answer

Elements are present in steel are iron and carbon. This alloy of iron (steel) is hard and strong. It also rusts less readily than pure iron.

48 C. Question

Give the constituents and one use of brass.

Answer

Brass contains copper and zinc. Brass is used for making cooking utensils.

49 A. Question

Name two metals which resist corrosion due to the formation of a thin, hard and impervious layer of oxide on their surface.

Answer

The two metals which resist corrosion due to the formation of a thin, hard and impervious layer of oxide on their surface are Aluminium and Zinc.

49 B. Question

Name five methods of preventing rusting of iron.

Answer

The five methods of preventing rusting of iron are

1) painting

2) applying grease or oil

3) galvanization

4) Tin and chromium plating

5) Alloying to form stainless steel.

49 C. Question

What are the constituents of stainless steel? What are the special properties of stainless steel?

Answer

The constituents of stainless steel are chromium and nickel. The special properties of stainless steel are Stainless steel does not rust at all and is strong and tough.

50 A. Question

Name an alloy of copper. State its chemical composition and any one use.

Answer

An alloy of copper is brass It contains Copper (Cu) - 80% and Zinc (Zn) - 20%. It is used for making cooking utensils.

50 B. Question

Explain why, when a copper object remains in damp air for a considerable time, a green coating is formed on its surface. What is this process known as?

Answer

When a copper object remains in damp air for a considerable time, a green coating is formed on its surface because copper reacts slowly with the carbon dioxide and water of air to form a green coating of basic copper carbonate on the surface of the object. The formation of this green coating of basic copper carbonate corrodes it. This process is known as corrosion of copper.

51 A. Question

How does the painting of an iron object prevent its rusting?

Answer

When a coat of paint is applied to the surface of an iron object, it prevents air and moisture to come in contact with the object; hence no rusting takes place.

51 B. Question

How does the electrical conductivity of copper alloys, brass and bronze, differ from that of pure copper ?

Answer

The electrical conductivity of copper alloys like brass and bronze is less than that of pure copper.

51 C. Question

What is meant by 22 carat gold? Name the metals which are usually alloyed with gold to make it harder.

Answer

It means that 22 parts pure gold is alloyed with 2 parts of either silver or copper for making ornaments; Silver and copper are usually alloyed with gold to make it harder.

52. Question

Explain giving equation, what happens when:

(a) $ZnC0_3$ is heated in the absence of air?

(b) a mixture of Cu_2O and Cu_2S is heated?

Answer

(a) When zinc carbonate heated in absence of air, it releases carbon di oxide gas and forms zinc oxide. We can see through equation as well.

$ZnCO_3 \rightarrow ZnO + CO_2$

(b) $2Cu_2O + Cu_2S \rightarrow 6Cu + SO_2$

Hence we can say that when a mixture of Cu_2O and Cu_2S is heated, carbon and Sulphur di oxide gas released.

53 A. Question

For the reduction of a metal oxide, suggest a reducing agent other than carbon.

Answer

When zinc carbonate is heated strongly in the absence of air, it decomposes to form zinc oxide and carbon dioxide.

$$\underset{\text{Zinc carbonate (Calamine ore)}}{ZnCO_3(s)} \xrightarrow{\text{Calcination}} \underset{\text{Zinc oxide}}{ZnO(s)} + \underset{\text{Carbon dioxide}}{CO_2(g)}$$

53 B. Question

Explain why, an aqueous solution of sodium chloride is not used for the electrolytic extraction of sodium metal.

Answer

An aqueous solution of sodium chloride is not used for the electrolytic extraction of sodium metal because When copper (I) oxide reacts with copper (I) sulphide, it forms copper metal and sulphur dioxide.

$$2Cu_2O(s) + Cu_2S(s) \xrightarrow{Heat} 6Cu(s) + SO_2(g)$$

54. Question

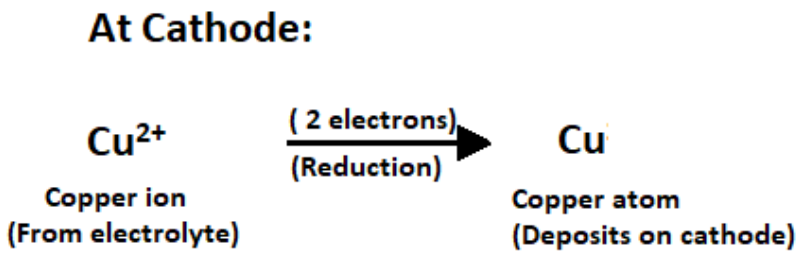
How are metals refined by the electrolytic process? Describe the electrolytic refining of copper with the help of a neat labelled diagram.

