

8th Science Lesson 12 Questions in English

12] Atomic Structure

1. Totally how many elements have been identified worldwide?

- a) 98
- b) 107
- c) **118**
- d) 125

Explanation

Every substance in our surrounding is made up of unique elements. There are 118 elements identified worldwide so far.

2. Which among the following is not the elements found in the nature?

- a) Silver
- b) Titanium
- c) **Plutonium**
- d) Germanium

Explanation

Copper, Iron, Gold, Titanium, Germanium and Silver are some of the elements found in the nature. Elements like Technetium, Promethium, Neptunium and Plutonium are synthesised in the laboratories.

3. How many elements occur in the nature out of 118 elements?

- a) 78
- b) 84
- c) 86
- d) **92**

Explanation

Out of these 118 elements, 92 elements occur in the nature and the remaining elements are synthesised in the laboratories.

4. Each element is made up of similar, minute particles called _____

- a) Dark matter
- b) Void
- c) **Atom**
- d) All the above

Explanation

Each element is made up of similar, minute particles called atoms. For example, the element gold is made up of similar atoms which determine its characteristics. The word atom is derived from the Greek word atomas. Tomas means smallest divisible particle and atomas means smallest indivisible particle.

5. Who among the following Tamil poet has mentioned about atoms in his/her poem while describing Thirukkural?

- a) Andal
- b) Kambar
- c) **Avvaiyar**
- d) Ilango Adigal

Explanation

Our Tamil poet Avvaiyar has mentioned about atoms in her poem while describing Thirukkural (அணுவைத் துளைத்து ஏழ் கடலைப்புகட்டிக் குறுகத் தரித்த குறள்).

6. Which ancient Greek philosopher have spoken about atoms?

- a) Aristotle
- b) **Democritus**
- c) Parmenides
- d) Socrates

Explanation

Ancient Greek philosophers like Democritus have spoken about atoms.

7. The first scientific theory about atom was given by whom?

- a) John Dalton
- b) **J. J. Thomson**
- c) Rutherford
- d) Niels Bohr

Explanation

The first scientific theory about atom was given by John Dalton. Followed by him, J.J. Thomson and Rutherford have given their theory about atom.

8. In which year John Dalton proposed a model of atom known as Dalton's atomic theory?

- a) 1800
- b) **1808**

- c) 1814
- d) 1851

Explanation

John Dalton provided a basic theory about the nature of matter. He proposed a model of atom known as Dalton's atomic theory in 1808 based on his experiments.

9. Which among the following is not the postulates of Dalton's atomic theory?

- 1) All the matters are made up of extremely small particles called atoms (Greek philosopher Democritus used the same name for the smallest indivisible particles). Atoms of the same element are identical in all respects (size, shape, mass and properties).
 - 2) Atoms of different elements have same sizes and masses but possess different properties. Atoms can be created not be destroyed. i.e., atom is indestructible.
 - 3) Atoms of different elements may combine with each other in a fixed simple ratio to form molecules or compounds. An atom is the smallest particle of matter that takes part in a chemical reaction.
- a) Both 1 and 2
 - b) Both 1 and 3**
 - c) Both 2 and 3
 - d) All 1, 2 and 3

Explanation

Atoms of different elements have different sizes and masses and possess different properties. Atoms can neither be created nor be destroyed. i.e., atom is indestructible.

10. Which among the following statement is incorrect regarding Dalton's atomic theory?

- a) Dalton's theory fails to explains most of the properties of gases and liquids.**
- b) This explains the laws of chemical combination and the law of conservation of mass
- c) This theory helps to recognize the molecular differences of elements and compounds.
- d) Substances made up of same kind of atoms may have different properties (Ex. Coal, Graphite and Diamond are made up of carbon atoms but they differ in their properties).

Explanation

Dalton's theory explains most of the properties of gases and liquids. Atom is no longer considered as the smallest indivisible particle.

11. If atoms have the same element but have different masses it is known as _____

- a) Isotopes**
- b) Isobars
- c) Isopropyl

d) Isoforms

Explanation

If atoms have the same element but have different masses it is known as Isotopes.

12. If atoms have the different elements but have same masses it is known as_____

- a) Isotypes
- b) Isobars**
- c) Isopropyl
- d) Isoforms

Explanation

If atoms have the different elements but have same masses it is known as Isobars.

13. In 1878, who conducting an experiment using a discharge tube, found certain visible rays travelling between two metal electrodes?

- a) Rutherford
- b) James Chadwick
- c) Marie Curie
- d) William Crookes**

Explanation

In 1878, Sir William Crookes, while conducting an experiment using a discharge tube, found certain visible rays travelling between two metal electrodes.

14. Crookes rays are also known as _____

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

Explanation

The Crookes rays are also known as Cathode rays. The discharge tube used in the experiment is now referred as Crookes tube or more popularly as Cathode Ray Tube (CRT).

