

LETTERS TO THE EDITORS

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A Conjectured Electrolytic Enrichment of Tin Isotopes

It is, of course, a matter of history that a considerable enrichment of heavy water was found in long-used commercial electrolytic cells.

It occurred to me some years ago that a corresponding enrichment of tin isotopes may take place in the formidably large industrial plants used for the continuous electrolytic manufacture of tinplate. To take but one example, the Ebbw Vale tinplate works of Richard Thomas and Baldwins continuously employs a volume of tin electrolyte from which may be plated, in a period of $1\frac{1}{2}$ years, some 550 tons of tin. The current density in the bath is of the order 200 amp./sq. ft., the current passed being some 50,000 amp. Over the long time period this corresponds to the formidable figure of some 250 million amp. hours passing through about 30,000 litres of solution containing, say, 30 gm. metallic tin per litre.

Although, of course, the hydrogen-deuterium mass ratio is exceptional, yet owing to the large spread of isotopes in tin, the ratio position is much better than one might expect for masses in the region of 120. The isotope abundance percentage figures in normal tin (Aston) are as follows:

112	114	115	116	117	118	119	120	122	124
(1.1)	(0.8)	(0.4)	(15.5)	(9.1)	(22.5)	(9.8)	(23.5)	(5.5)	(6.8)

There is then a mass spread of some 10 per cent and furthermore the two extreme isotopes, namely, 124 and 112, are present in the ratio of about 6:1, which is a good ratio for measurement. Arguing by analogy from the hydrogen-deuterium electrolysis, it might well be expected that any tin extracted from such a long-run bath might exhibit an appreciably altered isotope distribution. One would anticipate a shift in concentrations favouring an increase in the heavier isotopes and a decrease in the lighter. In particular, one would seek for and expect that the ratio of tin-124 to tin-112 would be bigger than the value 6:1 of normal tin.

A sample of electrolyte from such a long-used tin plating bath has kindly been supplied by Richard Thomas and Baldwins through the good offices of Dr. W. E. Hoare of the Tin Research Institute, Fraser Road, Greenford, Middlesex. Dr. Hoare has extracted some tin (in gram quantities) and is ready to supply a small quantity of the metal to anyone sufficiently interested in carrying out a mass-spectrographic analysis.

If this conjecture as to an altered distribution of isotopes should prove to be correct, it will then be the second interesting example of an unsuspected enrichment arising from a prolonged industrial electrolytic process.

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Jan. 18.

Auroral Activity during April–December 1956

FOLLOWING the increasing number of sunspots, the activity of auroræ has also increased considerably in 1956. In particular, some red auroræ appeared between October and December, giving promise of a fine auroral activity during the approaching International Geophysical Year, 1957–58.

On the night of April 21–22, 1956, a series of very high rays lying in the sunlit atmosphere was measured; they appeared in the morning of April 22 and ended with a corona persisting even when the dawn had advanced so much that only first magnitude stars were visible.

Among my stations, Oslo, Askim and Holmestrand were in action and the height and position of sunlit rays near the zenith were measured with base lines of between 47 and 56 km. We found the following great heights for the upper part of these rays (in km.): 514, 697, 829, 1,077, 760, 573, 860, 677, 1,088, 1,079, 749. The bases of the rays were at 279, 313, 181, 200, 271, 229, 181, 200, 271, 229, 282, 305, 202 km.

On October 26–27, a very strong red colour was seen over great parts of the sky, with long red rays, between 20h. and 20h. 30m. G.M.T. Two of my aurora stations, Oslo and Askim, secured good simultaneous pictures of long red rays in the east towards the zenith between 20h. 18m. and 20h. 21m. Heights varied from 308 km. (base) to more than 750 km. (summit). The rays were situated in the Earth's shadow.

After midnight on November 14–15, a great many single pictures of fine aurora even to the south of the zenith were obtained with very fine red spots between the yellow-green auroral rays. No height measurements were, however, obtained.

On November 22–23, twenty-seven days after the aurora of October 26–27, a very similar aurora recurred with a remarkable red ray between 21h. 26m. and 21h. 28m. G.M.T. A series of five simultaneous pictures of this ray were taken from three stations, Oslo (*M*), Nordsæter (*NO*) and Kongsberg (*K*), the base-line *M-NO* being about 138 km. and of *K-NO* about 176 km. These pictures gave a good determination of height and position. The ray was situated very far away, over a region near the border line of northern Finland and the U.S.S.R., about 1,100 km. from Oslo. The foot and summit of the ray were at about 150 and 680 km., in the Earth's shadow. Measurements of the same points with base lines *M-NO* and *K-NO* gave good agreement.

It is hoped that this auroral activity recurs in the spring of this year and will be still more enhanced during the coming Geophysical Year.

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Jan. 23.

Influence of Pressure on the Dielectric Properties of Ice

EXPERIMENTS have recently been performed in which the effects of pressure on the electrical properties of ice were studied. The stress applied was compression between two plates which formed the measuring capacitor. Samples measured included a polycrystalline specimen having coarse- and fine-