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 $N-(\beta,\gamma-Dihydroxypropyl)$  aniline was subjected to reaction with aldehydes. It was proved that the reaction products are 3-phenyl-5-hydroxymethyloxazolidines. A number of 3-phenyl-5-acyloxymethyloxazolidines were obtained by the reaction of the latter with acid anhydrides.

In continuing our search for biologically active compounds among the amino alcohols of the aromatic series and their derivatives [1-3], we have synthesized 3-phenyl-5-hydroxymethyloxazolidines and their esters.

In the condensation of  $N-(\beta,\gamma-dihydroxypropyl)$  aniline with aldehydes one might have expected the formation of 3-phenyl-5-hydroxymethyloxazolidines (I) or the isomeric 3-phenyl-5-hydroxytetrahydro-1,3-oxazines (II):





Fig. 1. NMR spectra: a) 3-phenyl-5hydroxymethyloxazolidine (I); b) 3-phenyl-5-acetoxymethyloxazolidine.

To ascertain the structure of the compounds, we obtained the NMR spectra of the product of the reaction of N- $(\beta, \gamma$ -dihydroxypropyl)aniline with formaldehyde (Fig. 1a) and its acetyl derivative (Fig. 1b).

A multiplet (5H) due to five aromatic protons is observed in the NMR spectrum of the product of the reaction of N-( $\beta$ , $\gamma$ -dihydroxypropyl)aniline with formaldehyde in the weak-field region at  $\delta$  6.2-7 ppm. The two-proton quartet, centered at  $\delta$  3.05 ppm with J<sup>gem</sup> = 12 Hz, corresponds to the CH<sub>2</sub>-N grouping, the complicated triplet (2H) at  $\delta$  3.46 ppm corresponds to the CH<sub>2</sub>OH group, the quartet (2H) at 4.61 ppm is due to the -N-CH<sub>2</sub>-O protons, the -CH-O methine proton is observed at 4.10 ppm, and the OH group gives a signal at 3.76 ppm, which was verified by obtaining the spectrum with added CD<sub>3</sub>OD.

Of importance in choosing between structures I and II is the fact that when the hydroxyl group is acetylated, a paramagnetic shift of the signal of the two protons of the  $CH_2$ -OAc group should be observed in the case of I; this is, in fact, observed, i.e., in the spectrum of the acetyl deriva-

Institute of the Chemistry of Plant Substances, Academy of Sciences of the UzbekSSR, Tashkent. Translated from Khimiya Geterotsiklicheskikh Soedinenii, No. 4, pp. 451-453, April, 1971. Original article submitted April 28, 1970.

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TABI

Startin pounds	g com- g		(mm) ng			MR		Rf		Fmnirical	z	8	
alde-	N-(β, γ-di- lydroxprop- rl)aniline	а.	or mp, °C	<i>d</i> <sup>4</sup> <sup>20</sup>	n D <sup>20</sup>	found	calc.	(system 1)	IR spectra, cm <sup>-1</sup>	formula	found	calc.	Yield, %
41,6	66,8	Н	154-156 (2)	1,1847	1,5782	50,27	49,68	0,78	700, 755, 830, 890, 1080, 1145, 1190, 1500,	C <sub>10</sub> H <sub>13</sub> NO <sub>2</sub>	7,89	7,82	16
22,0	66,8	CH <sub>3</sub>	156-158 (3)	1,1405	1,5648	55,18	54,30	0,73	1003, 3030, 3400 700, 755, 840, 875, 1120, 1160, 1190, 1505,	$C_{11}H_{15}NO_2$	7,23	7,25	72
27,4	33,4	C <sub>6</sub> H <sub>5</sub>	135	l	l	I		0,71	1000, 3030, 3400 700, 755, 815, 870, 1115, 1170, 1190, 1505, 1595, 3030, 3400	C <sub>16</sub> H <sub>17</sub> NO <sub>2</sub>	5,58	5,49	86