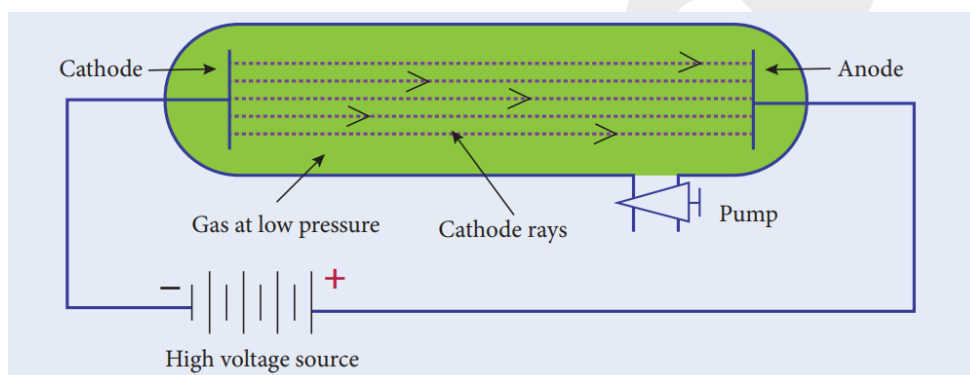
15. Which among the following statement is correct regarding Cathode ray tube

- 1) Cathode Ray Tube is a long glass tube filled with gas and sealed at both the ends. It consists of two metal plates (which act as electrodes) connected with high voltage. The electrode which is connected to the positive terminal of the battery is called the cathode (positive electrode).

- 2) The electrode connected to the negative terminal is called the anode (negative electrode). There is a side tube which is connected to a pump. The pump is used to lower the pressure inside the discharge tube.
- a) Only 1
 - b) Only 2
 - c) Both 1 and 2
 - d) **None**

Explanation

The electrode which is connected to the negative terminal of the battery is called the cathode (negative electrode). The electrode connected to the positive terminal is called the anode (positive electrode). There is a side tube which is connected to a pump. The pump is used to lower the pressure inside the discharge tube.



16. Electricity, when passes through air, removes the electrons from the gaseous atoms and produces ions. This is called -----
- a) Productive discharge
 - b) **Electrical discharge**
 - c) Gaseous discharge
 - d) Spontaneous discharge

Explanation

Electricity, when passes through air, removes the electrons from the gaseous atoms and produces ions. This is called electrical discharge.

17. Which among the following statement is correct
- a) Air is a good conductor of electricity
 - b) **Air is a poor conductor of electricity**
 - c) Air is neither a good conductor nor a bad conductor.
 - d) None of the above

Explanation

The fact that air is a poor conductor of electricity is a blessing in disguise for us. Imagine what would happen if air had been a good conductor of electricity. All of us would have got electrocuted, when a minor spark was produced by accident.

18. Which among the following statement is correct regarding discovery of electron

- 1) When a high electric voltage of 10,000 volts or more is applied to the electrode of a discharge tube containing air or any gas at atmospheric pressure, no electricity flows through the air.
- 2) However, when the high voltage of 10,000 volts is applied to the electrodes of discharge tube containing air or any gas at a very low pressure of about 0.001 mm of mercury, a greenish glow is observed on the walls of the discharge tube behind anode. This, observations clearly show some invisible ray coming from the cathode. Hence, these rays are called cathode rays. Later, they were named as electrons.

- a) Only 1
- b) Only 2
- c) **Both 1 and 2**
- d) None

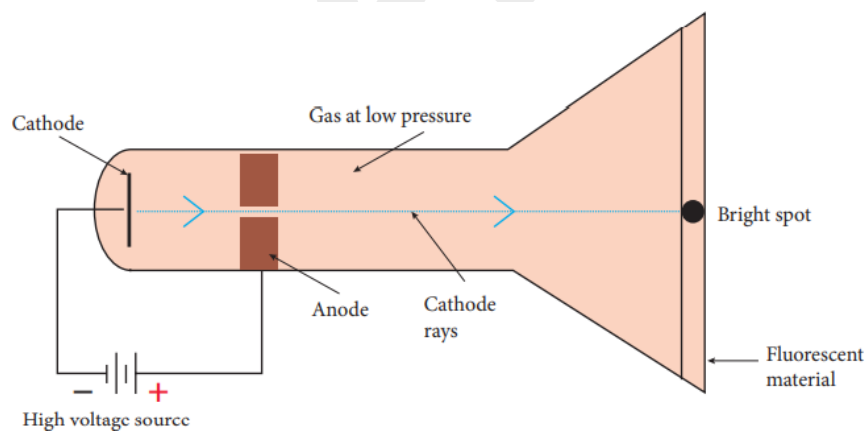
Explanation

Figure 4.2 Emission of Electrons

19. In television tube cathode rays are deflected by _____

- a) Electric fields
- b) Electric capacitor
- c) **Magnetic fields**
- d) Magnetic resistor

