LITERATURE CITED

1. P. Kutschy, M. Dzurilla, L. Kniezo, J. Bernat, Y. Imrich, P. Kristian, and R. Nadaskay, *Coll. Czech. Chem. Commun.*, **00**, 1119 (1986).

HIGHLY EFFECTIVE DEHYDROGENATION OF STEROID ISOXAZOLINES

V. A. Khripach, R. P. Litvinovskaya, and A. V. Baranovskii

UDC 547.92'786.1.04

We have previously described the synthesis of steroid derivatives Ia, b, which contain anisoxazolinyl substituent attached to the $C_{(20)}$ atom [1]. Various methods for the isoxazoline → isoxazole oxidative transformation are known; however, their application to derivatives of the I type does not lead to the desired results. We have established the formation of isoxazoles IIa, b as side products in the dehydration of 20-isoxazolinyl steroids with thionyl chloride in chloroform; the principal reaction products are olefins IIIa, b.

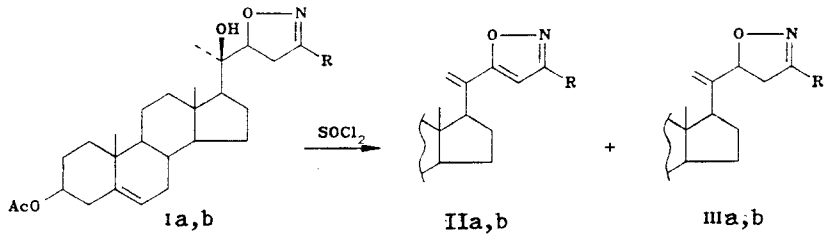
Replacement of chloroform by pyridine leads to the formation of II and III in equal ratios, while the use of DMF as the solvent makes it possible to obtain a single product, viz., isoxazoles IIa, b in up to 90% yields.

It was shown by special experiments that the formation of isoxazoles IIa, b does not occur in the reaction of thionyl chloride and isoxazolines IIIa, b in DMF. A steroid isoxazoline that does not have a 20-hydroxy group remains unchanged under the same conditions. These results constitute evidence that the observed dehydrogenation occurs in the step involving the dehydration itself of starting alcohols Ia, b, while the mechanism of the dehydrogenation that we observed probably includes participation of the 20-hydroxy group.

A 0.27-mmole sample of thionyl chloride was added with stirring to a solution of 0.18 mmole of Ia, b in 1 ml of DMF, after which the mixture was stirred for 1 h at 20°C and then poured into 10 ml of saturated Na_2CO_3 solution. The resulting mixture was extracted with ether, the extract was dried with Na_2SO_4, and the solvent was evaporated in vacuo. The residue was chromatographed on silica gel [elution with ether–hexane (1:10)] to give IIa, b.

The results of elementary analysis of IIa, b were in agreement with the calculated values.

3β-Acetoxy-20(3-isopropyl-5-isoxazolyl)pregna-5,20(21)-diene (IIa). This compound was obtained in 90% yield and had mp 140-142°C. PMR spectrum ($CDCl_3$): 5.33 and 5.81 (2H, two s, 21-H), 6.08 ppm (1H, s, 4'-H). Mass spectrum, m/z: 451 (M^+), 391 $(M - AcOH)^+$.



Ia,b IIa,b IIIa,b

I–III a R=CH(CH$_3$)$_2$; б R=COOC$_2$H$_5$

3β-Acetoxy-20(3-carbethoxy-5-isoxazolyl)pregna-5,20(21)-diene (IIb). This compound was obtained in 85% yield and had mp 168-170°C. PMR spectrum ($CDCl_3$): 5.44 and 5.96 (2H, two s, 21-H), 6.63 ppm (1H, s, 4'-H). Mass spectrum, m/z: 481 (M^+), 421 $(M - AcOH)^+$.

Institute of Bioorganic Chemistry, Academy of Sciences of the Belorussian SSR, Minsk 220045.

Translated from Khimiya Geterotsiklicheskikh Soedinenii, No. 6, pp. 852-853, June, 1990. Original article submitted July 27, 1989.

0009-3122/90/2606-0713$12.50

LITERATURE CITED

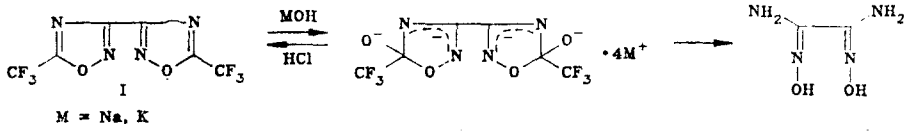
1. A. A. Akhrem, V. A. Khripach, R. P. Litvinovskaya, A. V. Baranovskii, M. I. Zavadskaya, A. N. Kharitonovich, E. V. Borisov, and F. A. Lakhvich, *Zh. Org. Khim.* **25**, 1901 (1989).

σ-ADDUCTS IN THE 1,2,4-OXADIAZOLE SERIES

V. G. Andrianov and A. V. Eremeev

UDC 547.793.3.04

It is known that the 5-trichloromethyl group in 1,2,4-oxadiazoles is readily replaced under the influence of nucleophiles, particularly alkalis [1]. We have established that, in contrast to the trichloromethyl derivative, bis(5-trifluoromethyl-1,2,4-oxadiazol-3-yl) reacts with alkalis to give stable anionic σ-adducts, which were previously unknown in the 1,2,4-oxadiazole series [2].



I

M = Na, K

Owing to the strongly expressed electron-acceptor properties of the oxadiazole ring and the trifluoromethyl group, the acidities of the hydroxy groups in the σ adduct are so high that they are ionized in alkaline solution. Thus a precipitate of the tetrapotassium or tetrasodium salt of bis(5-hydroxy-5-trifluoromethyl-1,2,4-oxadiazol-3-yl) is formed in 67% of 73% yield, respectively, in the reaction of 5 mmoles of I with a solution of 30 mmoles of KOH or NaOH in 50 ml of alcohol for several minutes. The salts melt above 300°C. The results of elementary analysis for C, H, and N were in agreement with the calculated values.

The reaction involving the formation of the adduct is reversible: the starting bis(oxadiazolyl) I, with mp 138°C (from alcohol), is formed in 55% yield when a solution of 5 mmole of the adduct in 5 ml of water is treated with hydrochloric acid to pH 3-4. The adduct gradually decomposes during storage; the process takes place faster in aqueous solution – in a few days. However, products of ordinary nucleophilic substitution are not formed in this case, since cleavage of the ring C–O bond, which ultimately leads to a diaminoglyoxime, rather than cleavage of the C–CF_3 bond occurs.

LITERATURE CITED

1. F. Eloy, *Fortschr. Chem. Forsch.* **4**, 807 (1965).
2. G. Illuminati and F. Stegel, *Advances in Heterocyclic Chemistry*, Vol. 34, A. R. Katritzky and A. J. Boulton (eds.), Academic Press, New York (1983), p. 305.

Institute of Organic Synthesis, Latvian Academy of Sciences, Riga 226006.

Translated from Khimiya Geterotsiklicheskikh Soedinenii, No. 6, pp. 853-854, June, 1990. Original article submitted March 22, 1989; revision submitted September 5, 1989.

0009-3122/90/2606-0714$12.50