

10th Science Lesson 8 Questions in English**8] Periodic Classification of Elements**

1. How many elements were discovered by the scientists by 1860?

- a) 100
- b) 5000
- c) 60**
- d) 25

Explanation

By 1860, scientists had already discovered 60 elements and determined their atomic masses. They noticed that some elements had similar properties and hence arranged them into groups.

2. According to which property the elements were arranged in Mendeleev's periodic table?

- a) Atomic mass**
- b) Number of protons
- c) Valence Electrons
- d) All the above

Explanation

Mendeleev's periodic table had some discrepancies, which were difficult to overcome. For example the atomic mass of argon (39.95amu) is greater than that of potassium (39.10 amu) but argon comes before potassium in the periodic table.

3. Which of the fundamental property was not known to the earlier scientists?

- a) Number of Protons**
- b) Number of Electrons
- c) Number of Neutrons
- d) Number of chemical reactions

Explanation

The fundamental property turned out to be the number of protons in an atom's nucleus, something that could not have been known by Mendeleev and his contemporaries.

4. Who discovered the atomic number of the elements?

- a) Antoine Lavoisier
- b) John Berzelius
- c) Robert Boyle
- d) Henry Moseley**

Explanation

Henry Moseley, a British scientist in 1912 discovered a new property of elements called atomic number, which provided a better basis for the periodic arrangement of the elements. It is a well-

known fact that atomic number of an element is equal to the number of protons or the numbers of electrons present in the neutral atom of an element.

5. Which of these refers to the modified periodic law?

- a) The Physical property depends on the source of the elements.
- b) The Elements are classified based on the number of chemical reactions.
- c) The Physical and chemical properties are the functions of the atomic numbers of the elements.**
- d) The Chemical property of an element is depends on the number of electrons.

Explanation

The periodic law was modified to frame a modern periodic law which states that "The physical and chemical properties of the elements are the periodic functions of their atomic numbers".

6. Which of these statements is true regarding the modern periodic table?

- a) The Elements are arranged in increasing order of atomic numbers.
- b) The Elements are arranged in periods and groups
- c) It highlights the regular repetition of properties of elements.
- d) All the above**

Explanation

With reference to the modern periodic law the elements were arranged in the increasing order of their atomic numbers to form the modern periodic table. The modern periodic table is a tabular arrangement of elements in periods and groups highlighting the regular repetition of properties of the elements.

7. How many periods are in the horizontal row of the periodic table?

- a) 7**
- b) 8
- c) 4
- d) 10

Explanation

The horizontal rows are called periods. There are seven periods in the periodic table.

8. How many elements are present in the first period of the periodic table?

- a) 2**
- b) 1
- c) 4
- d) 3

Explanation

First period (Atomic number 1 and 2): This is the shortest period. It contains only two elements (Hydrogen and Helium).

9. What is the last element in the second period of the periodic table?

- a) Hydrogen
- b) Lithium
- c) Neon**
- d) Helium

Explanation

Second period (Atomic number 3 to 10): This is a short period. It contains eight elements (Lithium to Neon).

10. Which of this element is not present in the third period of the periodic table?

- a) Aluminium
- b) Lithium**
- c) Sulphur
- d) Argon

Explanation

Third period (Atomic number 11 to 18): This is also a short period. It contains eight elements (Sodium to Argon).

11. Choose the Incorrect statements about the fourth period of elements.

- i) The fourth group of elements consists of atomic values from 20 to 45.
- ii) The fourth group contains eighteen elements.
- iii) Ten transition elements are present in the fourth group.

- a) i only**
- b) ii only
- c) iii only
- d) None of the above

Explanation

Fourth period (Atomic number 19 to 36): This is a long period. It contains eighteen elements (Potassium to Krypton). This includes 8 representative elements and 10 transition elements.

12. In which of this period the rubidium is classified in the periodic table?

- a) Third
- b) Second
- c) Fifth**
- d) Fourth

Explanation

Fifth period (Atomic number 37 to 54): This is also a long period. It contains 18 elements (Rubidium to Xenon). This includes 8 representative elements and 10 transition elements.

13. How many Lanthanides are present in the sixth period of the modern periodic table?

- a) 8
- b) 14**
- c) 10
- d) 4

Explanation

Sixth period (Atomic number 55 to 86): This is the longest period. It contains 32 elements (Cesium to Radon). This includes 8 representative elements, 10 transition elements and 14 inner transition elements (Lanthanides).

14. How many new elements were added in the seventh period recently?

- a) 4**
- b) 10
- c) 3
- d) 7

Explanation

Seventh period (Atomic number 87 to 118): Like the sixth period this period also accommodates 32 elements. Recently 4 elements have been included by IUPAC.

15. How many groups of elements are classified in the periodic table?

- a) 20
- b) 15
- c) 18**
- d) 12

Explanation

The vertical columns in the periodic table starting from top to bottom are called groups. There are 18 groups in the periodic table.

16. Which of these are called as inner transition elements?

- a) Lanthanides
- b) Actinides
- c) Group 3
- d) All the above**

Explanation

The Lanthanides and Actinides which form part of Group 3 are called inner transition elements.

17. Which of this group does not have same number of valence electrons?

- a) Group 18**
- b) Group 7
- c) Group 8
- d) Group 10

Explanation

Except 'group 18', all the elements present in each group have the same number of electrons in their valence shell and thus have the same valency. For example, all the elements of group 1 have one electron in their valence shells (1s1). So, the valency of all the alkali metals is '1'.

18. Which of these given identical property results in similar chemical properties of elements?

a) Valance shell configurations

- b) Atomic weight
- c) Physical property
- d) Number of protons

Explanation

As the elements present in a group have identical valence shell electronic configurations, they possess similar chemical properties.

19. Which of the given are the physical property of elements?

- a) Melting point
- b) Density
- c) Boiling point

d) All the above**Explanation**

The physical properties of the elements in a group such as melting point, boiling point and density vary gradually.

20. Which of these group elements are unreactive?

- a) Group 1
- b) Group 20
- c) Group 18**
- d) Group 12

Explanation

The atoms of the 'group 18' elements have stable electronic configuration in their valence shells and hence they are unreactive.

21. Assertion (A): The physical and chemical properties are known by the electronic configuration of the elements.

Reasoning(R): The electronic configuration of elements occurs repeatedly.

