

New Neutron Cross-Section Measurements on ^{41}K and ^{55}Mn from ORELA

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After operation of the Oak Ridge Electron Linear Accelerator (ORELA) was restored, a series of new measurements was undertaken in response to deficiencies identified in nuclear data libraries. These data are of crucial importance to the U.S. Nuclear Criticality Safety Program as well as for studies of the storage of radioactive waste. New data and evaluations including covariances are required for materials found in mixtures with uranium. For example, because of their large neutron cross sections and the substantial uncertainties in previous measurements, new neutron capture and total cross-section measurements are needed for ^{41}K and ^{55}Mn .

The ^{41}K neutron capture experiment, using an enriched ^{41}KCl sample, was performed on flight path 7 at the 40-m flight station of ORELA. The pulse-height-weighting technique using a pair of deuterated benzene (C_6D_6) detectors was employed. These data will complete a series of measurements made at ORELA to be used in an evaluation of the neutron capture and total cross sections of ^{39}K and ^{41}K . The neutron capture cross section of ^{55}Mn was measured with the same setup, using a solid metallic ^{55}Mn sample that was 2.54 x 5.08 x 0.317 cm.

The total cross section of ^{55}Mn was measured by using a modernized apparatus at flight path 1. The sample was metallic ^{55}Mn powder with a thickness of 0.118 at/barn. Two channels of an Acqiris digitizer were used to digitize signals from a ^6Li -glass detector and determine both time of flight and pulse height for each event. Data were written to disk in event mode as well as displayed online in histograms. A sample changer, located 9 m from the neutron target, was operated by a stepping motor that was controlled by the acquisition computer.

We will present preliminary results of these new measurements, which ultimately will be the basis for new evaluations of neutron total and capture cross sections of ^{41}K and ^{55}Mn .

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