TABLE 1. Characteristics of the Compounds (IIa, b) and (IIIa, b)

Com- pound	mp, °C	UV spectrum		IR spec	PMR spectrum, δ, ppm				Yield,
		λ _{max} , nm	ε·10·3	trum, V C=C, cm ⁻¹	lH,s,	IH.S, NH	2H.S, NH ₂	18H; m (CH ₂) _n	%
IIa IIb IIIa IIIb	218 197 198 233 234 251	258 268 255 263	3,4 5,4 3,7 3,3	1675 1680 1682 1682	7,89 7,76	7,05 6,85 9,90 9,95	4,85 - 4,90	1,1 2,2 1,1 2,3 1,0 2,1 1,1 2,2	54 57 56 61

The difference in the direction of reactions A and B clearly shows that the self-condensation of two molecules of cyclohexanone cannot be the first stage of its reaction with the amines (Ia, b).

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ADDITION OF 4-NITROBENZONITRILE-N-OXIDE TO DERIVATIVES OF a-METHYLENELACTONES

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The N-acylated α -methylenelactones (I) and (II) readily participate in the reaction of the cycloaddition with 4-nitrobenzoni-trile-N-oxide resulting in the formation of the spirocyclic derivatives (III) and (IV). The reaction proceeds at room temperature in acetonitrile:

The addition proceeds regiospecifically and only leads to the isomer in which the oxygen atom of the isoxazoline ring is connected to the spiro atom. The orientation of the addition is confirmed by the data of the PMR spectra, in which the signals of the methylene protons of the isoxazoline ring appear in the region of 4 ppm; this is characteristic of the methylene group at the position 4 [1].

The amide (III) is readily deacylated by the action of aqueous alkali; the spirocyclic system is thereby retained.

4-Benzoyl-5,5-dimethyl-4'-(4-nitrophenyl)-2-oxomorpholine-3-spiro-5'-(2-isoxazoline) (III). mp 209-211°C (from CH₃CN). PMR spectrum (DMSO-D₆): 1.27 and 1.46 ppm (3H each, s, CH₃), 3.62 and 4.29 ppm (1H each, d, J = 19 Hz, CH₂), 4.33 and 4.62 ppm (1H each, d, J = 12 Hz, CH₂), 7.1-7.5 ppm (5H, m, C₆H₅), and 7.62 and 8.16 ppm (2H each, d, J = 9 Hz, C₆H₄).

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- 4-Benzoxycarbonyl-5,5-dimethyl-4'-(4-nitrophenyl)-2-oxomorpholine-3-spiro-5'-(2-isoxazoline) (IV). mp 153-155°C (from 2-propanol). PMR spectrum (DMSO-D₆): 1.33 and 1.38 ppm (3H each, s, CH₃), 3.89 and 4.22 ppm (1H each, d, J = 18 Hz, CH₂), 4.29 and 4.47 ppm (1H each, d, J = 12 Hz, CH₂), 4.98 ppm (2H, s, CH₂), 7.16 ppm (5H, s, C₆H₅), and 7.71 and 8.18 ppm (2H each, d, J = 9 Hz, C₆H₄).
- 5,5-Dimethyl-4'-(4-nitrophenyl)-2-oxomorpholine-3-spiro-5'-(2-isoxazoline) (V). mp 190-192°C (from 2-propanol). PMR spectrum (DMSO-D₆): 1.12 and 1.17 ppm (3H each, s, CH₃), 3.20 and 3.98 ppm (1H each, d, J = 18 Hz, CH₂), 4.16 and 4.42 ppm (1H each, d, J = 11 Hz, CH₂), 5.00 ppm (1H, s, NH), and 7.79 and 8.24 ppm (2H each, d, J = 9 Hz, C_6H_4).

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