

THE PLUTONIUM STORY

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ABSTRACT

The first nuclear synthesis and identification (i.e., the discovery) of the synthetic transuranium element plutonium (isotope ^{238}Pu) and the demonstration of its fissionability with slow neutrons (isotope ^{239}Pu) took place at the University of California, Berkeley, through the use of the 60-inch and 37-inch cyclotrons, in late 1940 and early 1941. This led to the development of industrial scale methods in secret work centered at the University of Chicago's Metallurgical Laboratory and the application of these methods to industrial scale production, at manufacturing plants in Tennessee and Washington, during the World War II years 1942-1945. The chemical properties of plutonium, needed to devise the procedures for its industrial scale production, were studied by tracer and ultramicrochemical methods during this period on an extraordinarily urgent basis. This work, and subsequent investigations on a worldwide basis, have made the properties of plutonium very well known. Its well studied electronic structure and chemical properties give it a very interesting position in the actinide series of inner transition elements.

KEYWORDS

Plutonium; fortieth anniversary; discovery; fissionability; tracer chemistry; ultramicrochemistry; first isolation; industrial scale production; actinide.

INTRODUCTION

This year marks the fortieth anniversary of the synthesis and identification (i.e., the discovery) of plutonium. I believe that this "Actinides-1981" conference is an appropriate place to recount some of the history and describe the present status of this element.

The story of plutonium is one of the most dramatic in the history of science. For many reasons this unusual element holds a unique position among the chemical elements. It is a synthetic element, the first realization of the alchemist's dream of large-scale transmutation. It was the first synthetic element to be seen by man. One of its isotopes has special nuclear properties