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SYNTHESIS OF 3,1-BENZOXAZINES FROM N-SUBSTITUTED *ortho*-(CYCLOALK-1-ENYL OR ALK-2-EN-2-YL)ANILINES*

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New derivatives of 3,1-benzoxazine have been synthesized by the cyclization of RCO-substituted at the nitrogen atom (R = OEt, Me, NH_2) ortho-(cycloalk-1-enyl or alken-1-yl)anilines under mild conditions.

Keywords: *ortho*-alkenylanilines, arylureas, arylurethanes, 3,1-benzoxazines, cyclization.

The high biological activity of certain compounds of the benzoxazine series stimulates investigation in this area. The synthesis of highly effective cardiostimulants [1] or oxytocin antagonists from anthranilic acid [2] has been described. 2-Aminoalkyl-3,1-benzoxazines, which potentially are active inhibitors of chymase, have been obtained from phthalimide [3]. An inhibitor of reverse transcriptase HIV-1 belonging to this series has been synthesized [4].

On continuation of our investigations on the heterocyclization of 2-(alkenyl)-N-acylanilines under mild conditions [5-7] new examples of this reaction are given, carried out with such substrates as N-ethoxycarbonylanilines **1** and **2a,b**, acetanilide **3**, and N-carbamoylaniline **4**.

Urethanes (*Z*)-**1**, (*E*)-**1** and **2a,b** were synthesized by the ethoxycarbonylation of the (*Z*)- and (*E*)-isomers of 4-methyl-2-(pent-2-en-2-yl)aniline (**5**) and also of the 2-R-6-(cycloalk-1-enyl)anilines **6a** [5] and **6b** obtained from cycloalk-2-enyl-substituted isomers **7a** and **7b** respectively. Anilide **3** was obtained by the acetylation of aniline **6b**, and arylurea **4** was obtained by the ammonolysis of urethane **2a [8]**.

Compounds **1-4** were subjected to heterocyclization under various conditions. The action of Br_2 in CCl_4 on the (*Z*)- and (*E*)-isomers of 4-methyl-2-(pent-2-en-2-yl)urethane (**1**) gave diastereomers (**A** and **B**) of 4,4-dimethyl-4-(1-bromopropyl)-(4H)-3,1-benzoxazin-2-one (**8**). Isomer **A** is (4*R*,1'*R*+4*S*,1'*S*) and **B** – (4*R*,1'*S*+4*S*,1'*R*). The formation of enantiomer **A** from isomer (*Z*)-**1** is more probable since on cyclization of similar olefins by the action of halogens it is generally accepted that the reaction proceeds through the stage of an onium complex [9]. Under the conditions indicated anilide **3** was converted into 2'-bromo-2-methyl-8-methoxyspiro[4H-3,1-benzoxazine-4,1'-cyclohexane] hydrobromide (**9**). Treatment of urethanes **2a,b** and urea **4** with HCl in EtOH or $C_2H_4Cl_2$ led to the hydrochlorides **10a,b** and **11** respectively. The desired derivatives of 2-substituted 3,1-benzoxazine **12** and **13** were obtained from hydrohalides **9** and **11** respectively by the action of aqueous Na_2CO_3 or K_2CO_3 solution, and 3,1-benzoxazine derivative **14** was obtained similarly from hydrochloride **10a,b**.

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* Dedicated to Academician of the Russian Academy of Sciences M. G. Voronkov on his 80th Birthday.