- a) Both A and R is True and R is the correct explanation of A.**
- b) Both A and R is True but R is not the correct explanation of A.
- c) A is True but R is False.
- d) Both A and R is False.

Explanation

The electronic configurations of elements help us to explain the periodic recurrence of physical and chemical properties.

22. Choose the correct statements.

- i) Periodicity is the property of elements repeating at regular interval.
- ii) All the atomic properties of elements are periodic.

a) i only

b) ii only

c) Both i and ii

d) None of the above

Explanation

Anything which repeats itself after a regular interval is called periodic and this behavior is called periodicity. Some of the atomic properties of the elements are periodic.

23. Which of these are the periodic properties of the elements?

- a) Ionic radius
- b) Electron affinity
- c) Ionization energy

d) All the above

Explanation

Properties such as atomic radius, ionic radius, ionization energy, electronegativity, electron affinity, show a regular periodicity and hence they are called periodic properties.

24. What is the value distance between center of nucleus and valence electron?

a) Atomic radius

b) Atomic number

c) Atomic distance

d) Atomic affinity

Explanation

Atomic radius of an atom is defined as the distance between the center of its nucleus and the outermost shell containing the valence electron.

25. Choose the correct statements.

- i) Isolated atom radius can be easily measured.
- ii) Noble gas atomic radius is referred as covalent radius.

a) i only

b) ii only

c) Both i and ii

d) None of the above

Explanation

Direct measurement of the radius of an isolated atom is not possible. Except for noble gases, usually the atomic radius is referred to as covalent radius or metallic radius depending on the nature of the bonding between the concerned atoms.

26. Assertion (A): Metal atoms atomic radius value is known as metallic radius.

Reasoning(R): Metallic radius is measured as half the distance between the nuclei of adjacent atoms.

a) Both A and R is True and R is the correct explanation of A.

b) Both A and R is True but R is not the correct explanation of A.

c) A is True but R is False.

d) Both A and R is False.

Explanation

Atomic radius in metal atoms is known as metallic radius. It is defined as half the distance between the nuclei of adjacent metal atoms.

27. What is the atomic radius value of non-metallic elements?

a) Covalent radius

b) Metallic radius

c) Non-metal radius

d) All the above

Explanation

In non-metallic elements, their atomic radius is known as covalent radius. It is defined as half the distance between the adjacent nuclei of two covalently bonded atoms of the same element in a molecule.

28. What is the change in atomic radius value in the groups from top to bottom?

a) Decreases

b) Constant

c) Increases

d) Similar value

Explanation

Along the period, from left to right the atomic radius of the elements decreases whereas along the groups, from the top to bottom, the atomic radius increases.

29. Which of this value is increased along the period?

a) Valence electron

b) Protons

c) Atomicity

d) All the above

Explanation

Along the period, the shell number remains the same but the number of protons (i.e. atomic number) increases.

30. Which of these results in atomic size reduction?

- a) Positive charges
- b) Shrinking of electron clouds
- c) Strong attraction of electrons
- d) All the above**

Explanation

More and more positive charges impose a strong attraction over the electrons and thus the electron cloud shrinks towards the nucleus, which results in the decrease in the atomic size.

31. Choose the correct statements.

- i) Ions are formed by lose or gain electrons in an atom.
- ii) A positively charged ion loses an electron.
- iii) Anion gains an electron and it is negatively charged ion.

- a) i only
- b) ii only
- c) iii only
- d) All the above**

Explanation

Ions are formed when an atom loose or gain electrons. When a neutral atom loses an electron, it becomes a positively charged ion called cation. The gain of an electron by a neutral atom forms a negatively charged ion called anion.

32. Which of this property is used to determine the behavior and structure of ionic solids?

- a) Atomicity
- b) Size of ions**
- c) Chemical property of ions
- d) None of the above

Explanation

The size of the ions is important to determine their behaviors in solutions and the structure of ionic solids.

33. Choose the correct statements.

- i) Size of a cation may be smaller than the neutral atom.
- ii) Anion is always larger than the neutral atom.

- a) i only
- b) ii only**
- c) Both i and ii

d) None of the above

Explanation

The size of a cation is always smaller than its corresponding neutral atom. But the anion is larger than its neutral atom.

34. Which of these increases the size of anion?

a) Decrease in positive charge

b) Increase in negative charge

c) Decrease in positive charge

d) Increase in negative charge

Explanation

The positive charge increases the size of the cation decreases. The negative charge increases the size of the anion increases.

35. How many electrons are lost /gained by sodium to form its cation?

a) Gain single electron

b) Gain two electrons

c) Lose one electron

d) Lose four electrons

Explanation

Lithium and sodium lose the single electron from their outermost energy level to form cations. The ions so formed are smaller because the remaining electrons are at inner cells and attracted more strongly by the nucleus.

36. Which of this group number represents the carbon family of elements?

a) 15

b) 2

c) 14

d) 17

Explanation

Group Number	Family
1	Alkali Metals
2	Alkaline earth metals
3 to 12	Transition metals
13	Boron Family
14	Carbon Family
15	Nitrogen Family
16	Oxygen Family (or) Chalcogen family
17	Halogens
18	Noble gases

37. What is the value of the minimum energy required to remove an electron from an isolated gaseous atom?

a) Ionization enthalpy

b) Ionization measure

c) Ionization force

d) Ionized value

Explanation

Ionization energy is the minimum energy required to remove an electron from an isolated gaseous atom in its ground state to form a cation. It is otherwise called ionization enthalpy.

38. What is the unit of ionization enthalpy?

a) kJ/mol

b) k mol

c) J

d) kJ

Explanation

Ionization enthalpy: It is measured in kJ/mol. Higher the ionization energy, it is more difficult to remove the electron.

39. How the ionization energy increases along a period of elements?

a) Decrease in atomic size

b) Increase in valence electron

c) Decrease in proton value

d) Increase in velocity of electrons

Explanation

As the atomic size decreases from left to right in a period, more energy is required to remove the electrons. So, the ionization energy increases along the period.

40. Choose the correct statements.

- i) The atomic size increases down the group of elements.
- ii) Valence electrons are tightly bound down the group.
- iii) Ionization energy increases down the group in a periodic table.

a) i only

b) ii only

c) iii only

d) All the above

Explanation

Down the group, the atomic size increases and hence the valence electrons are loosely bound. They require relatively less energy for the removal. Thus, ionization energy decreases down the group in the periodic table.

