CHAPTER

Metal and Non - Metals

4.1 ELEMENTS

Till now, out of 118 elements known, only the first 98 elements occur naturally on the earth. Elements are divided into metals, i.e., Fe, Cu, Hg, Pb, etc., and nonmetals, i.e., C, O, H, N, etc.

Elements showing properties of both metals and nonmetals like boron, silicon, germanium, arsenic, antimony and tellurium are called metalloids.

4.1.1 Metals

Three-quarters of elements are metals. Coinage metals Au, Ag and Pt are used to make coins, etc.

1. Strategic metals titanium, chromium, manganese, zirconium, etc., are used for country’s economy and defence. Co, Cu, Fe, Mg, K, Na and Zn are essential to human, plant and animal health.

2. Metals are solid at room temp. except mercury, i.e., liquid at room temp. They have metallic lustre. They are hard and cannot be easily cut with a sharp knife but metals Na and K are so soft that they can be easily cut with a knife. Chromium is the hardest and caesium the softest metal.

3. Metals like Au, Ag, Cu, Sn, Al, etc., are malleable, i.e., can be beaten with a hammer into thin sheets. They are ductile, i.e., drawn into fine wires. Gold is the most ductile and malleable metal.

4. Metals are good conductors of heat and electricity. Silver is the best conductor of heat and electricity. Lead is a poor conductor of heat and electricity.

5. Metals are crystalline in nature and densely packed, i.e., have high density. However, lithium (Li), sodium (Na) and potassium (K) have densities less than water.

6. Metals have high MP and BP because their constituent atoms are closely packed and strong forces of attraction exist between them. Gallium and caesium will melt if kept on the palm of our hand due to having low MP. Metals are sonorous, i.e., give a ringing sound when struck.

4.1.2 Nonmetals

All living organisms are composed of nonmetals, i.e., carbon, hydrogen, oxygen and nitrogen. Oxygen, the survival of living organisms, is the most abundant non-metal in the earth’s crust.

1. Out of 22 nonmetals, 10 are solids, 11 are gases and 1 (Br) is a liquid. Solid nonmetals are brittle, i.e., when hammered, e.g., S and P. Nonmetals are non-malleable and non-ductile.

2. Nonmetals are bad conductors of heat and electricity except graphite. They have low density, and low MP and BP except diamond (3873 K) and graphite (3773 K) which have high MP.

4.1.3 Chemical Properties of Metals

The metals when listed according to their electron-releasing tendency, the list is called activity series or reactivity series. It is shown in decreasing order as follows:

K > Na > Ca > Mg > Al > Zn > Fe > CO > Ni > Su > Pb > [H]* > Cu > Hg > Ag > Au

1. Metals combine with O₂ to give their oxides, e.g., metals like Na quickly burns with bright golden yellow flame, Mg burns with dazzling
white light to give magnesium oxide (MgO) and Al burns in O₂ to form aluminium oxide (Al₂O₃).

\[ 2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO} \]

\[ 4\text{Al} + 3\text{O}_2 \rightarrow 2\text{Al}_2\text{O}_3 \]

2. Iron slowly rusts in moist air to form a reddish-brown powder called rust [Fe₂O₃ · xH₂O].

\[ 4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3 \]

\[ \text{Fe}_2\text{O}_3 + x\text{H}_2\text{O} \rightarrow \text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} \]

3. Silver and gold do not react with oxygen even at high temperature.

4. Metals form basic oxides which react with H₂O to form basic solution, e.g.,

\[ \text{Na}_2\text{O}(s) + \text{H}_2\text{O}(l) \rightarrow 2\text{NaOH}(aq) \]

5. Oxides of metals, insoluble in water, react with acids to form salt and water.

\[ \text{CaO}(s) + 2\text{HCl}(aq) \rightarrow \text{CaCl}_2(aq) + \text{H}_2\text{O}(l) \]

6. Amphoteric oxides ZnO, Al₂O₃ and PbO₂ react with acid and base to form salt and water, e.g.,

\[ \text{ZnO}(s) + 2\text{HCl}(aq) \rightarrow \text{ZnCl}_2(aq) + \text{H}_2\text{O}(l) \]

or

\[ \text{ZnO}(s) + 2\text{NaOH}(aq) \rightarrow \text{Na}_2\text{ZnO}_2(aq) + \text{H}_2\text{O}(l) \]

A metal placed above hydrogen is more reactive than a metal placed below hydrogen. Sodium violently reacts with water, i.e.,

\[ 2\text{Na}(s) + 2\text{H}_2\text{O}(l) \rightarrow 2\text{NaOH}(aq) + \text{H}_2(g) \]

Lithium, potassium and calcium react with cold water.

1. Ca reacts with H₂O violently. The heat evolved is insufficient for hydrogen to catch fire.

Ca, heavier than H₂O, however, floats on water because bubbles of H₂ gas evolved during the reaction stick to the surface of Ca and make it float. Less reactive metals like Mg displace H₂ from boiling water.

\[ \text{Ca}(s) + 2\text{H}_2\text{O}(l) \rightarrow \text{Ca(OH)}_2(aq) + \text{H}_2(g) \]

\[ \text{Mg}(s) + \text{H}_2\text{O}(l) \rightarrow \text{MgO}(s) + \text{H}_2(g) \]

Fe, Al and Zn react on passing steam over hot metal. Pb, Cu, Ag and Au do not react with H₂O.

### 4.1.4 Reaction of Metals with Acids

Active metals react with dil. acids to evolve H₂ and form salt.

1. Metals placed above hydrogen in the activity series displace hydrogen from dil. hydrochloric acid or dil. sulphuric acid to evolve hydrogen gas and form the corresponding salt. Metals like Cu, Ag, Au placed below hydrogen in activity series do not evolve H₂ from dil. acids.

2. H₂ gas is not evolved when a metal reacts with HNO₃. Mg and Mn react with dil. HNO₃ to evolve H₂ gas, e.g.,

\[ \text{Mn} + 2\text{HNO}_3 \rightarrow \text{Mn(NO}_3)_2 + \text{H}_2 \uparrow \]

\[ \text{Mg} + 2\text{HNO}_3 \rightarrow \text{Mg(NO}_3)_2 + \text{H}_2 \]

3. The combining atom of metal loses one or more of its valence electrons to change into positive ion (cation) and atom of the nonmetal gains these electrons to convert into negative ion (anion). Due to transfer of electrons between atoms of compounds, they are ionic compounds.

### 4.1.5 Physical Properties of Ionic Compounds

Ionic compounds (solids) have high MP and BP. They are soluble in the water but are insoluble in solvents kerosene, benzene, etc. They do not conduct electricity in solid state due to the presence of ions.

### 4.1.6 Chemical Properties of Nonmetals

Nonmetals containing 4 or more than 4 electrons in their valence shell gain electrons to acquire its octet to form negative ions, thus, called electronegative elements.

