

Name _____

The Ever-Expanding Periodic Table: Evolution Over Time

Open-Ended Response Answer Key

1. The ongoing efforts to discover new elements and expand the periodic table involve conducting experiments that result in the creation of superheavy elements. To confirm a new element, scientists must produce it repeatedly and study its properties, such as half-life and chemical reactivity. Criteria for recognition include the element's stability, its ability to be independently verified by other laboratories, and approval by organizations like the International Union of Pure and Applied Chemistry (IUPAC). Naming new elements typically follows guidelines established by IUPAC, which often involve honoring scientists, places, or mythological figures.
2. Glenn T. Seaborg made significant contributions to the field of chemistry by expanding the periodic table to include the actinide series and synthesizing transuranium elements. His work added elements with atomic numbers beyond that of uranium, expanding our understanding of nuclear physics and chemistry. The synthesis of transuranium elements led to advancements in our understanding of atomic structure, particularly in the behavior of heavy elements. Seaborg's contributions were recognized with the naming of element 106 as seaborgium (Sg) in his honor.
3. Discovering a new element with an atomic number higher than any currently known is a complex process. It begins with conducting experiments that involve colliding atomic nuclei to create the desired element. The element's properties, including its half-life, decay products, and chemical behavior, are carefully studied to confirm its existence. Independent verification by other laboratories is crucial for validation. Once confirmed, the element is proposed for official recognition, and a name is suggested following IUPAC guidelines. The entire process requires collaboration, rigorous scientific investigation, and adherence to established protocols.
4. The historical evolution of the periodic table is a testament to the progress of human knowledge and its impact on modern chemistry. The organized framework of the periodic table has facilitated advancements in chemistry by providing a systematic way to categorize elements and predict their properties. This organization has led to discoveries of new elements, deeper insights into atomic structure, and innovations in materials science. The periodic table remains a cornerstone of chemistry, guiding research and shaping our understanding of the natural world.

