Supporting Information

Water Exclusion Reaction in Aqueous Media: Nitrone formation and Cycloaddition in Single Pot

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Experimental Section

General: ^{1}H and ^{13}C NMR spectra were recorded on a BRUKER DPX-300 or BRUKER DRX-500 spectrometer in $CDCl_3$. Tetramethyl silane (TMS) served as internal standard ($\delta = 0$) for ^{1}H NMR and $CDCl_3$ as internal standard ($\delta = 77.0$) for ^{13}C NMR. IR spectra were measured with JASCO FT/IR-410 spectrometer.

Preparation of Phenyl hydroxylamine

A vigorously stirred mixture of nitrobenzene (13 g, 0.105 mol), NH_4Cl (6.5 g, 0.12 mol) and H_2O (200 mL) was maintained below 60 °C whilst zinc dust (90%, 15.4 g, 0.21 mol) was added in small portions during 15 min. The reaction mixture was stirred for 15 min after addition was complete, filtered while still warm, and the filter cake was washed with hot water (50 mL). The combined filtrates and washings were saturated with salt, and cooled to 0°C, and the resulting solid were collected, dried. The crude phenyl hydroxylamine was recrystallized from petroleum ether. The pure *N*-phenyl hydroxylamine had mp 80 °C.

A Typical experimental procedure for surfactant catalyzed nitrone formation followed by cycloaddition reaction in water.

To a solution of surfactant (SDS or CTAB, 0.05 mmol) in H_2O (2 ml) were added an aldehyde (0.5 mmol), and phenyl hydroxylamine (0.6 mmol , 1.2 equiv.) successively at room- temperature in a 25 ml round bottom flask. The reaction was sonicated for 5 minutes and then stirred at room temperature. The reaction was monitored by T.L.C. After the disappearence of aldehyde, ethyl acrylate (1mmol, 0.1ml) was added and the reaction mixture was stirred at room temperature. After stirring at the same temperature for the period of time listed in Table 2, the product was extracted with ethyl acetate, washed with brine, dried over Na_2SO_4, concentrated and purification by silica gel chromatography gave the desired product(s).

Characterization of the isoxazolidines products

3-(2-Nitro-phenyl)-2-phenyl-isoxazolidine-5-carboxylic acid ethyl ester (5a): yellow oil, a 64:36 (*trans:cis*) mixture of the diastereoisomer **5** was obtained but further separation by column chromatography failed. ^{1}H NMR (300MHz, $CDCl_3$) major isomer (*trans*) δ 1.21 (3H, t, *J*= 7.1 Hz), 2.45-2.57 (1H, m), 3.29 (1H, td, J= 8.7, 12.9 Hz), 4.08-4.20 (2H, m), 4.81 (1H, dd, *J*=6.4, 8.7 Hz), 5.53-5.61 (1H, m), 6.94-7.08 (3H, m), 7.21-7.30 (2H, m), 7.43-7.50 (2H, m), 7.64-7.69 (1H, m), 8.06-8.19 (1H, m), minor isomer (*cis*): δ 1.22 (3H, t, *J*=7.2 Hz), 2.45-2.57 (1H, m), 3.16 (1H, ddd, *J*=7.41, 7.7, 12.8 Hz), 4.08-4.20 (2H, m), 4.65 (1H, t, *J*=7.41 Hz), 5.5-5.6 (1H, m), 6.94-7.08 (3H, m), 7.21-7.30 (2H, m), 7.43-7.50 (2H, m), 7.64-7.69 (1H, m), 8.06-8.19 (1H, m); ^{13}C NMR (125 MHz, $CDCl_3$) major isomer (*trans*) δ 14.46, 42.1, 61.5, 66.8, 76.04, 115.16, 123.15, 125.28, 128.8, 129.5, 129.9, 134.5, 137.8, 147.7, 150.5, 170.0, minor isomer (*cis*) 14.40, 41.2, 62.0, 66.5, 76.04, 115.7, 122.8 , 125.5 , 129.0 , 129.1 , 129.8 , 134.6 , 136.9 , 147.8 , 150.9 , 170.5 ; IR (neat) 3068, 2982, 2922, 1739, 1597, 1526, 1488, 1451, 1348, 1278, 1207, 1088, 1033, 858, 753, 695 cm^{-1}; EIMS: 342 (M^+ base peak), 325, 294, 269, 225, 209, 194, 179, 162, 130, 118, 91, 76.