1. Nonmetals, on heating in air, form their respective oxides, e.g.,

\[ \text{C}(s) + \text{O}_2(g) \xrightarrow{\text{Hea}} \text{CO}_2(g) \]

2. Oxides of nonmetals, being acidic in character,
dissolve in water to form acids, i.e.,
\[ \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{H}_2\text{CO}_3(\text{aq}) \]

3. Nonmetals act as oxidising agents because they gain electrons and get reduced, e.g., fluorine (strongest oxidising agent). They also form covalent compounds.

MULTIPLE CHOICE QUESTIONS

1. Which of the following property is generally not shown by metals?
   (a) Electrical conduction
   (b) Sonorous in nature
   (c) Dullness
   (d) Ductility

   Sol : www.cbse.site/sc/cm101

2. The ability of metals to be drawn into thin wire is known as
   (a) Ductility
   (b) Malleability
   (c) Sonority
   (d) Conductivity

   Sol : www.cbse.site/sc/cm102

3. Aluminium is used for making cooking utensils. Which of the following properties of aluminium are responsible for the same?
   1. Good thermal conductivity
   2. Good electrical conductivity
   3. Ductility
   4. High melting point

   (a) 1 and 2
   (b) 1 and 3
   (c) 2 and 3
   (d) 1 and 4

   Sol : www.cbse.site/sc/cm103
4. Which one of the following metals do not react with cold as well as hot water?
   (a) Na  
   (b) Ca  
   (c) Mg  
   (d) Fe
   Sol: www.cbse.site/sc/cm104

5. Which of the following oxide(s) of iron would be obtained on prolonged reaction of iron with steam?
   (a) FeO  
   (b) Fe₂O₃  
   (c) Fe₃O₄  
   (d) Fe₂O₃ and Fe₃O₄
   Sol: www.cbse.site/sc/cm105

6. What happens when calcium is treated with water?
   1. It does not react with water.
   2. It reach violently with water.
   3. It reacts less violently with water.
   4. Bubbles of hydrogen gas formed stick to the surface of calcium.
   (a) 1 and 4  
   (b) 2 and 3  
   (c) 1 and 2  
   (d) 3 and 4
   Sol: www.cbse.site/sc/cm106

7. Generally metals react with acids to give salt and hydrogen gas. Which of the following acids does not give hydrogen gas on reacting with metals (except Mn and Mg)?
   (a) H₂SO₄  
   (b) HCl  
   (c) HNO₃  
   (d) All of these
   Sol: www.cbse.site/sc/cm107

8. The composition of aqua regia is
   (a) Dil.HCl : Conc.HNO₃  
        3 : 1  
   (b) Conc.HCl : Dil.HNO₃  
        3 : 1  
   (c) Conc.HCl : Conc.HNO₃  
        3 : 1  
   (d) Dil.HCl : Dil.HNO₃  
        3 : 1
   Sol: www.cbse.site/sc/cm108

9. Which of the following are not ionic compounds?
   1. KCl  
   2. HCl  
   3. CCl₄  
   4. NaCl  
   (a) 1 and 2  
   (b) 2 and 3  
   (c) 3 and 4  
   (d) 1 and 3
   Sol: www.cbse.site/sc/cm109

10. Which one of the following properties is not general 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
    Sol: www.cbse.site/sc/cm110

11. Which of the following metals exist in their native state in nature?
    1. Cu

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2. Au  
3. Zn  
4. Ag  
- (a) 1 and 2  
- (b) 2 and 3  
- (c) 2 and 4  
- (d) 3 and 4  

Sol: www.cbse.site/sc/cm111

12. Silver articles become black on prolonged exposure to air. This is due to the formation of  
- (a) $\text{Ag}_3\text{N}$  
- (b) $\text{Ag}_2\text{O}$  
- (c) $\text{Ag}_2\text{S}$  
- (d) $\text{Ag}_2\text{S}$ and $\text{Ag}_3\text{N}$  

Sol: www.cbse.site/sc/cm112

13. Stainless steel is very useful material for our life. In stainless steel, iron is mixed with  
- (a) Ni and Cr  
- (b) Cu and Cr  
- (c) Ni and Cu  
- (d) Cu and Au  

Sol: www.cbse.site/sc/cm113

14. If copper is kept open in air, it slowly loses its shining brown surface and gains a green coating. It is due to the formation of  
- (a) $\text{CuSO}_4$  
- (b) $\text{CuCO}_3$  
- (c) $\text{Cu(NO}_3)_2$  
- (d) $\text{CuO}$  

Sol: www.cbse.site/sc/cm114

15. Generally, metals are solid in nature. Which one of the following metals is found in liquid state at room temperature?  
- (a) Na  
- (b) Fe  
- (c) Cr  
- (d) Hg  

Sol: www.cbse.site/sc/cm115

16. Which of the following metals are obtained by electrolysis of their chlorides in molten state?  
1. Na  
2. Ca  
3. Fe  
4. Cu  
- (a) 1 and 4  
- (b) 3 and 4  
- (c) 1 and 3  
- (d) 1 and 2  

Sol: www.cbse.site/sc/cm116

17. Generally, non-metals are not lustrous. Which of the following non-metals is lustrous?  
- (a) Sulphur  
- (b) Oxygen  
- (c) Nitrogen  
- (d) Iodine  

Sol: www.cbse.site/sc/cm117

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18. Which one of the following four metals would be displaced from the solution of its salts by other three metals?
   (a) Mg  
   (b) Ag  
   (c) Zn  
   (d) Cu  
   Sol: www.cbse.site/sc/cm118

19. 2 mL each of concentrated HCl, HNO₃ and a mixture of concentrated HCl and concentrated HNO₃ in the ratio of 3 : 1 were taken in test tubes labelled as A, B and C. A small piece of metal was put in each test tube. No change occurred in test tubes A and B but the metal got dissolved in test tube C respectively. The metal could be
   (a) Al  
   (b) Au  
   (c) Cu  
   (d) Pt  
   Sol: www.cbse.site/sc/cm119

20. An alloy is
   (a) an element  
   (b) a compound  
   (c) a homogeneous mixture  
   (d) a heterogeneous mixture.  
   Sol: www.cbse.site/sc/cm120

21. An element A is soft and can be cut with a knife. This is very reactive to air and cannot be kept open in air. It reacts vigorously with water. Identify the element from the following:
   (a) Mg  
   (b) Na  
   (c) P  
   Sol: www.cbse.site/sc/cm121

22. Alloys are homogeneous mixtures of a metal with a metal or non-metal. Which among the following alloys contain non-metal as one of its constituents?
   (a) Brass  
   (b) Bronze  
   (c) Amalgam  
   (d) Steel  
   Sol: www.cbse.site/sc/cm122

