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3-Alkyl-2-[3(4)-pyridyl]-5-(2-vinyloxyethoxymethyl)-oxazolidines

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Abstract—1-Alkylamino-3-(2-vinyloxyethoxy)-2-propanols react with 3- and 4-pyridinecarbaldehydes to give equimolar mixtures of *cis*- and *trans*-3-alkyl-5-(2-vinyloxyethoxymethyl)-2-[3(4)-pyridyl]oxazolidines.

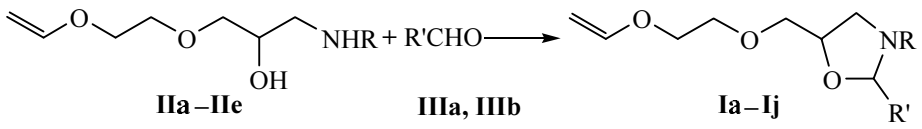
Pyridine derivatives exhibit versatile biological activity [1]. A wide spectrum of biological activity is also inherent to such amino alcohol derivatives as vinyl ethers [2] and cyclic N,O-acetals (oxazolidines) [3]. Undoubtedly, substances whose molecules include fragments of the above compounds (vinyloxy group and oxazolidine and pyridine rings) attract interest from the viewpoint of their biological activity.

In the present work we synthesized 3-alkyl-2-[3(4)-pyridyl]-5-(2-vinyloxyethoxymethyl)oxazolidines **Ia**–**Ij** in 27–88% yield by condensation of 1-alkylamino-3-(2-vinyloxyethoxy)-2-propanols **IIa**–**IIe** with 3- and 4-pyridinecarbaldehydes **IIIa** and **IIIb** (Scheme 1). The reactions were carried out by heating equimolar mixtures of the reactants in boiling benzene with simultaneous removal of water as azeotrope. We failed to effect condensation of 1-*tert*-butylamino-3-(2-vinyloxyethoxy)-2-propanol with aldehydes **IIIa** and **IIIb** even in the presence of acid catalysts such as *p*-toluenesulfonic acid and orthophosphoric acid and using toluene as solvent with a higher boiling point. Presumably, the reason is steric hindrances created by the bulky *tert*-butyl group.

Oxazolidines **Ia**–**Ij** were formed as equimolar mixtures of *trans* and *cis* isomers. This followed from the presence in the ^{1}H NMR spectra of **Ia**, **Ic**, and **Ie**–**Ii** of two singlets with equal intensities in the region δ 4.68–5.07 ppm; these signals belong to proton in position *2* of the oxazolidine ring. The difference in the chemical shifts of isomeric oxazolidines was 0.01 to 0.04 ppm. The corresponding difference for compounds **Ib**, **Id**, and **Ij** was small, so that the OCHN signals from their *trans* and *cis* isomers merged together, and only one slightly broadened singlet was observed in the ^{1}H NMR spectra. Nevertheless, the presence of two isomers followed from increased multiplicity of the NCH_2 signals, which was typical of all compounds except for **Ia** (R = Me). Presumably, the substituent on the nitrogen atom in isomeric oxazolidines occupies different positions with respect to the nearby magnetically anisotropic pyridine ring. On the other hand, more distant protons in the vinyloxy group of the substituent in position *5* of the oxazolidine do not suffer from the above effect, and their signals are not doubled.

The reactions of aldehydes **IIIa** and **IIIb** with amino alcohol **IIf** could give rise to mixtures of isomeric products

Scheme 1.



IIa–IIe **IIIa, IIIb** **Ia–Ij**

I, R = Me, R' = 3-Py (**a**); R = Bu, R' = 3-Py (**b**); R = $EtO(CH_2)_2$, R' = 3-Py (**c**); R = CH_2=$CHO(CH_2)_2$, R' = 3-Py (**d**); R = CH_2=$CHO(CH_2)_3$, R' = 3-Py (**e**); R = Me, R' = 4-Py (**f**); R = Bu, R' = 4-Py (**g**); R = $EtO(CH_2)_2$, R' = 4-Py (**h**); R = CH_2=$CHO(CH_2)_2$, R' = 4-Py (**i**); R = CH_2=$CHO(CH_2)_3$, R' = 4-Py (**j**); **II**, R = Me (**a**), Bu (**b**), $EtO(CH_2)_2$ (**c**), CH_2=$CHO(CH_2)_2$ (**d**), CH_2=$CHOCH_2)_3$ (**e**); **III**, R' = 3-Py (**a**), 4-Py (**b**).