3-(3-Nitro-phenyl)-2-phenyl-isoxazolidine-5-carboxylic acid ethyl ester (5b): yellow oil, a 54:46 (*trans: cis*) mixture of the regioisomer **5** was obtained but further separation by column chromatography failed. ^{1}H NMR (300MHz, $CDCl_3$) major isomer (*trans*) δ 1.23 (3H, t, *J*=7.1 Hz), 2.62-2.71 (1H, m), 3.01-3.11 (1H, m), 4.20 (2H, q, *J*= 7.1 Hz), 4.72-4.93 (2H, m), 6.9-7.06 (3H, m), 7.1-7.3 (2H, m), 7.52-7.60 (1H, m), 7.82-7.91 (1H, m), 8.14-8.18 (1H, m), 8.35-8.37 (1H, m), minor isomer (*cis*): δ 1.25 (3H, t, *J*=7.1 Hz), 2.62-2.71 (1H, m), 3.01-3.11 (1H, m), 4.19 (2H, q, *J*= 7.1

Hz), 4.7-4.9 (2H, m), 6.9-7.1 (3H,m), 7.1-7.3 (2H, m), 7.52- 7.59 (1H, m), 7.8- 7.9 (1H, m)**,** 8.14- 8.18 (1H, m), 8.35- 8.36 (1H, m); ^{13}C NMR (125 MHz, $CDCl_3$) major isomer (*trans*) δ 14.4, 42.08, 62.1, 69.1, 76.1, 115.8, 121.5, 122.0, 123.5, 129.4, 130.2, 133.1, 143.8, 148.9, 150.3, 170.3, minor isomer (*cis*) δ 14.5, 42.2, 62.08, 68.59, 76.1, 116.2, 121.5, 123.0, 123.5, 129.4, 130.3, 133.1, 143.3, 148.9, 150.7, 170.7; IR (neat) 3069, 2982, 1735, 1596, 1531, 1489, 1450, 1349, 1210, 1093, 1029, 898, 859, 807, 758, 695 cm^{-1}; EIMS 342 (M^+, base peak), 307, 262, 220, 182, 146, 130, 118, 104, 91, 77.

3-(4-Nitro-phenyl)-2-phenyl-isoxazolidine-4-carboxylic acid ethyl ester (4c): Yellow oil, only *endo* isomer of regioisomer **4** is formed. ^{1}H NMR (300MHz, $CDCl_3$) δ 1.21 (3H, t, *J*= 7.1 Hz), 3.49-3.56 (1H, m), 4.15 (2H, q, *J*= 7.2 Hz), 4.31 (1H, t, *J*=7.1 Hz), 4.39 (1H, t, *J*= 8.3 Hz), 5.17 (1H, d, *J*= 5.5 Hz), 6.95-7.01 (3H, m), 7.24 (1H, d, *J*= 8.02 Hz), 7.27 (1H, d, *J*= 7.4 Hz), 7.75 (2H, d, *J*= 8.4 Hz), 8.24 (2H, d, *J*=8.4 Hz); ^{13}C NMR (125MHz, $CDCl_3$) δ 14.4, 58.9, 62.2, 69.3, 71.6, 115.3, 123.0, 124.5, 127.9, 129.4, 147.9, 149.2, 150.3, 170.6; IR (neat) 3071, 2982, 2936, 1732, 1665, 1599, 1521, 1490, 1347, 1227, 1106, 1027, 936, 856, 755, 697 cm^{-1} ; MS m/z 342 (M^+) (FAB).

3-(4-Methoxy-phenyl)-2-phenyl-isoxazolidine-4-carboxylic acid ethyl ester (4d): colourless oil, for regioisomer **4,** *endo* isomer is formed. ^{1}H NMR (300 MHz, $CDCl_3$) δ 1.20 (3H, t, *J*= 7.2 Hz), 3.51 (1H, td, *J*=6.7, 7.3 Hz), 3.81 (3H, s), 4.12 (2H, q, *J*=7.2 Hz), 4.31 (1H, dd, *J*= 6.7, 8.3 Hz), 4.34 (1H, t, *J*= 8.3 Hz), 4.91 (1H, d, *J*=5.85 Hz), 6.89-6.99 (5H, m), 7.19-7.26 (2H, m), 7.45 (2H, d, *J*= 8.6 Hz); ^{13}C NMR (125MHz, $CDCl_3$) δ 14.4, 55.7, 59.02, 61.7, 69.27, 72.3, 114.6, 115.7, 122.6, 128.2, 129.2, 133.6, 151.01, 159.6, 171.4; IR (neat) 3397, 3063, 2981, 2933, 2837, 1732, 1599, 1511, 1489, 1373, 1247, 1178, 1031, 933, 835, 696 cm^{-1}; EIMS 327 (M^+, base peak), 294, 266, 249, 226, 219, 210, 198, 161, 145, 91, 77.