23. Which among the following statements is incorrect for magnesium metal?
   (a) It burns in oxygen with a dazzling white flame.  
   (b) It reacts with cold water to form magnesium oxide and evolves hydrogen gas.  
   (c) It reacts with hot water to form magnesium hydroxide and evolves hydrogen gas.  
   (d) It reacts with steam to form magnesium hydroxide and evolves hydrogen gas.  
   Sol: www.cbse.site/sc/cm123

24. Which among the following alloys contain mercury as one of its constituents?
   (a) Stainless steel  
   (b) Alnico  
   (c) Solder  
   (d) Zinc amalgam  
   Sol: www.cbse.site/sc/cm124

25. Reaction between X and Y, forms compound Z. X loses electron and Y gains electron. Which of the following properties
is not shown by $Z$?
(a) Has high melting point
(b) Has low melting point
(c) Conducts electricity in molten state
(d) Occurs as solid
**Sol:** www.cbse.site/sc/cm125

**26.** The electronic configurations of three elements $X$, $Y$ and $Z$ are $X$- 2, 8; $Y$- 2, 8, 7 and $Z$- 2, 8, 2. Which of the following is correct?
(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.
**Sol:** www.cbse.site/sc/cm126

**27.** Although metals form basic oxides, which of the following metals form an amphoteric oxide?
(a) Na
(b) Ca
(c) Al
(d) Cu
**Sol:** www.cbse.site/sc/cm127

**28.** Generally non-metals are not conductors of electricity. Which of the following is a good conductor of electricity?
(a) Diamond
(b) Graphite
(c) Sulphur
(d) Fullerene
**Sol:** www.cbse.site/sc/cm128

**29.** Electrical wires have a coating of an insulating material. The material, generally used is
(a) Sulphur
(b) Graphite
(c) PVC
(d) all can be used.
**Sol:** www.cbse.site/sc/cm129

**30.** Which of the following non-metals is a liquid?
(a) Carbon
(b) Bromine
(c) Phosphorus
(d) Sulphur
**Sol:** www.cbse.site/sc/cm130

**31.** Which of the following can undergo a chemical reaction?
(a) $\text{MgSO}_4 + \text{Fe}$
(b) $\text{ZnSO}_4 + \text{Fe}$
(c) $\text{MgSO}_4 + \text{Pb}$
(d) $\text{CuSO}_4 + \text{Fe}$
**Sol:** www.cbse.site/sc/cm131

**32.** Substance that can be beaten into thin are called .......... .
(a) Malleable
(b) Ductile
(c) Liquid
(d) None of these
**Sol:** www.cbse.site/sc/cm132

**33.** Sodium kept immersed in kerosene oil because-
(a) Sodium is most reactive metal.
(b) Sodium is less reactive metal.
(c) Sodium is not a reactive metal.
(d) None of these.
34. \(2\text{Fe}(s) + 2\text{H}_2\text{O}(l) \rightarrow X + 4\text{H}_2(g)\). Here \(X\) is.
(a) \(\text{Fe}_2\text{O}_3\)
(b) \(\text{Fe}_3\text{O}_4\)
(c) \(\text{FeO}_2\)
(d) \(\text{Fe}_2\text{O}_2\)

Solution: \(\text{www.cbse.site/sc/cm134}\)

35. When dilute hydrochloric acid is added to a reactive metal .......... gas is evolved.
(a) Hydrogen
(b) Argon
(c) Helium
(d) Nitrogen

Solution: \(\text{www.cbse.site/sc/cm135}\)

36. When zinc is added to a sodium of iron (II) sulphate than it would displace .......... from the solution
(a) Zinc
(b) Sodium
(c) Iron
(d) None of these

Solution: \(\text{www.cbse.site/sc/cm136}\)

37. The electron dot structure for sodium is
(a) \(\text{Na}^+\)
(b) \(\text{Na}^+\)
(c) \(\text{Na}^-\)
(d) \(\text{Na}^+\)

Solution: \(\text{www.cbse.site/sc/cm137}\)

38. Ionic compound have high melting point due to
(a) Strong force of attraction between oppositely charged ions.
(b) Less force of attraction between oppositely charged ions.
(c) Strong force of attraction between similar charged ions.
(d) None of these

Solution: \(\text{www.cbse.site/sc/cm138}\)

39. Which of the following pairs will give displacement reaction?
(a) \(\text{NaCl}\) solution and copper metal
(b) \(\text{MgCl}_2\) solution and aluminium metal
(c) \(\text{FeSO}_4\) solution and silver metal
(d) \(\text{AgNO}_3\) solution and copper metal.

Solution: \(\text{www.cbse.site/sc/cm139}\)

40. An element reacts with oxygen to give a compound with a high melting point. This compound is also soluble in water. The element is likely to be
(a) calcium
(b) carbon
(c) silicon
(d) iron

Solution: \(\text{www.cbse.site/sc/cm140}\)

41. Food cans are coated with tin and not with zinc because
(a) Zinc is costlier than tin.
(b) Zinc has higher melting point than tin.
(c) Zinc is more reactive than tin.
(d) Zinc is less reactive than tin.

Solution: \(\text{www.cbse.site/sc/cm141}\)
42. Which of the following is amphoteric oxides?
(a) Al₂O₃
(b) SO₂
(c) ZnO₂
(d) AlO₂
Sol : www.cbse.site/sc/cm142

43. Which of the following metal displace hydrogen from dilute acid?
(a) Zinc
(b) Magnesium
(c) Copper
(d) Sodium
Sol : www.cbse.site/sc/cm143

44. 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. Here X, Y and Z are
(a) Carbon Diamond Graphite
(b) Graphite Diamond Carbon
(c) Carbon Graphite Diamond
(d) Diamond Graphite Carbon
Sol : www.cbse.site/sc/cm144

45. An element forms an oxide, A₂O₃ which is acidic in nature. Here A is
(a) metal
(b) non-metal
(c) cannot be identified
(d) mixture of metal and non metal
Sol : www.cbse.site/sc/cm145

46. Which of the following elements makes iron hard and strong?
(a) carbon
(b) oxygen
(c) water
(d) magnesium
Sol : www.cbse.site/sc/cm146

47. The percentage of Au in 18 carat gold?
(a) 25%
(b) 75%
(c) 30%
(d) 20%
Sol : www.cbse.site/sc/cm147

48. When a metal X is treated with cold water, it gives a base Y with molecular formula XO₃H (Molecular mass = 40) and liberates a gas Z which easily catches fire. Here X, Y and Z are
(a) Na NaOH H₂
(b) H₂ NaOH Na
(c) H₂ Na NaOH
(d) NaOH Na H₂
Sol : www.cbse.site/sc/cm148