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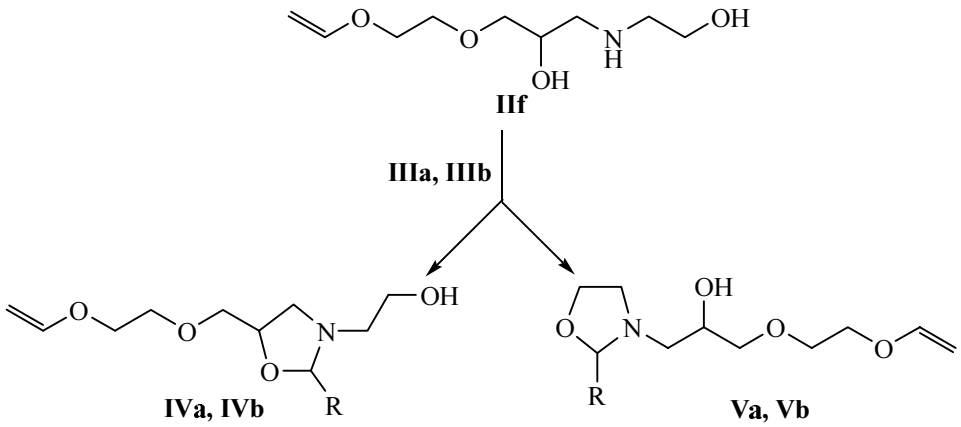
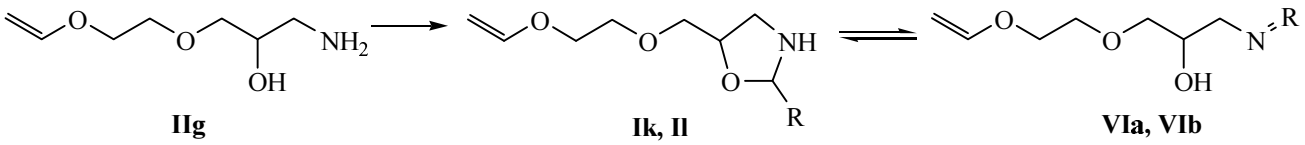
Scheme 2.



IV, **V**, R = 3-Py (**a**), 4-Py (**b**).

Scheme 3.



IVa/**Va** and **IVb**/**Vb** (Scheme 2). In fact, the ^{1}H NMR spectra of the condensation products contained two groups of doubled signals in the region δ 5.02–5.13 ppm, whose overall intensity corresponded to one proton. The intensity of the two more downfield singlets was about 29% of the intensity of the two upfield singlets. Taking into account the known data [4, 5] that introduction of a substituent into the closing unit facilitates cyclization, the more intense upfield signals were assigned to the *trans* and *cis* isomers of oxazolidines **IVa** and **IVb**, and the downfield signals, to oxazolidines **Va** and **Vb**. This assignment is also confirmed by the fact that the chemical shift of the OCHN proton in **IVa** and **IVb** is closer to the chemical shift of the corresponding proton in oxazolidines **Ia**–**Ij**.

According to the data of [5, 6], oxazolidines formed by condensation products of carbonyl compounds with α-amino alcohols having a primary amino group exist in tautomeric equilibrium with the corresponding imino alcohols. Analogous tautomeric oxazolidine–imino alcohol mixtures (**Ik/VIa, Il/VIb**) were expected to be formed in the condensation of aldehydes **IIIa** and **IIIb** with amino alcohol **IIg** (Scheme 3). In fact, in the IR spectra of the isolated products we observed an absorption band at 1640 cm^{-1}, which can be assigned to stretching vibrations of the C=N bond. However, its intensity was much lower than the intensity of absorption at 1605 and 1630 cm^{-1} due to vinyloxy group; this means that the concentration of imino alcohols **VIa** and **VIb** is small.