3-(4-methoxy-phenyl)-2-phenyl-isoxazolidine-5-carboxylic acid ethyl ester (5d): colourless oil, for regioisomer **5** only *cis* isomer is formed. ^{1}H NMR (300 MHz, $CDCl_3$) δ 1.26 (3H, t, *J*= 7.2 Hz), 2.67 (1H, ddd, *J*= 6.9, 7.6, 12.4 Hz), 2.87 (1H, ddd, *J*=5.5, 6.9, 12.4 Hz), 3.8 (3H, s), 4.18 (2H, q, *J*=7.2 Hz), 4.66 (1H, t, *J*=6.9 Hz), 4.77 (1H, dd, *J*=5.5, 7.6 Hz), 6.84-7.07 (5H, m), 7.17-7.27 (2H, m), 7.36-7.46 (2H, m); ^{13}C NMR (125 MHz, $CDCl_3$) δ 14.42, 42.9, 55.7, 61.8, 67.1, 76.4, 114.6, 115.7, 122.8, 128.8, 129.5, 132.5, 151.3, 159.6, 171.3; IR (neat) 3063, 2981, 2936, 2837, 1734, 1599, 1511, 1489, 1458, 1375, 1298, 1248, 1180, 1032, 834, 759, 696 cm^{-1}; EIMS 327 (M^+ base peak), 254, 219, 210, 191, 147, 145, 134, 91, 77.

3-(2,5-Dimethoxy-phenyl)-2-phenyl-isoxazolidine-5-carboxylic acid ethyl ester (5e): colourless oil, only *trans* isomer of regioisomer **5** is formed stereochemistry is confirmed by NOE experiment. ^{1}H NMR (300 MHz, $CDCl_3$) δ 1.22 (3H, t, *J*=7.1Hz), 2.54 (1H, ddd, *J*= 4.6, 7.4, 12.3Hz), 2.89 (1H, td, *J*=7.4, 12.3Hz), 3.75 (3H, s), 3.82

(3H, s), 4.15 (2H, m), 4.66 (1H, t, *J*= 7.4 Hz), 5.13 (1H, dd, *J*= 4.6, 7.4 Hz), 6.78-6.85 (2H, m), 6.93 (1H, t, J= 7.3 Hz), 7.11-7.12 (1H, m), 7.20-7.23 (2H, m), 7.27 (1H, d, *J*=2.8 Hz); ^{13}C NMR (125MHz, $CDCl_3$) δ 14.4, 40.3, 56.20, 56.22. 61.7, 64.6, 76.7, 111.6, 113.3, 113.8, 115.9, 122.3, 128.8, 130.2, 150.6, 151.8, 154.3, 171.3; IR (neat) 3064, 2941, 2834, 1736, 1594,1493, 1276, 1215, 1045, 881, 808,755, 696 cm^{-1}; EIMS 357 (M^+, Base peak), 284, 249, 226, 203, 175, 149, 121, 104, 91, 77.

3-(4-Chloro-phenyl)-2-phenyl-isoxazolidine-4-carboxylic acid ethyl ester (4f): colourless oil, for regioisomer **4,** *endo* isomer is formed. ^{1}H NMR (300 MHz, $CDCl_3$) δ 1.20 (3H, t, *J*= 7.1 Hz), 3.46-3.53 (1H, m), 4.13 (2H, q, *J*= 7.1 Hz), 4.29 (1H, dd, *J*= 7.0, 8.3 Hz), 4.37 (1H, t, *J*=8.3 Hz), 4.98 (1H, d, *J*= 5.7 Hz), 6.95-6.97 (3H, m), 7.20-7.25 (2H, m), 7.35 (2H, d, *J*=8.5 Hz), 7.49 (2H, d, *J*=8.5 Hz); ^{13}C NMR (125 MHz, $CDCl_3$) δ 14.4, 58.9, 61.9, 69.2, 71.9, 115.5, 122.7, 128.4, 129.3, 129.4, 133.9, 140.2, 150.7, 171.0; IR (neat) 3064, 3031, 2982, 2931, 1733, 1596, 1488, 1373, 1231, 1186, 1090, 1019, 830, 756, 695 cm^{-1} ; MS 331 (M^+) (FAB).