49. Which of the following metals on reacting with sodium hydroxide solution produce hydrogen gas?
1. Cu
2. Al
3. Fe
4. Zn
(a) 2 and 3
(b) 2 and 4
(c) 1 and 4
(d) 2 only
50. Match the items and select the correct alternative:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sodium</td>
<td>A</td>
<td>On burning produces an acidic gas.</td>
</tr>
<tr>
<td>2. Phosphorus</td>
<td>B</td>
<td>Reacts neither with acids nor bases.</td>
</tr>
<tr>
<td>3. Copper</td>
<td>C</td>
<td>It is so soft that it can be cut with a knife.</td>
</tr>
<tr>
<td>4. Charcoal</td>
<td>D</td>
<td>Burns spontaneously on exposure to air.</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>Acquires a dull green coating on exposure to air.</td>
</tr>
</tbody>
</table>

(a) 1- (C), 2- (E), 3- (B), 4- (A)
(b) 1- (D), 2- (A), 3- (C), 4- (B)
(c) 1- (D), 2- (E), 3- (C), 4- (B)
(d) 1- (C), 2- (D), 3- (E), 4- (A)

Sol : www.cbse.site/sc/cm150

51. Two elements X and Y on burning in air give corresponding oxides. Oxides of both X and Y are soluble in water. The aqueous solution of oxide of X is alkaline and reacts with aqueous solution of oxide of Y to give another compound. Identify X and Y

(a) X and Y both are metals
(b) X and Y are non-metals
(c) X is metal and Y is non-metal
(d) X is non-metal and Y is metal

Sol : www.cbse.site/sc/cm151

52. A highly reactive element X is stored under water. It readily reacts with oxygen of air to give a compound Y which dissolves in water. The aqueous solution of Y changes blue litmus solution to red. The element X

(a) Sodium
(b) Sulphur
(c) Phosphorous
(d) Potassium

Sol : www.cbse.site/sc/cm152

53. Match the items in column I with the items in column II.

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Iron</td>
<td>A Liquid at room temperature</td>
</tr>
<tr>
<td>2. Copper</td>
<td>B Deposition of reddish-brown layer on exposure to moist air</td>
</tr>
<tr>
<td>3. Potassium</td>
<td>C Can be cut easily with a knife</td>
</tr>
<tr>
<td>4. Mercury</td>
<td>D Formation of a greenish layer on exposure to moist air</td>
</tr>
</tbody>
</table>

Select the correct alternative.

(a) 1- A, 2- C, 3- D, 4- B
(b) 1- B, 2- D, 3- C, 4- A
(c) 1- C, 2- A, 3- B, 4- D
(d) 1- D, 2- B, 3- A, 4- C

Sol : www.cbse.site/sc/cm153

54. An element X (atomic number 12) reacts with another element Y (atomic number 17) to form a compound Z. Which of the following statements are true regarding this compound?

1. Molecular formula of Z is XY₂.
2. It is soluble in water.
3. X and Y are joined by sharing of electrons.
4. It would conduct electricity in the molten state.

(a) 2 and 3
(b) 1 and 3
(c) 1, 3 and 4
(d) 1 and 4
Sol: www.cbse.site/sc/cm154

55. A metal occurs in nature as its ore $X$ which on heating in air converts to $Y$. $Y$ reacts with unreacted $X$ to give the metal. The metal is:
(a) Hg
(b) Cu
(c) Zn
(d) Fe
Sol: www.cbse.site/sc/cm155

56. An element $X$ has electronic configuration 2, 8, 1 and another element $Y$ has electronic configuration 2, 8, 7. They form a compound $Z$. The property that is not exhibited by $Z$ is:
(a) It has high melting point.
(b) It is a good conductor of electricity in its pure solid state.
(c) It breaks into pieces when beaten with hammer.
(d) It is soluble in water
Sol: www.cbse.site/sc/cm156

57. The compound containing both ionic and covalent bonds is
(a) AlBr$_3$
(b) CaO
(c) MgCl$_2$
(d) NH$_4$Cl
Sol: www.cbse.site/sc/cm157

58. The metal used to recover copper from an aqueous solution of copper sulphate is:
(a) Na
(b) Ag
(c) Hg
(d) Fe
Sol: www.cbse.site/sc/cm158

59. A metal $M$ of moderate reactivity is present as its sulphide $X$. On heating in air, $X$ converts into is oxide $Y$ and a gas evolves. On heating $Y$ and $X$ together, the metal $M$ is produced. $X$ and $Y$ respectively are:
(a) $X$ cuprous sulphide, $Y$ cuprous oxide
(b) $X$ cuprous sulphide, $Y$ cupric oxide
(c) $X$ sodium sulphide, $Y$ sodium oxide
(d) $X$ calcium sulphide, $Y$ calcium oxide
Sol: www.cbse.site/sc/cm159

60. Which of the following are correctly matched?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ductility</td>
</tr>
<tr>
<td>2.</td>
<td>Malleability</td>
</tr>
<tr>
<td>3.</td>
<td>Good conductors</td>
</tr>
<tr>
<td>4.</td>
<td>Non-metals</td>
</tr>
</tbody>
</table>
(a) 1, 2 and 3
(b) 1, 2 and 4
(c) 1, 3 and 4
(d) 2, 3 and 4
Sol: www.cbse.site/sc/cm160

61. Which of the following are correctly matched?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Mercury</td>
</tr>
<tr>
<td>2.</td>
<td>Iodine</td>
</tr>
<tr>
<td>3.</td>
<td>Lithium</td>
</tr>
</tbody>
</table>
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4. Graphite is a good conductor.
(a) 1, 2 and 3
(b) 1, 2 and 4
(c) 1, 3 and 4
(d) 2, 3 and 4
Sol: www.cbse.site/sc/cm162

62. Which of the following statements is/are correct for metals?
1. They react with oxygen to form metal oxides.
2. All metallic oxides are basic in nature.
3. Metals are reducing agents.
(a) 1 and 2
(b) 2 and 3
(c) 1 and 3
(d) 1, 2 and 3
Sol: www.cbse.site/sc/cm62

63. Which of the following metals do/does not react with cold water?
1. Potassium
2. Sodium
3. Magnesium
4. Aluminium
(a) 1 and 2
(b) 2 and 3
(c) 2 and 4
(d) 3 and 4
Sol: www.cbse.site/sc/cm63

64. Which of the following statements is/are correct for aqua regia?
1. It is a freshly prepared mixture of concentrated hydrochloric acid and concentrated nitric acid.
2. Hydrochloric acid and nitric acid are in ratio 2:1
3. It can dissolve gold.
(a) 1 and 2
(b) 2 and 3
(c) 1 and 3
(d) 1, 2 and 3
Sol: www.cbse.site/sc/cm64

65. What is/are true for ionic compounds?
1. They are solids.
2. They have low melting and boiling points.
3. They are soluble in water.
4. They are good conductors of electricity.
(a) 1, 2 and 3
(b) 1, 2 and 4
(c) 1, 3 and 4
(d) 2, 3 and 4
Sol: www.cbse.site/sc/cm65