41. What is the value of amount of energy released from an isolated gas atom?

a) Electron affinity

b) Joule

c) Work

d) Enthalpy

Explanation

Electron affinity is the amount of energy released when an isolated gaseous atom gains an electron to form its anion. It is also measured in kJ/mol.

42. Choose the correct statements.

- i) The Electron affinity decreases from left to right in a period of the periodic table.
- ii) The ionization energy value decreases from top to bottom of a group in the periodic table.

a) i only

b) ii only

c) Both i and ii

d) None of the above

Explanation

Like ionization energy, electron affinity also increases from left to right in a period and decreases from top to bottom in a group.

43. Which of these statements is true regarding the noble gas?

a) It has fewer acceptances of electrons.

b) The valence electrons are not present in the orbit.

c) Electrons cannot be added.

d) Has maximum electron affinity value.

Explanation

Noble gases show no tendency to accept electrons because the outer s and p orbitals of noble gases are completely filled. No more electrons can be added to them and hence their electron affinities are zero.

44. Which of these values does not depend on electronegativity?

- a) Bond energy
- b) Ionization potential
- c) Electron affinity

d) Valence electrons

Explanation

Electronegativity is based on various experimental data such as bond energy, ionization potential, electron affinity, etc.

45. Assertion (A): The Pauling scale is used to determine the electronegativity value.

Reasoning(R): The nature of bonding of the atoms is predicted by the Pauling scale.

- a) Both A and R is True and R is the correct explanation of A.**
- b) Both A and R is True but R is not the correct explanation of A.
- c) A is True but R is False.
- d) Both A and R is False.

Explanation

Pauling scale is the widely used scale to determine the electronegativity, which in turn predicts the nature of bonding (ionic or covalent) between the atoms in a molecule.

46. Match the electronegativity value of elements.

- | | |
|-------------|----------|
| A. Bromine | i) 1 |
| B. Sodium | ii) 2.8 |
| C. Chlorine | iii) 4.0 |
| D. Fluorine | iv) 3.0 |

- a) iv, iii, i, ii
- b) ii, i, iv, iii**
- c) iii, i, iv, ii
- d) ii, i, iii, iv

Explanation

Electronegativity of some of the elements are given below

F = 4.0, Cl = 3.0, Br = 2.8, I = 2.5, H = 2.1, Na = 1

47. What is the minimum electronegativity threshold value used to identify the character of elements?

- a) 1
- b) 1.7**
- c) 2.1
- d) 7

Explanation

If the difference in electronegativity between two elements is 1.7, the bond has 50% ionic character and 50% covalent character.

48. What is the character of an element if the electronegativity difference value is greater than 1.7?

- a) Alkali
- b) Compound
- c) Ionic**
- d) Covalent

Explanation

Elements with electronegativity difference less than 1.7, the bond is considered to be more covalent and if the difference is greater than 1.7 the bond is considered to be more ionic.

49. Choose the Incorrect statements.

- i) The value of electronegativity along the period is increases from left to right.
 - ii) The electrons attracts more strongly as the nuclear charge value decreases along the period.
- a) i only
 - b) ii only
 - c) Both i and ii
 - d) None of the above**

Explanation

Along the period, from left to right in the periodic table, the electronegativity increases because of the increase in the nuclear charge which in turn attracts the electrons more strongly.

50. Which of this value is decreased by the increasing number of valence shell?

- a) Electronegativity**
- b) Atomicity
- c) Radioactivity
- d) Conductivity

Explanation

On moving down a group the electronegativity of the elements decreases because of the increased number of valence shells.

51. Which of the following metals is not found in a human body?

- a) Sodium
- b) Mercury**

- c) Potassium
- d) Calcium

Explanation

We use metals in our day to day activities. It is the utmost need to have some metals like sodium, potassium, calcium, iron, etc. in the human body. Deficiency of these metals affects the metabolic activities thereby causing diseases

52. Which of these properties of metals are analyzed by the metallurgical process?

- a) Physical properties
- b) Atom structure
- c) Metal extraction methods

d) All the above**Explanation**

Metallurgy is a science of extracting metals from their ores and modifying the metals into alloys for various uses, based on their physical and chemical properties and their structural arrangement of atoms.

53. Which of these is not involved in the metallurgical process?

- a) Separation of ore
- b) Metal production
- c) Classification of ore
- d) Metal refining

Explanation

A metallurgical process involves three main steps as follows:

- (i) Concentration or Separation of the ore: It is the process of removal of impurities from the ore.
- (ii) Production of the metal: It is the conversion of the ore into metal.
- (iii) Refining of the metal: It is the process of purification of the metal.

54. Assertion (A): Ore is the mineral form of metal which can be economically extracted on a large scale.

Reasoning(R): Minerals may be a single compound or a complex mixture of metals.

- a) Both A and R is True and R is the correct explanation of A.
- b) Both A and R is True but R is not the correct explanation of A.
- c) A is True but R is False.
- d) Both A and R is False.

Explanation

Minerals: A mineral may be a single compound or a complex mixture of various compounds of metals found in the Earth.

Ore: The mineral from which a metal can be readily and economically extracted on a large scale is said to be an ore.

55. Which is referred as the impurity in a metal ore?

a) Gangue (Matrix)

b) Alkali

c) Slug

d) Flux

Explanation

Gangue or Matrix: The rocky impurity associated with an ore is called gangue or matrix.

56. Which of these is used to remove the impurities in metal extraction process?

a) Steam

b) Pure ore

c) Flux

d) All the above

Explanation

Flux: It is the substance added to the ore to reduce the fusion temperature and to remove the impurities. E.g. Calcium oxide (basic), Silica (acidic). If the gangue is acidic, then basic flux is added and vice versa.

57. Which of this product is formed by the reaction of flux and gangue?

a) Slag

b) Ore

c) Pure metal

d) Solvents

Explanation

Slag: It is the fusible product formed when a flux reacts with a gangue during the extraction of metals. $\text{Flux} + \text{Gangue} \rightarrow \text{Slag}$

58. Which is added to remove the impurities as slag in smelting process?

a) Flux

b) Positive charge

c) Valence electron

d) Heat

Explanation

Smelting is the process of reducing the roasted metallic oxide from the metal in its molten condition. In this process impurities are removed as slag by the addition of flux.