3-(4-Chloro-phenyl)-2-phenyl-isoxazolidine-5-carboxylic acid ethyl ester (5f): colourless oil, for regio isomer **5,** *trans* predominant over *cis*. ^{1}H NMR (300 MHz, $CDCl_3$) major isomer (*trans*) δ 1.24 (3H, t, *J*= 7.0 Hz), 2.54-2.68 (1H, m), 3.03 (1H, td, *J*= 8.4, 12.5 Hz), 4.19 (2H, q, *J*= 7.1 Hz), 4.62-4.79 (2H, m), 6.9-7.0 (3H, m), 7.17-7.26 (2H, m), 7.30-7.34 (2H, m), 7.39-7.43 (2H, m), minor isomer (*cis*) δ 1.25 (3H, t, *J*= 7.1 Hz), 2.54-2.68 (1H, m), 2.93 (1H, ddd, *J*=5.4, 7.2, 12.3 Hz), 4.18 (2H, q, *J*= 7.1 Hz), 4.62-4.79 (2H, m), 6.92-7.05 (3H, m), 7.17-7.26 (2H, m), 7.30-7.34 (2H, m), 7.39-7.43 (2H, m); ^{13}C NMR (75 MHz, $CDCl_3$) major isomer (*trans*) δ 14.5, 42.69, 61.9, 69.3, 75.9, 116.1, 123.2, 128.5, 128.9, 129.2, 129.4, 133.7, 139.9, 150.7, 170.6, minor isomer (*cis*) δ 14.4, 42.64, 61.4, 68.8, 76.5, 116.4, 122.9, 128.4, 128.9, 129.4, 133.9, 139.4, 151.1, 171.0; IR (neat) 3063, 2982, 1736, 1595, 1488, 1450, 1374, 1343, 1205, 1089, 1019, 826, 757, 695 cm^{-1}; MS 331(M^+) (FAB)

2-Phenyl-3-pyridin-3-yl-isoxazolidine-5-carboxylic acid ethyl ester (5g): yellow oil, only regio isomer **5** is formed and *trans* isomer predominates over *cis*. ^{1}H NMR (500 MHz, $CDCl_3$) major isomer (*trans*) 1.23 (3H, t, *J*= 7.1 Hz), 2.63-2.70 (1H, m), 3.07 (1H, td, *J*= 8.56, 12.7 Hz), 4.19 (2H, q, *J*= 7.1 Hz), 4.74-4.84 (2H, m), 6.95-7.07 (3H, m), 7.20-7.31 (2H, m), 7.91 (1H, d, *J*=7.8 Hz), 8.55 (1H, m), 8.68 (1H, m); minor isomer (*cis*) δ 1.23(3H, t, *J*=7.1 Hz), 2.63-2.70 (1H, m), 3.00 (1H, ddd, *J*=5.81, 7.19, 12.7Hz), 4.19 (2H, q, *J*= 7.1 Hz), 4.74-4.84 (2H, m), 6.95-7.07 (3H, m), 7.20-7.31 (2H, m), 7.84 (1H, d, *J*= 7.8 Hz), 8.55 (1H, m), 8.68 (1H, m); ^{13}C NMR (125 MHz, $CDCl_3$) major isomer (*trans*) δ 14.48, 42.18, 62.05, 67.68, 75.9, 116.1, 123.5, 124.1, 129.4, 135.1, 137.1, 148.7, 149.3, 150.4, 170.4, minor isomer (*cis*) δ 14.40, 42.27, 62.02, 67.19, 76.5, 116.12, 123.2, 124.22, 129.07, 134.91, 136.48, 148.7, 149.6, 150.7, 170.8; IR (neat) 3389, 3032, 2983, 1736, 1595, 1487, 1426, 1374, 1209, 1027, 896, 856, 759, 698 cm^{-1}; EIMS 298 (M^+, base peak), 225, 181, 162, 144, 91, 77.