66. Which one of the following is incorrect for metal?
1. In their pure state, metal have a shining surface.
2. The ability of metals to be drawn into thin wires is called malleability.
3. Metals are generally soft.
4. Some metal can be beaten into thin sheets.
(a) 1 and 2
(b) 2 and 3
(c) 3 and 4
(d) 1 and 4
Sol: www.cbse.site/sc/cm66

67. Which of the following is the most malleable metal?
(a) Sulphur
(b) Gold
(c) Phosphorus
(d) Iron

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68. Which of the following metal have low density?
   (a) Iridium
   (b) Osmium
   (c) Lithium
   (d) None of these

69. Select the odd one out-
   1. Tin
   2. Sulphur
   3. Hydrogen
   4. Carbon
   5. Iodine
   6. Oxygen
   (a) 2
   (b) 4
   (c) 5
   (d) 1

70. Which of the following is the best conductor of heat?
   (a) Silver
   (b) Iron
   (c) Gold
   (d) Aluminium

71. Which of the following is incorrect regarding to non-metals?
   (a) Non-metal are generally non lustrous and dull.
   (b) Non-metal are generally brittle.
   (c) Non-metals are generally soft.
   (d) Non-metal have high densities.

72. An element \( X \) (atomic number 12) reacts with another element \( Y \) (atomic number 17) to form a compound \( Z \). Which of the following statements are true regarding this compound?
   1. Molecular formula of \( Z \) is \( XY_2 \).
   2. It is soluble in water.
   3. \( X \) and \( Y \) are joined by sharing of electrons.
   4. It would conduct electricity in the molten state.
   (a) 2 and 3
   (b) 1 and 2
   (c) 1, 3 and 4
   (d) 1, 2 and 4

73. Metals tend to have high melting points of the strength of ......... bond.
   (a) Metallic
   (b) Ionic
   (c) Compound
   (d) None of these

74. In the following practical set which of the following gas is emitted?
(a) Hydrogen  
(b) Carbon monoxide  
(c) Carbon dioxide  
(d) Nitrogen  

**Sol:** [www.cbse.site/sc/cm74](http://www.cbse.site/sc/cm74)

### 75. Which of the following is the most reactive metal?
(a) Gold  
(b) Copper  
(c) Tin  
(d) Sodium  

**Sol:** [www.cbse.site/sc/cm75](http://www.cbse.site/sc/cm75)

<table>
<thead>
<tr>
<th>These metals are more reactive than hydrogen</th>
<th>Potassium K</th>
<th>Sodium Na</th>
<th>Calcium Ca</th>
<th>Magnesium Mg</th>
<th>Aluminium Al</th>
<th>Zinc Zn</th>
<th>Iron Fe</th>
<th>Tin Sn</th>
<th>Lead Pb</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>[Hydrogen]</strong></td>
<td>[H]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>These metals are less reactive than hydrogen.</th>
<th>Copper Cu</th>
<th>Mercury Hg</th>
<th>Silver Ag</th>
<th>Gold Au</th>
<th>Platinum Pt</th>
</tr>
</thead>
</table>

### 76. Action of stem on a metal is shown in the figure.

The metal sample in the above experiment is-
(a) Zinc  
(b) Copper  
(c) Aluminium  
(d) Platinum  

**Sol:** [www.cbse.site/sc/cm76](http://www.cbse.site/sc/cm76)

### 77. Test tubes A, B and C contain zinc sulphate, silver nitrate and iron (II) sulphate solutions respectively as shown in the figure. Copper pieces are added to each test tube. Blue colour will appear in case of

Zinc sulphate solution  
Silver nitrate solution  
Iron(II) sulphate solution
78. A metal rod \((M)\) was dipped in a coloured solution \((Y)\). After some time it was observed that the metal rod starts dissolving in the solution and the solution starts fading in colour. However, a coloured precipitate \((Z)\) was seen at the bottom of the beaker. \((M),\) \((Y)\) and \((Z)\) could be

(a) Test tube \(A\)
(b) Test tube \(B\)
(c) Test tube \(C\)
(d) All the test tube

Sol : www.cbse.site/sc/cm77

79. What is the chemical formula of the compound formed when \(\frac{8}{12} X\) combines with \(\frac{9}{19} Y\)?

(a) \(XY\)
(b) \(X_2Y\)
(c) \(XY_2\)
(d) \(X_2Y_3\)

Sol : www.cbse.site/sc/cm79

80. The electronic structures of six elements \(A\) to \(F\) are given in the table below:

<table>
<thead>
<tr>
<th>Electronic structure</th>
<th>Formula of compound</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. (A : 2, 1) (B : 2, 6)</td>
<td>(A_2B)</td>
</tr>
<tr>
<td>2. (B : 2, 6) (C : 2, 7)</td>
<td>(B_2C)</td>
</tr>
<tr>
<td>3. (C : 2, 7) (D : 2, 8, 3)</td>
<td>(DC_3)</td>
</tr>
<tr>
<td>4. (E : 2, 8, 6) (F : 2, 8, 8, 2)</td>
<td>(FE_2)</td>
</tr>
</tbody>
</table>

Which of the compounds formed are wrong?
(a) 1 and 3
(b) 2 and 3
(c) 3 and 4
(d) 2 and 4

Sol : www.cbse.site/sc/cm80

81. Observe the given reactions and answer the question that follows:

\[ \text{Na}_{\text{\((2,8,1)\)}} \rightarrow \text{Na}^+ + e^- \]
\[ \text{Cl}^- + e^- \rightarrow \text{Cl}^-_{\text{\((2,8,8)\)}} \]
\[ \text{Mg}_{\text{\((2,8,2)\)}} \rightarrow \text{Mg}^{2+} + 2e^- \]

Which of the following are correct representations for the ionic compounds formed of these ions?

(a) \([\text{Na}^+]_{\text{\((\times\times\)}}} \text{Cl}^-_{\text{\((\times\times\)}} \right)_{2} \right)_{2}

(b) \([\text{Na}^+]_{\text{\((\times\times\)}}} \text{Cl}^-_{\text{\((\times\times\)}} \right)_{2} \right)_{2}\]

(c) \([\text{Na}^+]_{\text{\((\times\times\)}}} \text{Cl}^-_{\text{\((\times\times\)}} \right)_{2} \right)_{2}\]

Sol : www.cbse.site/sc/cm79
82. ........ metal has highest melting point.
(a) Tungsten
(b) Sodium
(c) Silver
(d) Copper

83. Which of the following is correct regarding to metals?
1. They have one to three valence electrons
2. They have 4 to 8 valence electrons
3. They are brittle
4. They are capable to form anions easily
(a) 1 and 2
(b) 2 and 3
(c) 1
(d) 1, 2, 3 and 4

84. Which of the following only contain non-metals?
(a) Carbohydrates
(b) Proteins
(c) Alloys
(d) Both (a) and (b)

85. Which of the following is incorrect regarding to non-metal?
1. They are neither malleable nor ductile
2. They are brittle
3. They are sonorous
4. They are poor conductor of heat and electricity (except graphite)
(a) 1
(b) 2 and 3
(c) 3
(d) 4 and 1

86. A student mistakenly used a wet gas jar to collect sulphur dioxide. Which one of the following tests of the gas is likely to fail?
(a) Odour
(b) Effect on acidified K$_2$Cr$_2$O$_7$ solution
(c) Solubility test
(d) None of these

87. **Assertion** : Nitrate ores are rarely available.  
**Reason** : Bond dissociation energy of nitrogen is very high. 
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.  
(b) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.  
(c) Assertion is correct and Reason is false.  
(d) Both Assertion and Reason are false.

