Chapter-3

METALS AND NONMETALS

SUB TOPIC – METALS AND NON-METALS AND THEIR PROPERTIERS

VERY SHORT QUESTIONS: (1 MARK)

1. Which metal is the best conductor of electricity?
2. Which metal is poorest conductor of electricity?
3. Which metal is best conductor of heat ?
4. Which metal other than mercury is liquid at room temperature?
5. Which metal is poorest conductor of heat?
6. What is the nature of oxides of metal?
7. What is the nature of oxides of non- metal?
8. Which non-metal conduct electricity?
9. Graphite, allotrope of carbon conduct electricity.
10. Which non-metal is lusturous?
11. Why metals are hard and have high melting point?
12. What is an amalgam?
13. What are the constituents of solder?
14. Name the green coloured compound which appears on the surface of copper utensils?
15. Why the item made of silver turns black when exposed to air?
16. Why do silver ornaments loose their shine when kept for some time?
17. Name a metal other than aluminium that is covered with an oxide film layer.
18. Name one metal and one non-metal which exists in liquid state at room temperature?
19. Name a non-metal which is lustrous and a metal which is non-lustrous.
20. Name two metal which have very low melting point.
21. If copper metal is heated over a flame, it develops a coating. What is the colour and composition of this coating?
22. Why is sodium metal kept immersed in kerosene oil?
23. Name one metal which react with very dilute HNO_3 to evolve hydrogen gas.

24. A non-metal X exists in two different forms Y and Z. Y is the hardest natural substance, whereas Z is a good conductor of electricity. Identify X, Y, and Z.

25. An element A form two oxides AO and AO2.The oxide AO is neutral whereas the oxideAO_2 is acidic in nature. Would you call element A a metal or non-metal.

26. In the refining of silver the recovery of silver from silver nitrate solution involves displacement by copper metal. Give the reason for the same.

27. Name two metals which are both ductile as well as malleable.

28. The reaction of iron (III) oxide Fe_2O_3 with aluminium is used to join cracked iron parts of machines.

29. Give reason for the following: (a) Ionic compounds conduct electricity in the molten state.

30. Give reason for the following: Metals can be given different shapes according to our needs.

31. How will you test for the gas which is liberated when hydrochloric acid reacts with an active metal?

32. Which reducing agent is used in the reduction of alumina?

33. What are metalloids?

34. Why are titanium and chromium classified as strategic metals?

35. Which one of the following metals does not react with oxygen even at high temperatures?(i) Calcium (ii) Gold (iii) Sodium

36. Give reasons for the following : Addition of some silver to pure gold for makingornaments.

37. Give reason for the following: Alumina is dissolved in molten cryolite for electrolysis to obtain aluminum metal.

38. Write the chemical equation to represent the reaction taking place between sodium metal and cold water.

39. Why is tungsten metal selected for making filaments of incandescent lamp bulbs?

40. Name a metal which offer higher resistance to the passage of electricity than copper.

41. Write the chemical equation for the reaction of hot aluminium with steam.

42. How does the metal magnesium differ from the metal calcium in their reaction with water?

43. What is seen to happen when a piece of sodium metal is dropped into water?

44. What are amphoteric oxides? Give an example.\

45. Name two metals that react with dil.HNO_3 to evolve H_2 gas ?

46. Why metals like potassium and sodium catch fire when treated with water?

47. Why sodium is kept immersed in kerosene oil?

48. Which gas is produced when dil. HCl is added to a reactive metal? Write the chemical reaction when iron reacts with dil. H_2SO_4?

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

50. Why ionic compounds have high melting points?

SHORT ANSWER QUESTIOINS [3 MARKS]

51. A metal M does not liberate hydrogen from acids but reacts with oxygen to give a black colour product. Identify M and black coloured product and also explain the reaction of M with oxygen.

52. Given below are the steps for extraction of copper from its ore .Write the reaction involved

(i) Roasting of copper (I) sulphide.

(ii) Reduction of copper (I) oxide with copper (1) sulphide.

(iii) Draw a neat and well labelled diagram for electrolytic refining of copper.

53. A metal is found in liquid state in nature .It is less reactive than hydrogen .It occurs as sulphide ore .Describe the reactions how can we extract this metal from its ore .Name the ore also.

54. Explain why

(i) Aluminium cannot be extracted by reducing alumina with carbon.

(ii)Concentrated HNO_3 can be stored in aluminum containers.

