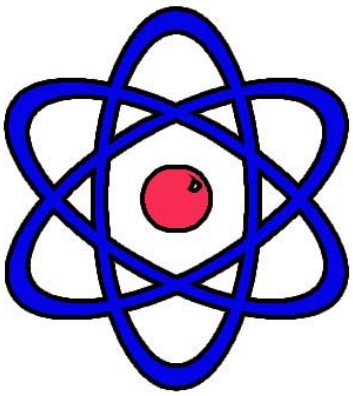
Name _____



What Is an Isotope?

Have you ever wondered what makes up the stuff around us, like water, air, or even the materials that make up your toys and gadgets? Everything you see and touch is made up of tiny building blocks called atoms. These atoms are the basic units of matter, and they combine in various ways to form the different substances we encounter every day.

Atoms are incredibly small, and they have a central part called the nucleus, which contains even tinier particles called protons and neutrons. Surrounding the nucleus are even tinier particles called electrons. Elements are the different types of atoms we have on the periodic table, each with its own unique number of protons.

Now, let's talk about isotopes. An isotope is a variant of an element, and it differs from a regular element in one crucial way: its number of neutrons. Remember, all atoms of a particular element have the same number of protons. However, isotopes of the same element have a different number of neutrons, which makes them slightly different from one another.

Let's take a closer look at an example. Carbon is an element, and its most common form, or isotope, is carbon-12. This means that a carbon-12 atom has 6 protons and 6 neutrons in its nucleus. However, there is another isotope of carbon called carbon-14, which has 6 protons and 8 neutrons. So, both carbon-12 and carbon-14 are carbon atoms, but they have different numbers of neutrons.

Why is this important? Well, the number of neutrons in an atom can affect its properties. For example, carbon-14 is used in a scientific process called radiocarbon dating, which helps scientists determine the age of ancient artifacts and fossils. This is possible because carbon-14 atoms decay over time, and by measuring how many are left in a sample, scientists can estimate how long ago the sample was formed.

Isotopes aren't limited to just carbon; they exist for many different elements. Some isotopes are stable and do not change over time, while others are unstable and undergo radioactive decay. This property can be harnessed for various applications, including in the fields of medicine, energy production, and even in understanding the Earth's history.