THE AVERAGE $^{130}$Ba(n,γ) CROSS SECTION AND THE ORIGIN OF $^{131}$Xe ON THE MOON, W.A. Kaiser, Univ. of California at Berkeley, Physics Dept., Berkeley, Calif., 94720, and B. L. Berman, Univ. of California, Lawrence Livermore Laboratory, Livermore, Calif., 94550.

The average $^{130}$Ba(n,γ) cross section has been measured for a neutron spectrum similar to the one at the lunar surface. The pulsed-neutron facility at the Livermore 100-MeV Electron Linear Accelerator served as the source of radiation. The spectrum and flux of neutrons were measured simultaneously with the sample irradiation by the neutron time-of-flight technique. Chemically pure natural BaCl$_2$ samples were irradiated with a total integrated neutron flux of $1.6 \times 10^{13}$ neutron/cm$^2$. The $^{131}$Xe resulting from neutron capture on $^{130}$Ba was measured mass spectrometrically. The results show that the integrated product of the neutron flux and the neutron-capture cross section is equal to $1.8 \times 10^{-10}$, whence the average cross section $\bar{\sigma} = 12$ b. If, however, the energy range is restricted to the most likely region for large capture resonances (1 - 1000 eV), the resulting $\bar{\sigma} = 220$ b. This large value enables us to conclude that the anomalously high concentration of $^{131}$Xe in lunar rocks probably has been produced via this reaction.

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