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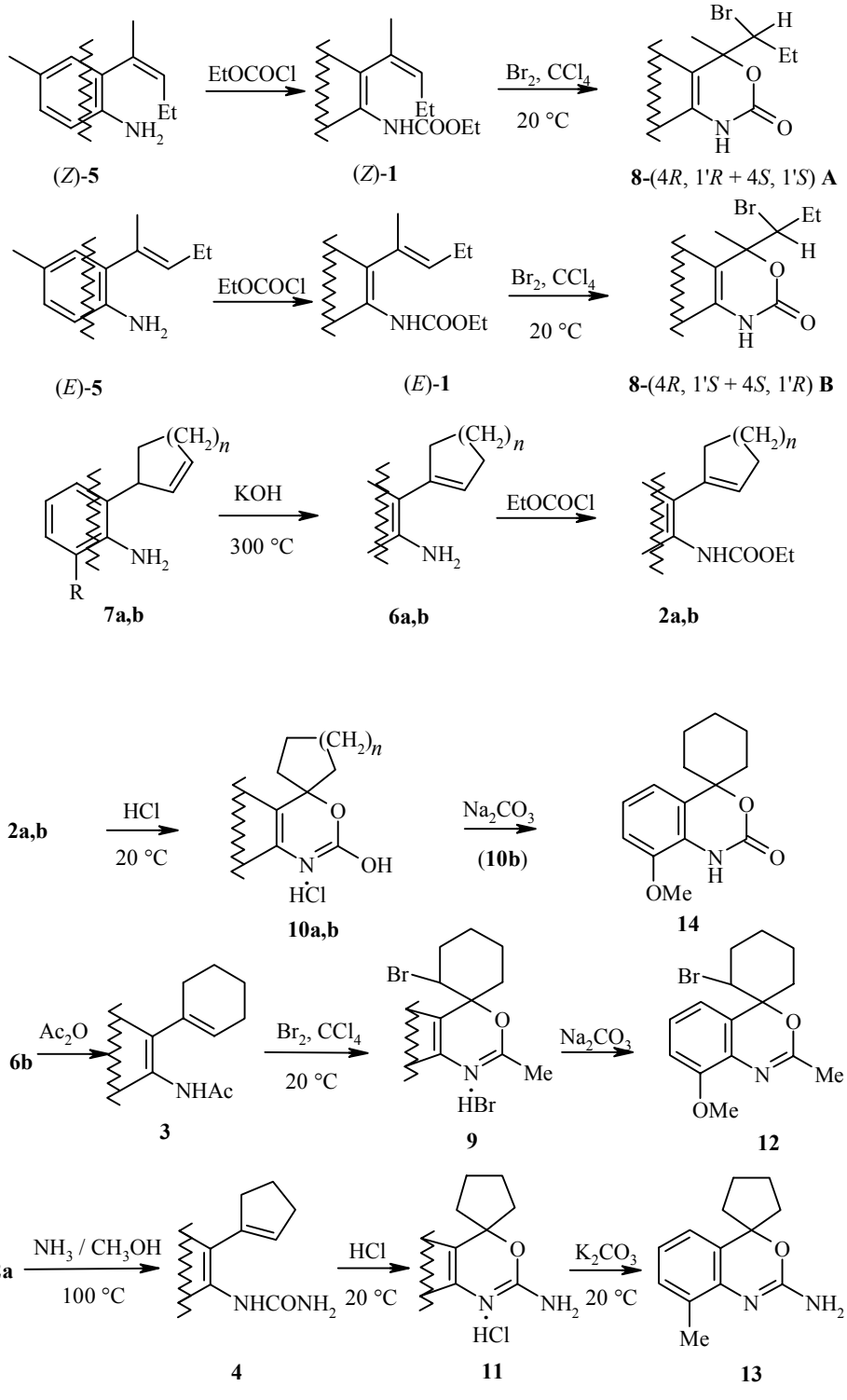

2, 6, 7, 10a *n* = 1, R = Me; **b** *n* = 2, R = OMe; **3, 9** R = OMe; **4, 11** R = Me

The composition and structures of the compounds synthesized were confirmed by the results of elemental analysis, and by data of ^{1}H and ^{13}C NMR spectra and of IR spectra (see Experimental).

EXPERIMENTAL

The ^1H and ^{13}C NMR spectra were taken on a Bruker AM 300 instrument with an operating frequency of 300.13 and 75.47 MHz for solutions in $CDCl_3$, internal standard was Me_4Si. The IR spectra were obtained on a UR 20 instrument. A check on the purity of products was effected on a Chrom 4 chromatograph and on Silufol UV 254 plates.