88. **Assertion** : Metals possess metallic lustre.  
**Reason** : Metals is their pure state, have a shining surface. 
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.  
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
89. **Assertion**: Metals are said to be sonorous.  
**Reason**: Metals conduct heat and electricity.  
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.  
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.  
(c) Assertion is true but Reason is false.  
(d) Both Assertion and Reason are false.  
Sol : www.cbse.site/sc/cm89

92. **Assertion**: Ionic compounds are soft solids.  
**Reason**: There is weak molecular forces between particles of ionic compounds.  
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.  
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.  
(c) Assertion is true but Reason is false.  
(d) Both Assertion and Reason are false.  
Sol : www.cbse.site/sc/cm92

90. **Assertion**: Some metal oxides are amphoteric in nature.  
**Reason**: Metallic oxides show acidic behaviour.  
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.  
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.  
(c) Assertion is true but Reason is false.  
(d) Both Assertion and Reason are false.  
Sol : www.cbse.site/sc/cm90

93. **Assertion**: An arrangement of metals in decreasing order of their reactivity is called activity series.  
**Reason**: Metals can be differentiated from non metals.  
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.  
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.  
(c) Assertion is true but Reason is false.  
(d) Both Assertion and Reason are false.  
Sol : www.cbse.site/sc/cm93

94. **Assertion**: Alloying is a good method of improving the properties of a metal.  
**Reason**: We can be differentiated from non metals.  
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.  
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.
Sol : www.cbse.site/sc/cm94

95. **Assertion** : Solder is an alloy of lead and copper.
**Reason** : It has a high melting point.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.
Sol : www.cbse.site/sc/cm95

98. **Assertion** : Electrical wires can be made by copper.
**Reason** : Copper is a good conductor of electricity.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.
Sol : www.cbse.site/sc/cm98

96. **Assertion** : Sodium metal is obtained by electrolytic reduction.
**Reason** : Sodium is a highly reactive metal.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.
Sol : www.cbse.site/sc/cm96

99. **Assertion** : When zinc is added to a solution of iron (II) sulphate, no change is observed.
**Reason** : Zinc is less reactive than iron.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.
Sol : www.cbse.site/sc/cm99

100. **Assertion** : Food cans are coated with zinc and not with tin.
**Reason** : Zinc is more reactive than tin.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.
Sol : www.cbse.site/sc/cm100

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true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Assertion is false but Reason is true.
Sol : www.cbse.site/sc/cm100

101. **Assertion** : Carbon reacts with oxygen to form carbon monoxide which is an acidic oxide.
**Reason** : Non-metals form acidic oxides.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Assertion is false but Reason is true.
Sol : www.cbse.site/sc/cm101

102. **Assertion** : Different metals have different reactivities with water and dilute acids.
**Reason** : Reactivity of a metal depends on its position in the reactivity series.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Assertion is false but Reason is true.
Sol : www.cbse.site/sc/cm102

103. **Assertion** : Zinc becomes dull in most air.
**Reason** : Zinc is coated by a thin film of its basic carbonate in moist air.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

104. **Assertion** : Gas bubbles are observed when sodium carbonate is added to dilute hydrochloric acid.
**Reason** : Carbon dioxide is given off in the reaction.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Assertion is false but Reason is true.
Sol : www.cbse.site/sc/cm104

105. Clean small pieces of magnesium, zinc, aluminium, iron and copper by rubbing them with a piece of sand paper. Take them in separate test tubes. Add about 10 mL of
Identify the correct statements (S).
1. The rate of evolution of hydrogen gas bubbles is not same in all the test tubes.
2. The rate of formation of bubbles is the fastest in the case of magnesium.
3. The reactivity decreases in the order: 
   Mg > Zn > Al > Fe > Cu.
4. In the case of copper, no bubbles are seen and the temperature also remains unchanged. This shows that copper does not react with dilute HCl.
   (a) 2 and 4
   (b) 3 and 4
   (c) Only 3
   (d) 1, 2 and 4  
   Sol : www.cbse.site/sc/cm105

106. Four metals A, B, C and D are tested with water steam and dilute hydrochloric acid and its observation is listed below.

<table>
<thead>
<tr>
<th>Metal</th>
<th>Reaction with water</th>
<th>Reaction with steam</th>
<th>Reaction with dilute HCl</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>No reaction</td>
<td>reaction</td>
<td>reaction</td>
</tr>
<tr>
<td>B</td>
<td>No reaction</td>
<td>No reaction</td>
<td>reaction</td>
</tr>
<tr>
<td>C</td>
<td>reaction</td>
<td>reaction</td>
<td>reaction</td>
</tr>
<tr>
<td>D</td>
<td>No reaction</td>
<td>No reaction</td>
<td>No reaction</td>
</tr>
</tbody>
</table>

Between which two metals should hydrogen be placed in the series?
(a) A and B
(b) B and D
(c) A and C
(d) C and D

Sol : www.cbse.site/sc/cm106

Direction For Questions (109-110)

Samples of four metals A, B, C and D were taken and added to the following solutions one by one. The results obtained have been tabulated as follows.

<table>
<thead>
<tr>
<th>Metal</th>
<th>Iron (II) sulphate reaction</th>
<th>Copper (II) sulphate displacement</th>
<th>Zinc sulphate reaction</th>
<th>Silver nitrate displacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>No reaction</td>
<td>Displacement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Displacement</td>
<td>No reaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>No reaction</td>
<td>No reaction</td>
<td>No reaction</td>
<td>Displacement</td>
</tr>
<tr>
<td>D</td>
<td>No reaction</td>
<td>No reaction</td>
<td>No reaction</td>
<td>No reaction</td>
</tr>
</tbody>
</table>

Use the Table above to answer the following questions about metals A, B, C and D.