Explanation

In television tube cathode rays are deflected by magnetic fields. A beam of cathode rays is directed toward a coated screen on the front of the tube, where by varying the magnet field generated by electromagnetic coils, the beam traces a luminescent image

20. Which among the following is not the property of cathode rays?

- a) Cathode rays travel in straight line from cathode towards anode.
- b) Cathode rays are made up of material particles which have mass and kinetic energy
- c) Cathode rays are deflected by both electric and magnetic fields. They are negatively charged particles.
- d) **The nature of the cathode rays depends on the nature of the gas filled inside the tube or the cathode used.**

Explanation

The nature of the cathode rays does not depend on the nature of the gas filled inside the tube or the cathode used.

21. When invisible radiation falls on materials like zinc sulphide, they emit a visible light (or glow). These materials are _____

- a) Infrared materials
- b) Ultra Violet materials
- c) **Fluorescent materials**
- d) Eco materials

Explanation

When invisible radiation falls on materials like zinc sulphide, they emit a visible light (or glow). These materials are called fluorescent materials.

22. The presence of positively charged particles in the atom has been precisely predicted by whom?

- a) Rutherford
- b) Chadwick
- c) **Goldstein**
- d) Marie Curie

Explanation

The presence of positively charged particles in the atom has been precisely predicted by Goldstein based on the conception that the atom being electrically neutral in nature, should necessarily possess positively charged particles to balance the negatively charged electrons.

23. Goldstein repeated the cathode ray experiment by using a perforated cathode. On applying a high voltage under low pressure, he observed which colour on the wall behind the cathode?

- a) Faint green
- b) Faint blue
- c) **Faint red**
- d) Faint black

Explanation

Goldstein repeated the cathode ray experiment by using a perforated cathode. On applying a high voltage under low pressure, he observed a faint red glow on the wall behind the cathode. Since these rays originated from the anode, they were called anode ray.

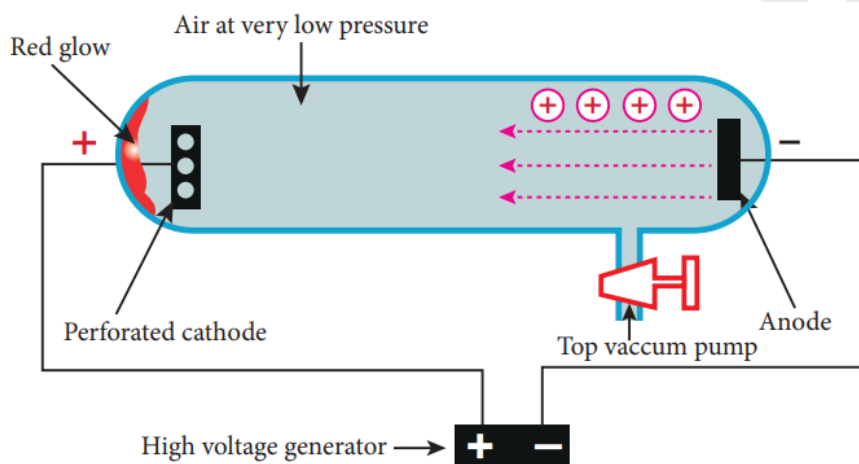


Figure 4.3 Emission of Protons

24. Anode rays are also called as _____

- a) Spontaneous rays
- b) Bullet rays
- c) Trap rays
- d) **Canal rays**

Explanation

Anode rays are also called as canal rays or positive rays. Anode rays were found as a stream of positively charged particles.

25. Which among the following statement is correct regarding properties of anode rays

- a) Anode rays travel in straight lines. Anode rays are made up of material particles.
- b) Anode rays are deflected by electric and magnetic fields. Since, they are deflected towards the negatively charged plate, they consist of positively charged particles.
- c) The properties of anode rays depend upon the nature of the gas taken inside in the discharge tube.
- d) **The mass of the particle is different from the atomic mass of the gas taken inside the discharge tube.**

Explanation

The mass of the particle is the same as the atomic mass of the gas taken inside the discharge tube.

26. The proton can be defined as _____

- a) Argon ion
- b) Hydrogen ion**
- c) Nitrogen ion
- d) Carbon ion

Explanation

When hydrogen gas was taken in a discharge tube, the positively charged particles obtained from the hydrogen gas were called protons. Each of these protons are produced when one electron is removed from one hydrogen atom. Thus, a proton can be defined as a hydrogen ion (H^+).

