

Name _____

Unlocking the Secrets of Atoms: Building Blocks of the Universe

Open-Ended Response Answer Key

1. Atoms consist of a nucleus, which contains protons (positively charged) and neutrons (neutral), surrounded by electron clouds. Protons and neutrons are found in the nucleus, contributing to the atom's mass and stability. Electrons orbit the nucleus in energy levels or shells, creating a balance of positive and negative charges that keeps the atom electrically neutral.
2. Determining the atomic number of a new element is crucial for its identification and classification. The atomic number represents the number of protons in the nucleus, which is unique to each element. By identifying the atomic number, scientists can place the element on the periodic table, predict its chemical properties, and study its behavior in various reactions.
3. Isotopes have diverse applications in medicine, industry, and research. For example, radioactive isotopes are used in medicine for imaging and cancer treatment. In industry, stable isotopes are employed in tracing and quality control. Their different atomic masses make them valuable tools for various purposes, from medical diagnosis to preserving the authenticity of products.
4. Atoms play a vital role in chemical reactions by rearranging and bonding with other atoms to form new substances. During a chemical reaction, bonds are broken and formed, resulting in the creation of different compounds. Understanding how atoms interact and combine is fundamental in explaining the changes that occur in chemical reactions and predicting the outcomes of these reactions.