In the ^{1}H NMR spectra of tautomer mixtures **Ik/VIa, Il/VIb**, the HC=N signal (δ ~8.1–8.5 ppm) is completely overlapped by signals from protons in the pyridine ring. Therefore, the fraction of the open-chain isomer (~4%) was estimated on the basis of the intensity of the OCHN signal of the cyclic isomer, which was equal to ~96% of the overall intensity of the OCH signals of the two isomers. Our spectral data did not allow us to assign *E* or *Z* configuration to imino alcohols **VIa** and **VIb**. According to the ^{1}H NMR spectra, cyclic tautomers **Ik** and **Il**, as well as the other compounds **I,** are equimolar mixtures of *trans* and *cis* isomers. In particular, this follows from analysis of the OCHN multiplets which are superpositions of two doublets belonging to the *trans* and *cis* isomers.

All the isolated compounds are light yellow viscous liquids which can be stored in a nitrogen atmosphere.

EXPERIMENTAL

The ^{1}H NMR spectra were recorded on a Bruker DPX-400 instrument (400 MHz) at 26°C from solutions in $CDCl_3$ using HMDS as internal reference. The IR spectra were measured on a Specord 75IR spectrometer from samples prepared as thin films. The purity of the initial compounds and reaction products was checked by

GLC on an LKhM-80 chromatograph equipped with a thermal conductivity detector and a 3 × 3000-mm steel column packed with 3% of OV-17 on Inerton Super (0.160-0.200 mm); oven temperature programming from 60 to 280°C at a rate of 4 deg/min; carrier gas helium.

Freshly distilled commercial 3- and 4-pyridinecarbaldehydes were used; they contained no less than 99% of the main substance (according to the GLC data). 1-Alkylamino-3-(2-vinyloxyethoxy)-2-propanols **IIa**–**IIg** were synthesized from 2,3-epoxypropyl vinyloxyethyl ether and the corresponding amines according to the procedures reported in [7, 8].

Oxazolidines Ia–Il, IVa, IVb, Va, and Vb (*general procedure***).** Pyridinecarbaldehyde **IIIa** or **IIIb**, 0.11 mol, was added to a solution of 0.1 mol of vinyloxyalkylamine **IIa**–**IIg** in 100 ml of benzene, and the mixture was heated under reflux in a flask equipped with a Dean–Stark trap until water no longer separated. The mixture was cooled, and oxazolidines **Ia**–**Il**, **IVa**, **IVb**, **Va**, and **Vb** were isolated by vacuum distillation.

3-Methyl-2-(3-pyridyl)-5-(2-vinyloxyethoxymethyl)oxazolidine (Ia). Yield 88%, bp 183–186°C (1.5 mm), d_4^{20} = 1.1019, n_D^{20} = 1.5154. IR spectrum, ν, cm^{-1}: 540, 555, 605, 660, 710, 805, 840, 915, 960, 970, 1015, 1055, 1070, 1130, 1160, 1200, 1245, 1290, 1320, 1370, 1420, 1430, 1450, 1580, 1590, 1615, 1630, 1675, 1700, 1920, 2350, 2710, 2780, 2870, 2920, 3030, 3110. ^{1}H NMR spectrum, δ, ppm (*J*, Hz): 2.24 s (3H, CH_3), 2.54–3.80 m (8H, NCH_2, $CH_2OCH_2CH_2O$), 4.00 d.d (1H, *cis*-**H**C=CHO, ^2J = 2.0, ^3J = 6.7), 4.17 d.d (1H, *trans*-**H**C=CHO, ^2J = 2.0, ^3J = 14.1), 4.43 m (1H, CHO), 4.68 s (0.5H, OCHN), 4.72 s (0.5H, OCHN), 6.49 d.d (1H, OCH=C, $^3J_{cis}$ = 6.7, $^3J_{trans}$ = 14.1), 7.28 m (1H, 5-H), 7.81 m (1H, 4-H), 8.58–8.64 m (2H, 2-H, 6-H). Found, %: C 63.87; H 7.49; N 10.86. $C_{14}H_{20}N_2O_3$. Calculated, %: C 63.62; H 7.63; N 10.60.

