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SYNTHESIS OF BIISOXAZOLINIC SPIRO COMPOUNDS

G. Lo Vecchio, G. Cum and G. Stagno d'Alcontres
Istituto di Chimica Organica dell'Università, Messina (Italy)

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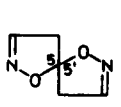
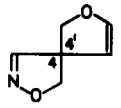
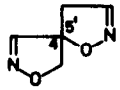
Three classes of spiro-$\Delta^{2,2'}$-biisoxazolines are theoretically possible: 5,5'-spiro-$\Delta^{2,2'}$-biisoxazolines (I), 4,4'-spiro-$\Delta^{2,2'}$--biisoxazolines (II) and 4,5'-(or 5,4')-spiro-$\Delta^{2,2'}$-biisoxazolines (III).



I



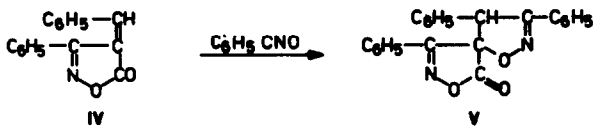
II



III

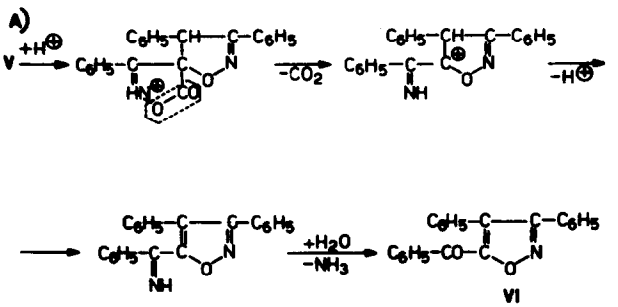
None of the fundamental members are known, but a few derivatives of (I) have been synthesized (1) by 1,3-dipolar cyclo addition of two molecules of benzonitrile oxide to allenes, whose cumulated double bonds possess a lenght that does not exceed the value of 1,35 Å which is critical (2) for the occurrence of the reaction of nitrile oxides with aliphatic double bonds; the 3,3'-diphenyl- (Ia), 3,3'-diphenyl-4--methyl- (Ib) and 3,3',4-triphenyl- (Ic) derivatives of (I) have thus been prepared respectively from allene, methylallene, phenylallene and benzonitrile oxide. Trisubstituted derivatives such as (Ib) and (Ic) can exist in two cis-trans diastereoisomeric forms which have been actually isolated.

We now succeeded in sinthesizing spiro compounds of type (III) by addition of benzonitrile oxide to the exocyclic double bond of 4--arylidene- and 4-alkylideneisoxazolones. Thus 3-phenyl-4-benzylidene--5-isoxazolone (IV) gave 3,3',4'-triphenyl-4,5'-spiro-(5)-isoxazolone--$\Delta^{2'}$-isoxazoline (V), m.p. 176°,5:



IV V

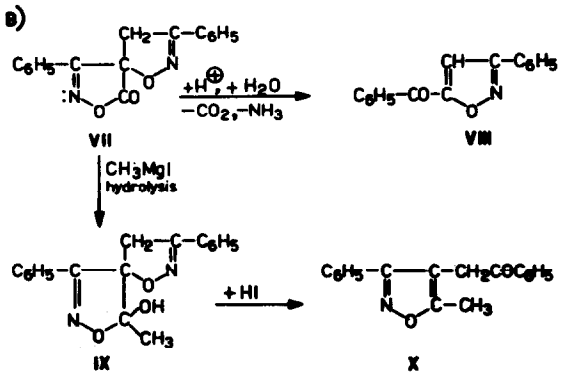
The structure of (V) is demonstrated by its conversion into the known 3,4-diphenyl-5-benzoylisoxazole (VI), m.p. 167° (3) on heating with hydrochloric or sulphuric acid (Schema A).



VI

Similarly, 3,3'-diphenyl-4,5'-spiro-(5)-isoxazolene-$\Delta^{2'}$-isoxazoline (VII), m.p. 158°, has been synthesized by reaction of benzonitrile oxide on the product formed from 3-phenyl-5-isoxazolene and aqueous formaldeyde (4). The structure of (VII) has been confirmed both by cleavage (Schema B) with dilute hydrochloric acid to the ketone (VIII), m.p. 70° (oxime m.p. 204°), and by U.V. (λ^{EtOH}_{max} 262 m ; λ^{EtOH}_{min} 228 m), I.R. ($\nu^{nujol}_{C=O}$ 1805 cm^{-1}), and N.M.R. (two protons of the methylenic group) data.

Further support to structure (VII) is supplied by the reaction of (VII) with CH_3MgI ; the spiro hydroxy-biisoxazoline (IX), m.p. 158°-159°, thus formed, when heated under pressure with aqueous hydroiodic acid yields 3-phenyl-4-phenacyl-5-pethylisoxazole (X) m.p. 62°.



Synthesis of derivatives of type (II) is in progress.

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