27. Who discovered another fundamental particle, called neutron in 1932?

- a) Rutherford
- b) Chadwick**
- c) Neil Bohr
- d) J. J. Thomson

Explanation

At the time of J.J. Thomson, only two fundamental particles (proton and electron) were known. In the year 1932, James Chadwick discovered another fundamental particle, called neutron. But, the proper position of these particles in an atom was not clear till Rutherford described the structure of atom.

28. What is the mass of proton?

- a) 1.6×10^{-24} grams**
- b) 3.2×10^{-24} grams
- c) 4.1×10^{-24} grams
- d) 7.6×10^{-24} grams

Explanation

The mass of proton is 1.6×10^{-24} grams. Its relative charge is +1.

29. Which English scientist, proposed the famous atom model in the year 1904, just after the discovery of electrons?

- a) Rutherford
- b) Chadwick**

- c) Neil Bohr
- d) J. J. Thomson

Explanation

J.J. Thomson, an English scientist, proposed the famous atom model in the year 1904, just after the discovery of electrons.

30. Thomson proposed that atom resembles which shape that having a radius of the order of 10^{-10} m?

- a) **Sphere**
- b) Rectangle
- c) Cuboid
- d) None of the above

Explanation

Thomson proposed that the shape of an atom resembles a sphere having radius of the order of 10^{-10} m.

31. Thomson's atom model was also called as _____

- a) Avocado model
- b) Apple model
- c) **Watermelon model**
- d) Citrus model

Explanation

The positively charged particles are uniformly distributed with electrons arranged in such a manner that the atom is electrically neutral. Thomson's atom model was also called as the plum pudding model or the watermelon model. The embedded electrons resembled the seed of watermelon while the watermelon's red mass represented the positive charge distribution. The plum pudding atomic theory assumed that the mass of an atom is uniformly distributed all over the atom.

32. Which among the following statement is incorrect regarding limitation of Thomson's atom model?

- 1) Thomson's model failed to explain how the positively charged sphere is shielded from the negatively charged electrons without getting neutralised.
- 2) This theory explains only about the protons and electrons and failed to explain the presence of neutral particle neutron.
 - a) Only 1
 - b) Only 2

- c) Both 1 and 2
- d) **None**

33. Who among the following said that an atom consists of subatomic particles namely, proton, electron and neutrons?

- a) John Dalton
- b) J. J. Thomson
- c) **Rutherford**
- d) All the above

Explanation

In order to understand valency of elements clearly, we need to learn a little about Rutherford's atom model here. According to Rutherford, an atom consists of subatomic particles namely, proton, electron and neutrons.

34. Protons and neutrons are found at the centre of an atom, called _____

- a) Anion
- b) Positron
- c) **Nucleus**
- d) Matter

Explanation

Protons and neutrons are found at the centre of an atom, called nucleus. Electrons are revolving around the nucleus in a circular path, called orbits or shells.

35. The electrons revolving in the outermost orbit are called _____

- a) Flex electron
- b) **Valence electron**
- c) Point electron
- d) Cuboid electron

Explanation

An atom has a number of orbits and each orbit has electrons. The electrons revolving in the outermost orbits are called valence electrons.

36. The arrangement of electrons in the orbits is known as _____

- a) Atomic configuration
- b) Positron configuration
- c) **Electronic configuration**
- d) Hydrogen configuration

Explanation

The arrangement of electrons in the orbits is known as electronic configuration. Atoms of all the elements will tend to have a stable electronic configuration, that is, they will tend to have either two electrons (known as duplet) or eight electrons (known as octet) in their outermost orbit.

37. Which is defined as the number of electrons lost, gained or shared by an atom in a chemical combination so that it becomes chemically inert?

- a) Combustion
- b) **Valency**
- c) Sublimation
- d) Partial

Explanation

When molecules are formed, atoms combine together in a fixed proportion because each atom has different combining capacity. This combining capacity of an atom is called valency. Valency is defined as the number of electrons lost, gained or shared by an atom in a chemical combination so that it becomes chemically inert.

38. Which among the following atom has one electron in its outermost orbit and in order to have stability it loses one electron and becomes positively charged?

- a) Helium atom
- b) Neon atom
- c) **Sodium atom**
- d) All the above

Explanation

Helium has two electrons in the outermost orbit and so it is chemically inert. Similarly, neon is chemically inert because, it has eight electrons in the outermost orbit. sodium atom (Atomic number: 11) has one electron in its outermost orbit and in order to have stability it loses one electron and becomes positively charged.

39. Which among the following statement is correct

- 1) The valence electrons in an atom readily participate in a chemical reaction and so the chemical properties of an element are determined by these electrons. Atoms of all metals will have 1 to 3 electrons in their outermost orbit. By losing these electrons they will have stable electronic configuration. So, they lose them to other atoms in a chemical reaction and become positively charged.
- 2) All metals will have 4 to 7 electrons in the outermost orbit of their atoms. In order to attain stable electronic configuration, they need few electrons. They accept these electrons from

same atoms in a chemical reaction and become negatively charged. These atoms which accept electrons are said to have negative valency.