2-Phenyl-3-styryl-isoxazolidine-4-carboxylic acid ethyl ester (4h): light yellow oil, for regio isomer **4** *exo* precedes *endo*. ^{1}H NMR (500 MHz, $CDCl_3$) major isomer (*exo*) δ 1.15 (3H, t, *J*=7.1 Hz), 3.60 (1H, two td overlapped), 4.04-4.15 (2H, m, peak of two isomer overlapped), 4.25 (1H, dd, *J*=7.0, 8.1 Hz), 4.28 (1H, t, *J*=8.3 Hz), 4.47 (1H, t, *J*=7.7 Hz), 4.70 (1H, t, *J*=8.1 Hz), 6.27 (1H, dd, *J*= 8.1, 16.1 Hz), 6.72 (1H, d, *J*= 16.1 Hz), 6.95-7.00 (1H, m), 7.09-7.11 (2H, m), 7.22-7.45 (7H, m), minor isomer (*endo*) δ 1.19 (3H, t, *J*= 7.13 Hz), 3.45 (1H, td, *J*= 5.94, 7.87 Hz), 4.02-4.15 (2H m, peak of two isomer overlapped), 4.32 (1H, t, *J*= 8.2 Hz), 4.59 (1H, t, *J*= 6.7 Hz), 6.38 (1H, dd, *J*= 6.7 Hz), 6.95-7.00 (1H, m), 7.09-7.11 (2H, m), 7.22-7.45 (7H, m); ^{13}C NMR (125 MHz, $CDCl_3$) major isomer (*exo*)δ 14.6, 52.09, 61.6, 67.8, 70.6, 115.7, 123.09, 125.2, 127.02, 128.37, 128.6, 128.9, 129.4, 132.4, 133.8, 136.7, 150.2, 169.8, minor isomer (*endo*) δ 14.5, 56.2, 61.8, 68.9, 71.6, 115.9, 122.8, 125.2, 127.01, 128.35, 128.9, 129.05, 129.2, 131.6, 133.8, 136.7, 150.9, 171.19; IR (neat) 3059, 3027, 2981, 2928, 1732, 1595, 1489, 1374, 1190, 1097, 1025, 969, 754, 694 cm^{-1} ; EIMS 323 (M^+, base peak), 220, 206, 169, 141, 128, 115, 91, 77.

2-Phenyl-3-styryl-isoxazolidine-5-carboxylic acid ethyl ester (5h): light yellow oil, for regio isomer **5** ^{1}H NMR (500 MHz, $CDCl_3$) major isomer (*trans*) δ 1.28 (3H, t, *J*= 7.1 Hz), 2.56 (1H, td, *J*= 5.5, 12.6 Hz), 2.83 (1H, td, *J*= 8.3, 12.6 Hz), 4.24 (2H, q, *J*=7.1 Hz), 4.28-4.33(1H, m), 4.75 (1H, dd, *J*= 7.2, 15.9 Hz), 6.34 (1H, dd, *J*= 7.2, 15.9 Hz) 6.66 (1H, d, *J*=15.9 Hz), 6.96-7.01 (1H, m), 7.14-7.15 (1H, m), 7.21-7.32 (5H, m), 7.36-7.39 (3H, m), minor isomer (*cis*) δ 1.24 (3H, t, *J*=7.1 Hz), 2.60 (1H, ddd, *J*= 6.4, 8.1, 12.5 Hz), 2.77 (1H, ddd, *J*=5.4, 7.1, 12.5 Hz), 4.19 (2H, dq, *J*= 2.8, 7.1 Hz), 4.32-4.37 (1H, m), 4.75-4.77 (1H, m), 6.26 (1H, dd, *J*=7.1, 15.9 Hz), 6.67 (1H, d, *J*=15.9 Hz), 6.96-7.01 (1H, m), 7.14-7.15 (2H, m), 7.20-7.32 (5H, m), 7.36-7.39 (2H, m); ^{13}C NMR (125MHz, $CDCl_3$) major isomer (*trans*) δ 14.59, 40.24, 62.00, 68.92, 75.61, 116.44, 123.28, 126.93, 128.24, 129.02, 129.08, 129.24, 132.18, 136.85, 150.88, 171.08, minor isomer (*cis*) δ 14.46, 40.38, 61.88, 68.06, 76.19, 117.15, 123.17, 126.93, 128.16, 128.35, 128.96, 129.06, 129.24, 132.85, 136.74, 150.95, 171.39; IR (neat) 3059, 3027, 2982, 1740, 1595, 1488, 1450, 1273, 1205, 1029, 970, 895, 857, 754, 695 cm^{-1}; MS 323(M^+) (FAB)