TABLE 2

N-CH <sub>2</sub> CH_CH <sub>2</sub> C
C <sub>6</sub> H <sub>5</sub> -N-

	Yield, %		92 86 78 91 91
	%	calc.	22222222 22222222 22222222 22222222 2222
	ź	found	6,85 6,04 5,08 5,30 6,08 5,30 6,08
	Empirical	formula	C12H16NO3 C13H17NO3 C13H17NO3 C14H13NO3 C14H13NO3 C14H19NO3 C14H19NO3 C16H21NO3
		IR spectrum, cm <sup>-1</sup>	700, 755, 850, 870, 1100, 1120, 1190, 1500, 1600, 1740, 3035 700, 755, 810, 870, 1090, 1120, 1180, 1500, 1600, 1740, 3035 700, 755, 850, 870, 1100, 1180, 1505, 1605, 1740, 3035 700, 755, 845, 875, 1125, 1160, 1190, 1510, 1605, 1740, 3035 700, 755, 845, 875, 1090, 1125, 1190, 1510, 1605, 1740, 3035 700, 755, 845, 875, 1090, 1180, 1500, 1600, 1740, 3035
	Rf	(system 3)	0,55 0,63 0,64 0,67 0,72 0,72
	R_D	calc.	59,05 63,67 63,67 68,28 68,28 72,90
	W	found	64,71 64,76 64,76 69,15 73,42
	n <sub>D<sup>20</sup></sub>		$\begin{array}{c} 1,5392\\ 1,5378\\\\ 1,5336\\ 1,5255\\ 1,5021\\ \end{array}$
	d, <sup>20</sup>		$\begin{array}{c}1,1640\\1,1377\\1,1377\\1,1299\\1,1060\\1,0602\end{array}$
, , , ,	Bp (mm) or mp ,°C		$ \begin{array}{c} 164-166(2-3) \\ 163-184(5) \\ 40 \\ 168-170(5) \\ 173-175(3) \\ 173-221(6) \end{array} $
	ж		$C_{3H_5}^{\rm CH}$
	×		сна ССН ССН Н н н
	anhy- dride		61,2 12,2 47,4 39,6 39,0 47,4
	Starting com- pounds, g	3-pheny1-5- hydroxymethyl oxazolidine	35,8 9,5,8 19,3 19,3 19,3 29,3

tive (Fig. 1b) the two-proton signal is shifted from 3.46 ppm to 4.02 ppm as a two-proton quartet, and the signal of the proton of the hydroxyl group vanishes simultaneously.

Thus the paramagnetic shift of the signal of the methylene protons attached to the same carbon atom as the OH group when it is acetylated unambiguously proves structure I, i.e., the products of the reaction of  $N-(\beta,\gamma-dihydroxypropyl)$  aniline with aldehydes are 3-phenyl-5-hydroxymethyloxazolidines.

In addition to the NMR data, we note that the IR spectra contain three bands at  $1100-1200 \text{ cm}^{-1}$  and two bands at  $810-890 \text{ cm}^{-1}$ , which can be assigned to the oxazolidine ring [4], and a band at  $1740 \text{ cm}^{-1}$  simultaneously appears in the IR spectra of the esters.

## EXPERIMENTAL

The NMR spectra of carbon tetrachloride solutions were recorded with an HNM-4H-100 spectrometer (100 MHz); the chemical shifts were reckoned from the signal of hexamethyldisiloxane as the internal standard taken as zero.

The IR spectra were obtained with a UR-10 double-beam IR spectrometer with NaCl and LiF prisms.

Thin-layer chromatography was carried out on plates (17 by 10) with a loose layer of activity II aluminum oxide in the following systems: System 1: benzene-methanol (3:1); System 2: acetone-methanol-water (8:2:1); System 3: diethyl ether-petroleum ether (2:1).

<u>3-Phenyl-5-hydroxymethyloxazolidines</u>.  $N-(\beta, \gamma)$ -Dihydroxypropyl)aniline, toluene (benzene), and the appropriate aldehyde were placed in a three-necked flask equipped with a stirrer, a thermometer, a reflux condenser, and a Dean-Stark trap. The mixture was heated until water liberation ceased. At the end of the process, the solvent was distilled from the reaction mixture, and the residue was vacuum fractionated.

The constants and yields of the compounds are presented in Table 1.

<u>3-Phenyl-5-acyloxymethyloxazolidines</u>. The appropriate 3-phenyl-5-hydroxymethyloxazolidine, acid anhydride, and toluene were placed in a three-necked flask equipped with a stirrer, a thermometer, and a reflux condenser. The mixture was heated at 100-110° for 2 h. The toluene and unchanged anhydride were removed by distillation, and the residue was vacuum fractionated.

The constants and yields of the compounds are presented in Table 2.

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