- a) Only 1
- b) Only 2
- c) Both 1 and 2
- d) None

Explanation

All non-metals will have 4 to 7 electrons in the outermost orbit of their atoms. In order to attain stable electronic configuration, they need few electrons. They accept these electrons from other atoms in a chemical reaction and become negatively charged. These atoms which accept electrons are said to have negative valency.

40. Chlorine atom has how many electrons in its outermost orbit?

- a) Four
- b) Six
- c) Five
- d) **Seven**

Explanation

Chlorine atom (Atomic number: 17) has seven electrons in its outermost orbit. By gaining one electron it attains stable electronic configuration. Thus, chlorine has negative valency.

41. Which among the following statement is correct

- 1) Since hydrogen atom loses one electron in its outermost orbit, its valency is taken as one and it is selected as the standard. Valency of the other elements are expressed in terms of hydrogen. Thus, valency of an element can also be defined as the number of hydrogen atoms which combine with one atom of it.
 - 2) In hydrogen chloride molecule, one hydrogen atom combines with one chlorine atom. Thus, the valency of chlorine is one. Similarly, in water molecule, two hydrogen atoms combine with one oxygen atom. So, valency of oxygen is two.
 - 3) Since some of the elements do not combine with hydrogen, the valency of the element is also defined in terms of other elements like chlorine or oxygen. This is because almost all the elements combine with chlorine and oxygen.
- a) Both 1 and 2
 - b) Both 1 and 3
 - c) Both 2 and 3
 - d) **All 1, 2 and 3**

42. What is the mass of Neutron?

- a) 1.6×10^{-24} grams
- b) 3.2×10^{-24} grams
- c) 4.1×10^{-24} grams
- d) 7.6×10^{-24} grams

Explanation

Neutron is a neutral particle, that is, it carries no charge. It has mass equal to that of a proton, that is 1.6×10^{-24} grams.

43. Which among the following statement is correct

- 1) Since valency of chlorine is one, the number of chlorine atoms with which one atom of an element can combine is called valency. In sodium chloride (NaCl) molecule, one chlorine atom combines with one sodium atom. So, the valency of sodium is one. same in magnesium chloride (MgCl_2) valency of magnesium is one because it combines with one chlorine atoms.
- 2) In another way, valency can be defined as double the number of oxygen atoms with which one atom of an element can combine because valency of oxygen is two. For example, in magnesium oxide (MgO) valency of magnesium is two.
 - a) Only 1
 - b) Only 2**
 - c) Both 1 and 2
 - d) None

Explanation

Since valency of chlorine is one, the number of chlorine atoms with which one atom of an element can combine is called valency. In sodium chloride (NaCl) molecule, one chlorine atom combines with one sodium atom. So, the valency of sodium is one. But, in magnesium chloride (MgCl_2) valency of magnesium is two because it combines with two chlorine atoms.

44. Which among the following is not the element with variable valency?

- a) Copper
- b) Tin
- c) Mercury
- d) Carbon**

Explanation

Copper, mercury, tin and iron are elements with variable valency.

45. Which among the following statement is correct

- 1) Atoms of some elements combine with atoms of other elements and form more than one product. Thus, they are said to have different combining capacity. These atoms have more

than one valency. Some cations exhibit more than one valency. For example, copper combines with oxygen and forms two products namely cuprous oxide (Cu_2O) and cupric oxide (CuO).

- 2) In Cu_2O , valency of copper is one and in CuO valency of copper is two. For lower valency a suffix -ous is attached at the end of the name of the metal. For higher valency a suffix -ic is attached at the end of the name of the metal. Sometimes Roman numeral such as I, II, III, IV etc. indicated in parenthesis followed by the name of the metal can also be used.
- a) Only 1
 - b) Only 2
 - c) **Both 1 and 2**
 - d) None

46. What is the mass of electron?

- a) 3.2×10^{-28} grams
- b) 4.8×10^{-28} grams
- c) 7.2×10^{-28} grams
- d) **9.1×10^{-28} grams**

Explanation

The mass of Electron (e) is 9.1×10^{-28} grams. Its relative charge is -1.

47. In an atom, the number of protons is equal to what?

- a) **Number of electrons**
- b) Number of neutrons
- c) Number of both electrons and neutrons
- d) Number of nucleus

Explanation

In an atom, the number of protons is equal to the number of electrons and so the atom is electrically neutral. But, during chemical reactions unstable atoms try to attain stable electronic configuration (duplet or octet) either by gaining or losing one or more electrons.

