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RECOMMENDED PROCEDURE FOR THE
MEASUREMENT OF 14-MeV NEUTRON FLUXES
FROM ACCELERATORS FOR ACTIVATION
ANALYSIS

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Abstract - A procedure based on the measurement of the ^{62}Cu activity induced in copper disks is described to facilitate interlaboratory comparisons of 14-MeV neutron fluxes.

INTRODUCTION

The method usually applied for determining effective fluxes of 14-MeV neutrons from generators using the T(d,n)He reaction in fast-neutron activation analysis is the one agreed upon at the Second International Conference on Modern Trends in Activation Analysis held in 1965 and known as the "Texas Convention on the Measurement of 14-MeV Neutron Fluxes from Accelerators" (1). Experience after that meeting has shown that, in order to facilitate interlaboratory comparisons of fluxes and establish a common basis for the determination of fast-neutron fluxes quoted in the activation analysis literature, some changes in the Convention are desirable.

The following procedure is now recommended.

RECOMMENDATION

The effective fluxes for sample activation are to be measured by exposing high-purity (99.9%) copper disks of 0.25-mm thickness and 1-cm and/or 2.5-cm diameter for 1 min to the neutron flux. After a minimum cooling time of 1 min, to permit sample transfer and decay of the interfering ^{16}N activity, the positron annihilation radiation emitted by the disk is counted and the disintegration rate of the ^{62}Cu activity determined for the time of the end of the activation. The recommended half life value for ^{62}Cu is 9.8 min. The flux obtained in dis/min/gram copper is then converted to neutrons/cm²/sec using for the cross section of the reaction $^{63}\text{Cu}(n,^{2n})^{62}\text{Cu}$ a value of 500 mb.

Flux measurement conditions should be designed to avoid inhomogenous fluxes which can result from depleted targets, uneven deuteron spots or changes in the deuteron beam density distribution. It is further recommended that in reporting fluxes the exact distance between the center of the tritium target and the center of the copper foil be indicated.

COUNTING PROCEDURE

The recommended counting procedure is that of R.L. Heath detailed in the "Appendix to the Texas Convention on the Measurement of 14-MeV Neutron Fluxes from Accelerators" (2).

REFERENCES

1. Proceedings, 1965 Int. Conf. on Modern Trends in Activation Analysis, ed. by Texas A&M University, College Station, USA, 1965, pp. 387-388.
2. Ibid., pp. 389-390.