

Name: _____

Period: _____ Date: _____

Elements, Atoms and Isotopes

Read this passage and answer the questions that follow.

A chemical element is a substance that cannot be made into simpler substances by ordinary chemical means. Examples of elements include hydrogen, oxygen, carbon, and iron. The smallest unit of a chemical element is an atom. An atom has all the properties of the element.

Atoms, in turn, consist of smaller particles, called subatomic particles. At the center of an atom is a nucleus (plural, nuclei). The nucleus consists of subatomic particles called protons and neutrons. Protons have a positive electrical charge. Neutrons are about the same size as protons but have no electrical charge. In other words, they are electrically neutral. Electrons are tiny subatomic particles that have a negative electrical charge. They are not found in the nucleus. They orbit the nucleus at various energy levels in a region known as the electron cloud.

Because electrons are minuscule compared with protons and neutrons, they contribute virtually nothing to the mass of an atom. Instead, the mass of an atom depends almost completely on the number of protons and neutrons in its nucleus. In fact, atomic mass is calculated as the number of protons plus the number of neutrons in an atom.

The number of protons in the nucleus of an atom determines what element the atom is. That's because each element has a unique number of protons in the nuclei of its atoms. However, atoms of a given element can differ in their numbers of neutrons. Atoms of an element with different numbers of neutrons are called isotopes. For example, atoms of carbon always have 6 protons, but they may have 6, 7, or 8 neutrons. This means that there are three isotopes of carbon: carbon-12 (6 protons + 6 neutrons), carbon-13 (6 protons + 7 neutrons), and carbon-14 (6 protons + 8 neutrons).

Questions

1. Relate **atoms** to **elements**.

2. Describe the **structure of atoms**.

3. What are **isotopes**? Give an **example**.