

X-Ray Crystal Structure of the Thallium Salt of Antibiotic-6016, a New Polyether Ionophore

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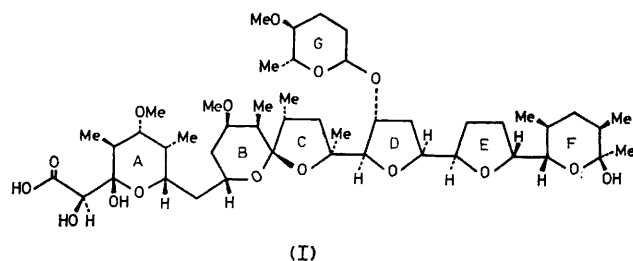
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Summary The molecular structure of the antibiotic-6016 has been established by X-ray crystallographic analysis of the thallium salt, $C_{46}H_{77}O_{16}Tl$.

ANTIBIOTIC-6016¹ is a new compound from *Streptomyces sp.* which shows antimicrobial activity against gram-positive

bacteria, mycobacteria, and fungi and is effective in treatment of coccidial infections in poultry. In the light of its biological activity and physico-chemical properties, antibiotic-6016 was thought to belong to the family of naturally occurring monocarboxylic ionophores including monensin,² nigericin,³ lasalocid A,⁴ A-204A,⁵ septamycin,⁶ dianemycin,⁷

salinomycin,⁸ lysocellin,⁹ lonomycin,¹⁰ carriomycin,¹¹ and mutalomycin.¹² It was isolated as the sodium salt from a culture of the producing organism as crystalline needles, m.p. 192–195 °C (decomp.), $[\alpha]_D^{25} -42.5$ (c 1, MeOH). The molecular formula $C_{46}H_{77}NaO_{16}$ was confirmed by elemental analysis and the structure (I) has been established by a three-dimensional X-ray analysis of the thallium salt.



Crystal data: $C_{46}H_{77}O_{16}Tl$, space group $P2_12_12_1$, $a = 18.767$, $b = 22.671$, $c = 12.402$ Å, $D_m = 1.37$ (floatation in aqueous KI), $D_c = 1.38$ g cm⁻³, $Z = 4$. The intensity data were collected on an automated four-circle diffractometer with $Cu-K\alpha$ radiation.

The structure was solved by the heavy-atom method and the positional and thermal parameters were refined by the least-squares method using anisotropic temperature factors for non-hydrogen atoms. The final R -value for 3770 reflexions used in the refinement is 0.056. The absolute configuration of the molecule was determined by the anomalous scattering technique. The resulting molecular structure of the molecule viewed along the c axis is shown in the Figure which correctly represents its absolute configuration. ‡

The molecule is wrapped around the metal cation and adopts a cyclic conformation with a strong hydrogen bond between the hemiacetal hydroxy group (O-29) on the terminal ring F and one of the carboxylate oxygens (O-1) on

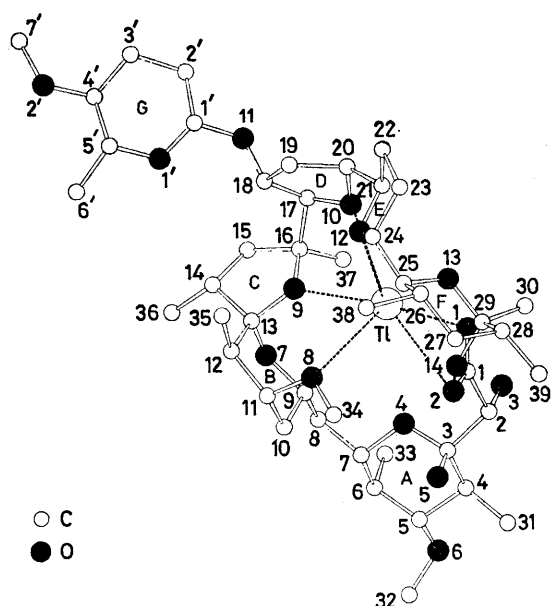


FIGURE. The molecular structure of the thallium salt of antibiotic-6016 (I) viewed along the c axis.

ring A. Interactions between the thallium atom and the oxygens are <3.0 Å.

It is noteworthy that antibiotic-6016 is the first recognized glycosidated polyether containing a hydroxy substituent at C-2 and a sugar group at the five-membered D ring.

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‡ The atomic co-ordinates for this work are available on request from the Director of the Cambridge Crystallographic Data Centre, University Chemical Laboratory, Lensfield Road, Cambridge CB2 1EW. Any request should be accompanied by the full literature citation for this communication.

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