## ADDITION OF HYDROGEN DISULFIDE TO 1,4-DIHYDROPYRIDINE DERIVATIVES

UDC 541.63:542.942

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In a continuation of a study of nucleophilic addition to 1,4-dihydropyridine derivatives not containing unsaturated electron-withdrawing groups, we are the first to report the cycloaddition of hydrogen disulfide to a 1,4-dihydropyridine structure in the case of derivatives of hexahydroquinoline (Ia) and decahydroacridine (Ib and Ic) with the formation of IIa-c containing the 6,7-dithia-8-azabicyclo[3.2.1]octane structure. The reaction proceeds upon mixing the 1,4-dihydropyridine and sodium disulfide in acetic acid-tetrahydrofuran at room temperature. Under analogous conditions, 2,2-methylenedicyclohexanone reacts with aniline and hydrogen disulfide to form IId, apparently through an intermediate dihydropyridine. The corresponding pyridinium salts IIIa-c were isolated as the perchlorate salts in 8-10% yield as side-products in the synthesis of IIa, IIb, and IId. These salts are apparently formed in the oxidation of dihydropyridine.



I, II a  $R = R^3 = C_6H_5$ ,  $R^2 = R^1 = H$ ;  $b R = C_6H_5$ ,  $R^2 - R^3 = (CH_2)_4$ ,  $R^1 = H$ ;  $c R - R^1 = (CH_2)_5$ ,  $R^2 - R^3 = (CH_2)_4$ . IId  $R = R^1 = H$ ,  $R^2 - R^3 = (CH_2)_4$ . III a  $R^2 = R^2 = C_6H_5$ ,  $R^1 = H$ ;  $b R = C_6H_5$ ,  $R^1 - R^2 = (CH_2)_4$ ; c R = H,  $R^1 - R^2 = (CH_2)_4$ .

The IR spectra of all compounds II lack double bond bands above 1600 cm<sup>-1</sup> and SH group bands. The mass spectra of IIb and IId have low-intensity molecular ion peaks corresponding to the calculated molecular masses and strong fragment ion peaks with M - 64, M - 65, and M - 66. A molecular ion peak is not found in the mass spectra of IIa and IIc and the greatest m/z value is found for the peak corresponding in mass to the related dihydropyridine. The PMR spectrum of IIb has the signal for the benzyl proton at C-9 of the hydroacridine system as a triplet at 2.50 ppm with coupling constant 10.3 Hz, which is possible only for trans-syn-trans configuration of the perhydroacridine structure. The reduction of IIb and IId by NaBH<sub>4</sub> gave trans-syn-trans-9,10-diphenylperhydroacridine [1] and two stereoisomeric 10-phenylperhydroacridines [2], respectively. Compound IIa was synthesized in 50% yield, mp 137-138°C (dec., 1:1 hexane-benzene), IIb was synthesized in 26% yield, mp 173-174°C (dec., from 1:2 ethyl acetate-acetone), IIc was synthesized in 60% yield, mp 155-157°C (from 1:1 hexane-benzene), and IId was synthesized in 33% yield, mp 106-109°C (from ethanol).

The elemental analysis data for C, H, N, and S for all the compounds obtained corresponded to the calculated values.

## LITERATURE CITED

- V. I. Alekseeva, V. A. Kaminskii, and M. N. Tilichenko, Khim. Geterotsikl. Soedin., No. 7, 957 (1976).
- 2. V. I. Vysotskii and M. N. Tilichenko, Khim. Geterotsikl. Soedin., No. 3, 376 (1971).

Far East State University, Vladivostok 690600. Translated from Khimiya Geterotsiklicheskikh Soedinenii, No. 12, pp. 1692-1693, December, 1983. Original article submitted April 6, 1983.