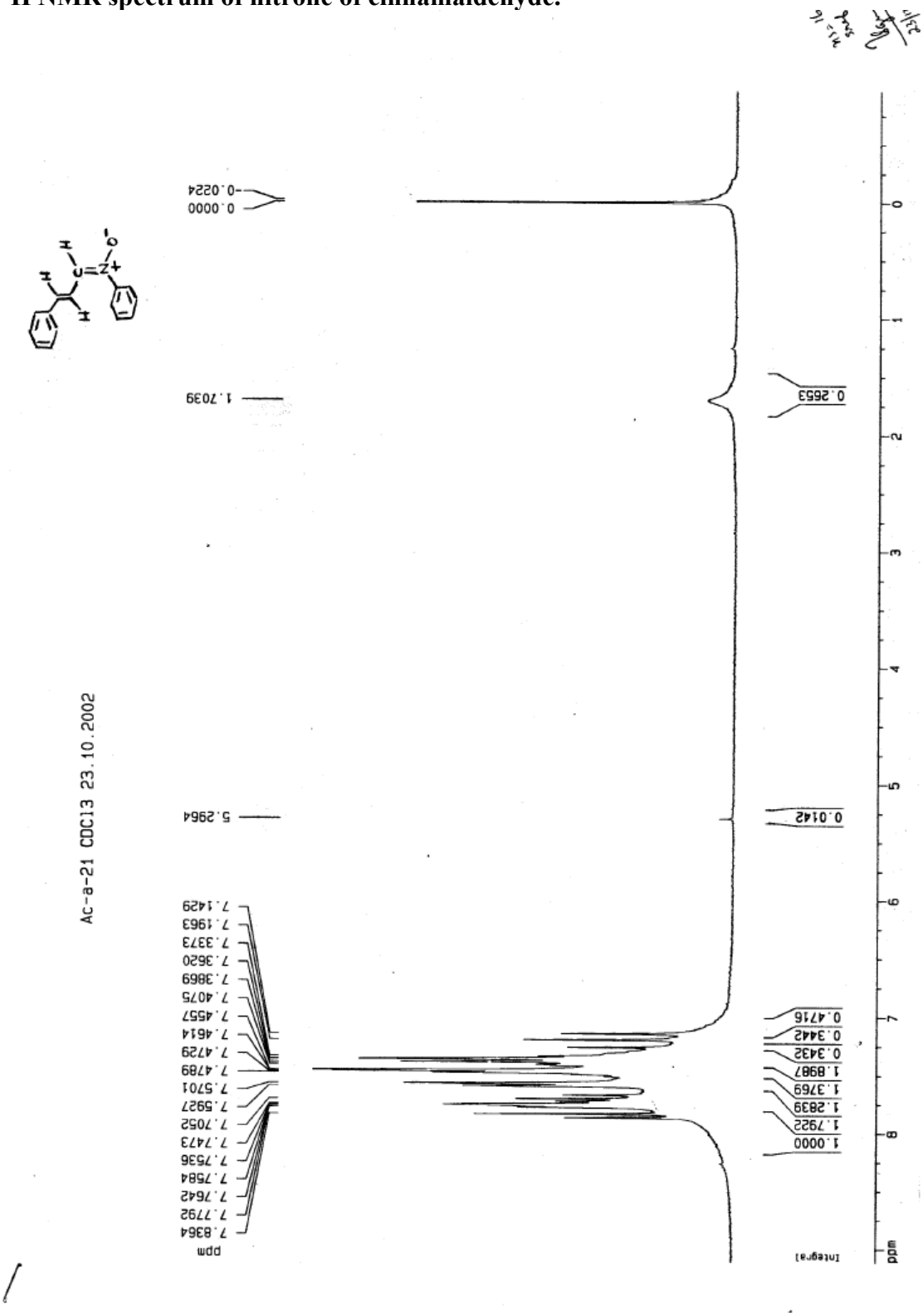
2-Phenyl-3-propyl-isoxazolidine-5-carboxylic acid ethyl ester: regioisomer **5** is formed having *cis:trans* ratio 43:57 as determined from the ^{1}H and ^{13}C NMR spectral data.

***cis*-2-Phenyl-3-propyl-isoxazolidine-5-carboxylic acid ethyl ester (5i) :** ^{1}H NMR (300 MHz, $CDCl_3$) δ 0.99 (3H, t, *J*= 7.1 Hz), 1.33 (3H, t, *J*= 7.1 Hz), 1.4-1.62 (3H, m), 1.76-1.87 (1H, m), 2.20 (1H, ddd, *J*=2.8, 6.0, 12.5 Hz), 2.57 (1H, ddd, *J*= 7.7, 9.7, 12.5 Hz), 3.77-3.79 (1H, m), 4.28 (2H, dq, *J*= 1.4, 7.1 Hz), 4.70 (1H, dd, *J*= 6.0, 9.7 Hz), 6.8-7.09 (3H, m), 7.22-7.29 (2H, m); ^{13}C NMR (125 MHz,$CDCl_3$) δ 14.45, 14.60, 20.69, 35.93, 38.26, 61.92, 67.10, 75.74, 115.38, 122.74, 129.36, 151.61, 171.10; IR