6-(Cyclohex-1-enyl)-2-methoxyaniline (6b). A mixture of amine **7b** (10 g) and KOH (10 g) was kept for 1 h at 300°C. After cooling, benzene (50 ml) was added to the reaction mixture, stirred, and decanted. After evaporation of benzene the residue was distilled in vacuum. Product **6b** (8.7 g) was obtained; bp 125-128°C (3 mm Hg), mp 41-43°C (pentane). IR spectrum, ν, cm^{-1}: 3260, 3320 (NH_2). ^1H NMR spectrum, δ, ppm: 1.52-1.63 (4H, m, $2CH_2$); 2.18 (2H, m, CH_2); 2.21 (2H, m, CH_2); 3.64 (3H, s, OCH_3); 4.58 (2H, br s, NH_2); 5,77 (1H, m, =CH); 6.50-6.67 (3H, m, H_{Ar}). ^{13}C NMR spectrum, δ, ppm: 20.1 ($C_{(4')}$); 24.4 ($C_{(5')}$); 25.1 ($C_{(3')}$); 28.2 ($C_{(6')}$); 55.0 (CH_3O); 108.3 ($C_{(4)}$); 110.4 ($C_{(3)}$); 120.5 ($C_{(5)}$); 126.3 ($C_{(2')}$); 126.4 ($C_{(6)}$); 133.5 ($C_{(1)}$); 136.5 ($C_{(1')}$); 145.7 ($C_{(2)}$). Found, %: C 76.18; H 8.03; N 6.55. $C_{13}H_{17}NO$. Calculated, %: C 76.81; H 8.43; N 6.89.

Ethoxycarbonylation of Compounds (*Z*)-5, (*E*)-5, and 6a,b (General Method). Potassium carbonate (10 g) was introduced into solution of compound (*Z*)-**5**, (*E*)-**5**, or **6a,b** (10 mmol) in CH_2Cl_2 (20 ml). Solution of ethyl chloroformate (15 mmol) in CH_2Cl_2 (15 ml) was added dropwise with stirring at 20°C. The reaction mixture was stirred for 2 h and kept for 16 h at the same temperature. The inorganic solid was filtered off, washed with CH_2Cl_2 (2 × 10 ml), and the filtrate was washed with 10% aqueous $NaHCO_3$ solution until cessation of CO_2 evolution, then with water, and dried over $MgSO_4$. The solvent was distilled off, and the product purified by distillation in vacuum.

6-(Cyclohex-1'-enyl)-N-(ethoxycarbonyl)-2-methoxyaniline (2b). Yield 83%; bp 180-183°C (3 mm Hg); mp 58-61°C (CCl_4). IR spectrum, ν, cm^{-1}: 3270 (NH). ^1H NMR spectrum, δ, ppm, *J* (Hz): 1.07 (3H, t, *J* = 7.0, $\underline{CH_3}CH_2$); 1.47-1.61 (4H, m, $2CH_2$); 2.04 (2H, m, CH_2); 2.19 (2H, m, CH_2); 3.60 (3H, s, OCH_3); 4.04 (2H, q, *J* = 7.0, $\underline{CH_2}CH_3$); 6.53 (1H, br. s, NH); 5.82 (1H, m, =CH); 6.60-6.72 (3H, m, H_{Ar}). ^{13}C NMR spectrum, δ, ppm: 14.4 (CH_3); 20.2 ($C_{(4')}$); 24.9 ($C_{(5')}$); 25.2 ($C_{(3')}$); 28.3 ($C_{(6')}$); 55.0 (CH_3O); 60.3 (CH_2O); 108.8 ($C_{(4)}$); 114.4 ($C_{(3)}$); 120.3 ($C_{(5)}$); 122.3 ($C_{(1)}$); 126.3 ($C_{(2')}$); 126.4 ($C_{(6)}$); 136.1 ($C_{(1')}$); 142.5 ($C_{(2)}$); 154.1 ($C_{(1)}$). Found, %: C 67.42; H 7.29; N 4.82. $C_{16}H_{21}NO_3$. Calculated, %: C 69.79; H 7.69; N 5.09.