Answer

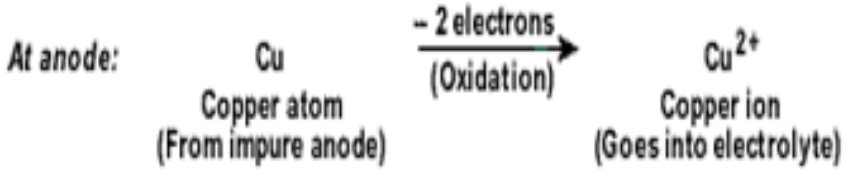
For the refining of an impure metal by the process of electrolysis, a thick block of impure metal is made anode (connected to +ve terminal of the battery) and a thin strip of the pure metal is made cathode (connected to -ve terminal of battery). A water soluble salt (of the metal to be refined) is taken as electrolyte. On passing current, impure metal dissolves from the anode and goes into the electrolyte Solution And pure metal from the electrolyte deposits on the cathode.

Electrolytic refining of copper: In an electrolytic tank, acidified copper sulphate ($CuSO_4$+ dilute H_2O_4) solution forms the electrolyte. A block of impure copper is made into an anode by connecting the positive terminal of a power supply (battery). A thin strip of highly pure copper metal is the cathode of the cell. The negative terminal of the power supply is connected to it .

A small electric current is passed through the cell. Atoms from the anode enter the electrolyte. The copper from the anode gets converted into copper sulphide. An equal number of copper atoms from the solution get deposited on the cathode. This is to keep the concentration of the solution constant. Impurities from the anode block either remain in solution or collect below the anode, as they are unable to displace copper from the sulphate Solution. The insoluble impurities remain in the electrolyte and are called anode mud.



Copper sulphate solution contains ions of Cu++ and SO4--. The following reactions take place at the anode and cathode when an electric current is passed.



Pure copper is scraped or removed from the cathode. Anode becomes thinner as the electrolysis process proceeds. Some important metals like gold and silver are present in the anode mud. These can be recovered separately

55 A. Question

Name the chemical compound which is electrolyzed in molten state to obtain aluminium metal. Which gas is evolved during this process ?

Answer

Aluminium oxide; Oxygen

55 B. Question

Name the chemical compound which is electrolyzed in molten state to obtain sodium metal. Which gas is produced in this process ?

Answer

Sodium chloride; Chlorine

55 C. Question

Name the gas produced when calamine ore is calcined.

Answer

Carbon dioxide

55 D. Question

Name the gas evolved when cinnabar ore is roasted.

Answer

Sulphur dioxide

56 A. Question

Name two metals which are found in nature mainly in the free state (as metallic elements).

Answer

The two metals which are found in nature mainly in the free state (as metallic elements) are Gold and Platinum.

56 B. Question

Name two metals which are always found in combined state.

Answer

The two metals which are always found in combined state are Sodium and Magnesium.

56 C. Question

What iron compound is present in haematite ore? Also write its chemical formula.

Answer

Iron (III) oxide is the iron compound is present in haematite ore. Its chemical formula is Fe_2O_3.

Long Answer Type Questions-Pg-193

57 A. Question

What is the difference between a mineral and an ore?

Answer

The main difference between a mineral and an ore is that, the natural materials in which the metals or their compounds are found in earth are called minerals. Those minerals from which the metals can be extracted conveniently and profitably are called ores.

57 B. Question

Which metal is extracted from cinnabar ore?

Answer

Mercury metal is extracted from cinnabar ore.

57 C. Question

Name one ore of sodium. Name the sodium compound present in this ore and write its chemical formula.

Answer

Rock salt - Sodium chloride, NaCl.

57 D. Question

How is sodium metal extracted? Explain with the help of equation of the reaction involved.

