Modern Alchemy

HISTORICAL PERSPECTIVE

Until a hundred years ago, chemists were still debating the validity of John Dalton's atomic theory. Few, however, challenged the notion that the elements were unchangeable. Near the beginning of the twentieth century, the discovery of some new elements and the strange radiation they emitted established the connection between atoms and the elements while resurrecting an ancient notion long discarded by science.

Before Chemistry

Until the chemical revolution of the seventeenth and eighteenth centuries, most theories about matter were based on the ideas of the ancient Greek philosopher Aristotle. He postulated that all matter consisted of four elements: earth, water, air, and fire. In turn, each of these elements exhibited two of four fundamental properties: moistness, dryness, coldness, and hotness. By altering these basic properties, Aristotle claimed, the elements could be transformed, or transmuted, into one another.

The interior of an alchemist's laboratory is depicted by artist Eugene Isabey.

The practical pursuit of transmutation became known as alchemy, and for more than 1,500 years investigators searched in vain for alchemical methods that would transform common metals such as mercury and lead into precious gold. Then, in the seventeenth century, chemists began to question Aristotle's assumptions. They defined an element as a material that can't be broken down into simpler substances, and with no evidence to support the possibility of transmutation of the modern elements, alchemy fell into ill repute.

Strange Rays

In 1896, French scientist Henri Becquerel discovered that the element uranium gave off a strange, invisible radiation. The report of these "uranic rays" caught the attention of a young chemist by the name of Marie Curie.

Working with her husband, Pierre, Marie began to test various substances for radioactivity. Analyzing a mineral composite called pitchblende, a known source of uranium, she was startled to find that the composite's level of radioactivity was greater than that of a similar amount of pure uranium. This meant that another radioactive material besides uranium was present in the pitchblende.

After months of tedious work, Marie had isolated two new radioactive elements, which she

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