(iii)Aluminium is used for making transmission wires.

(ii) 24 carat gold cannot be used for making ornaments.

55. treated a lustrous, divalent element M with sodium hydroxide. He observed the formation of bubbles in reaction mixture. He made the same observations when this element was treated with hydrochloric acid. Suggest how can he identify the produced gas. Write chemical equations for both the reactions.

56. During extraction of metals, electolytic refining is used to obtain pure metals.
(a) Which material will be used as anode and cathode for refining of silver metal by this process?
(b) Suggest a suitable electrolyte also.
(c) In this electrolytic cell, where do we get pure silver after passing electric current?

57. Why should the metal sulphides and carbonates be converted to metal oxides in the process of extraction of metal from them?

58. Generally, when metals are treated with mineral acids, hydrogen gas is liberated but when metals (except Mn and Mg), treated with HNO3, hydrogen is not liberated, why?

59. Compound X and aluminium are used to join railway tracks.
(a) Identify the compound X
(b) Name the reaction
(c) Write down its reaction.

60. When a metal X is treated with cold water, it gives a basic salt Y with molecular formula XOH (Molecular mass = 40) and liberates a gas Z which easily catches fire. Identify X, Y and Z and also write the reaction involved.

61. A metal M does not liberate hydrogen from acids but reacts with oxygen to give a black colour product. Identify M and black coloured product and also explain the reaction of M with oxygen.

62. An element forms an oxide A_2O_3 which is acidic in nature. Identify A as a metal or non-metal.

63. A solution of $CuSO_4$ was kept in an iron pot. After few days the iron pot was found to have a number of holes in it. Explain the reason in terms of reactivity. Write the equation of the reaction involved.

64. A non-metal A which is the largest constituent of air, when heated with H2 in 1:3 ratio in the presence of catalyst (Fe) gives a gas B. On heating with O2 it gives an oxide C. If this oxide is passed into water in the presence of air it gives an acid D which acts as a strong oxidising agent.
(a) Identify A, B, C and D
(b) To which group of periodic table does this non-metal belong?

65. Give the steps involved in the extraction of metals of low and medium reactivity from their respective sulphide ores.

66. Explain the following
(a) Reactivity of Al decreases if it is dipped in HNO3

(b) Carbon cannot reduce the oxides of Na or Mg
(c) NaCl is not a conductor of electricity in solid state whereas it does conduct electricityin aqueous solution as well as in molten state
(d) Iron articles are galvanised.
(e) Metals like Na, K, Ca and Mg are never found in their free state in nature.

67. Given below are the steps for extraction of copper from its ore.
Write the reaction involved.
(a) Roasting of copper (1) sulphide
(b) Reduction of copper (1) oxide with copper (1) sulphide.
(c) Electrolytic refining

LONG TYPE QUESTIONS [5 MARKS]

68. Draw a neat and well labelled diagram for electrolytic refining of copper

69. Of the three metals X, Y and Z. X reacts with cold water, Y with hot water and Z with steam only. Identify X, Y and Z and also arrange them in order of increasing reactivity.

70. An element A burns with golden flame in air. It reacts with another element B, atomic

number 17 to give a product C. An aqueous solution of product C on electrolysis gives a compound D and liberates hydrogen. Identify A, B, C and D. Also write down the equations for the reactions involved.

Two ores A and B were taken. On heating ore A gives CO_2 whereas, ore B gives SO_2.What steps will you take to convert them into metals?

SUB TOPIC – EXTRACTION OF METALS AND THEIR PROPERTIES

1. Which of the following can be beaten into thin sheets?

(a) Zinc (b) Phosphorus (c) Sulphur (d) Oxygen

2. Which of the following statements is correct?

(a) All metals are ductile.

(b) All non-metals are ductile.

(c) Generally, metals are ductile.

(d) Some non-metals are ductile.

3. Which of the following is not a metal?

(a) copper

(b) sulphur

(c) aluminium

(d) iron

4. The substance that will be flattened on beating with a hammer is

(a) crystal of iodine

(b) lump of sulphur

(c) piece of coal

(d) zinc granule

5. Arun has learnt that non-metals on beating with a hammer are generally broken into pieces. Which of the following is a nonmetal?