59. How many types of separation methods are categorized based on the nature of ore?

a) 5

b) 3

c) 7

d) 4

Explanation

There are four major types of separation of ores based on the nature of the ore.

60. Choose the incorrect statements regarding the Hydraulic method?

a) Used for the heavier ores.

b) Based on the density difference principle.

c) Oxide ores use the hydraulic method.

d) Tinstone ore is separated by gravity separation method.

Explanation

Hydraulic (Gravity Separation) method

Principle: The difference in the densities or specific gravities of the ore and the gangue is the main principle behind this method.

Oxide ores are purified by this method. e.g. Hematite Fe_2O_3 the ore of iron. When the ore is heavier than the impurity, this method can be used.

61. Which of these ore is separated by the magnetic separation method?

a) Tinstone

b) Sulphides

c) Zinc blende

d) Haematite

Explanation

Magnetic separation method

Principle: The magnetic properties of the ores form the basis of separation. When either the ore or the gangue is magnetic this method is employed. e.g., Tinstone SnO_2 the ore of tin.

62. Which of these is not true regarding the froth floatation method?

a) Depends on the wettability of ore with oil.

b) The ore or the gangue is magnetic.

c) Used for lighter metals.

d) Sulphide ores are concentrated by this method.

Explanation

Froth floatation

Principle: This process depends on the preferential wettability of the ore with oil (pine oil) and the gangue particles by water. Lighter ores such as Sulphide ores are concentrated by this method. e.g., Zinc blende (ZnS).

63. Which of this method is used for the pure form of ores?

a) Froth floatation method

b) Magnetic separation method

c) Leaching method

d) Gravity separation method

Explanation

Chemical method or Leaching method is employed when the ore is in a very pure form.

64. Identify the incorrect match.

- | | |
|------------------|-----------------|
| A. Oxide Ore | i) Cuprite |
| B. Sulphide Ore | ii) Iron pyrite |
| C. Carbonate Ore | iii) Galena |
| D. Halide Ore | iv) Rock salt |

a) i only

b) ii only

c) iii only

d) iv only

Explanation

Types of ores

Oxide Ores	Carbonate Ores	Halide Ores	Sulphide Ores
Bauxite ($\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$)	Marble (CaCO_3)	Cryolite (Na_3AlF_6)	Galena (PbS)
Cuprite (Cu_2O)	Magnesite (MgCO_3)	Fluorspar (CaF_2)	Iron pyrite (FeS_2)
Haematite (Fe_2O_3)	Siderite (FeCO_3)	Rock salt (NaCl)	Zinc blende (ZnS)

65. How many types of metal extraction is categorized from metal oxides?

a) 2

b) 4

c) 3

d) 5

Explanation

Extraction of metal from metal oxide can be categorized into three types.

66. Match

- | | |
|---------------|--------------------|
| A. Chromite | i) Madurai |
| B. Lime stone | ii) Tirunelveli |
| C. Tungsten | iii) Cuddalore |
| D. Gypsum | iv) Salem |
| E. Titanium | v) Tiruchirappalli |

a) iv, iii, i, v, ii

b) iii, v, ii, iv, i

- c) ii, iv, iii, i, v
- d) iii, v, iv, ii, i

Explanation

Lime stone: Coimbatore, Cuddalore, and Dindugul

Gypsum: Tiruchi and Coimbatore Districts

Titanium minerals: Kanyakumari, Tirunelveli and Tuticorin.

Chromite: Coimbatore and Salem district.

Magnetite: Dharmapuri, Erode, Salem, Thiruvannamalai.

Tungsten: Madurai and Dindugul.

(Reference: mineral resources of Tamil Nadu-ENVIS Centre, Tamil Nadu)

67. Assertion (A): Metals possess a high lustre value.

Reasoning(R): All metals are solids at room temperature.

- a) Both A and R is True and R is the correct explanation of A.
- b) Both A and R is True but R is not the correct explanation of A.

c) A is True but R is False.

- d) Both A and R is False.

Explanation

Physical properties

Physical state: All metals are solids at room temperature except mercury and gallium.

Lustre: Metals possess a high lustre (called metallic lustre).

68. Which of these metals have low density and hardness?

a) Potassium

- b) Silver
- c) Gallium
- d) Zinc

Explanation

Hardness: Most of the metals are hard and strong (exceptions: sodium and potassium can be cut with a knife)

Density: Metals have a high density (exceptions: sodium and potassium are less dense than water).

69. Which of these metals vaporize at high temperature?

- a) Gallium
- b) Tungsten**
- c) Sodium
- d) Mercury

Explanation

Melting point and Boiling point: Usually metals possess high melting and boiling points and vaporize only at high temperatures (exceptions: gallium, mercury, sodium and potassium).

70. Which of these metals cannot be beaten into sheets?

- a) Silver
- b) Copper
- c) Mercury**
- d) Tungsten

Explanation

Malleability: Metals are usually malleable they can be beaten into thin sheets without cracking (except zinc and mercury).

71. Which of this metal is not a good conductor?

- a) Silver
- b) Gold
- c) Copper
- d) Tungsten**

Explanation

Conduction of heat and electricity: Metals are good conductors of heat and electricity; silver and copper excel in this property (exception: tungsten)

Solubility: Usually, metals do not dissolve in liquid solvents.

72. Which of the following is not a chemical property?

- a) Atomicity
- b) Solubility**
- c) Valence electrons
- d) Ions formation

Explanation

Chemical Properties

- Valence electrons: Atoms of metals usually have 1,2 or 3 electrons in their outermost shell.
- Formation of ions: Metals form Positive ions by the loss of electrons and hence they are electro positive.
- Discharge of ions: Metals are discharged at the cathode during the electrolysis of their compounds.
- Atomicity: Molecules of metals in their vapor state are usually monoatomic.
- Nature of oxides: Oxides of metals are usually basic.

73. Which of the statements are not true regarding aluminium?

- a) Reactive metal.
- b) It occurs in combined state.
- c) Most abundant metal in earth's crust.
- d) Non-reactive metal.**

Explanation

Aluminium is the metal found most abundantly in the Earth's crust. Since it is a reactive metal, it occurs in the combined state.