48. The atom which carry positive or negative charges are called _____

- a) **Ions**
- b) Variables
- c) Compounds
- d) Surges

Explanation

When an atom gains an electron, it has a more number of electrons and thus it carries negative charge. At the same time when an atom loses an electron it has more number of protons and thus it carries positive charge. These atoms which carry positive or negative charges are called ions.

49. When an atom loses an electron, what sign is shown in the superscript?

- a) '-'
- b) '+'
- c) 'x'
- d) Both '-' and '+'

Explanation

The number of electrons gained or lost by an atom is shown as a superscript to the right of its symbol. When an atom loses an electron, '+' sign is shown in the superscript and '-' sign is shown if an electron is gained by an atom. Sometimes, two or more atoms of different elements collectively loss or gain electrons to acquire positive or negative charge. Thus, we can say, an atom or a group of atoms when they either loss or gain electrons, get converted into ions or radicals.

50. Ions are classified into how many types?

- a) Two
- b) Three
- c) Four
- d) Six

Explanation

Ions are classified into two types. They are: cations and anions.

51. Which among the following statement is correct

- 1) If an atom loses one or more electrons during a chemical reaction, it will have more number of negative charge on it. These are called cations (or) negative radicals. Sodium atom loses one electron to attain stability and it becomes cation. Sodium ion is represented as Na^+ .
- 2) If an atom gains one or more electrons during a chemical reaction, it will have more number of negative charge on it. These are called anions or negative radicals. Chlorine atom attains stable electronic configuration by gaining an electron. Thus, it becomes anion. Chlorine ion is represented as Cl^- .
- 3) During a chemical reaction, an atom may gain or lose more than one electron. An ion or radical is classified as monovalent, divalent, trivalent or tetravalent when the number of charges over it is 1, 2, 3 or 4 respectively. Based on the charges carried by the ions, they will have different valences.
 - a) Both 1 and 2
 - b) Both 1 and 3

- c) Both 2 and 3
- d) All the above

Explanation

If an atom loses one or more electrons during a chemical reaction, it will have more number of positive charge on it. These are called cations (or) positive radicals. Sodium atom loses one electron to attain stability and it becomes cation. Sodium ion is represented as Na^+ .

52. Two hydrogen atoms combine with one sulphate ions (SO_4^{2-}) to form sulphuric acid (H_2SO_4). So, the valency of SO_4^{2-} is _____

- a) 2
- b) 4
- c) 6
- d) 8

Explanation

The valency of an anion or cation is a number which expresses the number of hydrogen atoms or any other monovalent atoms (Na, K, Cl...) which combine with them to give an appropriate compound. For example, two hydrogen atoms combine with one sulphate ions (SO_4^{2-}) to form sulphuric acid (H_2SO_4). So, the valency of SO_4^{2-} is 2.

53. Which among the following steps followed to write down the chemical formula of a substance is incorrect?

- 1) Write down the symbols of elements/ ions side by side so that the positive radical is on the right and the negative radical is on the left-hand side.
 - 2) Write the valencies of the two radicals above their symbols to the right in superscript (Signs '+' and '-' of the ions are omitted).
 - 3) Reduce the valency to simplest ratio if needed. Otherwise interchange the valencies of the elements/ions. Write these numbers as subscripts. However, '1' appearing on the superscript of the symbol is omitted.
- a) Both 1 and 2
 - b) Both 1 and 3
 - c) Both 2 and 3
 - d) All 1, 2 and 3

Explanation

Write down the symbols of elements/ ions side by side so that the positive radical is on the left and the negative radical is on the right-hand side. Chemical formula for calcium chloride. Write symbol of calcium chloride; Ca Cl. Write valency of calcium and chloride above symbol; $\text{Ca}^2 \text{Cl}^1$. Interchange the valency of elements; Ca Cl_2 . Thus, the chemical formula for calcium chloride is CaCl_2 .

54. Which is a substance formed out of more than one element joined together by chemical bond?

- a) **Chemical compound**
- b) Anion compound
- c) Chemical catalyst
- d) All the above

Explanation

A chemical compound is a substance formed out of more than one element joined together by chemical bond. Such compounds have properties that are unique from that of the elements that formed them.