3-Butyl-2-(3-pyridyl)-5-(2-vinyloxyethoxymethyl)oxazolidine (Ib). Yield 70%, bp 208–210°C (1.5 mm), d_4^{20} = 1.0437, n_D^{20} = 1.5062. IR spectrum, ν, cm^{-1}: 545, 605, 660, 700, 800, 840, 910, 950, 965, 1015, 1065, 1120, 1165, 1190, 1240, 1310, 1365, 1420, 1445, 1455, 1570, 1585, 1605, 1630, 1700, 1915, 2325–2350, 2710, 2800, 2860, 2915, 2940, 3020, 3075, 3100. ^{1}H NMR spectrum, δ, ppm (*J*, Hz): 0.80 m (3H, CH_3), 1.33 m (4H, $NCCH_2CH_2$), 2.31–3.79 m (10H, CH_2NCH_2, $CH_2OCH_2CH_2O$), 3.99 d.d (1H, *cis*-HC=CO, ^2J = 2.1, ^3J = 7.0), 4.16 d.d (1H, *trans*-HC=CO, ^2J = 2.1, ^3J = 14.3), 4.38 m (1H, CHO), 4.83 s (1H, OCHN), 6.47 d.d (1H, OCH=C, $^3J_{cis}$ = 7.0, $^3J_{trans}$ = 14.3), 7.26 m (1H, 5-H, $^3J_{4,5}$ = 7.7, $^3J_{5,6}$ = 4.8), 7.81 m (1H, 4-H, $^3J_{4,5}$ = 7.7, $^4J_{2,4}$ = 2.0, $^4J_{4,6}$ = 2.4), 8.55 m (1H, 6-H, $^3J_{5,6}$ = 4.8, $^4J_{2,6}$ = 1.8, $^4J_{4,6}$ = 2.4), 8.65 m (1H, 2-H, $^4J_{2,4}$ = 2.0, $^4J_{2,6}$ = 1.8). Found, %: C 66.50; H 8.85; N 9.55. $C_{17}H_{26}N_2O_3$. Calculated, %: C 66.64; H 8.55; N 9.14.

3-(2-Ethoxyethyl)-2-(3-pyridyl)-5-(2-vinyloxyethoxymethyl)oxazolidine (Ic). Yield 50%, bp 245–248°C (5.5 mm), d_4^{20} = 1.0926, n_D^{20} = 1.5099. IR spectrum, ν, cm^{-1}: 555, 605, 620, 660, 700, 800, 845, 865, 885, 920, 980, 1015, 1060, 1110, 1200, 1275, 1310, 1350, 1370, 1425, 1470, 1570, 1585, 1640, 1700, 1720, 1915-1950, 2320–2350, 2710, 2850, 2920, 2960, 3025, 3105. ^{1}H NMR spectrum, δ, ppm (*J*, Hz): 1.07–1.20 m (3H, CH_3), 2.31–3.24 m (4H, CH_2NCH_2), 3.34–3.80 m (10H, OCH_2, $NCCH_2OCH_2C$, OCH_2CH_2O), 4.15–4.20 m (1H, *cis*-HC=CO, ^2J = 2.0, ^3J = 6.7), 4.31–4.49 m (2H, *trans*-HC=CO, ^2J = 2.0, ^3J = 14.1, CHO), 4.98 s (0.5H, OCHN), 5.00 s (0.5H, OCHN), 6.42 d.d (1H, OCH=C, $^3J_{cis}$ = 6.7, $^3J_{trans}$ = 14.1), 7.25–7.31 m (1H, 5-H), 7.81–7.86 m (1H, 4-H), 8.52–8.56 m (1H, 6-H), 8.64–8.68 m (1H, 2-H). Found, %: C 63.18; H 8.98; N 9.09. $C_{17}H_{26}N_2O_4$. Calculated, %: C 63.33; H 8.13; N 8.69.