N-(Ethoxycarbonyl)-4-methyl-2-[(*Z*)-pent-2'-en-1'-yl]aniline [(*Z*)-1]. Yield 95%, oil; bp 146-148°C (3 mm Hg). IR spectrum, ν, cm^{-1}: 3270 (NH). ^1H NMR spectrum, δ, ppm, *J* (Hz): 0.92 (3H, t, *J* = 7.5, CH_3); 1.34 (3H, t, *J* = 7.0, CH_3); 1.78 (2H, q, *J* = 7.0, CH_2); 2.05 (3H, s, CH_3); 2.30 (3H, s, CH_3); 4.16 (2H, q, *J* = 7.5, CH_2); 5.71 (1H, dt, *J* = 1.0, *J* = 7.0, =CH); 6.65 (1H, d, *J* = 8.4, 6-H); 6.79 (1H, s, 3-H); 7.14 (1H, d, *J* = 8.4, 5-H); 8.02 (1H, s, NH). ^{13}C NMR spectrum, δ, ppm: 13.8, 14.4, 20.6, 22.4 ($4CH_3$); 24.9 ($C_{(3')}$); 60.9 (CH_2O); 118.4 ($C_{(6)}$); 128.1 ($C_{(2')}$); 128.5 ($C_{(5)}$); 130.7 ($C_{(1)}$); 131.7 ($C_{(2)}$); 131.8 ($C_{(4)}$); 132.1 ($C_{(1')}$); 132.4 ($C_{(3)}$); 153.6 (O–C=O). Found, %: C 72.42; H 8.29; N 5.21. $C_{15}H_{21}NO_2$. Calculated, %: C 72.83; H 8.57; N 5.66.

N-(Ethoxycarbonyl)-4-methyl-2-[(*E*)-1'-methylbut-1'-enyl]aniline [(*E*)-1]. Yield 95%, oil; bp 140-142°C (3 mm Hg). IR spectrum, ν, cm^{-1}: 3290 (NH). ^1H NMR spectrum, δ, ppm, *J* (Hz): 1.04 (3H, t, *J* = 7.3, CH_3); 1.31 (3H, t, *J* = 7.1, CH_3); 1.94 (3H, s, CH_3); 2.22 (2H, m, CH_2); 2.33 (3H, s, CH_3); 4.18 (2H, m, CH_2); 5.43 (1H, t, *J* = 6.9, =CH); 6.74 (1H, d, *J* = 8.4, 6-H); 6.82 (1H, s, 3-H); 6.95 (1H, d, *J* = 8.4, 5-H); 7.76 (1H, s, NH). ^{13}C NMR spectrum, δ, ppm: 13.8, 14.4, 17.5, 20.5 ($4CH_3$); 21.5 ($C_{(3')}$); 60.8 (CH_2O); 119.3 ($C_{(6)}$); 127.5 ($C_{(2')}$); 128.6 ($C_{(5)}$); 131.6 ($C_{(1)}$); 132.0 ($C_{(2)}$); 132.1 ($C_{(4)}$); 133.4 ($C_{(3)}$); 140.1 ($C_{(1')}$); 153.5 (O–C=O). Found, %: C 72.42; H 8.29; N 5.21. $C_{15}H_{21}NO_2$. Calculated, %: C 72.83; H 8.57; N 5.66.

N-Acetyl-6-(cyclohex-1-enyl)-2-methoxyaniline (3). Acetic anhydride (1.5 ml, 15 mmol) was added to solution of aniline **6b** (2.3 g, 10 mmol) in CH_2Cl_2 (20 ml) and the mixture was kept for 2 h at room temperature. The reaction mixture was treated with 10% Na_2CO_3, the organic portion was separated, dried over $MgSO_4$, and the solvent evaporated. Anilide **3** (2.25 g, 91%) was obtained; mp 99-101°C (CCl_4). ^1H NMR spectrum, δ, ppm: 1.51-1.68 (4H, m, $2CH_2$); 2.14 (2H, m, CH_2); 2.23 (3H, s, CH_3–CO); 2.24 (2H, m, CH_2); 3.72 (3H, s, CH_3–O);

6.77 (1H, m, =CH); 6.88-7.47 (3H, m, H_{Ar}); 8.25 (1H, s, NH). ^{13}C NMR spectrum. δ, ppm: 20.3 ($C_{(4')}$); 23.5 (CH_3); 24.8 ($C_{(5')}$); 25.5 ($C_{(3')}$); 28.4 ($C_{(6')}$); 55.1 (C–O); 109.0 ($C_{(3)}$); 114.7 ($C_{(4)}$); 122.0 ($C_{(5)}$); 124.3 ($C_{(1)}$); 126.4 ($C_{(2')}$); 127.5 ($C_{(6)}$); 136.0 ($C_{(1')}$); 148.3 ($C_{(2)}$); 168.3 (C=O). Found, %: C 72.70; H 7.30; N 5.04. $C_{15}H_{19}NO_2$. Calculated, %: C 73.44; H 7.81; N 5.71.

