

Sub Atomic Particles Chemistry Questions with Solutions

Q1. Which of the following has a positive charge?

- (a) Electrons
- (b) Protons
- (c) Neutrons
- (d) None of the above

Answer: (b) Proton has a positive charge.

Q2. Neutrons and protons are collectively known as

- (a) Nucleons
- (b) Mass number
- (c) Atomic number
- (d) None of the above

Answer: (a) Neutrons and protons are collectively known as nucleons.

Q3. The number of protons in an atom is equivalent to the number of

- (a) Neutrons
- (b) Protons
- (c) Electrons
- (d) None of the above

Answer: (c) The number of protons in an atom is equivalent to the number of electrons.

Q4. Name the scientist who was first to propose the atomic theory of an atom?

- (a) J. J. Thomson
- (b) John Dalton
- (c) Neils Bohr
- (d) None of the above

Answer: (b) John Dalton was the first to propose the atomic theory of an atom.

Q5. What was the source of alpha particles in the Rutherford scattering experiment?

- (a) Hydrogen nucleus
- (b) Helium nucleus
- (c) Lithium nucleus
- (d) None of the above

Answer: (b) Helium nucleus was the source of alpha particles in the Rutherford scattering experiment.

Q6. Is anything smaller than an atom?

Answer: The sub-atomic particles are smaller than an atom. Electrons, protons and neutrons collectively are known as the sub-atomic particles that constitute an atom.

Q7. What is an electron?

Answer: Electron is an atom's negatively charged sub-atomic particle that revolves around the nucleus. J. Thompson was the first to discover the presence of electrons inside an atom.

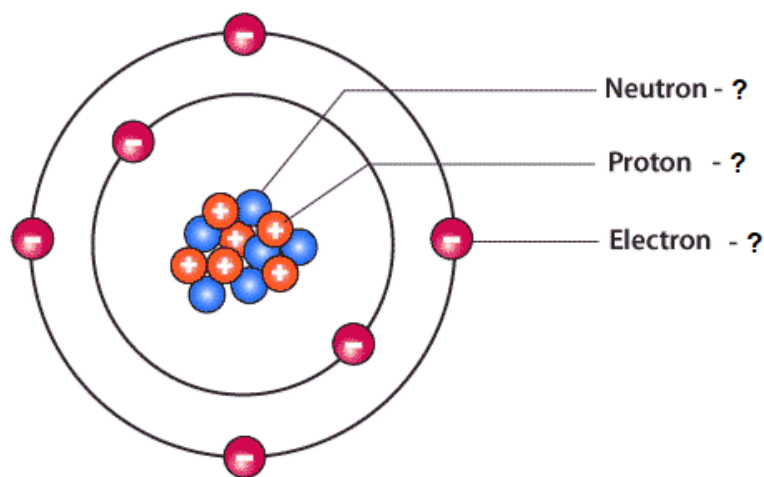
Q8. What is a proton?

Answer: Proton is an atom's positively charged sub-atomic particle. Ernest Rutherford was the first to discover the presence of electrons inside an atom.

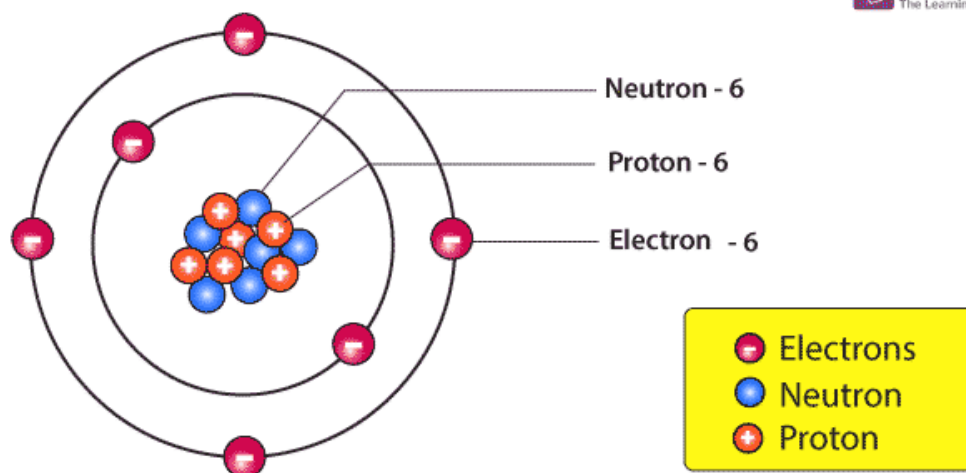
Q9. What is a neutron?

Answer: A neutron is an atom's neutral sub-atomic particle. James Chadwick was the first to discover the presence of neutrons inside an atom in 1932. Neutrons and protons are collectively known as nucleons.

Q10. Identify the number of electrons, protons and neutrons in the figure mentioned below.



Answer: The figure mentioned above has six electrons, protons and neutrons.



© Byjus.com

Q11. Identify the subatomic particles (electrons, protons and neutrons) in the following elements.