74. Which of these is not an ore of aluminium?

- a) Bauxite
- b) Cryolite
- c) Zinc**
- d) Corundum

Explanation

The important ores of aluminium are as follows

Ores of Aluminium Formula

Bauxite $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$

Cryolite Na_3AlF_6

Corundum Al_2O_3

75. Which is the chief ore of aluminium?

- a) Bauxite**
- b) Aluminate
- c) Alumina
- d) Graphite

Explanation

Bauxite is the chief ore of aluminium. The extraction of aluminium from bauxite involves two steps.

76. Which of this element is not involved in separation process of aluminium from bauxite?

- a) Graphite**
- b) Caustic soda
- c) Aluminium hydroxide
- d) Sodium Meta aluminate

Explanation

The extraction of aluminium from bauxite involves the following steps:

Bauxite ore is finely ground and heated under pressure with a solution of concentrated caustic soda solution at 150°C to obtain sodium meta aluminate. On diluting sodium meta aluminate with water, a precipitate of aluminium hydroxide is formed. The precipitate is filtered, washed, dried and ignited at 1000°C to get alumina. $2\text{Al}(\text{OH})_3 \rightarrow \text{Al}_2\text{O}_3 + 3\text{H}_2\text{O}$

77. Which of this reduction produces aluminium in Hall's process?

- a) Oxygen
- b) Electrolyte reduction**
- c) Electrochemical
- d) Aqua reduction

Explanation

Electrolytic reduction of alumina –Hall's Process

Aluminium is produced by the electrolytic reduction of fused alumina (Al_2O_3) in the electrolytic cell.

78. Which of this element is not related to the Hall's process?

- a) Graphite rods
- b) Pure alumina
- c) Steam**
- d) Fluorspar

Explanation

Cathode: Iron tank lined with graphite

Anode: A bunch of graphite rods suspended in molten electrolyte.

Electrolyte: Pure alumina+ molten cryolite + fluorspar (fluorspar lowers the fusion temperature of electrolyte)

79. What is the overall reaction of the Halls process?

- a) $2 \text{Al}_2\text{O}_3 \rightarrow 4 \text{Al} + 3 \text{O}_2\uparrow$**
- b) $\text{Al} + \text{H}_2\text{O} \rightarrow \text{Al} + \text{H}_2\uparrow$
- c) $\text{Al}_2 + \text{N}_2 \rightarrow 4 \text{Al} + \text{NO}_2\uparrow$
- d) $\text{Al}_2\text{O}_4 \rightarrow 4 \text{Al} + 3 \text{H}_2\text{O}\uparrow$

Explanation

Temperature: 900 - 950 °C

Voltage used: 5-6 V

Overall reaction: $2 \text{Al}_2\text{O}_3 \rightarrow 4 \text{Al} + 3 \text{O}_2\uparrow$

80. Which of these combines with graphite to form CO_2 ?

- a) Hydrogen
- b) Nitrogen
- c) Oxygen**
- d) Carbon

Explanation

Aluminium is deposited at the cathode and oxygen gas is liberated at the anode. Oxygen combines with graphite to form CO_2 .

81. Which is not a physical property of aluminium?

- a) Low density
- b) Heat and Electricity conductor
- c) Melting point is 100°C**
- d) White silvery metal

Explanation

Physical Properties of Aluminium

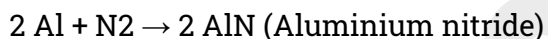
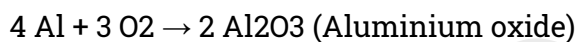
- It is a silvery white metal
- It has low density (2.7) and it is light
- It is malleable and ductile
- It is a good conductor of heat and electricity.
- Its melting point is 660 °C.
- It can be polished to produce a shiny attractive appearance.

82. Choose the correct statements.

- i) Aluminium reacts with dry air and produces hydrogen.
 - ii) Aluminium forms its oxide and nitride when heated at 800 °C
- a) i only
b) ii only
c) Both i and ii
d) None of the above

Explanation

Reaction with air: It is not affected by dry air. On heating at 800 °C, aluminium burns very brightly forming its oxide and nitride.



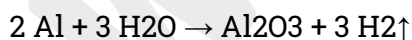
83. Assertion (A): Aluminium reacts with steam and produces hydrogen.

Reasoning(R): Water does not react with aluminium because of the oxide layer.

- a) Both A and R is True and R is the correct explanation of A.**
b) Both A and R is True but R is not the correct explanation of A.
c) A is True but R is False.
d) Both A and R is False.

Explanation

Reaction with water: Water does not react with aluminium due to the layer of oxide on it. When steam is passed over red hot aluminium, hydrogen is produced.

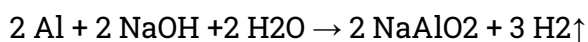


84. Which of these reacts with aluminium and produces aluminates?

- a) Acids
- b) Alkalis**
- c) Base
- d) Metals

Explanation

Reaction with alkalis: It reacts with strong caustic alkalis forming aluminates.



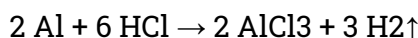
(Sodium meta aluminate)

85. Which of this gas is liberated by the reaction of aluminium with acids?

- a) **Hydrogen**
- b) Oxygen
- c) Nitrogen
- d) Carbon dioxide

Explanation

Reaction with acids: With dilute and con.HCl it liberates H₂ gas.



(Aluminium chloride)

Aluminium liberates hydrogen on reaction with dilute sulphuric acid and liberates sulphur dioxide on reaction with hot concentrated sulphuric acid.

86. Which of this acid reacts with aluminium and makes it as passive?

- a) Hydrochloric acid
- b) **Nitric acid**
- c) Sulphuric acid
- d) Carbonic acid

Explanation

Dilute or concentrated nitric acid does not attack aluminium but it renders aluminium passive due to the formation of an oxide film on its surface.

87. What is the result of the aluminothermic process?

- a) **Metal**
- b) Acid
- c) Alkali
- d) Oxygen

Explanation

As reducing agent: Aluminium is a powerful reducing agent. When a mixture of aluminium powder and iron oxide is ignited the latter is reduced to metal. This process is known as aluminothermic process. $\text{Fe}_2\text{O}_3 + 2 \text{Al} \rightarrow 2 \text{Fe} + \text{Al}_2\text{O}_3 + \text{Heat}$.

88. Which is not a usage of Aluminium?

- a) **Electrical cables**
- b) Industrial machineries
- c) Gold Jewelry
- d) Household utensils

Explanation

Aluminium is used in household utensils, electrical cable industry, making aero planes and other industrial machine parts.

