Furthermore, the temperature variation of the coefficient of viscosity by itself does not supply reliable information as to the nature of the attractive force, so that no final conclusions regarding the force field of the nitrogen molecule should be drawn from this work alone.

The writer would like to express his thanks to Dr. E. P. Ney for suggesting the problem and for valuable discussions in the initial stages of the project.

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Erratum: The Radial Dependence of the Tensor Force in the Deuteron

[Phys. Rev. **74**, 145 (1948)]

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IN the above article, on page 149, Eq. (33) should read

$$\langle J_1(r)\rangle_{Av} \geq \gamma \langle J_2(r)\rangle_{Av}.$$

Cloud-Chamber Observations of the Decay of Tritium

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August 5, 1948

THE introduction of a small amount of tritiated water[1] into a cloud chamber operating at atmospheric pressure, thus providing a weakly radioactive vapor in the chamber, has enabled us to observe a significant number of beta-particle tracks from the decay of $^1H^3$. The chamber had a diameter of 9 cm; and photography was non-stereoscopic, using an optical system with a 4-mm depth of focus. The photographs were measured at a magnification of 10.83 diameters, and only those tracks were recorded which were entirely in focus. 1565 tracks were acceptable, and the differential distribution of the lengths of their projections is shown in Fig. 1. Although all photographs were searched very carefully for very short tracks, we cannot be sure that the distribution as shown is accurate for projections smaller than 0.5 mm.

In view of the preliminary nature of this investigation, and of the uncertainties in available data relative to straggling and to the energy-range relation, it seems possible to reach only limited conclusions from Fig. 1. Apart from the fact that the data do not indicate any highly unusual form for the energy distribution, it is possible to report only that the maximum track length was observed to be 4.12 mm (referred to dry air at 15°C and 760-mm pressure). An application of Alper's[2] energy-range relation, as extrapolated to higher energies concordantly with Wilson's,[3] indicates an energy of 11±1 kev as the corresponding maximum energy for the tritium beta-particles. The uncertainty in the 4.12-mm measured range leads to a corresponding undertainty in the maximum-energy determination, but it is considerably less than the ±1 kev attributed to the uncertainties in the energy-range relation.

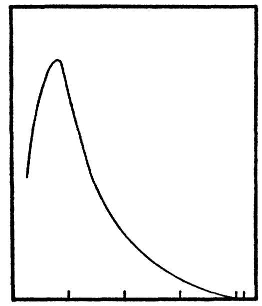

FIG. 1.

[1] The authors are indebted to the Carnegie Institution (DTM), and particularly to Drs. M. A. Tuve and P. H. Abelson and Mr. W. D. Whitehead of that Institution, for the gift of tritiated water.
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Cloud-Chamber Observation on Low Energy Portion RaE Beta-Spectrum

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SINCE measurements of the low energy behavior of continuous beta-spectra of Ra*E* have been somewhat contradictory, it seems that cloud-chamber measurements might provide significant new information. We have made cloud-chamber measurements of this spectrum using Ra*E* deposited on a collodion film having a thickness of about 0.15 micron, and have observed 716 tracks. The diameter of the cloud chamber was 9 cm and the effective depth of focus was about 4 mm; only those tracks were used which were entirely in focus. Tracks were photographed non-stereoscopically and measured according to the method of Petrova,[1] in which the projection of the track in the photographic plane is determined; all data were reduced to 15°C and 760 mm Hg. Corrections were applied to compensate for the change in effective solid angle with projected length of track. A second series of 262 tracks was obtained by using a source deposited electrolytically on a platinum wire, to exhibit the effects of a massive source support.

The data are shown as differential distributions in Fig. 1, indicating the intensity of each spectrum as a function of the "projected range." It is clear from this figure that the energy distribution of the Ra*E* beta-particles seems to vanish at zero (or some small energy); this result has not been reported by earlier workers,[2] presumably because of instrumental difficulties at very low energies.