Answer

Sodium metal is extracted by the electrolytic reduction of molten sodium chloride. When electric current is passed through molten sodium chloride, it decomposes to form sodium metal and chlorine gas.

$$2NaCl(l) \xrightarrow{\text{Electrolysis}} 2Na(s) + Cl_2(g)$$

57 E. Question

Name three other metals which are extracted in a manner similar to sodium.

Answer

Potassium, Calcium and Magnesium are the three other metals which are extracted in a manner similar to sodium.

58 A. Question

Name the metal which is extracted from haematite ore.

Answer

Iron is the metal which is extracted from haemetite ore.

58 B. Question

Name one ore of aluminium. Name the aluminium compound present in this ore and write its chemical formula.

Answer

Bauxite is the ore from whuch aluminium is extracted. Aluminium oxide ($Al_2O_3.2H_2O$) is present in this ore.

58 C. Question

How is aluminium metal extracted? Explain with the help of an equation.

Answer

Aluminium is extracted from bauxite by electrolytic reduction (electrolysis) of molten aluminium oxide. In this process, when electric current is passed through aluminium oxide, it decomposes to form aluminium metal and liberates oxygen gas.

$2Al_2O_3(l) \rightarrow 4Al(s) + 3O_2(g)$

58 D. Question

Name the electrode at which aluminium metal is produced.

Answer

Aluminium metal is produced at the negative electrode i.e. cathode.

58 E. Question

Which gas is produced during the extraction of aluminium? At which electrode is this gas produced?

Answer

During electrolysis of aluminium, oxygen gas is liberated at the positive electrode i.e. anode.

59 E. Question

Which metal is extracted from bauxite ore?

Answer

Aluminium is extracted from the bauxite ore.

59 B. Question

Give the name of one ore of iron. Which iron compound is present in this ore ? Write its chemical formula.

Answer

Hametite (Fe_2O_3) is the ore from which iron is extracted. It is also called Iron (III) oxide.

59 C. Question

Describe the extraction of zinc metal from its sulphide ore (zinc blende). Write equations of the reactions involved.

Answer

When Zinc Blende or Zinc Sulphide is strongly heated in air, it forms zinc oxide and sulphur di oxide. This process is called roasting.

$2ZnS(s) + 3O_2(g) \rightarrow 2ZnO(g) + 2SO_2(g)$

Then, zinc oxide is heatd with carbonto form zinc metal. This process is termed as reduction

$Zn(s) + C(s) \rightarrow Zn(s) + CO(g)$

59 D. Question

Explain why, the galvanized iron article is protected against rusting even if the zinc layer is broken.

Answer

The galvanized iron object remains protected even if a break occurs in the zinc layer because zinc is more easily oxidized than iron. Hence, the zinc continues to corrode but iron object does not corrode or rust.

59 E. Question

Name a common metal which is highly resistant to corrosion.

Answer

Aluminium

60 A. Question

Name the metal which is extracted from the ore called 'rock salt'.

Answer

Sodium

60 B. Question

Name two ores of zinc. Write the names of the chemical compounds present in them and give their chemical formulae.

Answer

Two ores of zinc are:

i) Calamine: Zinc Carbonate ($ZnCO_3$)

ii) Zinc Blende (ZnS)

60 C. Question

Explain how, mercury is extracted from its sulphide ore (cinnabar). Give equations of the reactions involved.

Answer

Mercury (II) Sulphide ore is roasted in air to form mercury (II) oxide.

$2HgS(s) + 3O_2(g) \rightarrow 2HgO(s) + 2SO_2(g)$

Then, Mercury (II) Oxide is heated to about 300^oC and it undergoes decomposition to form mercury metal.

60 D. Question

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

Answer

|The thick block of impure metal M is taken as Anode; Thin strip of pure metal M is taken as Cathode; and Water soluble salt of metal M is taken as the electrolyte.

60 E. Question

Name any five metals which are purified by electrolytic refining method.

Answer

Five metals are: Zinc, Copper, Nickel, Gold and Silver.

61 A. Question

Which metal is extracted from calamine ore?

Answer

Zinc is extracted from calamine ore.