89. In which of this form copper is found naturally?

- a) Native state only
- b) Combined state only
- c) Compounds only
- d) Both a and b**

Explanation

It was named as cuprum by the Romans because they got it from the Island of Cyprus. Copper is found in the native state as well as combined state.

90. Which of the following is not an ore of copper?

- a) Cuprite
- b) Ruby copper
- c) Cu_2O
- d) CuSO_4**

Explanation

Ores of copper Formula

Copper pyrites CuFeS_2

Cuprite or ruby copper Cu_2O

Copper glance Cu_2S

91. Which of this is the chief ore of copper?

- a) Copper pyrite**
- b) Ruby copper
- c) Copper glance
- d) Cuprite

Explanation

The chief ore of copper is copper pyrite. It yields nearly 76% of the world production of copper.

92. How many steps are involved in the preparation of copper from its ore?

- a) 4
- b) 3
- c) 5**
- d) 7

Explanation

Concentration of ore: The ore is crushed and the concentrated by froth floatation process and Roasting, Smelting, Bessemerisation and Refining

93. In which part impure copper metal is used in copper production technique?

- a) Cathode
- b) Anode**
- c) Electrolyte
- d) All the above

Explanation

Cathode: A thin plate of pure copper metal.

Anode: A block of impure copper metal.

Electrolyte: Copper sulphate solution acidified with Sulphuric acid.

When electric current is passed through the electrolytic solution, pure copper gets deposited at the cathode and the impurities settle at the bottom of the anode in the form of sludge called anode mud.

94. Which of the following is not a quality of copper?

- a) High melting point
- b) High density
- c) Low lustre**
- d) Brown metal

Explanation

Copper is a reddish brown metal with high lustre high density and high melting point (1356°C).

95. Which of these causes the copper to form its carbonates?

- a) CO₂**
- b) Sulphur
- c) Impurities
- d) Steam

Explanation

Chemical Properties of Copper

Action of Air and Moisture: Copper gets covered with a green layer of basic copper carbonate in the presence of CO₂ and moisture.

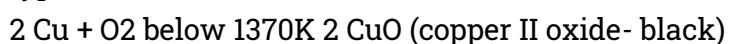


96. Which of these are formed by reaction of heat and copper?

- a) Oxide**
- b) Sulphide
- c) Nitrite
- d) Carbonate

Explanation

Action of Heat: On heating at different temperatures in the presence of oxygen, copper forms two types of oxides CuO and Cu₂O.



$4\text{Cu} + \text{O}_2 \xrightarrow{\text{above } 1370\text{K}} 2\text{Cu}_2\text{O}$ (copper I oxide – red)

97. Assertion (A): Copper dissolves in dilute HCl and H₂SO₄ in the presence of air.

Reasoning(R): Without air the dilute acids does not react with copper.

a) Both A and R is True and R is the correct explanation of A.

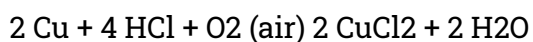
b) Both A and R is True but R is not the correct explanation of A.

c) A is True but R is False.

d) Both A and R is False.

Explanation

With dilute HCl and dilute H₂SO₄: Dilute acids such as HCl and H₂SO₄ have no action on these metals in the absence of air. Copper dissolves in these acids in the presence of air.



98. Which of these following gas is liberated in the reaction of copper and HNO₃?

a) Nitric oxide

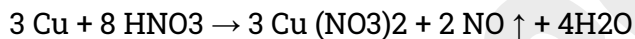
b) Hydrogen Sulphide

c) Carbon monoxide

d) Helium

Explanation

With dil. HNO₃: Copper reacts with dil. HNO₃ with the liberation of Nitric Oxide gas.



99. What is the end product of copper reacting with chlorine?

a) Copper nitrate

b) Copper Sulphide

c) Copper II chloride

d) Cupric acid

Explanation

Action of Chlorine: Chlorine reacts with copper resulting in the formation of copper (II) chloride. $\text{Cu} + \text{Cl}_2 \rightarrow \text{CuCl}_2$

100. Which of these does not affect the composition of copper?

a) Alkalies

b) Chlorine

c) Acids

d) Heat

Explanation

Action of Alkalies: Copper is not attacked by alkalies

101. What are the uses of copper?

- a) Electroplating
- b) Gold and silver jewels
- c) Electric cables and appliances

d) All the above

Explanation

Uses of Copper: It is extensively used in manufacturing electric cables and other electric appliances. It is used for making utensils, containers, calorimeters and coins. It is used in electroplating. It is alloyed with gold and silver for making coins and jewels.

102. What are the natural forms of iron?

- a) Oxides
- b) Sulphides
- c) Carbonates

d) All the above

Explanation

Iron is the second most abundant metal available next to aluminium. It occurs in nature as oxides, sulphides and carbonates.

103. Match

- | | |
|----------------|-----------------------------|
| A. Iron pyrite | i) Fe_2O_3 |
| B. Haematite | ii) Fe_3O_4 |
| C. Magnetite | iii) FeS_2 |

a) iii, i, ii

b) i, iii, ii

c) ii, iii, i

d) ii, i, iii

Explanation

The ores of iron are as follows: Ores of iron Formula

Haematite Fe_2O_3

Magnetite Fe_3O_4

Iron pyrite FeS_2

104. Which of these ore is the chief source of iron?

a) Haematite

b) Magnetite

c) Iron Pyrite

d) All the above

Explanation

Iron is chiefly extracted from haematite ore (Fe_2O_3)

105. Which of these is used in gravity separation to clean powdered ore?

- a) **Water steam**
- b) Low pressure air
- c) High pressure air
- d) Cold water

Explanation

Concentration by Gravity Separation: The powdered ore is washed with a steam of water. As a result, the lighter sand particles and other impurities are washed away and the heavier ore particles settle down.

106. Which of these iron impurities are oxidized in the roasting and calcination method?

- a) Sulphur
- b) Arsenic
- c) Phosphorus
- d) **All the above**

Explanation

Roasting and Calcination: The concentrated ore is strongly heated in a limited supply of air in a reverberator furnace. As a result, moisture is driven out and sulphur, arsenic and phosphorus impurities are oxidized off.