(a) α

(b) ${}^2\text{H}_1$

Answer: (a) Alpha particle is a helium atom (${}^4\text{H}_2$).

The total number of electrons = 2

The total number of protons = 2

The total number of neutrons = Mass number - Atomic number

The total number of neutrons = 4 - 2

The total number of neutrons = 2.

(b) ${}^2\text{H}_1$ is an isotope of hydrogen known as deuterium.

The total number of electrons = 1,

The total number of protons = 1,

and The total number of neutrons = Mass number - Atomic number.

The total number of neutrons = 2 - 1.

The total number of neutrons = 1.

Q12. Fill in the table.

Atomic number	Mass number	Number of protons	Number of electrons	Number of neutrons
2	-	-	2	-
-	23	-	-	11

-	-	15	16	-
-	85	37	-	-
53	-	-	74	-

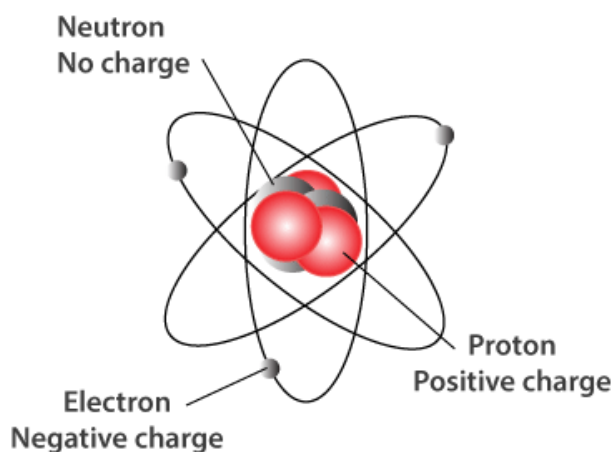
Answer:

Atomic number	Mass number	Number of protons	Number of electrons	Number of neutrons
2	4	2	2	2
11	23	11	12	11
15	31	15	16	15
37	85	37	48	37
53	127	53	74	53

Q13. Name the three sub-atomic particles of an atom.

Answer: The three sub-atomic particles of an atom are mentioned below.

1. Electrons
2. Protons
3. Neutrons.



Q14. What is the limitation of Dalton's Atomic Theory?

Answer: John Dalton was the first to explain the structure of an atom. However, he was unable to explain the structure of an atom correctly. A few shortcomings of the Dalton's Atomic Theory are mentioned below.

1. John Dalton's theory does not account for subatomic particles.
2. He failed to explain the existence of isotopes.
3. He failed to explain the existence of isobars.
4. He failed to explain the existence of allotropes.
5. He failed to explain the existence of fractional ratio compounds such as $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$.

Q15. How do the atomic structures of an isotope range?

Answer: The atomic structures of an isotope range in terms of the number of nucleons.

Practise Questions on Sub Atomic Particles

Q1. What are the postulates of Dalton's Atomic Theory?

Answer: John Dalton was the first to explain the structure of an atom. He stated that

1. All matter is made up of tiny, indivisible particles called atoms.
2. All atoms of a specific element are identical in mass, size, and other properties. However, atoms of different elements exhibit different properties and vary in mass and size.
3. Atoms can neither be created nor destroyed. Furthermore, atoms cannot be divided into smaller particles.
4. Atoms of different elements can combine in fixed whole-number ratios to form compounds.
5. In chemical reactions, atoms can be rearranged, combined, or separated.

Q2. What are the limitations of Bohr's atomic theory?

Answer: The limitations of Bohr's atomic theory are mentioned below.

1. Bohr's model of an atom failed to explain the Zeeman Effect, i.e., the magnetic field's effect on the atoms' spectra.
2. It also failed to explain the Stark effect, i.e. the effect of electric field on the spectra of atoms.
3. It violates the Heisenberg Uncertainty Principle.
4. It could not explain the spectra obtained from larger atoms.

Q3. How did Sommerfeld modify Bohr's theory?

Answer: Many modifications have been introduced to the Bohr model, most notably the Sommerfeld model or Bohr – Sommerfeld model, which suggests that electrons move around a nucleus in elliptical orbits rather than circular orbits of the Bohr model. The Bohr – Sommerfeld system was essentially incoherent, contributing to many paradoxes.

Q4. What is the significance of Rutherford's atomic model?

Answer: Rutherford was the first to determine the presence of a nucleus in an atom. He bombarded α -particles on a gold sheet, which made him encounter the presence of positively charged specie inside the atom.

Q5. What are the postulates of the Rutherford Atomic Model?

Answer: Rutherford stated that

1. The negatively charged electrons surround the nucleus of an atom.
2. The positively charged particles and most of the mass of an atom were concentrated in a small volume. He called this region of the atom a nucleus.
3. Rutherford also claimed that the nucleus's electrons revolve around it at a very high speed in circular paths. He named these circular paths orbits.
4. Electrons being negatively charged and the nucleus being a densely concentrated mass of positively charged particles are held together by a strong electrostatic force of attraction.