61 B. Question

Name one ore of mercury. Which mercury compound is present in this ore? Write its chemical formula.

Answer

Cinnabar is the ore from which mercury is extracted. The mercury compound present in Cinnabar is Mercury(II) Sulphide.

61 C. Question

How is copper extracted from its sulphide ore (copper glance), Cu_2S? Explain with equations of the reactions involved.

Answer

The concentrated Copper Glance (ore used to extract copper metal) is first roasted in air when a part of copper(I) sulphide is oxidized to copper(I) oxide.

$2Cu_2S(s) + 3O_2(g) \rightarrow 2Cu_2O(s) + 2SO_2(g)$

When a good amount of copper(I) oxide is formed, then the supply of air for roasting stopped. In the absence of air, copper(I) oxide reacts with remaining copper(I) sulphide to form copper metal and sulphur di oxide.

$2Cu_2O(s) + Cu_2S(s) \rightarrow 6Cu(s) + SO_2(g)$

61 D. Question

What is an alloy? Give two examples of alloys.

Answer

An alloy is a homogeneous mixture of two or more metals or a metal and small amount of non-metals. Example: stainless stell, bronze, brass, german silver,etc.

61 E. Question

How are the properties of an alloy different from those of the constitutent elements?

Answer

i) Alloys are stronger than the metals from which they are made.

ii) Alloys are harder than the constituent metals.

iii) Alloys are more resistant to corrosion.

iv) Alloys have lower melting point than constituents metals.

v) Alloys have lower electrical conductivity than pure metals.

Multiple Choice Questions (MCQs)-Pg-194

62. Question

An ore of manganese metal is: A. bauxite

B. hematite

C. cuprite

D. pyrolusite

Answer

Hematite is an ore of manganese.

63. Question

Which of the following is an iron ore? A. cinnabar

B. calamine

C. Hematite

D. rock salt

Answer

Hematite is an iron ore.

64. Question

The metal which can be extracted from the bauxite ore is: A. Na

B. Mn

C. Al

D. Hg

Answer

The metal which can be extracted from the bauxite ore is Al.

65. Question

The two metals which can be extracted just by heating their sulphides in air are : A. sodium and copper

B. copper and aluminium

C. potassium and zinc

D. mercury and copper

Answer

The two metals which can be extracted just by heating their sulphides in air are mercury and copper.

66. Question

A common metal which is highly resistant to corrosion is : A. iron

B. copper

C. aluminium

D. magnesium

Answer

A common metal which is highly resistant to corrosion is aluminium.

67. Question

An important ore of zinc metal is: A. calamine

B. cuprite

C. pyrolusite

D. haematite

Answer

An important ore of zinc metal is calamine.

68. Question

The major ore of aluminium is known as: A. cinnabar

B. calamine

C. bauxite

D. pyrolusite

Answer

The major ore of aluminium is known as bauxite.

69. Question

The two metals which are extracted by means of electrolytic reduction of their molten salts are : A. magnesium and manganese

B. iron and aluminium

C. zinc and magnesium

D. magnesium and aluminium

Answer

The two metals which are extracted by means of electrolytic reduction of their molten salts are magnesium and aluminium.

70. Question

In stainless steel alloy, iron metal is mixed with A. Cu and Cr

B. Cr and Ni

C. Cr and Sn

D. Cu and Ni

Answer

In stainless steel alloy, iron metal is mixed with Cr and Ni.

71. Question

If copper is kept exposed to damp air for a considerable time, it gets a green coating on its surface. This is due to the formation of: A. hydrated copper sulphate

B. copper oxide

C. basic copper carbonate

D. copper nitrate

Answer

If copper is kept exposed to damp air for a considerable time, it gets a green coating on its surface. This is due to the formation of basic copper carbonate.

72. Question

Which of the following alloys contains mercury as one of the constituents? A. stainless steel

B. solder

C. duralumin

D. zinc amalgam

Answer

zinc amalgam alloy contains mercury as one of the constituents.

73. Question

Which of the following is an ore of mercury metal?

Options||A. rock salt

B. cinnabar

C. calamine

D. haematite

Answer

Cinnabar is an ore of mercury metal.

