by electron capture. In some instances high efficiency was obtained by using a windowless proportional counter to detect Auger electrons. The samples obtained in the precipitation chemistry experiments (to be mentioned) were counted close to the thin window (3 mg/cm^2 mica) of a bell-jar-type Geiger counter filled with a mixture of 0.8 cm pressure of amyl acetate plus 11 cm pressure of xenon instead of the usual alcohol-argon mixture. The use of xenon enhances the efficiency for counting L x-rays. Hereafter in this paper this type of tube will be referred to as a xenon-filled Geiger tube. In the case of these relatively thick samples an aluminum absorber of thickness ~20 mg/cm^2 was used between the sample and counter window to reduce errors due to variable absorption of soft components as a function of differences in sample thickness. In some of the experiments samples were counted with various thicknesses of absorber (usually beryllium and beryllium together with lead) between the sample and the counter window in order to estimate energies and distinguish between electrons and electromagnetic radiations.

The L x-rays as counted in the xenon-filled Geiger counter were used as the basis for calculation of disintegration rates and total numbers of atoms. The L x-ray counting yield for the electron-capture isotope U^{231} had been determined previously by Crane, Ghiorso, and Perlman[12] using the same counter and conditions of measurement as were used by us. They compared the number of L x-ray counts of their U^{231} samples with the number of Pa^{231} daughter alpha-particles observed on complete decay. Defining counting yield as the number of L x-ray counts at ~10 percent geometry observed in a xenon-filled Geiger tube corrected to the number of counts at no absorber divided by the total number of electron-capture daughter atoms produced, Crane et al. obtain a counting yield of 0.0025. The same factor was used in our work to calculate the disintegration rate after making suitable corrections for the differences in absorption and in counting

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[12] Crane, Ghiorso, and Perlman, unpublished work.