The specific effect is

$$\Delta\nu_2=\left(\frac{128}{3}\right)\left(\frac{m}{M_4}-\frac{m}{M_3}\right)R_\infty(Z_1Z_2)^5n^3(n^2-1)\frac{(Z_1n-Z_2)^{2n-4}}{(Z_1n+Z_2)^{2n+4}}$$
$$=-0.364\ \text{cm}^{-1},$$

and total change is

$$\Delta\nu=\Delta\nu_1+\Delta\nu_2=-1.045\ \text{cm}^{-1},$$

or

$$\Delta\lambda=0.466\text{A}.$$

Using the Mount Wilson Observatory 15-ft. Rowland mounting with a 5-inch concave grating and a dispersion of 3.60A/mm in the first order, we photographed the line λ6678. From comparator readings, the average value of three different photographs shows

$$\Delta\lambda=0.471\pm0.009\text{A}.$$

The shift was also measured with a Fabry-Perot Interferometer. With a 3 mm etalon we obtained photographs of two interference patterns of λ6678. Measurements of the shift in six successive orders of the two microphotometer tracings give

$$\Delta\lambda=0.467\pm0.004\text{A}.$$

The agreement is well within experimental error.

We wish to express our gratitude to Professors W. R. Smythe and R. B. King for valuable discussions and suggestions.

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Disintegration of Tc^{95} and Tc^{96}

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IN a preliminary note[1] we have communicated that irradiation of molybdenum with 7-Mev protons leads to the formation of several Tc isotopes, which decay by emitting γ-lines in the range between 770 and 880 kev. A 873-kev line could be assigned to 53-min. Tc^{94} [2] and another one, of 810 kev, to 62-day Tc^{95}.[3]

The Tc isotope of mass number 96 (which disintegrates by K-capture[4,5] with a 104-hr. period) has now been investigated in more detail. While the curve of the γ-ray absorption in lead seemed to suggest a homogeneous γ-line of about 800 kev, a weak component of about 1100 kev resulted from coincidence absorption measurements of the secondary electrons. A sample, chemically separated from Mo and electrolytically deposited on a foil, was used for investigating (in a magnetic lens spectrometer) the conversion electrons. This analysis showed further complexities in the γ-radiation associated with the 104-hr. period. (Fig. 1.) Three strong electron lines at 751, 786, and 822 kev were found, which correspond to γ-energies of 771±2, 806±2, and 842±2 kev, respectively. Furthermore, weak conversion lines of γ-rays of 1119±2 and 312±2 kev are present. γ−γ-coincidence measurements which were carried out with Bi cathode counters showed, in accordance with measurements performed in the same calibrated arrangement with Al cathode counters, that the γ-ray components of 771, 806, and 842 kev are emitted in threefold cascade. Both from the intensity of the 1119-kev line (which was estimated from the recoil electrons from brass in the spectrometer) and the coincidence rate, we must conclude that this γ-line is also emitted in cascade with the 771- and 842-kev γ-lines. The weak 312-kev γ-line could only be observed through its converted part and its energy fits very well the difference between 1119 and 806 kev. The ratio of K-capture X-quanta to γ-quanta was determined by measuring the absorption in aluminum with counters of known sensitivity, the electrons from the sample and the recoil electrons from the absorber being deflected magnetically. Taking into account the fluorescence yield for Mo $K\alpha$-radiation and the L-capture, one finds that the number of cascade transitions is equal to the number of orbital electron captures. No positron tracks were found on cloud-chamber photographs.—We therefore suggest a decay scheme as in Fig. 2, in which the order of succession of the last two γ-ray transitions is as yet arbitrary. The lines due to conversion electrons were backed by a weak continuous spectrum extending up to 0.8 Mev. It could not be decided whether this background is simply due to scattered electrons or to an actual β^--spectrum. The existence of a stable ruthenium isotope of mass number 96 leaves the possibility of a dual decay open.

In the course of the investigation of the 104-hr. period further details of the 20-hr. period of Tc^{95} came to light. Spectrometer measurements indicated three conversion lines corresponding to γ-energies of 762±2, 932±2, and 1071±2 kev, the strongest component being that at 762 kev. On the other hand, we were unable to detect the 200-

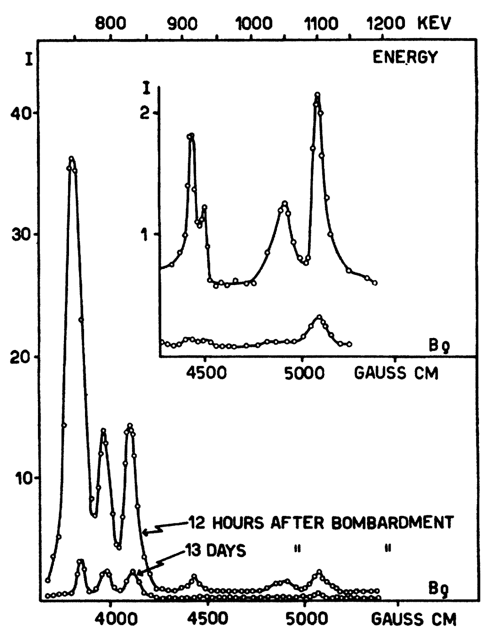

FIG. 1. Conversion electrons from 20-hr. Tc^{95} and 104-hr. Tc^{96}.