(a) iron nail

(b) aluminium wire

(c) copper plate

(d) piece of coal

6. Materials which can be drawn into wires are called ductile. Which of the following is not a ductile material?

(a) silver

(b) copper

(c) sulphur

(d) aluminium

7. Metals are generally hard. Which of the following metals is an exception and can be cut with a knife?

(a) iron

(b) sodium

(c) gold

(d) magnesium

8. Metals are generally solid. Which of the following metals is in the liquid state at room temperature?

(a) mercury

(b) silver

(c) aluminium

(d) sodium

9. Metals generally react with dilute acids to produce hydrogen gas. Which one of the

following metals does not react with dilute hydrochloric acid?

(a) magnesium

(b) aluminium

(c) iron

(d) copper

10. Which of the following reacts with cold water vigorously?

(a) carbon

(b) sodium

(c) magnesium

(d) sulphur

11. The metal which produces hydrogen gas on reaction with dilute hydrochloric acid as wellas sodium hydroxide solution is

(a) copper

(b) iron

(c) aluminium

(d) sodium

12. Which of the following non-metals reacts and catches fire on exposure to air?

(a) phosphorus

(b) nitrogen

(c) sulphur

(d) hydrogen

13. Generally metallic oxides are basic and non-metallic oxides are acidic in nature. Solutionof which of the following oxides in water will change the colour of blue litmus to red?

(a) sulphur dioxide

(b) magnesium oxideiron oxide

(c) copper oxide

14. Which of the following property is not responsible for copper to be used as electrical conduction wires?

(a) ductility

(b) colour

(c) good conductor of electricity

(d) it is solid

15. Fill in the blanks :

(a) Phosphorus is very_____non-metal.

(b) Metals are_____conductors of heat and_____.

(c) Iron is_____reactive than copper.

(d) Metals react with acids to produce_____gas.

16. A substance is malleable, ductile and electropositive in nature. What type of substance isit?

17. What property of a metal makes it possible to draw it into wires?

18. Why are metals good conductors?

19. Name the metal which is commonly used for making cooking utensils

20. Fill in the blanks:

(a) _____is liquid metal

(b) _____is only liquid Non metals

(c) _____,_____and_____are soft metal

(d) _____is the hardest natural substance

(e) _____and_____are have low melting points. They melt in the palmof the hand

(f) Metals can be beaten into thin sheets so they are called _____

(g) Non metals are bad conductors of electricity except _____

(h) Metals react with oxygen to form_____oxides

(i) Some metal oxides show acidic and basic properties. They are called_____.Eg :- Aluminum oxide, Zinc oxide etc.

(j) Al_2O_3 + 6HCl → _____+ $3H_2O$

(k) Al_2O_3 + NaOH → _____+ H_2O

(l) _____and_____does not react with oxygen even at high temperature.

(m) Metals like potassium and sodium react vigorously with oxygen and catch fire if kept in open. Hence they are stored in_____to prevent burning.

(n) Magnesium reacts only with_____water to form magnesium hydroxide and hydrogen.

(o) Metals like aluminium, iron and zinc react only with_____to form the metal

oxides and hydrogen.

(p) _____gas is not evolved when metals react with nitric acid (HNO_3) becauseit is a strong oxidising agent

(q) A more reactive metal displaces a_____reactive metal from its salt solution

(r) The arranging of metals in the decreasing order of their reactivity is called _____series of metals.

(s) Metals lose electrons and become positive ions. So they are called _____ elements

(t) Non metals_____electrons and become negative ions. So they are called electro negative elements

(u) _____are compounds formed by the transfer of electrons from a metal to a non metal.

(v) If one of the metals in an alloy is mercury, it is called an _____

(w) _____ is the damage caused to metals due to the reaction of metals with oxygen, moisture, carbon dioxide etc.

(x) Some elements show properties of both metals and non metals. They are called _____

(y) _____is a mixture of concentrated nitric acid and concentrated hydrochloric acid in the ratio 1:3.

21. Name one electrovalent compounds in each case in which ;

(i)One atom combines with one other atom

(ii)One atom combines with two other atoms

(iii)One atom combines with three other atoms

22. Give reasons for the following :

(a) Aluminium foils are used to wrap food items.

(b) Immersion rods for heating liquids are made up of metallic substances.

(c) Copper cannot displace zinc from its salt solution.

(d) Sodium and potassium are stored in kerosene.