2-(3-Pyridyl)-5-(2-vinyloxyethoxymethyl)-3-(2-vinyloxyethyl)oxazolidine (Id). Yield 74%, bp 230–234°C (2 mm), d_4^{20} 1.0904, n_D^{20} 1.5170. IR spectrum, ν, cm^{-1}: 545, 600, 655, 700, 800, 810, 830, 860, 890, 950, 985, 1010, 1050, 1060, 1085, 1110, 1115, 1180, 1230, 1240, 1280, 1305, 1350, 1360, 1420, 1445, 1460, 1570, 1580, 1600, 1620, 1690, 1910, 2315–2370, 2710, 2810, 2860, 2910, 3030, 3105. ^{1}H NMR spectrum, δ, ppm (*J*, Hz): 2.69–3.78 m (12H, $CH_2NCH_2CH_2O$, $CH_2OCH_2CH_2O$), 4.02 m (2H, *cis*-**H**C=CHO, ^2J = 2.0, ^3J = 6.7), 4.26 m (2H, *trans*-**H**C=CHO, ^2J = 2.0, ^3J = 14.1), 4.41 m (1H, CHO), 5.01 s (1H, OCHN), 6.42 m (2H, OCH=C, $^3J_{cis}$ = 6.7, $^3J_{trans}$ = 14.1), 7.26 m (1H, 5-H), 7.82 m (1H, 4-H), 8.55 m (1H, 6-H), 8.66 m (1H, 2-H). Found, %: C 63.69; H 7.40; N 8.83. $C_{17}H_{24}N_2O_4$. Calculated, %: C 63.73; H 7.55; N 8.74.

2-(3-Pyridyl)-5-(2-vinyloxyethoxymethyl)-3-(3-vinyloxypropyl)oxazolidine (Ie). Yield 27%, bp 217–220°C (5 mm), d_4^{20} = 1.0729, n_D^{20} 1.5130. IR spectrum, ν, cm^{-1}: 600, 700, 800, 875, 950, 965, 1015, 1060, 1120, 1185, 1220, 1275, 1305, 1360, 1415, 1440, 1570, 1605, 1620, 1710, 1915, 2320, 2715, 2860, 2920, 3030, 3110. ^{1}H NMR spectrum, δ, ppm: 1.77 m (2H, CCH_2C), 2.49–3.80 m (12H, $CH_2NCH_2CH_2O$, $CH_2OCH_2CH_2O$), 4.00 m (2H, *cis*-**H**C=CHO), 4.16 m (2H, *trans*-

HC=CHO), 4.41 m (1H, CHO), 4.89 s (0.5H, OCHN), 4.90 s (0.5H, OCHN), 6.45 m (2H, OCH=C), 7.27 m (1H, 5-H), 7.78 m (1H, 4-H), 8.55–8.64 m (2H, 2-H, 6-H). Found, %: C 64.67; H 7.83; N 8.21. $C_{18}H_{26}N_2O_4$. Calculated, %: C 64.65; H 7.84; N 8.38.

3-Methyl-2-(4-pyridyl)-5-(2-vinyloxyethoxymethyl)oxazolidine (If). Yield 80%, bp 186–189°C (2 mm), d_4^{20} = 1.0949, n_D^{20} = 1.5148. IR spectrum, ν, cm^{-1}: 530, 600, 620, 650, 670, 680, 710, 795, 900, 930, 950, 960, 975, 1045, 1075, 1115, 1160, 1185, 1220, 1300, 1365, 1398, 1410, 1440, 1550, 1585, 1600, 1615, 1640, 1930, 2320–2345, 2675, 2705, 2780, 2855, 2910, 3015, 3060, 3105. ^{1}H NMR spectrum, δ, ppm (*J*, Hz): 2.26 s (1.5H, CH_3), 2.29 s (1.5H, CH_3), 2.56–3.79 m (8H, NCH_2, $CH_2OCH_2CH_2O$), 4.00 d.d (1H, *cis*-**H**C=CHO, ^2J = 2.0, ^3J = 6.7), 4.17 d.d (1H, *trans*-**H**C=CHO, ^2J = 2.0, ^3J = 14.1), 4.43 m (1H, CHO), 4.70 s (0.5H, OCHN), 4.71 s (0.5H, OCHN), 6.48 d.d (1H, OCH=C, $^3J_{cis}$ = 6.7, $^3J_{trans}$ = 14.1), 7.37 d (2H, 3-H, 5-H, ^3J = 6.1), 8.60 d (2H, 2-H, 6-H, ^3J = 6.1). Found, %: C 63.40; H 8.01; N 10.54. $C_{14}H_{20}N_2O_3$. Calculated, %: C 63.62; H 7.63; N 10.60.

