

Name _____

Noble Gases: The Quiet Heroes of the Periodic Table

Open-Ended Response Answer Key

1. The discovery of noble gases was a significant milestone in chemistry. It began with the discovery of argon in 1894 by Lord Rayleigh and Sir William Ramsay. Later, Ramsay and Frederick Soddy discovered helium, neon, krypton, and xenon. These elements were unique because they did not react with other elements, challenging the prevailing understanding of chemical reactivity. This discovery led to a better understanding of atomic structure and the development of the periodic table.
2. The colorful glow emitted by noble gases in lighting technology is due to the excitation of electrons. When an electric current passes through the gas, electrons are temporarily raised to higher energy levels. As they return to their original energy levels, they release energy in the form of visible light, producing the characteristic glow. Each noble gas emits a specific color of light, creating the vibrant colors seen in neon signs and fluorescent lamps.
3. Noble gases have a relatively low environmental impact due to their inert nature. However, concerns may arise from the extraction and production processes. Helium, for example, is a non-renewable resource, and its extraction from natural gas fields can affect the environment. It is essential to explore alternatives and minimize waste in noble gas usage.
4. Noble gases, particularly helium, play a crucial role in magnetic resonance imaging (MRI) machines. Helium is used to cool superconducting magnets, which must operate at extremely low temperatures to function efficiently. This cooling enables the magnets to produce strong and stable magnetic fields for medical and scientific imaging. The significance of helium in MRI technology lies in its ability to maintain the required cryogenic temperatures, ensuring accurate and detailed imaging.