Cyclization of Compounds 3, (*Z*)-1, and (*E*)-1 under the Action of Br_2. Solution of Br_2 (0.1 ml, 1.9 mmol) in CCl_4 (5 ml) was added dropwise to solution of compound **3**, (*Z*)-**1**, or (*E*)-**1** (1.86 mmol) in dry CCl_4 (20 ml). The solid hydrobromide **9** was filtered off and washed with CCl_4 (10 ml). (*R,S*) and (*R,R*) benzoxazinones **8** were isolated by evaporating the solvent.

2'-Bromo-8-methoxy-2-methylspiro[4H-3,1-benzoxazine-4,1'-cyclohexane] Hydrobromide (9). Yield 86%; mp 132-134°C ($CHCl_3$). ^{1}H NMR spectrum, δ, ppm, *J* (Hz): 1.61-2.82 (8H, m, $4CH_2$); 3.11 (3H, s, CH_3); 4.05 (3H, s, OCH_3); 4.51 (1H, m, CHBr); 6.92 (1H, d, *J* = 7.9, 5-H); 7.02 (1H, d, *J* = 8.4, 7-H); 7.41 (1H, dd, *J* = 7.9, *J* = 8.4, 6-H); 14.90 (1H, br. s, HBr). ^{13}C NMR spectrum, δ, ppm: 19.6 (CH_3); 20.0 ($C_{(5')}$); 20.3 ($C_{(4')}$); 30.5 ($C_{(6')}$); 31.4 ($C_{(3')}$); 52.5 ($C_{(2')}$); 56.3 (OCH_3); 88.6 ($C_{(4)}$); 112.9 ($C_{(7)}$); 116.9 ($C_{(4a)}$); 118.2 ($C_{(5)}$); 124.3 ($C_{(8a)}$); 130.1 ($C_{(6)}$); 149.3 ($C_{(8)}$); 171.5 ($C_{(2)}$). Found, %: C 44.03; H 4.03; Br 39.17; N 3.01. $C_{15}H_{18}BrNO_2$·HBr. Calculated, %: C 44.47; H 4.73; Br 39.45; N 3.46.

(4*R),(1'*R**)-4-(1-Bromopropyl)-4,6-dimethyl-4H-3,1-benzoxazin-2-one (8A).** Yield 88%; mp 149-151°C (CCl_4). ^{1}H NMR spectrum, δ, ppm, *J* (Hz): 1.14 (3H, t, *J* = 7.2, CH_3); 1.83 (3H, s, CH_3); 2.14 (2H, m, CH_2); 2.26 (3H, s, CH_3); 4.11 (1H, d d, *J* = 2.0, *J* = 11.4, CHBr); 6.78 (1H, d, *J* = 8.0, 8-H); 6.91 (1H, s, 5-H); 7.13 (1H, d, *J* = 8.0, 7-H); 9.85 (1H, s, NH). ^{13}C NMR spectrum, δ, ppm: 13.1, 20.9, 25.0 ($3CH_3$); 26.0 ($C_{(3')}$); 64.0 ($C_{(2')}$); 86.3 ($C_{(4)}$); 114.7 ($C_{(5)}$); 122.0 ($C_{(6)}$); 126.0 ($C_{(7)}$); 130.1 ($C_{(8)}$); 131.7 ($C_{(4a)}$); 132.7 ($C_{(8a)}$); 152.3 ($C_{(2)}$). Found, %: C 51.83; H 5.22; Br 26.06; N 4.14. $C_{13}H_{16}BrNO_2$. Calculated, %: C 52.37; H 5.41; Br 26.80; N 4.70.