3-Butyl-2-(4-pyridyl)-5-(2-vinyloxyethoxymethyl)oxazolidine (Ig). Yield 67%, bp 220–224°C (5 mm), d_4^{20} = 1.0395, n_D^{20} = 1.5040. IR spectrum, ν, cm^{-1}: 510, 560, 630, 690, 725, 740, 810, 920, 950, 960, 975, 990, 1060, 1080, 1125, 1175, 1195, 1315, 1370, 1410, 1455, 1465, 1555, 1570, 1600, 1610, 1630, 1935, 2350, 2720, 2800, 2860, 2920, 2950, 3020, 3070, 3110. ^{1}H NMR spectrum, δ, ppm (*J*, Hz): 0.82 m (3H, CH_3), 1.35 m (4H, $NCCH_2CH_2$), 2.37–3.89 m (10H, CH_2NCH_2, $CH_2OCH_2CH_2O$), 4.01 d.d (1H, *cis*-**H**C=CHO, ^2J = 2.0, ^3J = 6.7), 4.14 d.d (1H, *trans*-**H**C=CHO, ^2J = 2.0, ^3J = 14.1), 4.37 m (1H, CHO), 4.87 s (0.5H, OCHN), 4.88 s (0.5H, OCHN), 6.47 d.d (1H, OCH=C, $^3J_{cis}$ = 6.7, $^3J_{trans}$ = 14.1), 7.38 d (2H, 3-H, 5-H, ^3J = 6.0), 8.58 d (2H, 2-H, 6-H, ^3J = 6.0). Found, %: C 67.03; H 8.64; N 9.08. $C_{17}H_{26}N_2O_3$. Calculated, %: C 66.64; H 8.55; N 9.14.

3-(2-Ethoxyethyl)-2-(4-pyridyl)-5-(2-vinyloxyethoxymethyl)oxazolidine (Ih). Yield 75%, bp 218–222°C (6 mm), d_4^{20} = 1.0892, n_D^{20} = 1.5080. IR spectrum, ν, cm^{-1}: 460, 500, 620, 645, 677, 715, 730, 740, 800, 875, 910, 950, 960, 975, 1045, 1100, 1180, 1220, 1300, 1340, 1365, 1400, 1440, 1550, 1585, 1600, 1620, 1670, 1700, 1930, 2725, 2855, 2915, 2960, 3020, 3060, 3105. ^{1}H NMR spectrum, δ, ppm (*J*, Hz): 1.13 t (1.5H, CH_3, ^3J = 7.0), 1.15 t (1.5H, CH_3, ^3J = 7.0), 2.52–3.81 m (14H, $CH_2NCH_2CH_2OCH_2$, $CH_2OCH_2CH_2O$), 4.00 d.d (1H, *cis*-**H**C=CHO, ^2J = 2.0, ^3J = 6.7), 4.10 d.d (1H, *trans*-**H**C=CHO, ^2J = 2.0, ^3J = 14.1), 4.37 m (1H, CHO), 5.03 s (0.5H, OCHN), 5.07 s (0.5H, OCHN), 6.47 d.d (1H, OCH=C, $^3J_{cis}$ = 6.7, $^3J_{trans}$ = 14.1), 7.41 d (2H, 3-H, 5-H, ^3J = 6.1), 8.58 d (2H, 2-H, 6-H, ^3J = 6.1). Found, %: C 63.68; H 8.42; N 9.03. $C_{17}H_{26}N_2O_4$. Calculated, %: C 63.33; H 8.13; N 8.69.

