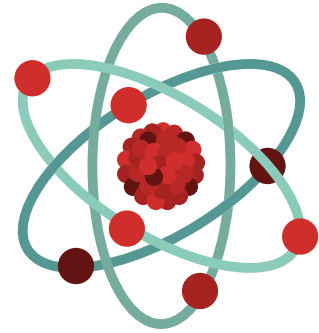


Name:

The Building Blocks of Matter

ATOMIC STRUCTURE



Please read the passage provided and follow the instructions to complete the activity.

Everything around us, from the air we breathe to the stars in the sky, is made up of tiny building blocks called atoms. Understanding atomic structure is like unlocking the secrets of the universe!

What are Atoms?

Atoms are the basic units of matter. They are incredibly tiny, so small that you'd need a special microscope to see them. Imagine that a grain of sand is about a million times bigger than an atom! Atoms are made up of even smaller particles: protons, neutrons, and electrons.

Protons and Neutrons

Protons and neutrons huddle together at the center of the atom, forming the nucleus. Protons have a positive charge, while neutrons are neutral, having no charge. The number of protons in an atom determines its identity; for example, all carbon atoms have six protons, and oxygen atoms have eight.

Electrons

Electrons are much lighter than protons and neutrons and zoom around the nucleus in specific energy levels called electron shells or orbits. They have a negative charge. The outermost electron shell, also known as the valence shell, is especially important as it determines how atoms interact with each other during chemical reactions.

The Electric Force

Protons have a positive charge, and electrons have a negative charge. Opposite charges attract each other, just like how a magnet attracts metal. This electrical force keeps the negatively charged electrons orbiting around the positively charged nucleus.

Elements and the Periodic Table

Different types of atoms are called elements. You might have heard of some common elements like hydrogen, oxygen, carbon, and gold. There are 118 known elements in total. They are organized in a chart called the Periodic Table. Each element is represented by a unique symbol, like H for hydrogen and O for oxygen.

Isotopes

Sometimes, an element can have different versions with varying numbers of neutrons in their nuclei. These are called isotopes. They have the same number of protons, giving them the same chemical properties, but their different numbers of neutrons result in different atomic masses.

Bonding

Atoms can bond with each other to form molecules or compounds. There are different types of bonds, including covalent bonds (where atoms share electrons) and ionic bonds (where atoms transfer electrons). These bonds create the diversity of materials and substances we find in the world.

Unlocking Energy

The atomic structure is essential in understanding how energy is harnessed in nuclear reactions, like those in the sun, and how it is released in atomic bombs. But don't worry; scientists use this knowledge to develop clean and safe energy sources too, like nuclear power plants.

ATOMIC STRUCTURE

Once you've finished reviewing the atomic structure, test your understanding by answering the following questions.

What are the three main subatomic particles that make up an atom?

Where are protons and neutrons located within an atom?

What is the charge of protons, neutrons, and electrons, respectively?

How does the number of protons in an atom determine its identity?

What is the significance of the outermost electron shell, also known as the valence shell?

What keeps the negatively charged electrons orbiting around the positively charged nucleus?

What are elements, and how many known elements are there?

How are elements organized and represented on the Periodic Table?

What are isotopes, and what distinguishes them from each other?

How do atoms bond with each other, and what are the two types of chemical bonds mentioned in the reading?

How does understanding atomic structure help in harnessing energy in nuclear reactions?

What are some potential applications of this knowledge in developing energy sources?

ATOMIC STRUCTURE

Naming and Identifying the Parts of an Atomic Structure

Here's a breakdown of the various components that make up an atomic structure:

- **Protons:** positively charged particles found in the nucleus of an atom
- **Neutrons:** neutral particles located in the nucleus of an atom
- **Electrons:** negatively charged particles orbiting around the nucleus
- **Nucleus:** the center of an atom that contains protons and neutrons