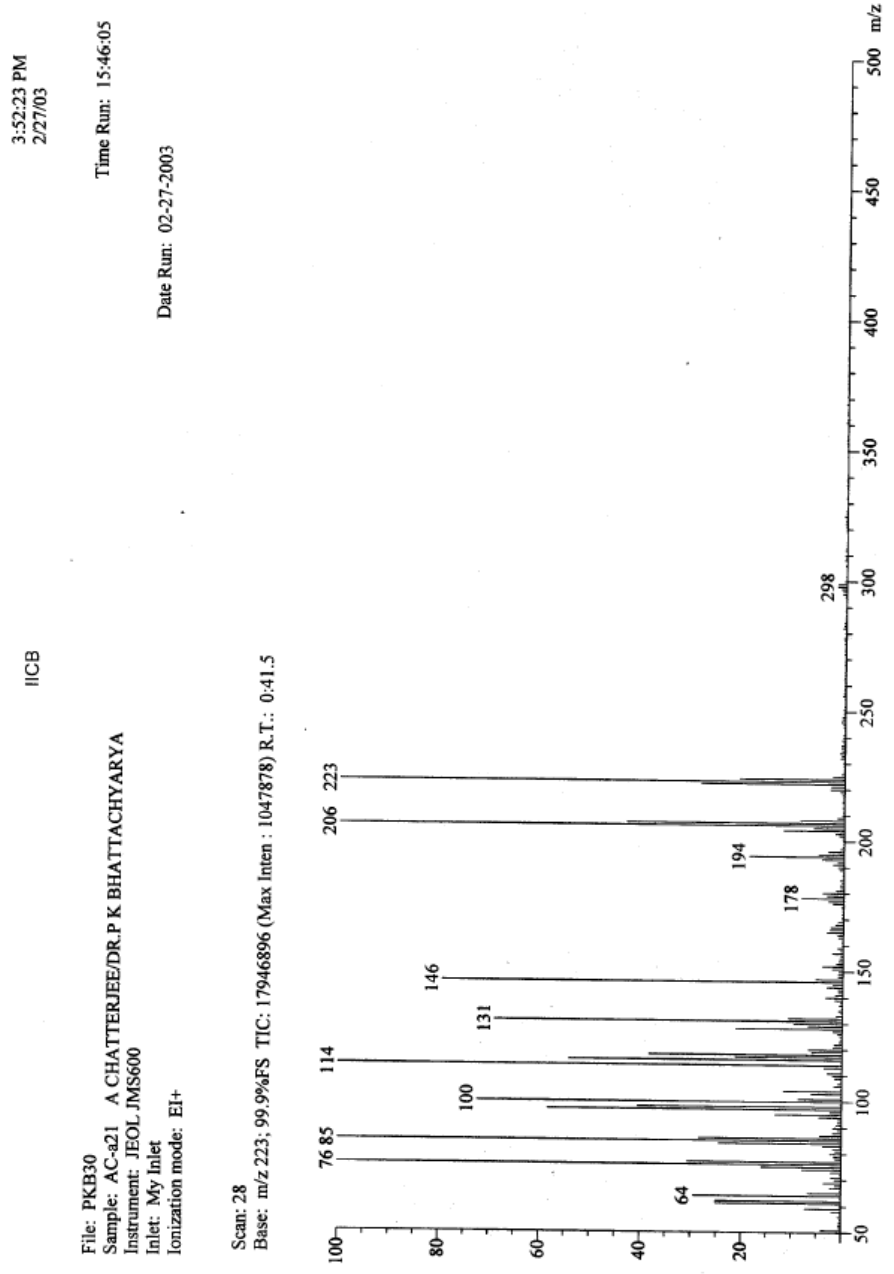
(neat) 3393, 3063, 2960, 2872, 1738, 1595, 1488, 1456, 1375, 1205, 1032, 758, 695; MS 263(M^+) FAB

***trans*-2-Phenyl-3-propyl-isoxazolidine-5-carboxylic acid ethyl ester (5i):** ^{1}H NMR (300 MHz, $CDCl_3$), δ 1.00 (3H, t, *J*= 7.1 Hz), 1.25 (3H, t, 7.1 Hz), 1.42-1.57 (3H, m), 1.68-1.80 (1H, m), 2.33 (1H, ddd, *J*= 4.1, 8.1, 12.3 Hz), 2.54 (1H, td, *J*= 7.2, 12.3 Hz), 3.73-3.85 (1H, m), 4.17 (2H, dq, *J*= 2.6, 7.1 Hz), 4.69 (1H, t, 7.2 Hz), 7.17-7.3 (5H, m); ^{13}C NMR (125 MHz, $CDCl_3$) δ 14.42, 14.57, 20.39, 35.92, 37.83, 61.77, 66.59, 76.85, 117.05, 123.06, 128.98, 129.36, 151.56, 171.73; IR (neat) 3393, 3063, 2960, 2872, 1738, 1595, 1488, 1456, 1375, 1205, 1032, 758, 695; MS 263 (M^+), FAB