2-(4-Pyridyl)-5-(2-vinyloxyethoxymethyl)-3-(2-vinyloxyethyl)oxazolidine (Ii). Yield 65%, bp 231–235°C (2 mm), d_4^{20} = 1.0915, n_D^{20} = 1.5175. IR spectrum, ν, cm^{-1}: 480, 520, 550, 630, 690, 720, 800, 880, 900, 915, 960, 980, 1050, 1075, 1120, 1185, 1310, 1350, 1370, 1400, 1445, 1550, 1560, 1590, 1605, 1620, 1930, 2330–2345, 2710, 2725, 2815, 2860, 2910, 3020, 3060, 3105. ^{1}H NMR spectrum, δ, ppm (*J*, Hz): 2.66–3.79 m (12H, $CH_2NCH_2CH_2O$, $CH_2OCH_2H_2O$), 3.99 m (2H, *cis*-**H**C=CHO), 4.24 m (2H, *trans*-**H**C=CHO), 4.37 m (1H, CHO), 5.06 s (0.5H, OCHN), 5.07 s (0.5H, OCHN), 6.45 m (2H, OCH=C), 7.41 d (2H, 3-H, 5-H, ^3J = 6.2), 8.58 d (2H, 2-H, 6-H, ^3J = 6.2). Found, %: C 63.59; H 7.75; N 8.54. $C_{17}H_{24}N_2O_4$. Calculated, %: C 63.73; H 7.55; N 8.74.

2-(4-Pyridyl)-5-(2-vinyloxyethoxymethyl)-3-(2-vinyloxypropyl)oxazolidine (Ij). Yield 49%, bp 232–234°C (4 mm), d_4^{20} = 1.0768, n_D^{20} = 1.5178. IR spectrum, ν, cm^{-1}: 470, 540, 620, 680, 800, 875, 910, 955, 970, 980, 1070, 1120, 1185, 1310, 1365, 1400, 1440, 1555, 1590, 1610, 1620, 1695, 1925, 2330, 2725, 2800, 2860, 2915, 3010–3050, 3100. ^{1}H NMR spectrum, δ, ppm: 1.76 m (2H, CCH_2C), 2.51–3.79 m (12H, $CH_2NCH_2CCH_2O$, $CH_2OCH_2CH_2O$), 4.00 m (2H, *cis*-**H**C=CHO), 4.13 m (2H, *trans*-**H**C=CHO), 4.34 m (1H, CHO), 4.92 s (1H, OCHN), 6.40 m (2H, OCH=C), 7.35 d (2H, 3-H, 5-H, ^3J = 6.1), 8.57 d (2H, 2-H, 6-H, ^3J = 6.1). Found, %: C 64.09; H 8.04; N 8.77. $C_{18}H_{26}N_2O_4$. Calculated, %: C 64.65; H 7.84 N 8.38.

2-(3-Pyridyl)-5-(2-vinyloxyethoxymethyl)-oxazolidine (Ik). Yield 85%, bp 181–184°C (1 mm), d_4^{20} = 1.1134, n_D^{20} = 1.5274. IR spectrum, ν, cm^{-1}: 520, 610, 700, 800, 820, 850, 960, 965, 1017, 1078, 1130, 1190, 1240, 1280, 1317, 1375, 1415, 1445, 1565, 1580, 1610, 1640, 1700, 1720, 2320–2340, 2860–2900, 2920, 3040–3090, 3280–3420. ^{1}H NMR spectrum, δ, ppm (*J*, Hz): 2.76–3.87 m (9H, NCH_2, $CH_2OCH_2CH_2O$, NH), 4.01–4.31 m (3H, $OC=CH_2$, CHO), 4.89 m (1H, OCHN), 6.49 d.d (1H, OCH=C, $^3J_{cis}$ = 6.7, $^3J_{trans}$ = 14.1), 7.32 m (1H, 5-H), 8.19 m (1H, 4-H), 8.55–8.74 m (2H, 2-H, 6-H). Found, %: C 63.07; H 6.49; N 10.96. $C_{13}H_{18}N_2O_3$. Calculated, %: C 62.38; H 7.25; N 11.19.