(4*R),(1'*S**)-4-(1-Bromopropyl)-4,6-dimethyl-4H-3,1-benzoxazin-2-one (8B).** Yield 85%; mp 134-136°C (CCl_4). ^{1}H NMR spectrum, δ, ppm, *J* (Hz): 1.12 (3H, t, *J* = 7.0, CH_3); 1.74 (2H, m, CH_2); 1.85 (3H, s, CH_3); 2.32 (3H, s, CH_3); 4.28 (1H, dd, *J* = 2.4, *J* = 11.2, CHBr); 6.81 (1H, d, *J* = 8.0, 8-H); 6.98 (1H, s, 5-H); 7.08 (1H, dd, *J* = 1.1, *J* = 8.0, 7-H); 9.55 (1H, s, NH). ^{13}C NMR spectrum, δ, ppm: 13.5, 20.3, 24.8 ($3CH_3$); 22.0 ($C_{(3')}$); 64.3 ($C_{(2')}$); 85.4 ($C_{(4)}$); 117.4 ($C_{(5)}$); 121.4 ($C_{(6)}$); 125.0 ($C_{(7)}$); 128.9 ($C_{(8)}$); 131.3 ($C_{(4a)}$); 131.9 ($C_{(8a)}$); 151.8 ($C_{(2)}$). Found, %: C 51.94; H 5.17; Br 26.30; N 4.45. $C_{13}H_{16}BrNO_2$. Calculated, %: C 52.37; H 5.41; Br 26.80; N 4.70.

Cyclization of Urethanes 2a,b and Urea 4 under the Action of HCl. Hydrogen chloride was passed for 5 min into solution of urethane **2a,b** or urea **4** (1 mmol) in ethyl alcohol or dichloroethane (20 ml). The reaction mixture was then left for 1 h at room temperature. The solvent was evaporated in vacuum. Hydrochlorides **10a,b** and **11** were obtained. Benzoxazine hydrochloride **10b** was treated with Na_2CO_3 solution without isolation.

2-Hydroxy-8-methylspiro[4H-3,1-benzoxazine-4,1'-cyclopentane] Hydrochloride (10a). Yield 98%; mp 128-131°C. R_f 0.37 (CH_2Cl_2–MeOH, 9:1). ^{1}H NMR spectrum, δ, ppm: 1.11-2.58 (8H, m, $4CH_2$); 2.40 (3H, s, CH_3); 6.78-7.23 (3H, m, H_{Ar}); 9.36 (1H, s, NH); 10.22 (1H, s, HCl). ^{13}C NMR spectrum, δ, ppm: 16.7 (CH_3); 23.2 ($C_{(3')}$, $C_{(4')}$); 38.8 ($C_{(2')}$, $C_{(5')}$); 92.0 ($C_{(4)}$); 120.0 ($C_{(7)}$); 122.4 ($C_{(8)}$); 122.8 ($C_{(5)}$); 124.2 ($C_{(6)}$); 129.8 ($C_{(8a)}$); 132.7 ($C_{(4a)}$); 152.8 ($C_{(2)}$). Found, %: C 61.12; H 6.37; Cl 14.03; N 5.07. $C_{13}H_{15}NO_2$.HCl. Calculated, %: C 61.54; H 6.31; Cl 14.00; N 5.52.

2-Amino-8-methylspiro[4H-3,1-benzoxazine-4,1'-cyclopentane] Hydrochloride (11). Yield 95%; mp 122-124°C. ^{1}H NMR spectrum, δ, ppm; 1.67-2.58 (8H, m, $4CH_2$); 2.44 (3H, s, CH_3); 6.89 (1H, m, 6-H); 7.05 (2H, m, 7-H, 5-H); 8.77 (1H, s, =NH); 9.21 (1H, s, NH); 11.45 (1H, s, HCl). ^{13}C NMR spectrum, δ, ppm: 18.6 (CH_3); 23.5 ($C_{(3')}$, $C_{(4')}$); 39.2 ($C_{(2')}$, $C_{(5')}$); 96.5 ($C_{(4)}$); 120.2 ($C_{(4a)}$); 124.0 ($C_{(5)}$); 125.3 ($C_{(6)}$); 126.5 ($C_{(8)}$); 128.8 ($C_{(7)}$); 131.2 ($C_{(8a)}$); 157.7 ($C_{(2)}$). Found, %: C 61.47; H 6.72; Cl 14.15; N 10.77. $C_{13}H_{16}N_2O$·HCl. Calculated, %: C 61.78; H 6.73; Cl 14.06; N 11.09.

Preparation of 3,1-Benzoxazines 12 and 14 as Bases. Hydrohalides **9** or **10b** (5 mmol) were dissolved in CH_2Cl_2 (50 ml) and treated with 10% Na_2CO_3 solution (10 ml). The organic phase was washed with water (10 ml), dried over $MgSO_4$, evaporated at reduced pressure, and bases **12** and **14** respectively were obtained.