55. Which among the following statement is correct regarding naming chemical compound

- 1) In naming a compound containing a metal and a non-metal, the name of the non-metal is written first and the name of the metal is written next after adding the suffix -ine to its name. Example; NaCl - Sodium chlorine, Ag Br - Silver bromine.
 - 2) In naming a compound containing a metal, a non-metal and oxygen, name of the metal is written first and name of the non-metal with oxygen is written next after adding the suffix -ate (for more atoms of oxygen) or -ite (for less atoms of oxygen) to its name. example; Na₂ SO₄ - Sodium sulphate Na NO₂ - Sodium nitrite.
 - 3) In naming a compound containing two nonmetals only, the prefix mono, di, tri, tetra, penta etc. is written before the name of non- metals. Examples: SO₂ - Sulphur dioxide, N₂O₅ - Dinitrogen pentoxide.
- a) Both 1 and 2
 - b) Both 1 and 3
 - c) **Both 2 and 3**
 - d) All 1, 2 and 3

Explanation

In naming a compound containing a metal and a non-metal, the name of the metal is written first and the name of the non-metal is written next after adding the suffix -ide to its name. Examples: NaCl - Sodium chloride Ag Br - Silver bromide.

56. Every chemical equation has two components, what are they?

- a) Reactants and Conductance
- b) **Reactance and Products**
- c) Products and Conductance
- d) Reactants and Sublimation

Explanation

A chemical equation is a short hand representation of a chemical reaction with the help of chemical symbols and formulae. Every chemical equation has two components: reactants and products. Reactants are the substances that take part in a chemical reaction and the products are the substances that are formed in a chemical reaction. Before writing the balanced equation of a chemical reaction, skeletal equation is written.

57. Which among the following is incorrect regarding the steps involved in writing the skeletal equation?

- 1) Write the symbols and formulae of each of the reactants on the left-hand side (LHS) and join them by plus (+) sign. Follow them by an arrow ($\rightarrow$) which is interpreted as gives or forms.
 - 2) Write on the right-hand side (RHS) of arrow the symbols and formulae for each of the products. The equation thus written is called as skeleton equation (unbalanced equation).
 - 3) If the product is a gas it should be represented by upward arrow ($\uparrow$) and if it is a precipitate it should be represented by downward arrow ($\downarrow$). Example: $\text{Mg} + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{H}_2\uparrow$
- a) Both 1 and 2
 - b) Both 1 and 3
 - c) Both 2 and 3
 - d) **All 1, 2 and 3**

58. According to which law the total mass of all the atoms forming the reactants should be equal to that of all the atoms forming the products?

- a) Law of conservation of energy
- b) Law of conservation of momentum
- c) **Law of conservation of mass**
- d) All the above

Explanation

According to law of conservation of mass, the total mass of all the atoms forming the reactants should be equal to that of all the atoms forming the products. This law will hold good only when the number of atoms of all types of elements on both sides is equal. A balanced chemical equation is one in which the total number of atoms of any element on the reactant side is equal to the total number of atoms of that element on the product side.

59. Which among the following is the methods of balancing a chemical equation?

- a) Trial and error method
- b) Fractional method
- c) Odd number-even number method
- d) **All the above**

Explanation

There are many methods of balancing a chemical equation. Trial and error method (direct inspection), fractional method and odd number-even number method are some of them.

60. Which among the following statement is incorrect regarding balancing a chemical equation?

- 1) Initially the number of times an element occurs on both sides of the skeleton equation should be counted. An element which occurs least number of times in reactant and product side must be balanced first. Then, elements occurring two times, elements occurring three times and so on in an increasing order must be balanced.
 - 2) When two or more elements occur same number of times, the non-metallic element is balanced first in preference metallic element. If more than one metal or nonmetal is present then a metal or non-metal with higher mass number (refer periodic table to find the mass number) is balanced first.
 - 3) The number of molecules of reactants and products are written as coefficient. The formula should not be changed to make the elements equal. Fractional method of balancing must be employed only for molecule of an element (O_2 , H_2 , O_3 , P_4 ,) not for compound (H_2O , NH_3 ,)
- a) Both 1 and 2
 - b) Both 1 and 3**
 - c) Both 2 and 3
 - d) All 1, 2 and 3

Explanation

When two or more elements occur same number of times, the metallic element is balanced first in preference to non-metallic element. If more than one metal or nonmetal is present then a metal or non-metal with higher atomic mass (refer periodic table to find the atomic mass) is balanced first.

61. Now let us balance the equation for the reaction of hydrogen (H_2) and oxygen (O_2) which gives water. Which among the following is correctly balanced?

- a) $2H_2 + O_2 \rightarrow 2H_2O$**
- b) $2H_2 + O_2 \rightarrow 4OH$
- c) $H_2 + O_2 \rightarrow H_2O$
- d) $2H_2 + O_2 \rightarrow H_2O$

Explanation

Write the skeleton equation. $H_2 + O_2 \rightarrow H_2O$ (Hydrogen + Oxygen $\rightarrow$ Water)

Select the element which is to be balanced first based on the number of times an element occurs on both sides of the skeleton equation. In the above case, both elements occur one time each. Here, preference must be given to oxygen because it has higher atomic mass (refer periodic table).

