Electrical conductivity measurements indicate that III behaves in aqueous solution as a binary strong electrolyte.

The d-α-bromocamphor-π-sulfonate of this cobaltic complex of I can be prepared from II and silver d-α-bromocamphor-π-sulfonate, and separated from a mixture of methanol and ether into a sparingly soluble crystalline brown solid (IV) and a very soluble gum (V). The aqueous solution of IV is strongly levorotatory, a 0.01% solution having a specific rotation of $-7,000°$ (Hg green line 5461). Iodides precipitate from this solution the levorotatory iodide 1-[CoS]$^+$I$^-$ (found: C, 41.5; H, 3.8; N, 4.9. I, 22.0%) m. p. 268° (dec.). After six recrystallizations from 20% methanol–water, the molecular rotation (Hg green line) was $-50,160°$. Solutions of this salt can be boiled for twenty minutes without appreciable racemization. The aqueous solution of V is strongly dextro-rotatory. From it, after considerable difficulty the pure d-iodide was obtained, with molecular rotation of $+50,160°$ (nine recrystallizations of the iodide were necessary).

Models show that I can function as a sexadentate chelate compound, occupying all six octahedrally disposed coördination positions about a six-covalent atom in one or other of two enantiomorphous strainless configurations provided that the nitrogen atoms are in *trans* positions and the sulfur atoms and oxygen atoms in *cis* positions to each other. The experimental evidence is wholly in favor of I being able to function as a sexadentate chelate compound.

CHEMISTRY DEPARTMENT   FRANCIS P. J. DWYER
THE UNIVERSITY OF SYDNEY   FRANCIS LIONS
SYDNEY, AUSTRALIA
RECEIVED OCTOBER 14, 1947

α-PELTATIN, A NEW COMPOUND ISOLATED FROM *PODOPHYLLUM PELTATUM*

Sir:

The drug podophyllin N. F., prepared from the dried rhizomes and roots of *Podophyllum peltatum* L., has been shown to produce severe damage to mouse tumor cells both *in vivo*[1,2a] and *in vitro*.[2b] Chemical fractionation involving solvent extraction and chromatographic adsorption on alumina,[2a] guided by bioassay,[3] yielded two tumor-necrotizing agents in pure form. One of these was identical with the well-known podophyllotoxin; the other was a new substance which was provisionally referred to as NCI-1074.

The new compound, for which the name α-peltatin is proposed, has now been conveniently isolated from podophyllin in a yield of about 9%

(1) M. Belkin, *Federation Proceedings*, **6**, 308 (March, 1947).

(2) (a) J. L. Hartwell and M. J. Shear; (b) R. A. Ormsbee and I. Cornman: both papers presented before the American Association for Cancer Research, annual meeting, May 16, 1947. Abstracts in *Cancer Research*, in press.

(3) The bioassay phase of the coöperative project was carried out by Dr. Virginia Downing, Mr. A. Perrault, and Dr. M. J. Shear

by chromatographic adsorption on alumina. α-Peltatin crystallizes from alcohol in colorless, transparent prisms, m. p. 230.5–232.5° (cor.) (shrinks at 222.5° and darkens at m. p.); $[\alpha]^{20}$D $-115°$ (c 1.0, absolute alcohol).[4] *Anal.*[5] Calcd. for $(C_{11}H_{11}O_4)_x$: C, 63.75; H, 5.35. Found: C, 63.4; H, 5.3. Calcd. for one methoxyl group per C_{11} unit: 15.0; found, 15.7. Discrepancies between the values for the molecular weight as determined by different methods make it impossible to report a true value at this time; other methods are being tried.

Solutions of the pure substance in alcohol and benzene exhibit a strong blue fluorescence under ultraviolet light, in distinction from solutions of podophyllotoxin which have only a weak blue fluorescence.

Structural, pharmacological and cytological studies with α-peltatin are in progress.

(4) Through the courtesy of Dr. N. K. Richtmyer, National Institute of Health.

(5) By Mr. C. A. Kinser and Mrs. M. M. Ledyard, National Institute of Health.

NATIONAL CANCER INSTITUTE.
NATIONAL INSTITUTE OF HEALTH
U. S. PUBLIC HEALTH SERVICE
BETHESDA, MARYLAND   JONATHAN L. HARTWELL
RECEIVED OCTOBER 20, 1947

ELECTROPHORETIC RESOLUTION OF HEPARIN AND RELATED POLYSACCHARIDES

Sir:

Sodium heparinate has been found to give an electrophoretic pattern indicating the presence of two components. The apparatus described by Longsworth and MacInnes[1] was used. The schlieren method was employed in photographing the moving boundaries.[2]

One per cent. solutions of the sodium salt of heparin (prepared from the crystalline barium acid salt of 500–600 Roche anticoagulent units[3] per mg.) in acetate and phosphate buffers of ionic strength 0.2 separated into two fractions under a potential gradient of 3 to 5 volts/cm. The major component migrated as an anion with a mobility at 0° of 0.8 × 10^{-4} to 2.4 × 10^{-4} cm.^{2}/sec./volt over a pH range of 3 to 9. The higher values were obtained in the alkaline range.

The minor component was electrically neutral and sulfate-free. From the peak areas the two fractions were found to be present in approximately a 3:2 weight ratio.

A comparison between the schlieren patterns obtained when the boundaries moved through the buffer and when they moved through the solution indicated that there was an association between the two components.

