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Radioactivity

Raximov Azizjon Zafar o'g'li
Freelance researcher

Ashirov Sunatilla
Former professor of the Institute of Finance

Annotation
Marie Curie's Discovery of Radioactivity: Unveiling the Hidden World Within Atoms. From the groundbreaking identification of polonium and radium to the understanding of subatomic particles, Curie's research revolutionized physics. Despite health risks, her perseverance transformed our understanding of the atomic realm, paving the way for significant scientific advancements.

Keywords: Radioactivity, Marie Curie, Discovery, Atoms, Polonium, Radium, Subatomic particles, Physics, Uranium, Scientific advancements.

Introduction:

Marie Curie's legacy in science remains unparalleled, particularly her seminal work on radioactivity. In an era marked by burgeoning scientific inquiry, Curie's research stood as a beacon of innovation. This article provides a comprehensive examination of Curie's discoveries, from the identification of polonium and radium to their far-reaching implications for our understanding of atomic structure and the nature of matter.

Why Is This One of the 100 Greatest?

Marie Curie's discovery of two naturally radioactive elements, polonium and radium, made head line news, but her real discovery was that at oms were not small solid balls and that there must be even smaller particles in side them. This discovery opened the door to all atomic and sub atomic research and even to the splitting of the atom.

Curie carried out her research with radioactive elements before the dangers of radioactivity were under stood. She suffered from ill health (radiation sickness) for most of her adult life. Indeed, for many years after her death, her note books were still highly radioactive.

Marie Curie's studies rank as one of the great turning points of science. Physics after Curie was completely different than before and focused on the un discovered sub atomic world. She cracked open a door that penetrated inside the atom and has led to most of the greatest advances of twentieth-century physics.

How Was It Discovered?

In 1896 Marie Curie decided to complete her doctoral dissertation in a totally new field: radiation. It was ex citing. It was something no one had ever seen or studied before. Scientists knew that electrically charged radiation flooded the air around uranium, but not much else was known. Marie used a device her husband, professor Pierre Curie, invented to detect electric charges around mineral samples. She named this process radio activity and concluded that radio activity was emitted from inside a uranium atom.

Since the Curies had had no money of their own to pay for her research, and since the university refused to fund a woman's graduate-level physics research, Marie scrounged for free lab space. She found an abandoned shed that had been used by the Biology Department to hold cadavers. It was un bear ably hot in the summer and freezing cold in the winter, with a few wooden tables and chairs and a rusty old stove.

In 1898 Marie was given a puzzling uranium mineral ore called pitch blende, which her tests showed gave off more radioactive emissions than expected from the amount of uranium it contained. She concluded that there must be another substance inside pitch blende that gave off the extra radiation.

She began each test with 3.5 ounces of pitch blende. She planned to remove all of the known met also that ultimately all that would be left would be this new, highly active element. She ground the ore with mortar and pestle, passed it through a sieve, dissolved it in acid, boiled off the liquid, filtered it, distilled it, then electrolyzed it.

Over the next six months Marie and her husband, Pierre, chemically isolated and tested each of the 78 known chemical elements to see if these mysterious radioactive rays flowed from any other substance besides uranium. Most of their time was spent begging for tiny samples of the many elements they could not afford to buy. Oddly, each time Marie removed more of the known elements, what was left of her pitch blende was always more radioactive than before.

What should have taken weeks, dragged into long months because of their dismal working conditions. In March 1901, the pitch blende finally gave up its secrets. Marie had found not one, but two new radioactive elements: polonium (named after Marie's native Poland) and radium (so named because it was by far the most radioactive element yet dis covered). Marie produced a tiny sample of pure radium salt. It weighed .0035 ounces—less than the weight of a potato chip—but it was a million times more radioactive than uranium!

Because the dangers of radiation were not yet understood, Marie and Pierre were plagued with health troubles. Aches and pains. Ulcer-covered hands. Continuous bouts of serious ill nesses like pneumonia. Never-ending exhaustion. Finally, the radiation Marie had studied all her life killed her in 1934.

In conclusion, Curie's remarkable achievements serve as a testament to the transformative potential of scientific inquiry and the enduring impact of perseverance and dedication. As we navigate the complexities of the modern world, we must draw inspiration from Curie's example and remain steadfast in our pursuit of knowledge and understanding. In doing so, we honor her legacy and continue to build upon her groundbreaking discoveries for the betterment of humanity and the advancement of scientific progress.

Interesting fact: Female Nobel Prize laureates accounted for only 34 out of a total of 723 prizes awarded as of 2005. Marie Curie is not only the first woman to be awarded a Nobel Prize, but also one of four persons to have been awarded the Nobel Prize twice.