according to Heidenreich and Shockley the distortion seems to be confined to the immediate vicinity of the slip bands. Somewhere in the range of strain from 1 percent to 20 percent the behavior changes, the strains become more homogeneously distributed, the rate of work-hardening increases, and the average of the internal strains over the volume increases rapidly. It may be that at large strains the deformation is sufficiently homogeneous that Taylor's theory can be applied. It seems that the limiting amount of deformation at the slip bands before severe work-hardening begins can be increased by increasing the temperature, by decreasing drastically the rate of strain, and by the use of solid solutions.[8]

There are a number of leading questions which we would like to ask: Does the stress-strain curve remain relatively flat as long as the slip bands consist of a single step; does the stress begin to rise when the slip bands change from a single step to one or more laminae? Does slip continue to occur at a slip band throughout the entire course of deformation? Do new slip bands appear throughout the course of deformation? At large strains is all of the strain accounted for by the relative shearing displacement of neighboring laminae or should one suppose that a portion of the strain is associated with a Taylor dislocation lattice? For deformations at low temperatures does the maximum shearing displacement at a step depend on the size of the specimen?

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The Positron Decay of F^{18}

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THE positron spectrum of F^{18} has been investigated by different authors with rather contradictory results. Snell[1] and Yasaki and Watanabe[2] found a simple spectrum with upper limit between 500 and 700 kev using absorption and cloud-chamber methods. Knox[3] could not find any evidence for nuclear γ-rays. A detailed investigation by means of a cloud chamber has been carried out recently by Zah-Wei Ho,[4] who described a twofold complex β^+-spectrum with upper limits at 950 ± 50 kev (20 percent) and 600 ± 100 kev (80 percent). In addition this author found a 1.4 Mev γ-ray together with some low energy γ-radiation.

A study of this problem with a magnetic β-spectrometer seems desirable. Thin sources of high specific activity are required herefor. A well suited F^{18}-source has been obtained by irradiation of a thin mica foil (muscovite: $KAl_3Si_3H_2O_{12}$) with protons from the cyclotron. A few minutes after bombardment all short periods arising from Al, Si and O have practically disappeared and only two periods of respectively 112 ± 1 minutes and 8 days remain. The negligibly weak 8 days activity can be assigned to Ca^{41} produced in the reaction $K(p, n)Ca$. The 112 minutes period showing β^+-activity arises from F^{18} formed by (p, n)-reaction of O^{18}. In spite of the low isotopic abundance of O^{18} the resulting activity is sufficient for spectrometer measurements. The source used for the magnetic lens spectrometer was a 1.6 mg/cm² mica foil activated directly with a 5.5 Mev proton beam of 1 μA and 6 mm in diameter.

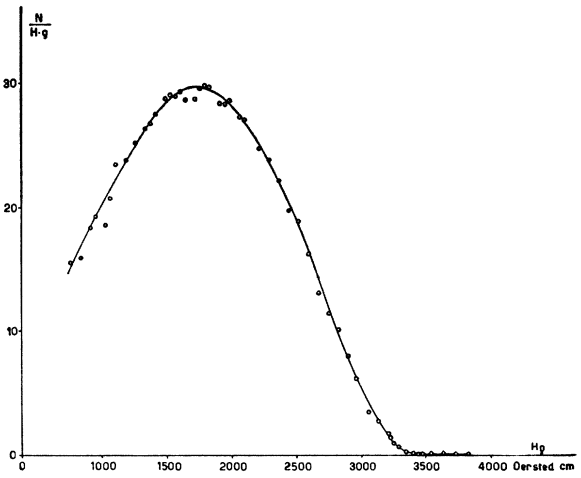

FIG. 1. Positron momentum distribution of F^{18}.

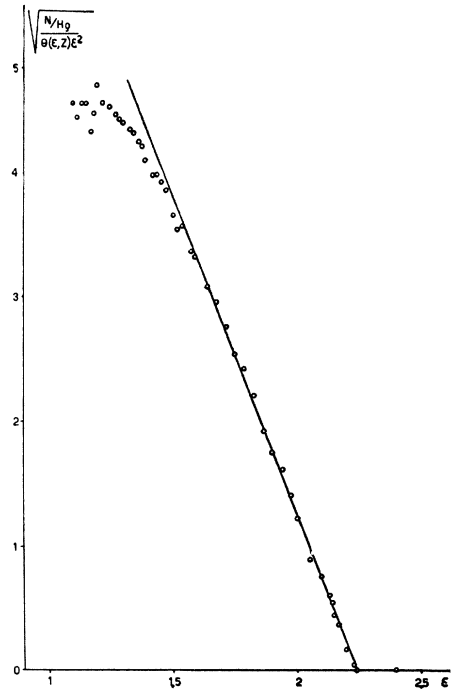

FIG. 2. Kurie plot of the positron spectrum of F^{18}.

Figure 1 shows the momentum distribution of the positrons. The Kurie plot (Fig. 2) indicates an upper limit of 635 ± 15 kev and brings to evidence that the β-spectrum is simple. With $W_0=2.24$ mc² the ft-value is found to be $ft=4100$ characterizing an allowed transition. The mass difference of F^{18} minus O^{18} becomes 0.001781 ± 0.000016 atomic mass units.

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