MEASUREMENT OF THE $^{51}$V(n,p)$^{51}$Ti REACTION CROSS SECTION FROM THRESHOLD TO 9.3 MEV BY THE ACTIVATION METHOD*

by

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ABSTRACT

The activation method was used to measure cross sections for the $^{51}$V(n,p)$^{51}$Ti reaction from near threshold at 2.856 MeV up to 9.267 MeV. Forty-five approximately-monoenergetic cross section values were obtained; they provide complete, detailed coverage of this energy range with FWHM resolutions of $\sim 0.08$ to $0.1$ MeV below $\sim 4.7$ MeV and $\sim 0.14$ to $0.28$ MeV above this energy. These data span $\sim 90\%$ of the total response for the standard $^{235}$U thermal-neutron-induced-fission neutron spectrum and $\sim 86\%$ of the total response for the standard $^{252}$Cf spontaneous-fission neutron spectrum. The present experimental cross sections are significantly larger (e.g., by $\sim 50\%$ at $\sim 8$ MeV) than the corresponding values from the ENDF/B-V evaluation which was derived from nuclear model calculations. The calculated integral cross section (based on the present work) for the $^{252}$Cf spontaneous-fission neutron spectrum agrees very well with a recently reported measurement (the calculated value is only $\sim 2\%$ smaller). Corresponding agreement with the equivalent experimental value for the $^{235}$U thermal-neutron-induced-fission neutron spectrum is less favorable (the calculated value is $\sim 20\%$ larger).

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