THE DEVELOPMENT OF THE LITERATURE OF THE TRANSPUTIUNIUM ELEMENTS

JERRY B. AVER	
Tennessee Technological University
Cookeville, Tennessee 38501

ABSTRACT

The development of the literature of the transplutonium elements has been rapid and serves to illustrate many of the problems of scientific information handling. Nearly 5,000 articles and other information sources have been abstracted in Chemical Abstracts (CA) and Nuclear Science Abstracts (NSA) during the period 1937 through 1968. The purpose of this paper is to trace the growth of the literature of the transplutonium elements and to indicate some of the factors that have been important in the development of CA and NSA. The subject indexes of CA and NSA were searched for all references to articles on transplutonium elements. The references were categorized into four broad areas based on the subject of the paper: Plutonium and other transplutonium elements; plutonium chemistry; transplutonium chemistry; and transplutonium physics and nuclear energy. The abstracts of the literature items have appeared in primary journals and 51% of these references have appeared in 15% of the journals. Approximately 50% of the items relate to the properties of the elements, 40% to literature on the use of the elements in Inertial and other applications of the elements. The growth of the literature of the transplutonium elements paralleled the growth of the literature of plutonium.

INTRODUCTION

The conclusion of World War II and the easing of war time security brought forth the announcement of the transplutonium elements (Seaborg, 1946). Prior to this announcement, fourteen papers were indexed in Chemical Abstracts between 1937 and 1945, which discussed the possible preparation and predicted the properties of these elements. From 1945 to 1968, a total of nine elements were discovered, which completed the actinide series of elements. These elements were distinguished by the number of articles, reports, etc., appearing in literature in increasing numbers through subsequent years. The purposes of this study were to trace the growth of the literature of the transplutonium elements in terms of interest to users of the literature and to examine the methods and subfields of information abstraction between Chemical Abstracts and Nuclear Science Abstracts.

DATA COLLECTION

In order to make a comprehensive survey of the literature of the transplutonium elements, all references to these elements should be consulted and duplications eliminated by cross-checking Chemical Abstracts and Nuclear Science Abstracts. Each paper by normal search methods was impractical and would have consumed too much time. Also some authors, such as Abstracts of Classified Reports, were not generally available. Therefore, the present study was based on two major sources, Chemical Abstracts (CA) and Nuclear Science Abstracts (NSA). These two publications were readily available and abstract a substantial portion of the literature on the elements.

In making the survey, the indices of CA Volume 31 (1937) through Volume 40 (1968) were searched using the following major search terms: name of each transplutonium element, element number, transplutonium, transplutonium (or appropriate variations). The indices of Volume 1 (1948) through Volume 22 (1968) of NSA were searched using the same technique employed with CA.

Internal documents and classified items were removed from the listings obtained from each abstract source, for each of the elements. Duplicates among CA and NSA were removed from each search. However, an item may be listed for more than one element. For example, a paper discussing a transplutonium element was published in Chemical Abstracts, then a subsequent paper discussing a transplutonium element was published in Nuclear Science Abstracts, and a third paper was published in another journal. A search on the element of the second paper found that the abstract was identical with the first paper. It was decided that the first source should be included because of the possible time lag before the second paper was published. This search did not include the possibility of an element being identified under more than one name or symbol. The purpose of this search was to identify items dealing with chemical and physical properties of the transplutonium elements; therefore, the references were limited under "properties." Items dealing with topics such as analytical methods, processing techniques, and environmental problems were included under "technology." While all items relating to the uses of the element, and their components and alloys were included under the heading of "application," items relating to toxicity and handling of the elements and the relationship of the elements to plants and animals were categorized under "health and safety."
for the items related to Americium. In general, the longer an element has been known the more overlap between the two abstract sources. Journal articles accounted for 70% of the references in CA and 46% in NSA. Reports and other items accounted for 30% and 54%, respectively, of the references in CA and NSA. There was only a slight variation in these figures for each of the elements.

CONCLUSIONS

This study has shown that the development of the literature of the transplutonium elements has been rapid, with a doubling of the literature every four to five years for the period 1956-1968. The development of the literature of the transplutonium elements has paralleled the development of the literature of plutonium. A total of 5,784 references appeared in the literature abstracted in CA and NSA during the first 25 years after the discovery of the first transplutonium element.

About 47% of the references to the transplutonium elements have appeared in a variety of primary journals. The remaining 54% of the literature items appeared in such publications as theses, reports, conference proceedings, etc. One of the most important problems associated with searching the literature of these elements is the confusion over material covered in reports and similar documents. The coding system for many of these items is extremely confusing and additional efforts must be made to clarify this situation.

The overlap between the two abstract sources is about 37%. For a conventional manual search of the literature for items related to the transplutonium elements, it is essential that both CA and NSA be searched thoroughly.

In order to cope with the increased volume, conventional methods of literature searching are becoming outmoded. Various groups are tackling the problems of dissemination of current information by more economical and rapid means. One of these groups is the Chemical Abstracts Service which has developed a number of chemically oriented computer data bases to meet the needs of scientists to remain current with the ever expanding literature. It is obvious that in the near future the traditional manual search of CA and NSA in the library stacks will be an insurmountable task. Information retrieval techniques such as computer based program searches will help improve this situation.

**LITERATURE CITED**

