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Preliminary communication

Saccharide oxadiazoles

MOHAMMED A.E. SHABAN*, EL SAYED H. EL ASHRY, MAHMOUD A. M. NASSR,
Chemistry Department, Faculty of Science, Alexandria University, Alexandria (Egypt)
and VERNON N. REINHOLD
Arthur D. Little, Inc., Cambridge, Massachusetts 02140 (U. S. A.)
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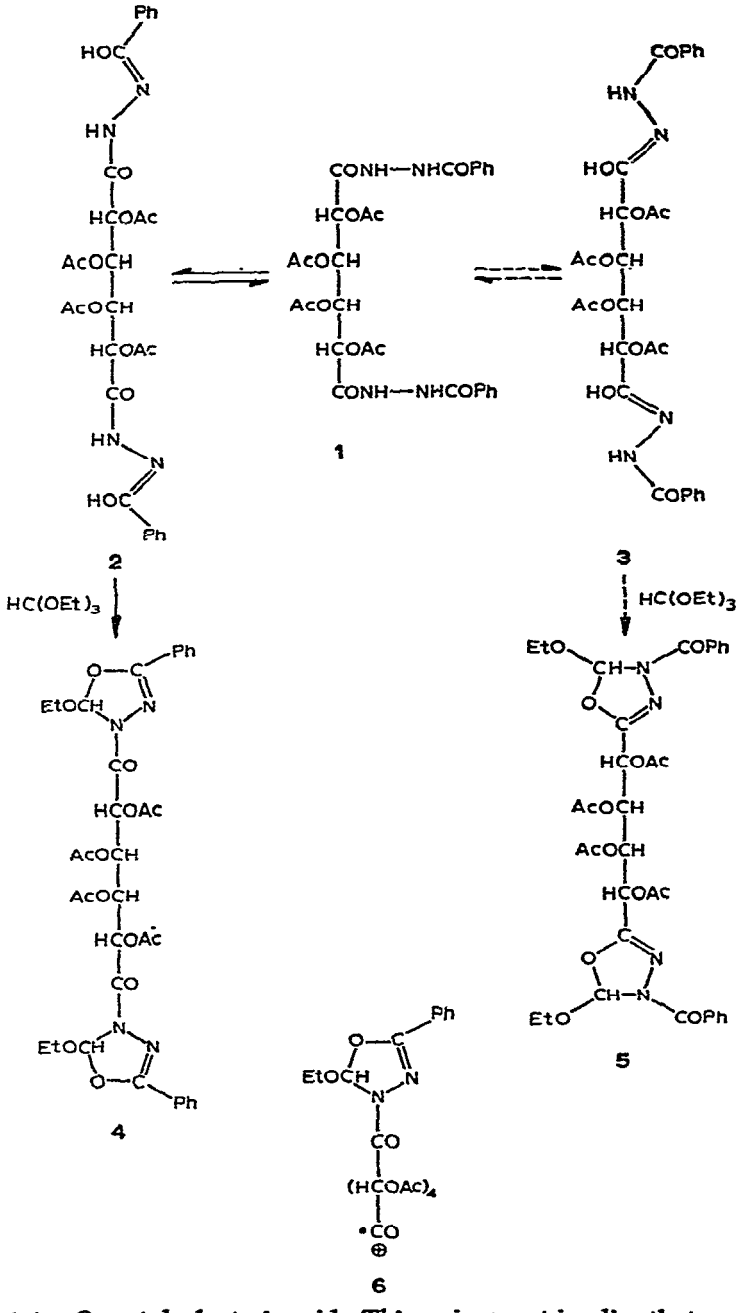
In connection with the increasing biological and industrial uses of 1,3,4-oxadiazole derivatives[1,2], we have recently been interested in the synthesis of saccharide 1,3,4-oxadiazoles[3,4]. One approach for the synthesis of the first known saccharide 1,3,4-oxadiazole derivatives was the oxidative cyclization of acetates of aroylhydrazones of aldehydo sugars[3]. Tronchet and Moskalyk utilized this approach for the synthesis of *C*-nucleoside analogs containing 1,3,4-oxadiazole rings[5]. A second approach was the dehydrative cyclization of aldaric acid bis(aroylhydrazide) acetates by heating with phosphoryl chloride[4].

In the present communication, we report the synthesis of the saccharide bis-(1,3,4-oxadiazoline) derivative 4 by use of a third approach, namely, condensative cyclization[6–8]. Thus, starting with 2,3,4,5-tetra-*O*-acetylgalactaric acid bis(benzoylhydrazide)[4] (**1**, 1 g), C-2(5) of each oxadiazoline ring was introduced by refluxing with triethyl orthoformate (5 ml) in 1,4-dioxane (20 ml) until complete dissolution occurred (20 h). Evaporation of the mixture, and crystallization of the residue from methanol, afforded a product (1 g, 84%) having m.p. 190°, $[\alpha]_D^{25}$ 0.0° (*c* 1, methanol). The i.r. spectrum of this product lacked the NH and CONH absorptions of the parent compound **1**, and showed absorptions at 1750 (OAc), 1705 (CON), 1630, 1580 (C=N), 1070 (C–O–C), 1035, 970 (C–O), 770, and 680 cm^{-1} (Ph). Elemental analysis gave values corresponding to those calculated for $C_{34}H_{38}N_4O_{15}$, and the n.m.r. spectrum showed signals at δ 7.80–7.40 (multiplet, 10 H, two Ph), 6.93 (2 H, oxadiazoline ring hydrogens), 3.53–3.93 (4 H, two CH_2), 2.14, 1.94 (12 H, four OAc), and 1.36, 1.26, and 1.13 (6 H, two Me).

These data are in agreement with both structures **4** and **5**, arising from the condensation of triethyl orthoformate with either of the two enolic forms of **1** possible (**2** and **3**), and cannot distinguish between them. However, the mass spectrum of the product showed, in addition to the molecular ion at *m/e* 726, fragment **6** at *m/e* 535. The latter would only be expected from **4**, and, accordingly, the product is assigned the structure of the 1,6-bis(2-ethoxy-2,3-dihydro-5-phenyl-1,3,4-oxadiazol-3-yl) derivative of

*Present address: Laboratory for Carbohydrate Research, Harvard Medical School at Massachusetts General Hospital, Boston, Massachusetts 02114, U. S. A., to whom inquiries should be directed.



tetra-*O*-acetylgalactaric acid. This assignment implies that, under the conditions of the reaction, the enolic structure **2** is the preponderant (or sole) existing entity, and this is compatible with the fact that the benzoylhydrazido groups of **1** should be more readily enolizable than the tetra-*O*-acetylgalactaroyl-hydrazido groups, due to the greater electron-withdrawing effect of the polyacetoxyalkyl chain as compared to that of the phenyl groups.

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