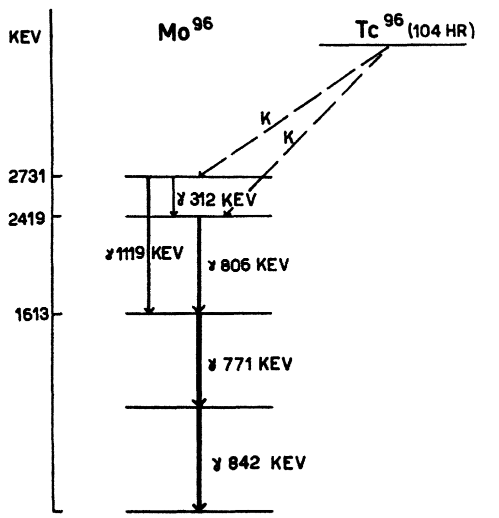

FIG. 2. Decay scheme of 104-hr. Tc^{96}.

kev electrons indicated by Eggen and Pool.[6] From the ratio of X-quanta to γ-quanta it follows that all K-captures lead to excited states. Eggen and Pool assign both the 20-hr. and the 62-day periods to an isotope of mass number 95, calling for the assumption of isomeric states in Tc^{95} decaying over different levels of Mo^{95}.

A detailed report of this work will appear in Helv. Phys. Acta. We take pleasure in thanking Professor P. Scherrer for his stimulating interest in this investigation.

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Observation of a Solar Noise Burst at 9500 Mc/s and a Coincident Solar Flare

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On July 29, 1948, 12:50 G.C.T. (7:50 A.M., E.S.T.), a solar noise burst on 9500 Mc/s was observed at this laboratory, and simultaneously a very bright chromospheric eruption or solar "flare" was observed at the Naval Observatory, Washington, D. C. Also, at the same time, solar noise bursts at 25, 50, 75, 110, and 480 Mc/s and the commencement of a sudden ionospheric disturbance were recorded at the National Bureau of Standards field station in Sterling, Virginia. Although similar coincidences have been observed below 3000 Mc/s,[1–6] this seems to be the first report above 3000 Mc/s.

A microwave radiometer[7] with a ten-foot paraboloid antenna, having a beam width of about 0.7°, was being used at the time to investigate atmospheric absorption, using the sun as the source of 9500 Mc/s noise. From 11:51 G.C.T. to 12:46 G.C.T. the antenna temperature[7] readings on the sun fluctuated between 2130°K to 2160°K. The sun was then allowed to drift partially out of the antenna beam for about three minutes, whereupon the antenna was again directed upon the sun. The reading then rose rapidly to normal but continued to rise at an irregular rate, taking 20 seconds to attain off-scale values of over 4000°K at 12:50:04 G.C.T. Ten seconds later the antenna was directed away from the sun, where the reading was found to be normal for the sky. At 12:53 G.C.T. the solar reading was down to 2380°K; by 13:00 G.C.T. it was 2240°K and was back to 2160°K by 13:26 G.C.T.

On this same day from 12:41 to 12:55 G.C.T., U. S. Lyons at the Naval Observatory was sketching the features of the solar disk observed through a spectrohelioscope in hydrogen alpha-light. At 12:52 G.C.T. he noticed a small, low velocity, very bright chromospheric eruption in a sunspot group at about 13° north and between 13° and 21° east of the center of the solar disk. However he feels sure that this flare commenced after 12:45 G.C.T. By 13:15 G.C.T. the flare had disappeared. The McMath-Hulbert Observatory, Pontiac, Michigan, from a photograph of the sun at 12:55 G.C.T. reported a solar flare of importance two on the I.A.U. scale arising from the same area.

G. Reber of the National Bureau of Standards informs us that a 480 Mc/s solar noise burst beginning at 12:49 G.C.T. rose in less than a minute to off-scale values of over ten times the normal antenna temperature. At 12:53 G.C.T. the reading was about twice normal, and by 13:02 G.C.T. it was normal.

J. R. Johler of the National Bureau of Standards records continuously cosmic noise received by half-wave dipoles at 25, 50, 75, and 110 Mc/s. At approximately 12:50 G.C.T. the readings on all four frequencies simultaneously went off scale for three to five minutes. These off-scale readings probably indicate a solar noise burst of over 50 or 100 times the noise power from the quiet sun.

The Coast and Geodetic Survey Magnetic Observatory at Cheltenham, Maryland, informs us that on July 29, 1948, there was no significant magnetic disturbance. Magnetograms taken near the sub-solar point have not yet been received.

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