To balance oxygen, put 2 before H_2O on the right-hand side (RHS). $H_2 + O_2 \rightarrow 2H_2O$

To balance hydrogen, put 2 near hydrogen (H_2) on the left-hand side (LHS). $2H_2 + O_2 \rightarrow 2H_2O$

In both sides $H = 4$ and $O = 2$. Now, on both sides number of hydrogen atoms is four and oxygen atoms is two. Thus, the chemical equation is balanced.

62. Which among the following information are given by balanced chemical equation?

- a) Qualitative information
- b) Quantitative information
- c) **Both qualitative and quantitative**
- d) None of the above

Explanation

A balanced chemical equation gives us both qualitative and quantitative information.

63. Which among the following is not the qualitative information?

- a) Names
- b) Formulae of the reactant molecules
- c) **Number of molecules**
- d) None of the above

Explanation

A balanced chemical equation gives us qualitative information's such as the names, symbols and formulae of the reactant molecules taking part in the reaction and those of the product molecules formed in the reaction. We also can get quantitative information like the number of molecules/atoms of the reactants and products that are taking part in the reaction.

64. Which among the following is not the limitation of chemical equation?

- a) **Chemical state of the reactants and the products.**
- b) Heat changes (heat liberated or heat absorbed) accompanying the chemical reaction.
- c) Conditions such as temperature, pressure, catalyst etc., under which the reaction takes place
- d) Concentration (dilute or concentrated) of the reactants and products

Explanation

The limitation of chemical equation are i) Physical state of the reactants and the products. ii) Heat changes (heat liberated or heat absorbed) accompanying the chemical reaction. iii) Conditions such as temperature, pressure, catalyst etc., under which the reaction takes place. iv) Concentration (dilute or concentrated) of the reactants and products. V) Speed of the reaction.

65. Which among the following is not the 'Laws of chemical combinations'?

- a) Law of conservation of mass
- b) Law of constant proportion
- c) **Law of divergent momentum**
- d) Gay Loussac's law of gaseous volumes

Explanation

By studying quantitative measurements of many reactions, it was observed that the reactions taking place between various substances are governed by certain laws. They are called as the 'Laws of chemical combinations. They are given below. 1. Law of conservation of mass 2. Law of constant proportion 3. Law of multiple proportions 4. Gay Loussac's law of gaseous volumes.

66. The law of conservation of mass which relates the mass of the reactants and products during the chemical change was stated by which French chemist in 1774?

- a) Robert Boyle
- b) **Lavoisier**
- c) Berzelius
- d) Joseph Proust

Explanation

The law of conservation of mass which relates the mass of the reactants and products during the chemical change was stated by a French chemist Lavoisier in 1774. It states that during any chemical change, the total mass of the products is equal to the total mass of the reactants.

67. Law of conservation of mass is also known as _____

- a) Law of consumption of mass
- b) Law of repulsion of mass
- c) **Law of indestructibility of mass**
- d) Law of proportion of mass

Explanation

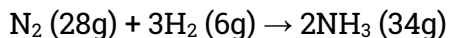
The law of conservation of mass means that mass can neither be created nor be destroyed during any chemical reaction. This law is also known as Law of indestructibility of mass.

68. Which among the following is the process of formation of Ammonia from the reaction between nitrogen and hydrogen?

- a) Pascal's process
- b) **Haber's process**
- c) Mosley's process
- d) Wolfgang's process

Explanation

Consider the formation of ammonia (Haber's process) from the reaction between nitrogen and hydrogen.



During Haber's process the total mass of the reactant and the product are exactly same throughout the reaction. Now, it is clear that mass is neither created nor destroyed during physical or chemical change. Thus, law of conservation of mass is proved.

69. Who among the following proposed law of constant proportions in 1779?

- a) Robert Boyle
- b) Berzelius
- c) **Joseph Proust**
- d) Rutherford

Explanation

Law of constant proportions was proposed by the scientist Joseph Proust in 1779. He states that in a pure chemical compound the elements are always present in definite proportions by mass.

70. Which among the following statement is correct regarding Law of constant proportions?

- 1) Joseph Proust observed all the compounds with two or more elements and noticed that each of such compounds had the same elements in same proportions, irrespective of where the compound came from or who prepared it.
 - 2) For example, water obtained from different sources like rain, well, sea, and river will always consist of the same two elements hydrogen and oxygen, in the ratio 1:8 by mass.
 - 3) Similarly, the mode of preparation of compounds may be different but their composition will never change. It will be in dynamic ratio. Hence, this law is also known as 'Law of dynamic proportions.'
- a) **Both 1 and 2**
 - b) Both 1 and 3
 - c) Both 2 and 3
 - d) All 1, 2 and 3

Explanation

Similarly, the mode of preparation of compounds may be different but their composition will never change. It will be in a fixed ratio. Hence, this law is also known as 'Law of definite proportions.'