

RING TRANSFORMATION OF A 4-AMINOISOXAZOLE INTO A TRIAZOLE

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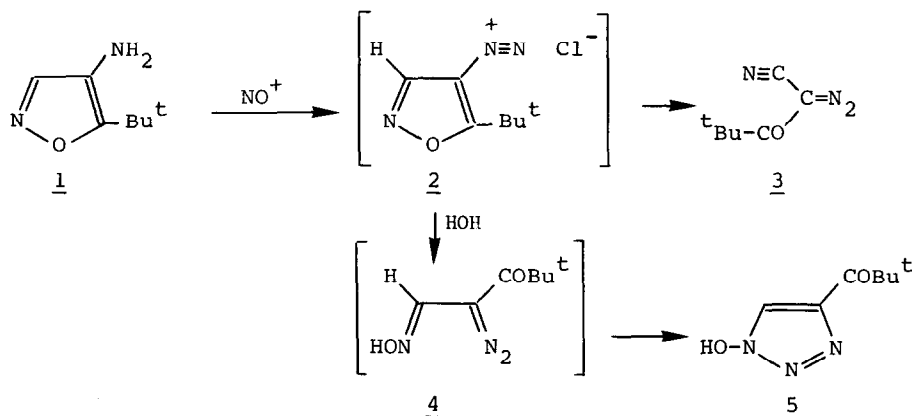
ABSTRACT. Diazotization of 4-amino-5-t-butylisoxazole (1) furnishes the  $\alpha$ -cyanodiazoketone 3 and the 1-hydroxy-1,2,3-triazole 5. A plausible mechanism is formulated.

4-Amino-3,5-dimethylisoxazole is easily converted into the diazonium chloride and has been used, inter alia, for the synthesis of the corresponding azide.<sup>1</sup> During our attempts to prepare 3-unsubstituted 4-azido-5-t-butylisoxazole by the diazotization procedure, we have found a rare case of isoxazole - triazole conversion, the results of which are described below.

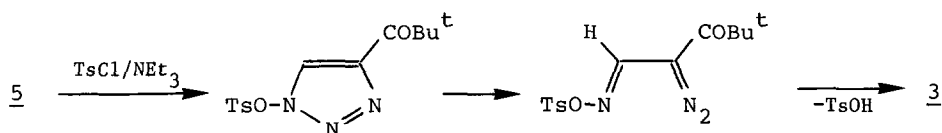
4-Amino-5-t-butylisoxazole (1) was prepared from 5-t-butylisoxazole<sup>2</sup> by nitration in nitric/sulfuric acid, followed by reduction with amalgamated aluminum in moist ether.<sup>1</sup> It was isolated and stored as the stable hydrochloride, and used as such for further reactions.

When 1 was treated with sodium nitrite in concentrated hydrochloric acid at 0/5°C for 10 min and the solution then allowed to react with sodium azide, the expected 4-azido-5-t-butylisoxazole was not obtained. The reaction products, isolated by extraction with ether, were found to be the  $\alpha$ -cyanodiazoketone 3 (44%, yellow liquid) and the 1-hydroxy-1,2,3-triazole 5 (35.5%, mp 130-131°C). No triazole was detected when the t-butyl group was replaced by a methyl group.

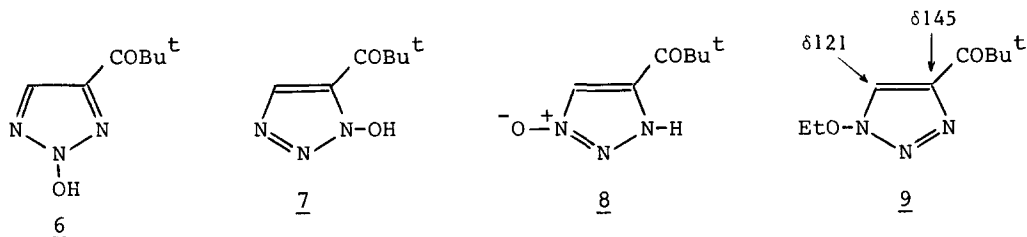
A mechanistic rationalization is outlined below. The diazo compound 3 obviously results from spontaneous deprotonation and ring cleavage of 2, whereas the formation of 5 is interpreted in terms of cyclization of the diazo-oxime 4, which would result from 2 by hydrolysis. Although, in general, triazoles can be prepared from 3-acyl substituted isoxazoles via the corresponding hydrazones (Boulton-Katritzky Scheme),<sup>3</sup> examples related to the title conversion are scarcely documented in the literature.<sup>4</sup>



The triazole 5 is converted quantitatively into 3 upon treatment with tosyl chloride and triethylamine in ether at room temperature. The mechanism is formulated as follows:



The structure of the reaction products were assigned on the basis of the spectral data (IR,  $^1\text{H}$  NMR,  $^{13}\text{C}$  NMR, MS). For instance, triazole 5 exhibits ring-carbon absorptions at  $\delta$  121.2 ( $\text{C}_5$ ) and 144.6 ( $\text{C}_4$ ) in the  $^{13}\text{C}$  NMR spectrum ( $\text{CDCl}_3/\text{DMSO}$ ). The difference in chemical shifts between  $\text{C}_4$  and  $\text{C}_5$  ( $\Delta\delta = 23.4$ ) is diagnostic for a 1,4-disubstituted triazole.<sup>5</sup> Thus, the alternative isomeric structures 6 (expected  $\Delta\delta < 15$ ) and 7 (expected  $\Delta\delta = 3-10$ ) are rejected. The remaining structure to be considered is the tautomeric form 8.<sup>6</sup> However, our triazole is soluble in ether, a property which would not be expected for 8. In addition, the close similarity of the  $^{13}\text{C}$  NMR absorptions of our product with those of 9 are strongly in favour of 5. Compound 9, yellow liquid, was prepared from 5 by treatment with triethyloxonium tetrafluoroborate and shown to be the O-ethyl derivative ( $\delta$  77 for  $\text{OCH}_2$ ). The possibility that 8 exists in equilibrium with 5 has not been excluded.



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