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# PROGRESS REPORT FROM TURKEY

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Study of lowest resonances with CS - number of nuclei in $Tm^{169}$
$In^{115m}$
applied nuclear studies in some non chemical bonds

# NEUTRON WIDTHS IN SLOW NEUTRON RESONANCES AND EFFECT OF THE DIFFUSE NUCLEAR EDGE ON LOW ENERGY NUCLEAR REACTIONS

Çetin CANSOY

In this study the s-wave character of low energy neutron resonances has been discussed. From experimental arguments it has been concluded that s-wave neutron resonances were impossible! It has been shown that the theoretical values of neutron widths of s-wave resonances were $10^4$- $10^5$ times larger than the experimental values. The formulae giving the neutron widths for the cases of p, d, and f-wave resonances have been developed and in this way the discrepancy between the theoretical and experimental values of neutron widths has been removed. Using the new neutron width formulae the method of resonance analysis has been modified. In the modified form of analysis of the experimental data one does not need the value of g(J). However, g(J) can be determined by using experimental total cross sections.

The total cross section of $^{169}$Tm has been measured in the energy range from 0.35 to 3.2 eV with the ÇNAEM crystal spectrometer using the Be(1231) crystal planes as a monochromator. Applying the modified form of the method of resonance analysis to these experimental data the value of g(J) has been found to be 7/4.

The total cross section of $^{159}$Tb has also been measured in the energy range from 0.35 to 3.65 eV with the ÇNAEM crystal spectrometer using the Be($12\bar{3}1$) crystal planes as a monochromator. The resonance at 3.34 eV was fitted to a Breit-Wigner single-level formula by the method of least squares. Using the modified form of the method of resonance analysis the value of g(J) has been found to be 1/8.

# MEASUREMENT OF $^{115}$In RESONANCE PARAMETERS BY ACTIVATION TECHNIQUE ITS COMPARISON WITH TRANSMISSION METHOD AND LOW INTENSITY ABSOLUTE MONO-ENERGETIC NEUTRON FLUX DETERMINATION IN CRYSTAL SPECTROMETER

Çetin ERTEK, Salih Zeki COŞKUN

In this study the resonance parameters of $^{115}$In has been determined by the method foil activation using monochromatic neutrons obtained in ÇNAEM crystal spectrometer. $^{115}$In foil has been irradiated by monochromatic neutrons at 22 different neutron energies using Be($12\bar{3}1$) crystal planes as a monochromator. The open beam neutron-counts were taken using a $BF_3$ counter before and after irradiation for activation normalization. The decay of the irradiated samples is followed by using an end-window beta-counter.

Since the activation process does not depend on scattering cross section. But it only depends on absorption cross section; the resonance energy ($E_o$) and the radiation width ($\Gamma_\gamma$) can be determined directly.

On the other hand, this method gave us the possibility of finding the absolute mono-energetic neutron flux inside the second collimator of the crystal spectrometer.

# THE INVESTIGATION OF THE $^{13}C(p,n)^{13}N$ REACTION BY THE RECOIL PROTONS

Tanzer TÜRKER, Talât ERBEN

$^{13}N$ is brought into view on $^{13}C$ by (p,n) reaction and on $^{16}O$ by (p,α) reaction. Having different threshold values, it is impossible to make discrimination with the reactor neutrons. For that reason, lineer accelerator was used in the Faculty of Science, University of İstanbul. But the counting afficiant was not sufficient.

Now, one of the trough tupes of the TR-1 Reactor is being prepared to provide neutron beam terminalized in high estimate and clean from gamma rays.

Neutron-captured gamma rays will be examined in different elements.

# THE REFLECTIVITY MEASUREMENTS OF SODIUM CHLORUR SINGLE CRYSTAL FOR SLOW NEUTRONS

Fehime BAYVAS

Neutron reflectivity measurements are being done by (200) plane of sodium chlorur single crystal to find out the reflectivity relation experimentally, between 0.01-1.0 eV.

The relative integrated intensities are being determined for the first order of Bragg reflections.

The results will be compared with the existing theories. The study has not been completed yet.

# REDETERMINATION OF THE CRYSTAL STRUCTURE OF SODIUM THIOSULPHATE PENTAHYDRATE BY NEUTRONS

Ali Fuad CESUR

Using a single crystal of the substance, neutron diffraction data for okl and hko reflection planes have been collected at TR-1 previously.

Two projections in the directions [100] and [001], of the structure have been studied by trial-and-error method and the position of all hydrogens have been fixed.

The tetiahedral of atoms around one of the sulphur atom was studied and three equal bond lengths were obtained. The shape and arrangement of water molecules and the probable arrangement of hydrogen-bonds have been deduced.

For this study no absorption and secondary extinction corrections have been applied to the data; but new data with smaller crystal for this purpose has been collected and is being analyzed.

# A CODE IN FORTRAN II
# FOR MONO-ENERGETIC NEUTRON ACTIVATION
# OF FILTERED FOILS

Çetin ERTEK

The code is based on the rigorous calculation of S. Pearlstein and E.V. Weinstock for foil activation measurements. In that work, calculations have been performed of scattering and absorption self shielding effects in the activation of bare and cadmium covered Au, In, and 1/v detectors in slab geometry in both mono-directional (beam) and isotropic flux, for a range of detector thicknesses. In the present work a CODE "AYTEK-I" is generated for mono-directional flux in slab geometry for only mono-energetic neutrons. So, in this code, mathematical expressions do not contain integral over the neutron energy. CODE "AYTEK-I" works for all kind of detectors and covers provided that the front and back cover thicknesses are same. A detecting foil of thickness $t_D$ sandwiched between two covers of filters, each of thickness $t_c$ in a neutron beam impinging normally are shown. The second cover is used to shield the foil from neutrons scattered from the surroundings.