2-(4-Pyridyl)-5-(2-vinyloxyethoxymethyl)-oxazolidine (II). Yield 85%, bp 184–186°C (1 mm), d_4^{20} = 1.1125, n_D^{20} = 1.5244. IR spectrum, ν, cm^{-1}: 520, 650, 680, 815, 890, 960, 970, 1060, 1075, 1140, 1200, 1270, 1290, 1320, 1380, 1415, 1455, 1555, 1600, 1620, 1640, 1650, 1730, 2330–2335, 2365, 2890, 2940, 3000, 3050–3085, 3285–3415. ^{1}H NMR spectrum, δ, ppm (*J*, Hz): 2.73–3.79 m (9H, NCH_2, $CH_2OCH_2CH_2O$, NH), 4.00–4.26 m (3H, $OC{=}CH_2$, CHO), 4.89 m (1H, OCHN), 6.45 d.d (1H, OCH=C, $^3J_{cis}$ = 6.7, $^3J_{trans}$ = 14.1), 7.57 m (2H, 3-H, 5-H), 8.55 m (2H, 2-H, 6-H). Found, %: C 63.22; H 6.51; N 11.03. $C_{13}H_{18}N_2O_3$. Calculated, %: C 62.38; H 7.25; N 11.19.

3-(2-Hydroxyethyl)-2-(3-pyridyl)-5-(2-vinyl-oxyethoxymethyl)oxazolidine (IVa) and 3-[2-hydroxy-3-(2-vinyloxyethoxy)propyl]-2-(3-pyridyl)oxazolidine (Va). Yield 60%, bp 250–253°C (9 mm), d_4^{20} = 1.1547, n_D^{20} = 1.5293. IR spectrum, ν, cm^{-1}: 555, 605, 620, 655, 700, 800, 840, 880, 960, 1020, 1060, 1090, 1120, 1160, 1195, 1250, 1280, 1320, 1370, 1430, 1450, 1465, 1565, 1590, 1610, 1625, 1700, 1915, 2330, 2350, 2710, 2870, 2920, 3030, 3050, 3100, 3220–3420. ^{1}H NMR spectrum, δ, ppm: 2.55–3.80 m (13H, $CH_2NCH_2CH_2O$, $CH_2OCH_2CH_2O$, OH), 3.98–4.38 m (3H, $OC{=}CH_2$, CHO), 5.02 s (0.35H, OCHN in **IVa**), 5.03 s (0.35H, OCHN in **IVa**), 5.06 s (0.15H, OCHN in **Va**), 5.07 s (0.15H, OCHN in **Va**), 6.47 m (1H, OCH=C), 7.26 m (1H, 5-H), 7.81 m (1H, 4-H), 8.54–8.65 m (2H, 2-H, 6-H). Found, %: C 61.57; H 7.94; N 10.05. $C_{15}H_{22}N_2O_4$. Calculated, %: C 61.21; H 7.53; N 9.52.

3-(2-Hydroxyethyl)-2-(4-pyridyl)-5-(2-vinyl-oxyethoxymethyl)oxazolidine (IVb) and 3-[2-hydroxy-3-(2-vinyloxyethoxy)propyl]-2-(4-pyridyl)oxazolidine (Vb). Yield 45%, bp 240–245°C (2 mm), d_4^{20} = 1.1546, n_D^{20} = 1.5310. IR spectrum, ν, cm^{-1}: 540, 630, 660, 695, 720, 750, 800, 870, 880, 915, 960, 980, 990, 1050, 1120, 1190, 1220, 1245, 1280, 1315, 1370, 1405, 1440, 1550, 1595, 1610, 1625, 1700, 1715, 1935, 2330–2345, 2725, 2860, 2920, 3020, 3060, 3105, 3215–3400. ^{1}H NMR spectrum, δ, ppm (*J*, Hz): 2.50–3.79 m (13H, $CH_2NCH_2CH_2O$, $CH_2OCH_2CH_2O$, OH), 4.05–4.38 m (3H, $OC{=}CH_2$, CHO), 5.05 s (0.36H, OCHN in **IVb**), 5.06 s (0.36H, OCHN in **IVb**), 5.12 s (0.14H, OCHN in **Vb**), 5.13 s (0.14H, OCHN in **Vb**), 6.46 m (1H, OCH=C), 7.39 m (2H, 3-H, 5-H, ^3J = 6.1), 8.57 d (2H, 2-H, 6-H, ^3J = 6.1). Found, %: C 61.58; H 7.52; N 10.21. $C_{15}H_{22}N_2O_4$. Calculated, %: C 61.21; H 7.53; N 9.52.

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