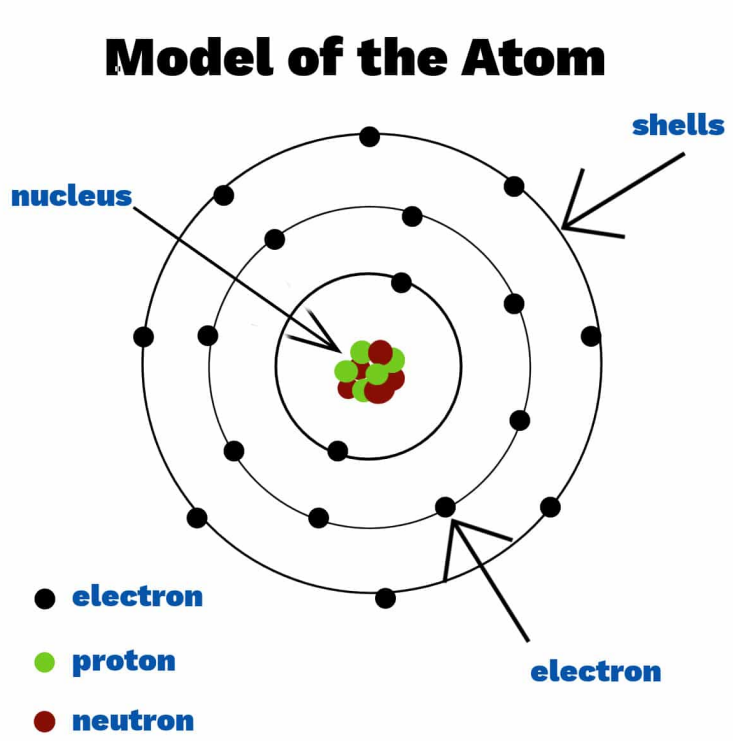
C. Atoms

Atoms

Have you ever wondered what makes up everything around us? From the air we breathe to the food we eat, everything is made up of tiny particles called atoms. Atoms are the building blocks of matter, and they play a crucial role in how everything in the universe comes together.

What Are Atoms?

Atoms are incredibly small particles that cannot be seen with the naked eye. They are so tiny that millions of them could fit on the head of a pin! Despite their small size, atoms are the fundamental units of matter. They are like the bricks that make up a building, and they combine in different ways to create all the substances and materials in the world.



Structure of Atoms

Atoms consist of even smaller particles known as subatomic particles. There are three main subatomic particles: protons, neutrons, and electrons.

1. **Protons**
   These are positively charged particles found in the center of the atom, called the nucleus. Each proton carries a positive electrical charge.

2. **Neutrons**
   Neutrons are neutral particles, which means they have no charge. They also reside in the nucleus along with protons.

3. **Electrons**
   Electrons are negatively charged particles that move around the nucleus in specific energy levels or shells.

The Atomic Nucleus

The nucleus is the central part of an atom, and it contains protons and neutrons tightly packed together. The electrons move around the nucleus in a region called the electron cloud. The electron cloud is vast compared to the nucleus, and the electrons move rapidly within this space.

Atomic Number and Atomic Mass

Each element on the periodic table is made up of atoms with a unique number of protons. This number is known as the atomic number, and it defines the identity of the element. For example, hydrogen has an atomic number of 1, which means it has one proton in its nucleus.

The atomic mass of an atom is the sum of the protons and neutrons in the nucleus. It is an average of the different forms, or isotopes, of the element. Isotopes are atoms of the same element with different numbers of neutrons.

Bonding of Atoms
Atoms can combine with other atoms to form molecules through a process called chemical bonding. There are two main types of chemical bonding:

1. **Ionic Bonding**
   In ionic bonding, atoms transfer electrons from one to another to form ions. Oppositely charged ions are attracted to each other, creating a strong bond.

2. **Covalent Bonding**
   Covalent bonding occurs when atoms share electrons with each other to complete their outer electron shells.

States of Matter
The way atoms are arranged and bonded together determines the state of matter of a substance. The three main states of matter are:

1. **Solid**
   In a solid, atoms are tightly packed together and vibrate in fixed positions. This gives solids a definite shape and volume.

2. **Liquid**
   In a liquid, atoms are still close together but can move more freely. Liquids take the shape of their container but have a definite volume.

3. **Gas**
   In a gas, atoms are far apart and move rapidly in all directions. Gases have neither a definite shape nor a definite volume.

1. What are atoms?
   A) Tiny particles that cannot be seen
   B) Large particles that make up everything
   C) Cells that make up living things
   D) The building blocks of plants

2. What are the three main subatomic particles in an atom?
   A) Neutrons, protons, and electrons
   B) Neutrons, protons, and ions

C) Electrons, protons, and molecules
D) Neutrons, electrons, and molecules

3. Where are protons and neutrons located in an atom?
   A) In the electron cloud
   B) In the nucleus
   C) Around the electron cloud
   D) In the electron shells

4. What is the atomic number of an element?
   A) The sum of protons and neutrons in an atom
   B) The number of electrons in an atom
   C) The number of protons in an atom
   D) The number of neutrons in an atom

5. What is the atomic mass of an atom?
   A) The sum of protons and electrons in an atom
   B) The sum of protons and neutrons in an atom
   C) The number of neutrons in an atom
   D) The number of electrons in an atom

6. How do atoms combine to form molecules?
   A) Through magnetic forces
   B) Through gravitational forces
   C) Through chemical bonding
   D) Through electrical forces

7. What is the process called when atoms transfer electrons from one to another to form ions?
   A) Covalent bonding
   B) Ionic bonding
   C) Molecular bonding
   D) Atomic bonding

8. In which state of matter are atoms tightly packed together and vibrate in fixed positions?
   A) Solid
   B) Liquid
   C) Gas
   D) Plasma

9. What determines the state of matter of a substance?
   A) The number of neutrons in its atoms
   B) The way its atoms are arranged and bonded together
   C) The number of protons in its atoms
   D) The number of electrons in its atoms

10. What is the electron cloud in an atom?
    A) The region where protons are located
    B) The region where electrons move around the nucleus
    C) The region where neutrons are located
    D) The region where protons and neutrons are located

ANSWERS & EXPLANATIONS

1. A - Tiny particles that cannot be seen.
    - Atoms are incredibly small particles that cannot be seen with the naked eye.

2. A - Neutrons, protons, and electrons.
    - The three main subatomic particles in an atom are neutrons, protons, and electrons.

3. B - In the nucleus.
    - Protons and neutrons are located in the nucleus, the central part of an atom.

4. C - The number of protons in an atom.
    - The atomic number of an element is the number of protons in an atom of that element.

5. B - The sum of protons and neutrons in an atom.
    - The atomic mass of an atom is the sum of protons and neutrons in the nucleus.

6. C - Through chemical bonding.
    - Atoms combine to form molecules through a process called chemical bonding.

7. B - Ionic bonding.
    - Ionic bonding occurs when atoms transfer electrons from one to another to form ions.

8. A - Solid.
    - In a solid, atoms are tightly packed together and vibrate in fixed positions.

9. B - The way its atoms are arranged and bonded together.
    - The state of matter of a substance is determined by the way its atoms are arranged and bonded together.

10. B - The region where electrons move around the nucleus.
    - The electron cloud is the region where electrons move around the nucleus in an atom.