

known. The close vicinity of samarium to the presumably very rare element 61 suggests that the activity may possibly be due to the presence of the latter. However, preparations of samarium so far investigated, mostly kindly given to us by the late Baron Auer von Welsbach and by Prof. Rolla of Florence, all show the same activity.

G. HEVESY.
M. PAHL.

Institute of Physical Chemistry,
University of Freiburg im Breisgau.

New Isotopes of Mercury

In the course of some tests with very sensitive Schumann plates supplied by Messrs. Adam Hilger, I have obtained mass-spectra of mercury of an intensity greater than any previously photographed. On the best of these there are unmistakable traces of two new lines 197 and 203. The first is certainly due to a new isotope. The chance that the second is a hydride of the strong line 202 is considered small, for the conditions were unfavourable to the formation of hydrides, while under very favourable conditions in previous experiments no trace of the line had been seen. Their abundance was estimated by comparison with the faint isotope 196 previously determined to be present to the extent of 0.10 per cent. Assuming this figure, photometry indicated that 197 and 203 were present roughly to the extent of 0.01 and 0.006 per cent respectively. Their effect on the mean atomic weight will therefore be quite negligible.

F. W. ASTON.

Cavendish Laboratory,
Cambridge.
Nov. 19.

Monoacetone Hexuronic Acid

TWENTY grams of hexuronic acid, prepared by Svirbely and Szent-Györgyi, were shaken in 500 c.c. of acetone in the presence of 50 grams of anhydrous copper sulphate for twenty-four hours. After filtration, the fluid was evaporated *in vacuo* to one third of its volume. On addition of a double volume of petroleum ether the monoacetone derivative of hexuronic acid crystallises out in well-formed large, colourless prisms or long needles. These were dissolved in acetone and recrystallised by the addition of petroleum ether. Seventy per cent of the theoretical yield was obtained.

The same substance was obtained when five per cent sulphuric acid was added to the acetone solution of hexuronic acid. After standing overnight, the sulphuric acid was removed by anhydrous sodium carbonate. Further treatment as above gave a yield of fifty per cent.

The acetone derivative is freely soluble in water, methyl and ethyl alcohol and pyridine, less freely in acetone or ether, insoluble in petrol ether or benzene. The melting-point is 220°–222° C. with decomposition. It causes a big depression of melting-point in hexuronic acid (melting-point of hexuronic acid 192° C.). The aqueous solution of the substance reduces silver nitrate, Fehling's solution, and iodine in the cold. The equivalent weight, estimated by iodine titration, is 107; the molecular weight is thus 214 (calc. 216). Analysis gives:

	Experiment.	Theoretical.
Carbon	49.32 per cent	49.9 per cent
Hydrogen	5.90 "	5.6 "

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The specific rotation of hexuronic acid, and the monoacetone derivative, are (at 20° C.):

	Hexuronic acid.	Monoacetone Hex. Ac.
In water	+ 24 (C, 1.0)	+ 20 (C, 1.04)
In abs. ethyl alcohol	+ 58 (C, 1.03)	+ 15 (C, 1.02)
In abs. methyl alcohol	+ 50 (C, 1.0)	+ 28 (C, 1.03)

The acetone derivative is readily decomposed by water into acetone and hexuronic acid, which latter substance can easily be recovered quantitatively. Accordingly, dissolved in water, the molecular rotations of hexuronic acid and of its acetone derivative were found to be the same (actually 4224 and 4321 respectively).

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L. V. VARGHA.

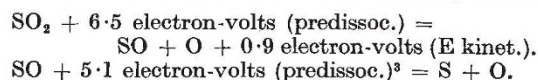
Institute of Medical Chemistry,
University Szeged, Hungary.
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Thermo-Optical Dissociation of Sulphur Dioxide

THE absorption spectrum of sulphur dioxide vapour in the far ultra-violet, which has been investigated by Henri¹ and Wieland between 2,500 and 2,000 Å., has now been extended up to 1,700 Å. by means of a 2 metre vacuum spectrograph. The analysis of the bandheads will be published in a later paper. Here I am discussing a dissociation process connected with this band spectrum.

The rotational structure of the SO₂ bands disappears gradually at about 1,900 Å. This limit of pre-dissociation corresponds to a dissociation of SO₂ into SO + O + kinetic energy, as has been shown by Franck, Sponer and Teller². Now there is no sign of dissociation at room temperature, obviously because the dissociated products recombine instantaneously. But at a temperature of 450° C. and a pressure of 1.5 mm. the absorption spectrum changes completely. The SO₂ bands are replaced by two quite different band systems, a faint one between 2,850 and 2,570 Å., which is identical with the well-known S₂ bands, and a strong one between 1,800 and 1,650 Å., which does not seem to have been known before, but which very probably also belongs to S₂ (the combinations demand a vibrational frequency of 725 cm.⁻¹ in the ground state). At the same temperature and a somewhat higher pressure of 4.5 mm. both the SO₂ bands and the S₂ bands are visible. After recooling the absorption tube at 20° C. the spectrum shows the unchanged SO₂ bands alone as before heating.

These results suggest a dissociation of SO₂ into $\frac{1}{2}$ S₂ + O₂. (The absorption spectrum of O₂ at a pressure of 1 or 2 mm. is too faint to be observed in a 5 cm. tube.) Now a purely thermal dissociation of SO₂ requires an energy of 83 kcal. (or 3.6 electron-volts) (SO₂ + 251.5 kcal. = $\frac{1}{2}$ S₂ + O₂ + 168.7 kcal.) and consequently cannot be caused by raising the temperature to 450° C. only (energy of thermal agitation 0.03 electron-volts). On the other hand, an optical decomposition requires 6.5 electron-volts, if the dissociation process takes the following course:



But although the light of the hydrogen lamp is photochemically active below 1,900 Å. (6.5 electron-volts) it does not have any appreciable decomposing effect on SO₂ at room temperature. Thus a combined thermo-optical effect only can be responsible for the