74. Question

Calamine ore can be used to extract one of the following metals. This metal is: A. copper

B. mercury

C. aluminium

D. zinc

Answer

Calamine ore can be used to extract zinc metal.

75. Question

Which of the following pair of metals exists in their native state in nature? A. Ag and Hg

B. Ag and Zn

C. Au and Hg

D. Au and Ag

Answer

Au and Ag is the pair of metals exists in their native state in nature.

76. Question

Which of the following reactants are used to carry out the thermite reaction required for welding the broken railway tracks? A. Al_2O_3 + Fe

B. MnO_2 + Al

C. Fe_2O_3 + Al

D. Cu_2O + Fe

Answer

Fe2O3 + Al reactants are used to carry out the thermite reaction required for welding the broken railway tracks.

77. Question

Which of the following alloys contains a non-metal as one of the constituents? A. brass

B. amalgam

C. steel

D. bronze

Answer

Steel contains a non-metal as one of the constituents.

78. Question

During the refining of an impure metal by electrolysis, the pure metal is a deposited: A. at cathode

B. on the walls of electrolytic tank

C. at anode

D. at the bottom of electrolytic tank

Answer

During the refining of an impure metal by electrolysis, the pure metal is deposited at cathode.

79. Question

Which of the following metals can be obtained from haematite ore? A. copper

B. sodium

C. zinc

D. iron

Answer

Iron metals can be obtained from haematite ore.

80. Question

Brass is an alloy of: A. Cu and Sn

B. Cu and Pb

C. Pb and Sn

D. Zn and Cu

Answer

Brass is an alloy of Zn and Cu.

81. Question

The metal which is always present in an amalgam is : A. iron

B. aluminium

C. mercury

D. magnesium

Answer

The metal which is always present in an amalgam is mercury.

82. Question

Manganese metal is extracted from manganese dioxide by a reduction process by making use of: A. carbon

B. hydrogen

C. electrolysis

D. aluminium

Answer

Manganese metal is extracted from manganese dioxide by a reduction process by making use of aluminium.

83. Question

The metal which can be extracted simply by heating the cinnabar ore in air is: A. Zn

B. Cu

C. Al

D. Hg

Answer

The metal which can be extracted simply by heating the cinnabar ore in air is Hg.

84. Question

During galvanization, iron metal is given a thin coating of one of the following metals. This metal is: A. chromium

B. tin

C. zinc

D. copper

Answer

During galvanization, iron metal is given a thin coating of zinc.

85. Question

Which of the following metals are extracted by the electrolysis of their molten chlorides? A. Na and Hg

B. Hg and Mg

C. Na and Mg

D. Cu and Fe

Answer

The metals which are extracted by the electrolysis of their molten chlorides are Na and Mg.

86. Question

Rock salt is an ore of one of the following metals. This metal is : A. Mn

B. Na

C. Fe

D. Cu

Answer

Rock salt is an ore of one of the metal Na.

87. Question

The articles made of silver metal become dark on prolonged exposure to air. This is due to the formation of a layer of its : A. oxide

B. hydride

C. sulphide

D. carbonate

Answer

The articles made of silver metal become dark on prolonged exposure to air. This is due to the formation of a layer of its sulphide.

88. Question

A sulphide ore is converted into metal oxide by the process of : A. carbonation

B. roasting

C. calcination

D. anodizing

Answer

A sulphide ore is converted into metal oxide by the process of roasting.

89. Question

The metal which can be extracted from pyrolusite ore is : A. mercury

B. manganese

C. aluminium

D. magnesium

Answer

The metal which can be extracted from pyrolusite ore is manganese.

90. Question

Calamine ore can be converted into zinc oxide by the process of : A. dehydration

B. roasting

C. calcination

D. sulphonation

Answer

Calamine ore can be converted into zinc oxide by the process of calcination.

91. Question

Zinc blende ore can be converted into zinc oxide by the process of : A. roasting

B. hydrogenation

C. chlorination

D. calcination

Answer

Zinc blende ore can be converted into zinc oxide by the process of roasting.

Questions Based on High Order Thinking Skills (HOTS)-Pg-195

92. Question

An element A which is a part of common salt and kept under kerosene reacts with another element B of atomic number 17 to give a product C. When an aqueous solution of product C is electrolyzed then a compound D is formed and two gases are liberated.