23. Can you store lemon pickle in an aluminium utensil? Explain.

24. Write the electron dot structure for oxygen and magnesium.

25. Show the formation of Na2O and CaO by the transfer of electrons.

26. Write an activity to show that ionic compounds are good conductors of electric current in their aqueous solution.

27. Why is aluminum extracted from alumina by electrolytic reduction and not by reducing with carbon?

28. Why is ZnO called an amphoteric oxide? Give the support to your answer. Give equationfor the following

(a) Iron is heated with steam.

(b) Magnesium reacts with water.

(c) iron reacts with dil.HCl

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

30. A trivalent metal X is manufactured by the process of electrolysis, It is the most abundant metal in the earth's crust. Identify the metal and state its two uses.

31. Which gas is always produced when a metal reacts with a dilute Write chemical reaction when iron reacts with dil. H_2SO_4.

32. What is the activity series of metals? Rearrange the following metals in an increasing orderof reactivity: Aluminum, Zinc, Mercury.

33. What is meant by the term 'enrichment of ore' ? name four Methods generally used for enrichment of ores.

34. You must have seen tarnished copper vessels being cleaned with lemon or tamarind juice. Explain why these sour substances are effective in cleaning the vessels.

35. Write a balanced chemical equation for the reaction of the following metals with water: (i)Ca (ii) Zn (iii) Fe

36. Define the terms:(i) Mineral (ii) Ore and (iii) Gangue

37. Explain how the following metals are obtained from their compounds by the reaction process:

(i) Metal 'X' , which is low in reactivity series.

(ii) Metal 'Y', which is middle in reactivity series.

(iii) Metal 'Z' which is high up in the reactivity series.

38. Give reasons:

(a) The surface of some metals acquires a dull appearance when exposed to air for a long time.

(b) A salt which does not conduct electricity in the solid state becomes a good conductorin molten state

39. What will happen if a :

(i) Strip of zinc is immersed in a solution of copper sulphate.

(ii) Strip of copper is kept immersed in a solution of silver nitrate

40. Explain why: (i) Conc. HNO3 can be stored in aluminium container.

(ii) Aluminium is used for making transmission wires.

(iii) 24 carat gold can not be used for making ornaments.

(iv) Aluminium is used for making cooking utensils.

(v) Metals generally do not form compounds with hydrogen.

41. An element X on reacting with O_2 forms X_2O.This Oxide dissolves in water and turns blue litmus paper red. Predict the nature of element whether it is a metal or a non metal.

42. An element E combines with O_2 to form an oxide E_2O, which is a good conductor of electricity. i) How many electrons will be present in the outer most shell of E? ii) Write the formula of the compound formed when it combines with Chlorine.

43. What happens when

(a) Dilute sulphuric acid is poured on a copper plate?

(b) Iron nails are placed in copper sulphate solution?

Write word equations of the reactions involved.

44. Saloni took a piece of burning charcoal and collected the gas evolved in a test tube.

(a) How will she find the nature of the gas ?

(b) Write down word equations of all the reactions taking place in this process.

45. One day Reeta went to a jeweller's shop with her mother. Her mother gave old gold jewellery to the goldsmith to polish. Next day when they brought the jewellery back, they found that there was a slight loss in its weight. Can you suggest a reason for the loss in weight?

46. Name two soft metals which can be cut with a knife.

47. Which non-metal is essential for our life and all living beings inhale it during breathing?

48. Name two major non-metals which are present in fertilisers and enhance the growth of

plants.

49. Which non-metal is used to disinfect water?

50. A purple coloured non-metal forms a brown solution in alcohol which is applied on wounds as an antiseptic. Name the nonmetal.

51. Zinc sulphate forms a colourless solution in water. Will you observe any colour on adding copper turning in it?

52. Why are bells made of metals?

53. Which liquid metal is used for making thermometers?

54. Which of the following metals can displace the other two metals from their salt solutions?

zinc, iron, copper

55. Arun bought a statue made of copper. To her surprise it acquired a dull green coating aftera couple of months. Explain the reason.

56. Find out the names of three metals and three non-metals from the box given below:

A	X	T	M	S	P	K	L	G
X	T	S	U	L	P	H	U	R
I	L	R	H	M	N	D	I	L
C	I	R	O	N	S	E	J	K
A	L	U	M	I	N	I	U	M
R	M	U	Q	T	R	S	T	U
B	N	P	C	O	P	P	E	R
O	X	Y	G	E	N	V	W	X
N	Y	Z	T	A	B	G	H	K