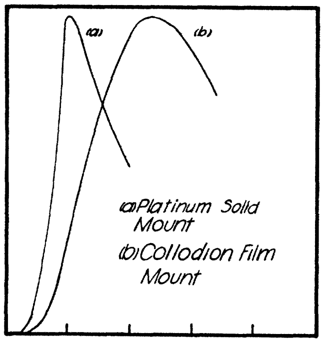

FIG. 1.

Preliminary measurements have also been made using Ra*E* in the form of a radioactive vapor formed by the interchange of Ra*E*, an isotope of Bi, with Pb in $Pb(CH_3)_4$, as described by Richardson and Leigh-Smith.[3] These measurements, though incomplete, indicate the same general behavior for the spectrum.

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On the Positive Particles Occurring from P^{32} in the Cloud Chamber

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THE ratio of occurrence of "positive" tracks from beta-emitters as determined from cloud-chamber measurements has been consistently higher than the ratio found by other methods of investigation by at least an order of magnitude. In order to determine if the ratio is dependent on the type of source mount used for the active material in the chamber, we have taken a number of stereoscopic pictures of the tracks arising from a source of P^{32} supported between two films of collodion, approximately 0.15 micron thick, in a cloud chamber filled with air and operated at approximately atmospheric pressure. A source having a very high specific activity was obtained by using the separated isotope P^{32} available from the United States Atomic Energy Commission at Oak Ridge. A total of 1493 pictures was taken using a chamber 7 inches in diameter and $2\frac{1}{4}$ inches deep, using a magnetic field strength of 400 gauss. Analysis of the pictures showed 7240 electron tracks and 11 positive tracks, a ratio of 0.15×10^{-2}. In order to obtain the best statistics possible all positives and negatives arising from the source were considered, regardless of their age. The ratio obtained is somewhat smaller than the values given by Sizoo, Barendregt, and Griffioen,[1] who used a glass capillary source mount in the center of the chamber, and Smith and Groetzinger[2] who mounted the P^{32} source at the end of a short aluminum channel which led into the chamber; but the ratio is in agreement with the values given by Pi and Chao,[3] who use glass capillary source mounts. Calculations made from the relation for multiple scattering given by Bethe[4] showed that only approximately 20 percent of the positives could be accounted for by multiple scattering of electrons, which is in agreement with the result of Heine,[5] who found no decrease in the ratio when a H_2+He mixture was used as the gas in the chamber. Since our ratio is not significantly different from those given by Pi and Chao, it appears that the behavior of the positives is not dependent on the nature of the source support used for the active material in the chamber.

In order to investigate the discrepancy between cloud-chamber results and the results of other methods of investigations, two experiments appear possible. An increase in the ratio of positives to negatives found by operating a magnetic beta-ray spectrograph with a small amount of the vapor used in the cloud chamber compared to the value with an evacuated spectrograph would indicate that the positives could be ascribed to scattering of electrons. Secondly, measurements made with a cloud chamber of at least twice the dimensions of the present chamber and filled with a H_2+He mixture would be relatively free from any uncertainty in the origin of the positive tracks. The very intense light available from flashtubes would enable pictures to be taken using such a deep chamber without loss of definition because of a small depth of focus which would occur if less intense light sources were used. Such an experimental arrangement could be used to test effectively the hypothesis given by McCusker[6] that the positives arise either from multiple scattering of electrons or from electrons which travel a full circle and return to the source.

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A Comparison of the Beta-Spectra of C^{14} and S^{35}*

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IN a recent paper[1] by one of us, absorption curves and Feather analyses[2,3] were presented for the β-radiations of C^{14} and S^{35}. In view of the fact that there was a marked difference in the shape of the Feather plots of the two β-emitters, which in turn would indicate a difference in the shape of their energy spectra,[3] it seemed advisable to repeat the absorption work under carefully controlled and identical conditions in order to determine whether or not a real difference exists.

For the absorption measurements essentially weightless sources (<0.1 mg) of high specific activity were evaporated in stamped copper cups over an area of about 0.5 cm^2.