History

Explore the discoverer's biography, including general facts about his life and anecdotes regarding how he made this particular discovery. Also see other significant scientific discoveries built largely on this concept and other real-world applications in history that may not still be relevant.

Discoverer/Developer

Antoine-Henri Becquerel (1852-1908) was the first to discover radioactivity. He was born in Paris into a family of physicists. His father and grandfather both had held the physics chair at the National Museum of Natural History in France. In 1892, Antoine-Henri Becquerel was appointed to hold the physics chair there as well. Marie Curie was one of Becquerel's students that he greatly influenced. Becquerel's discovery of radioactivity occurred when he was attempting to study fluorescence with photographic plates. When photographic plates were placed near materials containing uranium, such as uranium salts, the photographic plates became fogged. This was an unexpected discovery, as the plates were only expected to fog if exposed to light. Becquerel determined the particles given off by the uranium salts were electrons by measuring the particle's charge to mass ratio. The 1903 Nobel Prize in Physics was awarded jointly to Becquerel and Marie and Pierre Curie for their work on radiation. The units of radioactivity, Becquerels, are named in his honor. Also, craters on the moon and Mars are named for Becquerel.

Ernest Rutherford (1871-1937) was the first person to coin the term beta radiation. He was born in New Zealand and became a professor at McGill University where he studied radioactivity. He later went on to become a professor at Cambridge University. Rutherford's Model of the Atom, based off his Gold Foil Experiment, was a significant step forward in understanding the composition of the atom. In 1899, Rutherford named the mysterious particles given off by uranium beta particles. (This was before Becquerel had discovered beta particles were electrons.) Rutherford also determined that beta particles could be stopped only by a sheet of metal a few centimeters thick. The 1908 Nobel Prize in Chemistry was awarded to Rutherford, and he was knighted in 1914. Element 104, Rutherfordium, was named in honor of him.

Real World Application

Discover processes or disciplines in the natural or man-made worlds that employ the concept.

Radionuclide therapy (RNT) or radiotherapy is a cancer treatment that works by utilizing beta decay. Lutetium-177 or yttrium-90 is attached to a molecule and ingested, where it travels to the cancer cells. As the radioactive atoms decay, they release beta particles and kill the nearby cancer cells.

Carbon dating is used to date artifacts, wood, and animal remains by finding the ratio of carbon-14 to carbon-12 in the object. There is always a certain amount of carbon-14 in the atmosphere, and when a plant or animal dies the carbon-14 it had in its body starts to turn into nitrogen-14 via beta decay. By using the ratio of carbon-14 to carbon-12, the approximate date of the material can be determined.

Vocabulary

Learn important vocabulary for this concept, including words that might appear in assessments (tests, quizzes, homework, etc.) that indicate the use of this concept.

Important Vocabulary **Term** **Context**

beta particle

- an element emits beta particles from its nucleus

isotope

- two isotopes of radium

Videos

Browse relevant videos from the Journal of Chemical Education's (JCE) Chemistry Comes Alive! library and other video sources.

Radioactive Decay Equations

A description of alpha, beta, and gamma decay with reactions written out.

Cloud Chamber Apparatus

A cloud chamber with thorium nitrate and ethanol is used in order to see alpha and beta particles. The alpha particles are thin rays and the beta particles are wider blurs.

Computer Animations

Experience computer simulators or animations that illustrate the concept discussed here. Many simulators or animations come with worksheets for use in class.

http://www.colorado.edu/physics/2000/applets/iso.html

Works Cited

Review the works cited to write the researched parts of this page, such as the discover's biographical information and other areas.

Works Cited

Ihde, Aaron J. The Development of Modern Chemistry. New York: Harper & Row, 1964.