(1) L. G. Longsworth and D. A. MacInnes, *Chem. Revs.*, **24**, 271 (1939).

(2) We are indebted to Professor W. G. France and Dr. Q. Van Winkle of this Laboratory for assistance in the electrophoretic techniques and to Hoffmann-La Roche, Inc., of Nutley, New Jersey, for the bioassays.

(3) R. H. K. Foster. *J. Lab. Clin. Med.*, **27**, 820 (1942).

The two components were separated in the electrophoretic cell and bioassays showed that the moving component contained all the anticoagulant activity. The biologically active substance was stable, as tested over a period of several months, in the salt solution employed in the electrophoretic separation. It showed an activity in solution of 900–1000 Roche anticoagulant units[3] per mg. (neutral sodium salt basis).

At an ionic strength of 0.02, a 0.1% solution of the sodium salt of heparin, in acetate buffer at pH 6.9, migrated as a single component. This is in agreement with the results obtained by chargaff, Ziff and Moore.[4]

Previously described preparations[5] of chondroitinsulfuric acid and mucoitinsulfuric acid were examined in the electrophoretic apparatus. One per cent. solutions in phosphate buffers of ionic strength 0.2 and pH near neutrality were used. The chondroitinsulfuric acid was found to be composed of approximately equal amounts of stationary and moving components, while the mucoitinsulfuric acid was composed of a stationary component (40%) and two moving components (41% and 19%). The mobilities were less than that of heparin at the same pH.

Further work is in progress on the separation and characterization of these fractions.

(4) E. Chargaff, M. Ziff and D. H. Moore, *J. Biol. Chem.*, **139**, 383 (1941); *cf.* also O. Wilander, *Skand. Arch. Physiol.*, **81**, suppl. 15, 20 (1939).

(5) M. L. Wolfrom, D. I. Weisblat, J. V. Karabinos, W. H. Mc-Neely and J. McLean, THIS JOURNAL, **65**, 2077 (1943).

DEPARTMENT OF CHEMISTRY   M. L. WOLFROM
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RECEIVED AUGUST 14, 1947

NOTICE

The Conversion Factor for kX Units to Ångström Units

X-Ray wave lengths have been expressed in X units. The X unit is defined in terms of the calcite spacing and is nearly 10^{-11} cm., but is now known to differ from 10^{-11} cm. by about 0.2%. During the last twenty-five years X-ray diffraction workers have expressed X-ray wave lengths and crystal dimensions in terms of a unit which was 1000 X units, but instead of calling it 1000 X units have erroneously called it an Ångström unit. In recent years, the X-ray diffraction groups have agreed to use the term kilo X unit (abbreviated kX) in place of the incorrectly used Ångström unit, until agreement was reached on the best conversion factor to use for converting from kX to Ångström units. Agreement on the factor has now been reached.

As secretary of the American Society for X-ray and Electron Diffraction, I have been instructed to call the attention of American X-ray workers to the following announcement which appeared in the January, 1947, issue of the *Journal of Scientific Instruments*. Because of its importance it is here reproduced in its entirety.

"At the annual conference of the X-ray Analysis Group of the Institute of Physics in July, 1946, it was announced that agreement had been reached concerning the factor for converting measurements in kX units to Ångström units. The factor agreed upon, after consultation with the American Society for X-ray and Electron Diffraction and Prof. Siegbahn was 1.00202. This factor is probably correct to 0.003%. Since wave lengths in X-units have been measured to an accuracy of 0.001%, the wave lengths in Ångström units can be taken as accurate to 0.004% in general.

"The following is a list of values of wave lengths in Ångström units of certain emission lines and absorption edges in common use. The column headed $K\alpha$ gives the mean value of $K\alpha_1$ and $K\alpha_2$, $K\alpha_1$ being allowed twice the weight of $K\alpha_2$.

"Current values of the physical constants, such as those quoted by Birge in the 1941 volume of the Physical Society's *Reports on Progress in Physics*, should be used in conjunction with these wave lengths. In particular density ρ is given by the equation

$$\rho = 1.66020 \ \Sigma A / V$$

where ΣA is the sum of the atomic weights of the atoms in the unit cell, and V is the volume of the unit cell in A^3.

	$K\alpha_1$	$K\alpha_2$	$K\alpha$	$K\beta_1$	Absorption edge
Cr	2.28962	2.29352	2.2909	2.08479	2.0701
Mn	2.10174	2.10570	2.1031	1.91016	1.8954
Fe	1.93597	1.93991	1.9373	1.75654	1.7429
Co	1.78890	1.79279	1.7902	1.62073	1.6072
Ni	1.65783	1.66168	1.6591	1.50008	1.4869
Cu	1.54050	1.54434	1.5418	1.39217	1.3802
Zn	1.43510	1.43894	1.4364	1.29520	1.2831
Mo	0.70926	0.71354	0.7107	0.63225	0.6197
Rh	.61326	.61762	.6147	.54559	.5341
Pd	.58545	.58982	.5869	.52052	.5090
Ag	.55941	.56381	.5609	.49701	.4855

"It is recommended that in any published work the values of the wave-lengths used should be explicitly stated."

W. L. BRAGG, *Chairman*
  X-Ray Analysis Group of the
    Institute of Physics (England)

ELIZABETH ARMSTRONG WOOD, *Secretary*
  American Society for X-Ray
    and Electron Diffraction
      Bell Telephone Laboratories
      Murray Hill, N. J.

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