Letters to the Editor

PUBLICATION of brief reports of important discoveries in physics may be secured by addressing them to this department. The closing date for this department is, for the issue of the 1st of the month, the 8th of the preceding month and for the issue of the 15th, the 23rd of the preceding month. No proof will be sent to the authors. The Board of Editors does not hold itself responsible for the opinions expressed by the correspondents. Communications should not exceed 600 words in length.

Radiations from As^{72}*

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A PRELIMINARY investigation of the radiations from As^{72} has been made with the help of the coincidence counting apparatus available in this laboratory. Only meager information exists in the literature about this element. It is shown to be a positron emitter of approximately 26 hours half-life. It was of interest to this laboratory because it disintegrates to Ge^{72}. The authors have recently studied the energy levels of Ge^{72} when it is formed by beta-ray emission from Ga^{72}, and it is to be expected that a study of the radiations of As^{72} would shed further light on the levels of Ge^{72}.

As^{72} was prepared by bombarding gallium with 23 Mev alpha-particles from the cyclotron. A chemical separation was made, using arsenic carrier, and the active material showed a 26-hour period from As^{72} and a small amount (<2 percent) of an activity with a period of several days, probably from the 16-day As^{74} formed from the other isotope of gallium.

The positron end point was obtained by measuring the range of the positrons in aluminum and applying the Feather rule. The value obtained was 2.78 ± 0.10 Mev. Absorption curves were taken at various times after the end of the irradiation to make sure that this end point was that of As^{72} and not caused by the small amount of As^{74}.

The energy of the most energetic gamma-ray was obtained by placing an aluminum radiator in front of the source and measuring the range of the Compton electrons passing through two counters arranged in a coincidence circuit.[1] The range of the Compton electrons was 1.10 grams/cm^2 which, if one uses the curve of Curran, Dee, and Petrzilka,[2] corresponds to a gamma-ray energy of 2.4 Mev.

Positron-gamma and gamma-gamma coincidence experiments were also made. In the first instance the source was placed between two counters. With enough aluminum between source and counters to stop all positrons, the total non-particle coincidence rate was determined. This rate arises from annihilation radiation, true gamma-gamma coincidences and gamma-annihilation radiation coincidences. In the present experiments it served merely as a base for measuring particle-gamma coincidences. With the source between the two counters and enough aluminum between the source and one counter to stop all positrons, positron-gamma coincidences were measured as a function of the thickness of aluminum between the source and the other counter. The results show that positron emission probably does not lead to the ground state of Ge^{72} and that there is more than one group of positrons.

In another experiment, lead-lined counters were used to measure gamma-rays and gamma-gamma coincidences. With the counters placed in line with the source between, the number of coincidences observed from the source was the sum of annihilation-gamma, gamma-gamma, and annihilation coincidences. When the line between the source and one of the counters was perpendicular to the line between the source and the other counter, the coincidences due to annihilation radiation were greatly reduced. With the counters in line with the source, the ratio of coincidences per recorded gamma-ray was 3.89×10^{-3}; when they were out of line, the ratio was 1.06×10^{-3}.

The fact that a 2.4 Mev gamma-ray is present in the radiations from Ga^{72} as well as in those from As^{72} shows that possibly one level of Ge^{72} is excited by either disintegration.

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[1] A. C. G. Mitchell, E. T. Jurney, and M. Ramsey, Phys. Rev. **71**, 324 (1947).
[2] S. C. Curran, Dee, and Petrzilka, Proc. Roy. Soc. **169**, 269 (1938).

Erratum: The Analysis of the Vibration-Rotation Band ω_3 for $C^{12}O_2^{16}$ and $C^{13}O_2^{16}$

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ON re-examination of the data from which the band analysis for ω_3 of $C^{12}O_2^{16}$ and $C^{13}O_2^{16}$ was made, it was discovered that a mistake had been made in stating that the frequencies of the rotation lines had been reduced to vacuum. Through an oversight the lines given in Tables I and II are uncorrected. The constants have been recalculated in order to determine how they would be affected by this error. The only constants given in Table III which are affected are ω_0 for both molecules. For $C^{12}O_2^{16}$ the corrected value of ω_0 is 2349.33 cm^{-1} which is now in excellent agreement with the value quoted by Herzberg[1] in his compilation of the CO_2 data. The corrected value of ω_0 for $C^{13}O_2^{16}$ is 2283.56 cm^{-1}. B_{000}, B_{001}, and α_3 are not affected because the slopes of the straight lines in Figs. 3–6 are not altered measurably.

To obtain the corrected frequencies the following table of $\Delta\nu$ may be applied:

ν(cm^{-1})	$\Delta\nu$(cm^{-1})
2050	−0.532
2100	−0.545
2200	−0.571
2250	−0.584
2300	−0.597
2350	−0.610

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[1] G. Herzberg, *Infrared and Raman Spectra of Polyatomic Molecules* (D. Van Nostrand Company, Inc., New York, 1945) p. 274.