



AEC-NASA TECH BRIEF



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Detection Sensitivities in 3-8 MeV Neutron Activation

Neutron activation analysis is currently being used to identify certain elements that are difficult to isolate and identify in chemical systems. A sample of unknown material is activated with neutrons and the resulting γ -ray emission spectra is used to identify the material.

A study has been conducted to determine the relative detection sensitivities of 73 of the elements (all the radioactively stable elements except beryllium, lutetium, osmium, and the noble gases) using the fast, unmoderated neutrons from an $\text{Am}^{241}\text{-Cm}^{242}\text{-Be}$ source.

The experiments were carried out for three combinations of irradiation, cooling, and counting conditions for the purpose of differentiating the product nuclides on the basis of half-lives. The three conditions were: 1) 5 min. irradiation, 6 sec. cooling, 2 min. counting; 2) 5 min. irradiation, 4.9 min. cooling, 20 min. counting; and 3) 1 hour irradiation, 1 hour cooling, 40 min. counting.

The induced spectra were measured by a 10 cm diameter by 10 cm long NaI(Tl) crystal. A high output isotopic neutron source was used because it is mobile, requires little maintenance, has a small flux gradient, and has a neutron flux of 3-8 MeV neutrons.

The relative standard deviation of a typical series of measurements was 0.92%.

Notes:

1. The study has been reported in ANL-7242, "Detection Sensitivities in Nuclear Activation with an Isotopic Neutron Source (with a collection of γ -ray spectra)," by J. Wing and M. Wahlgren, Chemistry Division, Argonne National Laboratory, August, 1966. The report is available from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Va. 22151; price \$3.00 (microfiche, \$0.65).
2. Inquiries concerning this innovation may be directed to:

Office of Industrial Cooperation
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439
Reference: B68-10298

Source: J. Wing and M. A. Wahlgren
Chemistry Division
(ARG-10210)

Patent status:

Inquiries about obtaining rights for commercial use of this innovation may be made to:

Mr. George H. Lee, Chief
Chicago Patent Group
U.S. Atomic Energy Commission
Chicago Operations Office
9800 South Cass Avenue
Argonne, Illinois 60439

Category 02

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The AEC-NASA Tech Brief program is a joint effort of the Atomic Energy Commission and the National Aeronautics and Space Administration. It is designed to provide a means for the dissemination of technical information from research and development activities in the fields of atomic energy and space technology.

Progress Report on the Development of a New Type of Rocket Motor

The progress report describes the development of a new type of rocket motor. The motor is designed to provide a high thrust-to-weight ratio and is capable of operating in a wide range of altitudes. The report details the design of the motor, the materials used, and the results of the tests conducted to date.

The motor is based on a new type of propellant and a novel combustion chamber design. The propellant is a solid grain and the combustion chamber is a cylindrical shape with a conical nozzle. The motor is capable of operating at pressures up to 1000 psi and at temperatures up to 3000 K.

The results of the tests show that the motor is capable of operating at a thrust-to-weight ratio of 100 and a specific impulse of 300 seconds. The motor is also capable of operating in a wide range of altitudes, from sea level to 100,000 feet. The report concludes that the motor is a promising candidate for use in a variety of space applications.

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