107. The most reactive metal is?
   (a) A
   (b) C
   (c) D
   (d) B

   Sol : www.cbse.site/sc/cm107

108. The order of reactivity of metals is
   (a) B > A > D > C
   (b) B > A > C > D
   (c) A > B > C > D
   (d) D > A > B > C

   Sol : www.cbse.site/sc/cm107
109. Mohit arranged two metal rods in electrolyte solution as shown in the figure and electron flows from metal X to metal Y.

Here, metal X and Y are-
(a) Copper, Zinc
(b) Zinc, Silver
(c) Iron, Aluminium
(d) Iron, Silver

Sol: www.cbse.site/sc/cm108

110. Pratyush took sulphur powder on a spatula and heated it. He collected the gas evolved by inverting a test tube over it, as shown in figure below.

The balance chemical equation for the reaction taking place will be-
(a) \( S + O_2 \rightarrow SO_2 \)
(b) \( SO_2 + H_2O \rightarrow H_2SO_3 \)
(c) \( SO_2 + O_2 \rightarrow SO_4 \)
(d) Both (a) and (b)

Sol: www.cbse.site/sc/cm109

111. Consider the following figure.

Which of the following reaction take place in first test tube?
(a) \( Fe(s) + CuSO_4(aq) \rightarrow FeSO_4(aq) + Cu(s) \)
(b) \( Fe(s) + CuSO_3(aq) \rightarrow FeSO_4(aq) + Cu(s) \)
(c) \( Fe(s) + CuSO_4(aq) \rightarrow FeSO_3(aq) + Cu(s) \)
(d) \( Fe(s) + CuSO_4(aq) \rightarrow FeSO_4(aq) + Heat \)

Sol: www.cbse.site/sc/cm110

112. A student arrange the battery, bulb, switch
and clips as shown in the figure:

When .......... wire is placed between the terminals A and B. The bulb light up.

1. Copper
2. Aluminium
3. Iron
4. Silver
(a) 1
(b) 2
(c) 3
(d) All of these

Sol : www.cbse.site/sc/cm111

113. A student arrange the following practical setup-

Which of the following metals can be suitable for the experiment?
1. Iron

2. Gallium
3. Caesium
4. Copper
(a) 1 and 4
(b) 1 and 3
(c) 2 and 3
(d) 2 and 4

Sol : www.cbse.site/sc/cm112

114. A man went door to door posing as goldsmith. He promised to bring back the glitter of old and dull gold ornaments. An unsuspecting lady gave a set of gold bangles to him which he dipped in a particular solution. The bangles sparkled like new but their weight was reduced drastically. The lady was upset but after a futile argument the man beat a hasty retreat.

The particular solution is-

(a) Aqua regia
(b) NaCl solution
(c) HCl solution
(d) Nitric acid solution

Sol : www.cbse.site/sc/cm113

Direction For Questions (117-121)

In chemistry a metal is an element that readily forms positive ions and has metallic bonds. A metal is a material that when freshly prepared, polished or fractured, shows a lustrous appearance and conducts electricity and heat relatively well. Metals are typically malleable or ductile.

The table shows the reaction of different metals with water.

<table>
<thead>
<tr>
<th>Metal</th>
<th>Reaction with water</th>
<th>Reaction with steam</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>None</td>
<td>Mild</td>
</tr>
<tr>
<td>Q</td>
<td>Mild</td>
<td>Vigorous</td>
</tr>
<tr>
<td>R</td>
<td>Very slow</td>
<td>Vigorous</td>
</tr>
</tbody>
</table>
115. The current order of increasing reactivity of metals is:
   (a) \( P < R < Q < S \)
   (b) \( P < R < S < Q \)
   (c) \( P < Q < R < S \)
   (d) \( S < Q < R < P \)
   Sol: www.cbse.site/sc/cm114

116. Which metal is indicated by \( R \)?
   (a) Mg
   (b) Al
   (c) Fe
   (d) Cu
   Sol: www.cbse.site/sc/cm114

117. Which metal can displace \( R \) from its salt solution?
   (a) \( P \)
   (b) \( Q \)
   (c) \( S \)
   (d) Both (b) and (c)
   Sol: www.cbse.site/sc/cm114

118. Which metal is likely to be displaced by \( R \)?
   (a) \( P \)
   (b) \( Q \)
   (c) \( R \)
   (d) \( S \)
   Sol: www.cbse.site/sc/cm114

119. Which one of the following metals do not react with cold as well as hot water?
   (a) Fe
   (b) Na
   Sol: www.cbse.site/sc/cm115

120. ‘Sonorous’ means:
   (a) unique property of non-metals
   (b) induce conductivity
   (c) having high density
   (d) causing sound
   Sol: www.cbse.site/sc/cm115

121. Materials that conduct electricity are called:
   (a) metal
   (b) bad conductors
   (c) insulators
   (d) non-metal
   Sol: www.cbse.site/sc/cm115

122. Which metal shows ductility?
   (a) Zinc
   (b) Lithium
   (c) Magnesium
   (d) Copper
   Sol: www.cbse.site/sc/cm115
123. Property of metal by which it can be drawn into wire is:
(a) ductility  
(b) density  
(c) malleability  
(d) elasticity  
Sol : www.cbse.site/sc/cm115

124. Property of metal by virtue of which it can be beaten into sheets is:
(a) resistivity  
(b) ductility  
(c) malleability  
(d) conductivity  
Sol : www.cbse.site/sc/cm115

126. The metal which is known as strategic metal is
(a) zirconium  
(b) titanium  
(c) manganese  
(d) all of these  
Sol : www.cbse.site/sc/cm116

127. Metals can be given different shapes according to our needs because
(a) they are malleable and ductile  
(b) they are sonorous  
(c) they are generally hard  
(d) they have a shining surface  
Sol : www.cbse.site/sc/cm116

Direction For Questions (127-131)
Metals are elements that exhibit a variety of physical properties such as those of malleability, ductility, conductivity of heat and electricity, lustre, etc. Due to such properties, metals find usage in purpose such as cooking utensils, machinery, modes of transportation, construction, etc., in our daily life. Metals such as gold and silver have been used in making jewellery since ancient times. Non-metals have been found to exist in all the three states—solid, liquid and gaseous. They are non-malleable, non-ductile and brittle in nature. Non-metals have very low tensile strength and are easily broken up.

128. Which of the following non-metal is a good conductor of electricity?
(a) Oxygen  
(b) Nitrogen  
(c) Graphite  
(d) Bromine  
Sol : www.cbse.site/sc/cm116

129. Metals produce a metallic sound. This property of metal is called
(a) malleability  
(b) sonority  
(c) conductivity  
(d) ductility  
Sol : www.cbse.site/sc/cm116

Direction For Questions (132-136)
Metals react with non-metals by losing or gaining electrons. They have a give-and-take relation between them. Ionic compounds are usually solid and hard in nature. They
are generally soluble in water and insoluble in solvent like petrol, kerosene, etc. The melting and boiling points of electrovalent compounds are high. In order to change the physical state of the electrovalent compounds (from solid to liquid to gas), a high temperature is needed to overcome the attractive forces.

