

Class: Nine
Subject: Chemistry
CHAPTER-3: Structure of Matter

1. Q. What is element?

Answer: The matter which does not yield anything but itself is divided is called an element. As for example, hydrogen, oxygen, nitrogen etc.

2. Q. What is compound?

Answer: The substance which, if divided, gives away two or more elements is called compound. As for example, water, calcium carbonate, sulphuric acid etc. In a compound, elements will always exist in the same ratio.

3. Q. What is atom?

Answer: The smallest particle of an element, which contains the characteristics of the element, is called an atom. An atom has no independent entity but can take part in chemical reactions directly.

4. Q. What is molecule?

Answer: When two or more atoms remain connected with each other in a chemical bond, it is known as a molecule. A molecule has an independent entity but cannot take part in chemical reactions directly.

5. Q. What is symbol?

Answer: The sign by which an atom of an element is shortly expressed is called the symbol of that element. As for example, the symbol of hydrogen is H, the symbol of oxygen is O, the symbol of tungsten is W.

6. Q. What is formula?

Answer: The brief representation of a molecule by the symbols of constituent elements of that molecule along with mathematical terms is called the formula of that molecule. As for example, the formula of water is H_2O ; the formula of calcium carbonate is $CaCO_3$; the formula of sulphuric acid is H_2SO_4 .

7. Q. What are fundamental particles?

Answer: Each atom (except hydrogen) consists of three permanent particles – electrons, protons and neutrons. These particles are called fundamental particles.

8. Q. What is atomic number?

Answer: The total number of protons present in the nucleus of an atom is called the atomic number of that atom. It is expressed by Z.

9. Q. What is mass number / nucleon number?

Answer: The total number of protons and neutrons present in the nucleus of an atom is called the mass number / nucleon number of that atom. It is expressed by A.

10. Q. What is centripetal force?

Answer: The force by which, electrons are attracted by nucleus is called centripetal force.

11. Q. What is centrifugal force?

Answer: The force by which, electrons tends to move away from nucleus is called centrifugal force.

12. Q. What is orbit?

Answer: The electrons move around the nucleus in a circular motion, about an axis. This circular motion is called an energy level or orbit.

13. What is orbital?

Answer: Every energy level is divided into one or more sublevels. These sublevels are called orbitals.

14. Q. When is the spectra created in an atom? Explain.

Answer: When an electron moves from one energy level to another energy level, the emission of light creates the atomic spectra when it goes through a prism.

15. Q. What is isotope?

Answer: Atoms of the same element with equal number of protons but different numbers of neutrons and mass are called isotopes of each other. As for example, hydrogen has three stable isotopes of which the atomic number is 1 but their mass numbers are 1, 2 & 3 and they are called hydrogen (protium, H), deuterium (D) & tritium (T) respectively.

16. Q. What is relative atomic mass?

Answer: The ratio of the mass of one atom an element and $1/12^{\text{th}}$ of mass 1 atom of Carbon 12 isotope is called the relative atomic mass of that element.

17. Q. Why relative atomic mass has no unit?

Answer: Relative atomic mass is the ratio of two masses. So it doesn't have any unit.

18. Q. What is radioactive isotope?

Answer: There are some isotopes the nucleus of which spontaneously synthesize themselves and emit alpha (α), beta (β) and gamma (γ) rays. They are called radioactive isotopes. This phenomenon is called radioactivity.

19. Q. Is H^{2+} ion possible? Explain.

Answer: No, H^{2+} ion is not possible. We know, the atomic number of H is 1. That means it has only 1 proton. As it has no charge, it has only 1 electron. To gain $2+$ charge one atom need to have at least 2 electrons in its outermost shell. But H has only 1 electron in its outermost shell. Therefore, H^{2+} ion is not possible.

20. Q. Is Na^- ion possible? Explain.

Answer: No, Na^- ion is not possible. We know, the electronic configuration of Na is $1s^2 2s^2 2p^6 3s^1$. To gain the electronic configuration of nearest inert gas Na has two alternatives, either it has to donate its one outermost electron (gaining the electronic configuration of Ne) or it has to gain 7 electrons in its outermost shell (gaining the electronic configuration of Ar). But it is quite impossible for Na, to arrange such a huge amount of energy to gain 7 electrons in its outermost shell. Therefore, Na will donate its one outermost electron and will form Na^+ ion and will not gain any electron in its outermost shell. Therefore, Na^- ion is not possible.

21. Q. Is Cl^+ ion possible? Explain.

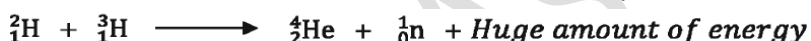
Answer: No, Cl^+ ion is not possible. We know, the electronic configuration of Cl is $1s^2 2s^2 2p^6 3s^2 3p^5$. To gain the electronic configuration of nearest inert gas Cl has two alternatives, either it has to donate its 7 outermost electrons (gaining the electronic configuration of Ne) or it has to gain 1 electron in its outermost shell (gaining the electronic configuration of Ar). But it is quite impossible for Cl, to arrange such a huge amount of energy to lose 7 electrons from its outermost shell. Therefore, Cl will gain one electron in its outermost shell and will form Cl^- ion and will not lose any electron from its outermost shell. Therefore, Cl^+ ion is not possible.

22. Q. What is nuclear fission reaction?

Answer: The nuclear process in which the nucleus of a larger and heavy element is broken into the nucleus of smaller elements is called a fission reaction. When a ${}^{235}_{92}U$ nucleus is struck by a neutron at low velocity, the nucleus become almost equally divided into two parts and produces ${}^{141}_{56}Ba$ and ${}^{92}_{36}Kr$ nuclei, 3 neutrons (1_0n) and a huge amount of energy. It is a nuclear fission reaction.

**23. Q. What is nuclear fusion reaction?**

Answer: The nuclear process in which a number of nucleuses of smaller and light elements combine into a nucleus of a larger element is called a fusion reaction. Below is an example of a fusion reaction:

**24. Q. Is 1p orbital possible? Explain.**

Answer: No, 1p orbital is not possible. 1p orbital refers to the p orbital of 1st energy level. In case of 1st energy level $n = 1$. If $n = 1$, $l = 0$. In case of p orbital $l = 1$. But for 1st energy level the maximum value of l is 0. Therefore 1p orbital is not possible.

25. Q. Is 2d orbital possible? Explain.

Answer: No, 2d orbital is not possible. 2d orbital refers to the d orbital of 2nd energy level. In case of 2nd energy level $n = 2$. If $n = 2$, $l = 0, 1$. In case of d orbital $l = 2$. But for 2nd energy level the maximum value of l is 1. Therefore 2d orbital is not possible.

26. Q. Is 3f orbital possible? Explain.

Answer: No, 3f orbital is not possible. 3f orbital refers to the f orbital of 3rd energy level. In case of 3rd energy level $n = 3$. If $n = 3$, $l = 0, 1, 2$. In case of f orbital $l = 3$. But for 3rd energy level the maximum value of l is 2. Therefore 3f orbital is not possible.