

of the recovered argon. The recovery of carrier argon was always greater than 95 percent. The entire argon sample was placed in a small proportional counter 1.2 cm long and 0.3 cm in diameter to measure the Ar^{37} activity. Pulse height analysis was used, and counts were recorded in anticoincidence with a ring of proportional counters, and an enveloping NaI crystal. The counter was provided with an end-window to permit exposure of the counting volume to Fe^{55} X-rays for energy calibration and determination of the resolution of the counter. The resolution, full width at half height for the 2.8 keV Auger electrons from the Ar^{37} decay, was 26 percent. The overall counter efficiency for Ar^{37} in the full peak was 46 percent. The counting rate with the sample was three counts in 18 days, the background rate for the counter. Assuming this rate corresponds to real events and using the efficiencies mentioned, the neutrino capture rate in 1000 gallons of C_2Cl_4 was ≤ 0.5 per day, or the $\bar{\nu} \leq 3 \times 10^{-34} \text{ sec}^{-1} \text{ Cl}^{37} \text{ atom}^{-1}$.

From a comparison of the limit set by this experiment to the calculated capture rate of $(4 \pm 2) \times 10^{-35} \text{ sec}^{-1} \text{ Cl}^{37} \text{ atom}^{-1}$ it is clear that the sensitivity of the experiment will have to be increased by a factor of 100 to measure accurately the solar neutrino flux. If the volume of perchloroethylene were increased to 100,000 gallons one would expect 4 to 11 solar neutrino captures per day. On the basis of experience obtained with the present experiment an increase in the volume of liquid to 100,000 gallons would not present any insuperable difficulties. The result of such an experiment would provide a valid test for the present theory of the solar energy generation process. The important features of the method are that small amounts of Ar^{37} can be removed efficiently from large volumes of liquid by the simple procedure of sweeping with helium and that the characteristic decay of Ar^{37} can be observed in a counter with an essentially zero background. There are, however, a number of other processes that could