Uranium – The Element

A picture containing indoor, table, sitting, vase

Description automatically generatedUranium was discovered in the 1789, shortly after the discovery of Uranus, the planet that it draws its name from. Uranium is Earth‘s heaviestnaturally-occuring element and has been located in all seven continents. It has even been detected in seawater in extremely low concentations. Uranium is atomic number 92 and is located in the bottow row of the periodic table called the actinides. It is the most extensively studied actinide element. Uranium has been mined for centuries and has been used to produce electicity in the US since 1958.

Figure 1The uranium mineral autunite grows as thin blocky plates.

Uranium is known for its bright yellow color, but is normally found as black ore when mined. However, under various environmental conditions and when enough water is present,hundreds of uranium minerals can form. The minerals are often bright yellow and exist in a variety of shapes. Uranium minerals have helped scientists around the world understand the chemistry and reactivity of uranium.

Uranium is radioactive. Radioactive elements are defined as elements with unstable nuclei. This property was discovered by Henri Becquerel in 1896 and further studied by his student, Marie Curie, who was awarded two nobel prizes for her work. Almost all of the elements in the periodic table have a radioactive isotope but no stable isotopes exist for elements with atomic numbergreater than 83.

When the nucleus of an atom is unstable, it breaks down and the atom splits into two other elements. This process is called nuclear fission, and it releases a tremendous amount of energy that can be converted into electricity. This type of electricity generation is incredibly efficient as very little material can provide a great amount of electricity. Nuclear reactors are used at nuclear power plants to control nuclear fission reactions that produce electricity. Additionally, nuclear reactors are also used to power submarines and space craft. The Mars Curiosity rover is powered by nuclear energy.

Due to its abundance and our knowledge of its properties, uranium is currently the most efficient and most commonly used element to fuel nuclear power plants. Nuclear energy is vital to the US economy as it generates roughly 20% of America‘s electricity. It is used to power hospitals, national laboratories, and other important industries across the country. The energy production from nuclear fission is a zero-emission clean energy source and does not contribute to global warming.

Reference:

1. P. C. Burns and G. E. Sigmon, *Uranium - Cradle to Grave*, Mineralogical Association of Canada, Winnipeg, Manitoba, Canada, 2013.