(a) What are A and B?

(b) Identify C and D.

(c) What will be the action of C on litmus solution? Why?

(d) State whether element B is a solid, liquid or gas at room temperature.

(e) Write formula of the compound formed when element B reacts with an element E having atomic number 5.

Answer

(a) In the above given question element A is sodium and element B is chlorine. Because element A is a part of common salt and also kept under kerosene where as another element B has an atomic number 17.

(b) Here element C is sodium chloride and element D is sodium hydroxide.

(c) Element C will turn the litmus solution blue. Because a basic element will turn the litmus solution blue.

(d) From the above given statement we can say the element B is a gas.

(e) The formula of the compound formed when element B reacts with an element E having atomic number 5 is EB_3.

93. Question

A metal which exists as a liquid at room temperature is obtained by heating its sulphide ore in the presence of air.

(a) Name the metal and write its chemical symbol.

(b) Write the name and formula of the sulphide ore.

(c) Give the equations of chemical reactions involved in the production of metal from its sulphide ore.

(d) Name a common 'device in which this metal is used.

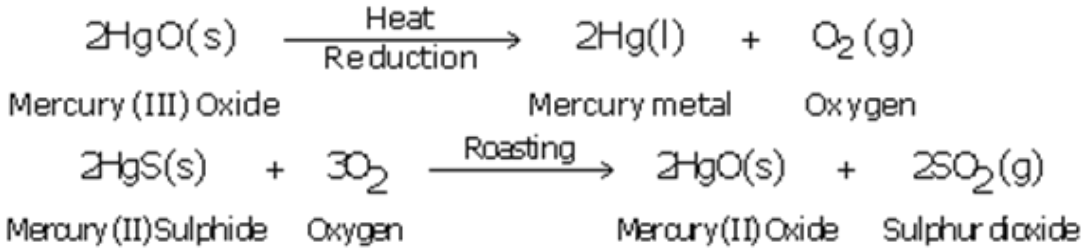
(e) Can this metal displace copper from copper sulphate solution? Why?

Answer

(a) The name of the metal is mercury. And its chemical formula is Hg.

(b) The name and formula of the sulphide ore is Cinnabar and HgS.

(c) The equations of chemical reactions involved in the production of metal from its sulphide ore is



(d) Mercury is used in thermometer.

(e) Mercury cannot displace copper from copper sulphate solution because it is less reactive then copper.

94. Question

No chemical reaction takes place when granules of a rusty-brown solid A are mixed with the powder of another solid B. However, when the mixture is heated, a reaction takes place between its components. One of the products C is a metal and settles down in the molten state while the other product D floats over it. It was observed that the reaction is highly exothermic.

(a) What could the solids A and B be?

(b) What are the products C and D most likely to be?

(c) Write the chemical equation for the reaction between A and B leading to the formation of C and D.

(d) What is the special name of such a reaction? State one use of such a reaction.

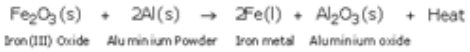
(e) Name any two types of chemical reactions under which the above reaction can be classified.

Answer

(a) From the above given statement solid A is iron (III) and the solid B is aluminium.

(b) The products C and D most likely to be iron and aluminium oxide respectively.

(c) The chemical equation for the reaction between A and B leading to the formation of C and D is like



Mention the physical states of all the reactants and products in this equation and indicate the heat change which takes place.

(d) The special name of such a reaction is Thermite reaction. One use of such a reaction is in Welding of broken pieces of heavy iron objects like railway tracks, etc.

(e) The two types of chemical reactions under which the above reaction can be classified are displacement reactions and Oxidation-reduction reactions.

95. Question

In an electrolytic tank, aluminium metal is being extracted by the electrolysis of molten aluminium oxide using carbon electrodes. It is observed that one of the carbon electrodes is gradually burnt away and has to be replaced.

(a) Which carbon electrode (cathode or anode) is burnt away?

(b) Why is this carbon electrode burnt away?

Answer

(a) The carbon electrode (cathode or anode) is burnt away is positively charged carbon electrode(Anode).