107. Which of the region is known as the fusion zone?

- a) **Middle region**
- b) Upper region
- c) Lower region
- d) All the above

Explanation

The Middle Region (Fusion Zone) – The temperature prevails at 1000°C . In this region, CO_2 is reduced to CO . $\text{CO}_2 + \text{C} \rightarrow 2\text{CO} - \text{Heat}$

Limestone decomposes to calcium oxide and CO_2 . $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2 - \text{Heat}$

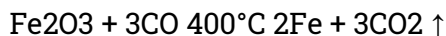
These two reactions are endothermic due to absorption of heat. Calcium oxide combines with silica to form calcium silicate slag. $\text{CaO} + \text{SiO}_2 \rightarrow \text{CaSiO}_3$

108. Which of this iron is formed in the reduction zone?

- a) Spongy iron
- b) Pig iron
- c) Cast iron
- d) **All the above**

Explanation

The Upper Region (Reduction Zone)- The temperature prevails at 400°C . In this region carbon monoxide reduces ferric oxide to form a fairly pure spongy iron.



The molten iron is collected at the bottom of the furnace after removing the slag. The iron thus formed is called pig iron. It is remelted and cast into different moulds. This iron is called cast iron.

109. Which of these physical properties of iron is not true?

- a) A lustrous metal.
- b) Low tensility and ductility.**
- c) Can be magnetized.
- d) Greyish white color.

Explanation

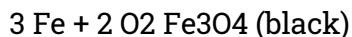
Physical properties of Iron: It is a lustrous metal, greyish white in color. It has high tensility, malleability and ductility. It can be magnetized.

110. Which of these results in heating iron with air or oxygen?

- a) Hydrated ferric sulphate
- b) Ferric Sulphide
- c) Ferrous oxide**
- d) Carbon monoxide

Explanation

Reaction with air or oxygen: Only on heating in air iron forms magnetic oxide.



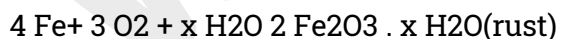
111. Assertion (A): The Brown hydrated ferric oxide forming on the surface of iron is called as rust.

Reasoning(R): Exposing iron to moist air forms rust and the phenomenon is known as rusting.

- a) Both A and R is True and R is the correct explanation of A.**
- b) Both A and R is True but R is not the correct explanation of A.
- c) A is True but R is False.
- d) Both A and R is False.

Explanation

Reaction with moist air: When iron is exposed to moist air, it forms a layer of brown hydrated ferric oxide on its surface. This compound is known as rust and the phenomenon of formation of rust is known as rusting.

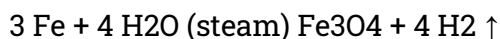


112. Which of these results in magnetic oxide with iron?

- a) Cool water
- b) Hydrogen gas
- c) Steam**
- d) High pressure water

Explanation

Reaction with steam: When steam is passed over red hot iron, magnetic oxide is formed.



113. What is the result of the chemical reaction of iron and chlorine?

a) Ferric Chloride

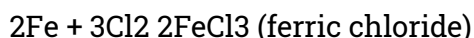
b) Ferrous oxides

c) Ferrous nitrates

d) None of the above

Explanation

Reaction with chlorine: Iron combines with chlorine to form ferric chloride.



114. Which of this gas is liberated in the chemical reaction of Iron and acids?

a) Carbon dioxide

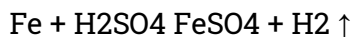
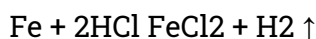
b) Hydrogen

c) Nitrogen

d) Helium

Explanation

Reaction with acids: With dilute HCl and dilute H₂SO₄ it liberates H₂ gas.



115. Which acid reacts with iron results in its nitrates?

a) HNO₃

b) H₂SO₄

c) HCl

d) H₂S

Explanation

With dilute HNO₃ in cold condition iron gives ferrous nitrate and ammonium nitrate.

116. Which of these is not a usage of pig iron?

a) Pipes

b) Railings

c) Television towers

d) Drain pipes

Explanation

Pig iron (Iron with 2.0% - 4.5% of carbon): It is used in making pipes, stoves, radiators, railings, manhole covers and drain pipes.

117. Assertion (A): Steel is used in the constructions, machineries and for transmission cables.

Reasoning (R): Iron with 0.25% - 2.0% of carbon is used for steel.

- a) Both A and R is True and R is the correct explanation of A.
- b) Both A and R is True but R is not the correct explanation of A.
- c) A is True but R is False.
- d) Both A and R is False.

Explanation

Steel (Iron with 0.25% - 2.0% of carbon): It is used in the construction of buildings, machinery, transmission cables and T.V towers and in making alloys.

118. What percentage of carbon makes a wrought iron?

- a) < 0.50%
- b) =0.25%
- c) >0.15%
- d) <0.25%

Explanation

Wrought iron (Iron with < 0.25% of carbon): It is used in making springs, anchors and electromagnets.

119. Assertion (A): Alloy is a heterogeneous mixture of two or more metals.

Reasoning (R): The alkali elements of metals are used to form an alloy.

- a) Both A and R is True and R is the correct explanation of A.
- b) Both A and R is True but R is not the correct explanation of A.
- c) A is True but R is False.
- d) Both A and R is False.

Explanation

An alloy is a homogeneous mixture of two or more metals or of one or more metals with certain non-metallic elements.

120. Which of this metal is used to increase the strength and utility of gold?

- a) Copper
- b) Zinc
- c) Silver
- d) Brass

Explanation

The properties of alloys are often different from those of its components. Pure gold is brittle to be used. The addition of small percentage of copper enhances its strength and utility.

121. Which of these is used with metals in an amalgam?

- a) Gold
- b) Iron

c) Copper

d) Mercury

Explanation

An amalgam is an alloy of mercury with another metal. These alloys are formed through metallic bonding with the electrostatic force of attraction between the electrons and the positively charged metal ions. Silver tin amalgam is used for dental filling.

122. Which of these metals are used to make brass?

a) Zinc, Copper

b) Iron, Tin

c) Copper, Gold

d) Silver, Zinc

Explanation

Method of making alloys : By fusing the metals together. E.g. Brass is made by melting zinc and copper.

123. Which of these metals does not included in making wood metal?

a) Lead

b) Bismuth

c) Copper

d) Cadmium powder

Explanation

Method of making alloys: By compressing finely divided metals. E.g. Wood metal: an alloy of lead, tin, bismuth and cadmium powder is a fusible alloy.