130. Which of the following properties is not generally exhibited ionic compounds?
(a) Electrical conductivity in molten state
(b) Electrical conductivity in solid state
(c) High melting and boiling points
(d) Solubility in water

131. Electrovalent compounds are usually solid and hard in nature. This is due to
(a) strong forces of attraction between the oppositely charged ions.
(b) weak forces of attraction between the oppositely charged ions.
(c) strong forces of attraction between the same charged ions.
(d) weak forces of attraction between the similarly charged ions.

132. Transfer of one or more valence electrons from a metal to non-metal takes place in case of
(a) chemical bonding
(b) molecular bonding
(c) ionic bonding
(d) covalent bonding

133. Calcium oxide is formed by loosing of electrons to oxygen atoms, the calcium atom has the number of valence electrons as
(a) three
(b) one
(c) four
(d) two

134. The atomic number of four elements A, B, C, D are 6, 8, 10 and 12 respectively. The two elements which can react to form ionic compounds are:
(a) A and B
(b) C and D
(c) B and D
(d) A and C

Direction For Questions (137-141)
The reactivity series is a list of metals arranged in the order of their decreasing activities. The metal at the top of the reactivity series is the most reactive and metal at the bottom is the least reactive. The more reactive metal displaces less reactive metal from its salt solution.
135. The metals which react with steam but not with hot water is
(a) Al, Zn, Fe
(b) K, Na, Mg
(c) Ag and Au
(d) Pb and Cu

Sol : www.cbse.site/sc/cm118

136. Non-metals do not displace hydrogen from acids because
(a) they are electron donor
(b) they are electron acceptor
(c) they have low tensile strength
(d) they have low density

Sol : www.cbse.site/sc/cm118

137. \[ \text{CO}_2(g) + \text{H}_2\text{O}(l) \rightarrow \]
(a) \text{HCO}_3(s)
(b) \text{H}_2\text{CO}_3(aq)
(c) \text{HCO}_3(aq)
(d) \text{H}_2\text{CO}_3(s)

Sol : www.cbse.site/sc/cm118

138. Among the following, the correct arrangement of the given metals in ascending order of their reactivity is
(a) Zinc, Iron, Calcium, Potassium
(b) Potassium < Calcium < Iron < Zinc
(c) Potassium < Zinc < Calcium < Iron
(d) Potassium < Calcium < Zinc < Iron

Sol : www.cbse.site/sc/cm118

139. Which of the following pair of reactants will give displacement reactions?
(a) \text{FeSO}_4 \text{ solution and lead metal}
(b) \text{CuSO}_4 \text{ solution and silver metal}
(c) \text{NaCl} \text{ solution and iron metal}
(d) \text{AgNO}_3 \text{ solution and Copper metal}

Sol : www.cbse.site/sc/cm118

Direction For Questions (142-146)
Alloying is a very good method of improving the properties of a metal. This gives the desired properties of the metal. For example, iron is the most widely used metal. But it is never used in its pure state. This is because pure iron is very soft and stretches easily when hot. But, if it is mixed with a small amount of carbon (about 0.05%), it becomes hard and strong. When iron is mixed with nickel and chromium, we get stainless steel, which is hard and does not rust. Thus, if iron is mixed with some other substance, its properties change. In fact, the properties of any metal can be changed, if it is mixed with some other substance. The substance added may be a metal or a non-metal.

140. Stainless steel which is used for making
cutlery, surgical instruments, etc., has iron mixed with
(a) Cu and Au
(b) Ni and Cu
(c) Cu and Cr
(d) Ni and Cr
Sol : www.cbse.site/sc/cm119

141. Which among the following alloys contain non-metal as one of its constituents?
(a) Brass
(b) Bronze
(c) Amalgam
(d) Steel
Sol : www.cbse.site/sc/cm119

142. Name an alloy of aluminium used in the construction of aircraft.
(a) Duralumin
(b) Solder
(c) Magnalium
(d) Amalgam
Sol : www.cbse.site/sc/cm119

143. An alloy is a/an
(a) compound
(b) element
(c) homogeneous mixture
(d) heterogeneous mixture
Sol : www.cbse.site/sc/cm119

144. Which one of the following alloy(s) contains mercury as one of its constituents?
(a) Stainless steel
(b) Alnico
(c) Zinc amalgam
(d) Solder
Sol : www.cbse.site/sc/cm119

Direction For Questions (147-150)
A metal \( M \) reacts vigorously with water to form a solution \( S \) and a gas \( G \). The solution \( S \) turns red litmus to blue whereas gas \( G \), which is lighter than air, burns with a pop sound. Metal \( M \) has a low melting point and is used as a coolant in nuclear reactors.

145. The metal \( M \) is:
(a) Sodium
(b) Copper
(c) Iron
(d) Steel
Sol : www.cbse.site/sc/cm120

146. The solution \( S \) is:
(a) NaCl
(b) NaOH
(c) CaCl\(_2\)
(d) CaOH
Sol : www.cbse.site/sc/cm120

147. Here the gas \( G \) is:
(a) Hydrogen
(b) Oxygen
(c) Carbon-dioxide
(d) Nitrogen
Sol : www.cbse.site/sc/cm120

148. Which of the following balanced reaction take place here?
(a) \( \text{Na} + \text{H}_2\text{O} \rightarrow \text{Na}_2\text{O} + \text{H}_2 \)
(b) \( 2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2 \)
(c) \( 2\text{Na} + 2\text{H}_2\text{O} \rightarrow \text{Na}_2\text{O}_2 + \text{O}_2 \)
(d) \( \text{Na} + \text{H}_2\text{O} \rightarrow \text{Na}_2\text{O}_2 + \text{H}_2 \)
Sol : www.cbse.site/sc/cm119
**Direction For Questions (151-153)**

The arrangement of metals in a vertical column in the decreasing order of their reactivities is called the reactivity series or activity series of metals. The most reactive metal is at the top position of the reactivity series. The least reactive metal is at the bottom of the reactivity series.

Hydrogen, though a non-metal, has been included in the activity series of metals only for comparison. Apart from it, the hydrogen atom also has tendency to lose its valence electron and form cation like the behaviour shown by metals. Thus,

\[ \text{H} \rightarrow \text{H}^+ + \text{e}^- \]

149. Which of the following metal can be displaced by copper from its salt solution?
(a) Mg  
(b) Ag  
(c) Fe  
(d) None of these

Sol : www.cbse.site/sc/cm121

150. An element X after reacting with acids liberate hydrogen gas and can displace lead and tin from their salt solution. Here X is:
(a) Sodium  
(b) Iron  
(c) Copper  
(d) Nickel

Sol : www.cbse.site/sc/cm121

151. Which of the following is the most reactive metal?
(a) Sodium  
(b) Iron