(b) The carbon electrode is burnt away because oxygen produced during the electrolysis of molten aluminium oxide reacts gradually with the carbon of carbon anode to form carbon dioxide gas.

96. Question

A metal X which is resistant to corrosion is produced by the electrolysis of its molten oxide whereas another metal Y which is also resistant to corrosion is produced by the reduction of its oxide with carbon. Metal X can be used in powder form in thermite welding whereas metal Y is used in making cathodes of ordinary dry cells.

(a) Name the metals X and Y.

(b) Which of the two metals is more reactive: X or Y?

(c) Name one ore or metal X. Also write its chemical formula.

(d) Name one ore of metal Y. Also write its chemical formula.

(e) Name one alloy of metal X and one alloy of metal Y.

Answer

(a) X is aluminium and Y is zinc, this can be determined by the above given statement.

(b) Among the two metals X and Y, X is more reactive then that of the Y.

(c) the name of the ore is Bauxite and its chemical formula is $Al_2O_3.2H_2O$.

(d) The name of the ore of metal Y is Calamine and its chemical formula is $ZnCO_3$.

(e) The name of the alloy of metal X is Duralumin and the name of the alloy of metal Y is Brass.

97. Question

When an object made of metal A is kept in air for a considerable time, it loses its shine and becomes almost black due to the formation of a layer of substance B. When an object made of another metal C is kept in damp air for a considerable time, it gets covered with a green layer of substance D. Metal A is the best conductor of electricity whereas metal C is the next best conductor of electricity.

(a) What is metal A?

(b) What is metal C?

(c) Name the substance B.

(d) Name the substance D.

(e) What type of chemical can be used to remove the green layer from metal C and clean it? Why?

Answer

(a) Metal A is silver. Because when silver is kept in air for a considerable time, it loses its shine and becomes almost black due to the formation of a layer of silver sulphide.

(b) The name of the metal C is copper.

(c) The name of the substance is silver sulphide.

(d) The name of the substance D is basic copper carbonate.

(e) Dilute acidic solution can be used to remove the green layer from metal C and clean it because the acid solution dissolves green coloured basic copper carbonate present on the corroded copper object makes it look shiny, red brown again.

98. Question

Four metals P, Q R and S are all obtained by the reduction of their oxides with carbon. Metal P is used to form a thin layer over the sheets of metal S to prevent its corrosion. Metal Q is used for electroplating tiffin boxes made of metal S whereas metal R is used in making car batteries. Metals Q and R form an alloy called solder. What are metals P, Q R and S? How have you arrived at this conclusion?

Answer

Metal P is zinc; Metal Q is tin; Metal R is lead; Metal S is iron; Metal P (zinc) is used to form a thin layer on metal S (iron) to prevent its corrosion; Metal Q (tin) is used for electroplating tiffin boxes made of metal S (iron); Metal R (lead) is used in making car batteries; Metals Q (tin) and R (lead) form an alloy called solder.

99. Question

A black metal oxide $X0_2$ is used as a catalyst in the preparation of oxygen gas from potassium chlorate. The oxide XO_2 is also used in ordinary dry cells. The metal oxide XO_2 cannot be reduced satisfactorily with carbon to form metal X.

(a) Name the metal X.

(b) Name the metal oxide XO_2

(c) Which reducing agent can be used to reduce XO_2 to obtain metal X?

(d) Name another metal which can also be extracted by the reduction of its oxide with the above reducing agent.

Answer

(a) The name of the metal x is manganese.

(b) The name of the metal oxide XO_2 is Manganese dioxide.

(c) Aluminium can be used as a reducing agent to reduce XO_2 to obtain metal X.

(d) The another metal which can also be extracted by the reduction of its oxide with the above reducing agent is chromium.

100. Question

Metals X and Y can be recovered from the anode mud left behind after the electrolytic refining of copper metal. The coins made of metal X look new even after several years of use but the coins made of metal Y lose their shine gradually and get blackened soon. When metal X is alloyed with a small amount of metal Y, it becomes hard and hence suitable for making ornaments. What are metals X and Y? Also state the colour of metal X.

Answer

When metal X is alloyed with a small amount of metal Y, it becomes hard and hence suitable for making ornaments the metal X is gold and the metal Y is silver. The colour of the of gold is yellow.