8-Methoxyspiro[3,1-benzoxazine-4,1'-cyclohexan]-2-one (14). Yield 87%; mp 158-160°C (CCl_4), R_f 0.47 (benzene–AcOEt, 6:1). ^{1}H NMR spectrum, δ, ppm, *J* (Hz): 1.46-1.75 (10H, m, $5CH_2$); 3.74 (3H, s, OCH_3); 6.45 (1H, d, *J* = 7.0, 7-H); 7.02 (1H, d, *J* = 7.0, 5-H); 7.63 (1H, t, *J* = 7.0, 6-H). ^{13}C NMR spectrum, δ, ppm: 22.6 ($C_{(3')}$, $C_{(5')}$); 24.4 ($C_{(4')}$); 34.9 ($C_{(2')}$, $C_{(6')}$); 55.1 (OCH_3); 82.6 ($C_{(4)}$); 109.7 ($C_{(7)}$); 122.5 ($C_{(5)}$); 122.8 ($C_{(8a)}$); 125.4 ($C_{(6)}$); 128.3($C_{(4a)}$); 144.7 ($C_{(8)}$); 154.5 ($C_{(2)}$). Found, %: C 67.33; H 6.09; N 5.07. $C_{15}H_{17}NO_2$. Calculated, %: C 68.00; H 6.93; N 5.66.

2'-Bromo-8-methoxy-2-methylspiro[3,1-benzoxazine-4,1'-cyclohexane] (12). Yield 90%; mp 82-85°C (CCl_4). R_f 0.75 (benzene–AcOEt, 9:1). ^{1}H NMR spectrum, δ, ppm, *J* (Hz): 1.47-2.68 (8H, m, $4CH_2$); 2.22 (3H, s, CH_3); 3.87 (3H, s, OCH_3); 4.40 (1H, m, CHBr); 6.77 (1H, d, *J* = 9.0, 7-H); 6.85 (1H, d, *J* = 9.0, 5-H); 7.06 (1H, t, *J* = 9.0, 6-H). ^{13}C NMR spectrum, δ, ppm: 19.1 (CH_3); 19.5 ($C_{(5')}$); 20.2 ($C_{(4')}$); 29.4 ($C_{(6')}$); 29.9 ($C_{(3')}$); 53.5 ($C_{(2')}$); 55.8 (OCH_3); 78.6 ($C_{(4)}$); 110.9 ($C_{(7)}$); 118.3 ($C_{(5)}$); 125.8 ($C_{(6)}$); 127.0 ($C_{(8a)}$); 127.9 ($C_{(4a)}$); 151.8 ($C_{(8)}$); 158.8 ($C_{(2)}$). Found, %: C 55.33; H 5.43; Br 24.07; N 4.07. $C_{15}H_{18}BrNO_2$. Calculated, %: C 55.57; H 5.60; Br 24.65; N 4.32.

2-Amino-8-methylspiro[3,1-benzoxazine-4,1'-cyclopentane] (13). Solution of hydrochloride **11** (50 mg, 0.2 mmol) in $CHCl_3$ (20 ml) was stirred with K_2CO_3 (0.5 g) at 20°C for 2 h. The precipitate was filtered off, the filtrate was evaporated in vacuum, and base **13** (42 mg, 97.6%) was obtained as an amorphous powder. ^{1}H NMR spectrum, δ, ppm, *J* (Hz): 1.57-2.31 (8H, m, $4CH_2$); 2.32 (3H, s, CH_3); 5.30 (2H, br. s, NH_2); 6.67 (1H, t, *J* = 7.4, 6-H); 6.44 (1H, d, *J* = 7.4, 7-H); 7.08 (1H, d, *J* = 7.4, 5-H). ^{13}C NMR spectrum, δ, ppm: 17.4 (CH_3); 23.3 ($C_{(2')}$, $C_{(5')}$); 38.8 ($C_{(3')}$, $C_{(4')}$); 89.8 ($C_{(4)}$); 119.1 ($C_{(5)}$); 121.5 ($C_{(6)}$); 129.3 ($C_{(7)}$); 126.8 ($C_{(4a)}$); 130.0 ($C_{(8)}$); 140.0 ($C_{(8a)}$); 154.1 ($C_{(2)}$). Found, %: C 71.85; H 7.07; N 12.52. $C_{13}H_{16}N_2O$. Calculated, %: C 72.19; H 7.46; N 12.95.

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