124. Which of these is used as solvent in solid alloy solutions?

a) High concentration metals

b) High density metals

c) Low concentration metals

d) Low density metals

Explanation

Alloys as solid solutions: Alloys can be considered as solid solutions in which the metal with high concentration is solvent and other metals are solute. For example, brass is a solid solution of zinc (solute) in copper (solvent).

125. Choose the correct statements.

i) Iron alloys can be classified into ferrous and Non-ferrous alloys.

ii) Ferrous alloys contain iron as major component.

iii) Aluminum alloy is an example of Non-ferrous alloys.

a) i only

- b) ii only
c) iii only
d) All the above

Explanation

Based on the presence of Iron alloys can be classified into

Ferrous alloys: Contain Iron as a major component. A few examples of ferrous alloys are Stainless Steel, Nickel Steel etc.

Non-ferrous alloys: These alloys do not contain Iron as a major component. For example, Aluminium alloy, Copper alloy etc.

126. What type of alloy is Brass?

- a) Copper Alloy
b) Ferrous Alloy
c) Aluminium Alloy
d) Iron Alloy

Explanation**Copper Alloys (Non-ferrous)**

Alloys	Uses
Brass (Cu, Zn)	Electrical fittings, medal, decorative items, hardware
Bronze (Cu, Sn)	Statues, coins, bells, gongs

127. Which of these alloys are used in aircrafts and scientific instruments?

- a) Magnalium
b) Bronze
c) Tin
d) Nickel steel

Explanation

Aluminium Alloys (Non-ferrous)

Aluminium Alloys (Non-ferrous)

Alloys	Uses
Duralumin (Al, Mg, Mn, Cu)	Aircrafts, tools, pressure cookers
Magnalium (Al, Mg)	Aircraft, scientific instruments

128. Which of these constitute the nickel steel?

- a) Iron

- b) Carbon
- c) Nickel
- d) All the above**

Explanation

Iron Alloys (Ferrous)

Iron Alloys (Ferrous)

Alloys	Uses
Stainless steel (Fe,C, Ni,Cr)	Utensils, cutlery, automobile parts
Nickel steel (Fe,C,Ni)	Cables , aircraftparts, propeller

129. Which of these is not the reason for alloying?

- a) Modify appearance and color.
- b) Lower melting point.
- c) Increase hardness and tensile strength.
- d) Decreases resistance to electricity.**

Explanation

Reasons for alloying: To modify appearance and color, To modify chemical activity, To lower the melting point, To increase hardness and tensile strength, To increase resistance to electricity.

130. Assertion (A): Alloying is destruction of materials by electrochemical and chemical reaction with environment.

Reasoning(R): The natural process of alloying converts metals into its oxides, hydroxide or Sulphide.

- a) Both A and R is True and R is the correct explanation of A.**
- b) Both A and R is True but R is not the correct explanation of A.
- c) A is True but R is False.
- d) Both A and R is False.

Explanation

Alloying is the gradual destruction of metals by chemical or electrochemical reaction with the environment. It is a natural process which converts a metal into its oxide, hydroxide or Sulphide so that it loses its metallic characteristics.

131. Which of these are chemically known as rust?

- a) Hydrated Ferric oxide
- b) Ferrous oxide
- c) $\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$
- d) Both a and c**

Explanation

Rust is chemically known as hydrated ferric oxide (it is formulated as $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$). Rusting results in the formation of scaling reddish brown hydrated ferric oxide on the surface of iron and iron containing materials.

132. Which of these does not cause dry corrosion?

- a) O_2
- b) H_2O**
- c) H_2S
- d) N_2

Explanation

Dry Corrosion or Chemical Corrosion: The corrosive action in the absence of moisture is called dry corrosion. It is the process of a chemical attack on a metal by a corrosive liquids or gases such as O_2 , N_2 , SO_2 , H_2S etc. It occurs at high temperature. Of all the gases mentioned above O_2 is the most reactive gas to impart the chemical attack.

133. Assertion (A): Wet corrosion occurs due to the presence of moisture in metals.

Reasoning (R): The electrochemical reaction of metal with water or aqueous solution of salt, acids and bases.

- a) Both A and R is True and R is the correct explanation of A.**
- b) Both A and R is True but R is not the correct explanation of A.
- c) A is True but R is False.
- d) Both A and R is False.

Explanation

Wet Corrosion or Electrochemical Corrosion: The corrosive action in the presence of moisture is called wet corrosion. It occurs as a result of electrochemical reaction of metal with water or aqueous solution of salt or acids or bases.

134. Which of this metal uses alloying method to prevent from corrosion?

- a) Stainless steel**
- b) Iron
- c) Copper
- d) Sodium

Explanation

Methods of preventing corrosion

Alloying: The metals can be alloyed to prevent from the process of corrosion. E.g: Stainless Steel

135. Which is not a surface coating method for protecting metals?

- a) Galvanization
- b) Alloying**
- c) Anodizing

d) Electroplating

Explanation

Surface Coating: It involves application of a protective coating over the metal. It is of the following types: Galvanization, Electroplating, and Anodizing and Cathodic protection.

136. Which of these is used in galvanization method?

a) Zinc on iron sheets

b) Tin on iron rods

c) Copper on Gold

d) Electro chemical coating

Explanation

Galvanization: It is the process of coating zinc on iron sheets by using electric current.

137. Which of this process uses electric current to coat a metal?

a) Alloying

b) Anodizing

c) Cathodic protection

d) Electroplating

Explanation

Electroplating: It is a method of coating one metal over another metal by passing electric current.

138. Which of this metal is used for anodizing process?

a) Zinc

b) Tin

c) Aluminium

d) Copper

Explanation

Anodizing: It is an electrochemical process that converts the metal surface into a decorative, durable and corrosion resistant. Aluminium is widely used for anodizing process.

139. What metal is used for cathodic protection?

a) Sacrificial metal

b) Non-metals

c) Alloys

d) Alkalis

Explanation

Cathodic Protection: It is the method of controlling corrosion of a metal surface protected is coated with the metal which is easily corrodible. The easily corrodible metal is called sacrificial metal to act as anode ensuring cathodic protection.

140. When Pamban Bridge was opened in India?

- a) 1930
- b) 1945
- c) 1914
- d) 1887

Explanation

Pamban is a railway bridge which connects the town of Rameshwaram on Pamban Island to mainland India. Opened on 1914, it was India's first sea bridge in India until the opening of the Bandra Worli Sea Link in 2010.