The method permits the preparation without co-precipitant and, consequently, without absorption of activity, of strong sources of radio-copper in extremely thin layers. Unfortunately, it is not applicable to other known artificial radio-elements, since the elements obtained up to the present by neutron bombardment are generally either isotopes of the elements bombarded or electrochemically less noble.

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Disintegration Constant and the Upper Limit of the Continuous β-Spectrum

SARGENT[1] discovered the relation between the disintegration constant of the radioactive elements which decay by emitting a β-particle and the upper limit of the continuous β-spectrum. He found that in the diagram obtained by plotting the logarithms of the disintegration constants against the logarithms of the upper limits, a straight line can be drawn through the points for RaE, $MsTh_2$, ThC and RaC, and a curved line through the points for RaD, UX_1, ThB, AcC″, ThC″ and UX_2. The points for AcB and RaB do not fall on either of these curves.

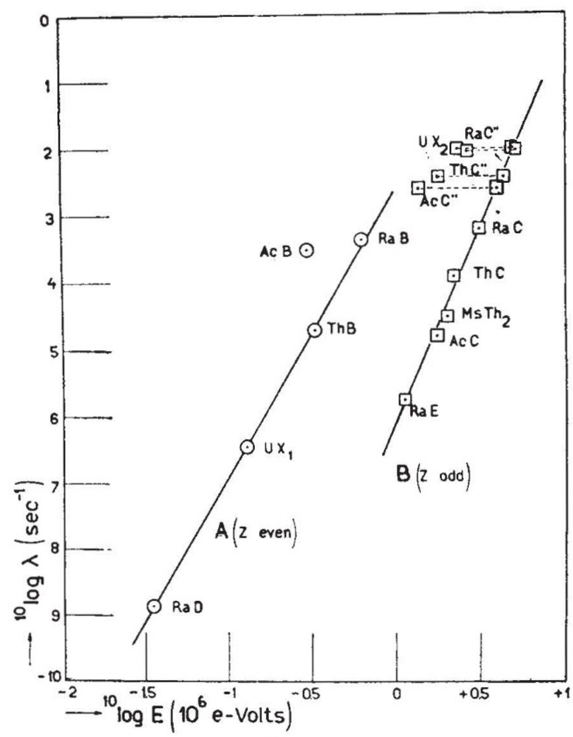

FIG. 1.

Recently, I remarked[2] that a simple diagram is obtained if the upper limits are plotted against $M - 1{\cdot}5Z$ (M = mass number, Z = charge number). From this diagram the upper limits of the elements AcC and RaC″, which are not yet measured, can be estimated with good approximation. Using the two values obtained in this way ($1{\cdot}8_1 \times 10^6$ and $2{\cdot}6_7 \times 10^6$ electron volts respectively) to complete Sargent's diagram, one finds that the point for AcC falls on the straight line and that for AcC″ on the curved line. In the same communication I directed attention to the fact that the upper limits are generally higher for the elements with odd charge number, than for those with even charge number. From this fact the question arose whether the difference between the even and the odd elements might be of interest for the interpretation of Sargent's diagram.

That this is really the case can be seen from Fig. 1, in which the diagram is reproduced completed with the points for AcC and RaC″. Instead of the curved line mentioned above, a straight line is drawn through the points for RaD, UX_1, ThB and RaB. Now, in the diagram, three groups of points are to be distinguished: (1) Points for the elements with *even charge number* which, with the single exception of AcB, fall on the straight line A; (2) points for the elements with *odd charge number*, RaE, AcC, $MsTh_2$, ThC, RaC, which fall on the straight line B; (3) points for the elements with *odd charge number* AcC″, ThC″, RaC″, UX_2.

If λ is expressed in sec.$^{-1}$ and E in 10^6 e.-volts (and if logarithms to the base of ten are used) the straight lines correspond to the formulæ:

$$A\ (Z \text{ even}):\ \log\lambda = -2{\cdot}63 + 4{\cdot}35 \log E = -2{\cdot}63 + 1{\cdot}45 \log E^3.$$

$$B\ (Z \text{ odd}):\ \log\lambda = -6{\cdot}11 + 5{\cdot}80 \log E = -6{\cdot}11 + 1{\cdot}45 \log E^4.$$

If the energy of an electron, $m_0c^2 = 0{\cdot}510_4 \times 10^6$ e.-volts, is used as unit of energy, these equations become:

$$A\ (Z \text{ even}):\ \log\lambda = -3{\cdot}90 + 1{\cdot}45 \log E^3.$$

$$B\ (Z \text{ odd}):\ \log\lambda = 2(-3{\cdot}90 + 1{\cdot}45 \log E^2).$$

It may be of interest to remark that the four elements of the third group are all 'branch products'. Further, it was found, as is indicated in Fig. 1 by the dotted lines, that the points belonging to these four elements all can be brought on to the straight line B by adding $2{\cdot}6_3 \times 10^6$ e.-volts to the value of the upper limit. This can scarcely be a mere chance. Moreover, this energy of $2{\cdot}6_3 \times 10^6$ e.-volts is just equal to the energy of the intense γ-radiation which is emitted by ThC″, and is the hardest γ-radiation known. A γ-radiation of about the same energy is also observed with RaC + C′ + C″. Here it is generally ascribed to RaC, but the possibility does not seem excluded that it has its origin in the nucleus of RaC″. Perhaps it would repay the trouble to look for such a hard γ-radiation also with UX_2 and AcC″.

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[1] B. W. Sargent, *Proc. Roy. Soc.*, A, **139**, 659; 1933.
[2] G. J. Sizoo, *Physica*, **2**, 472; 1935.

Diffraction of X-Rays and Electrons by Carbon Tetrachloride Vapour

RECENT electron-diffraction investigations[1] of the molecular structure of gaseous carbon tetrachloride give values of the interatomic distances, which are appreciably lower than those obtained in earlier electron-diffraction measurements and those obtained by Bewilogua[2] from X-ray photographs. This discrepancy of about 4 per cent is so important that it cannot be explained by the probable errors given by the authors. As, moreover, carbon tetrachloride is generally used as a standard substance for testing the apparatus, it