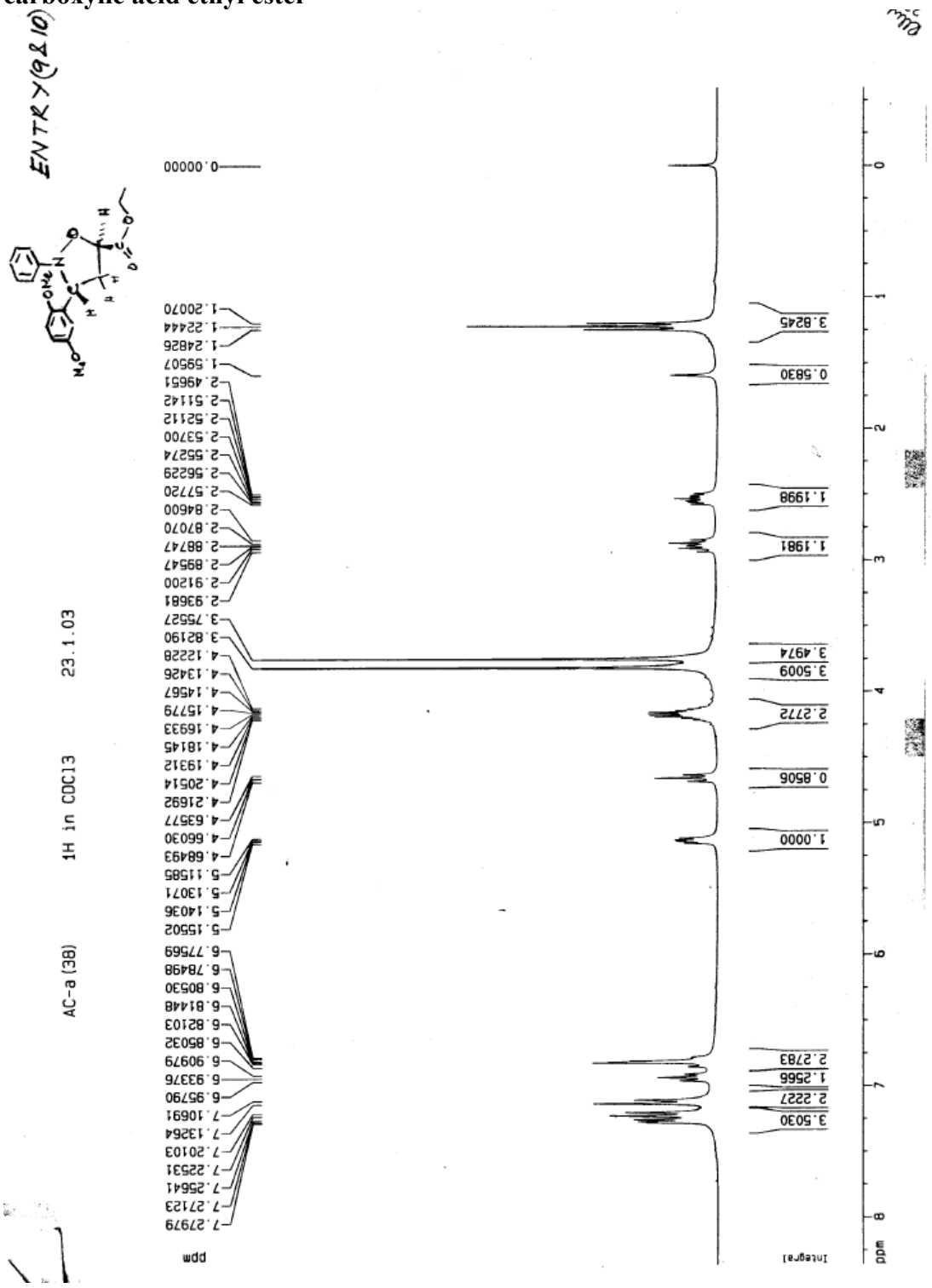
^{1}H NMR spectrum of nitrone of cinnamaldehyde.

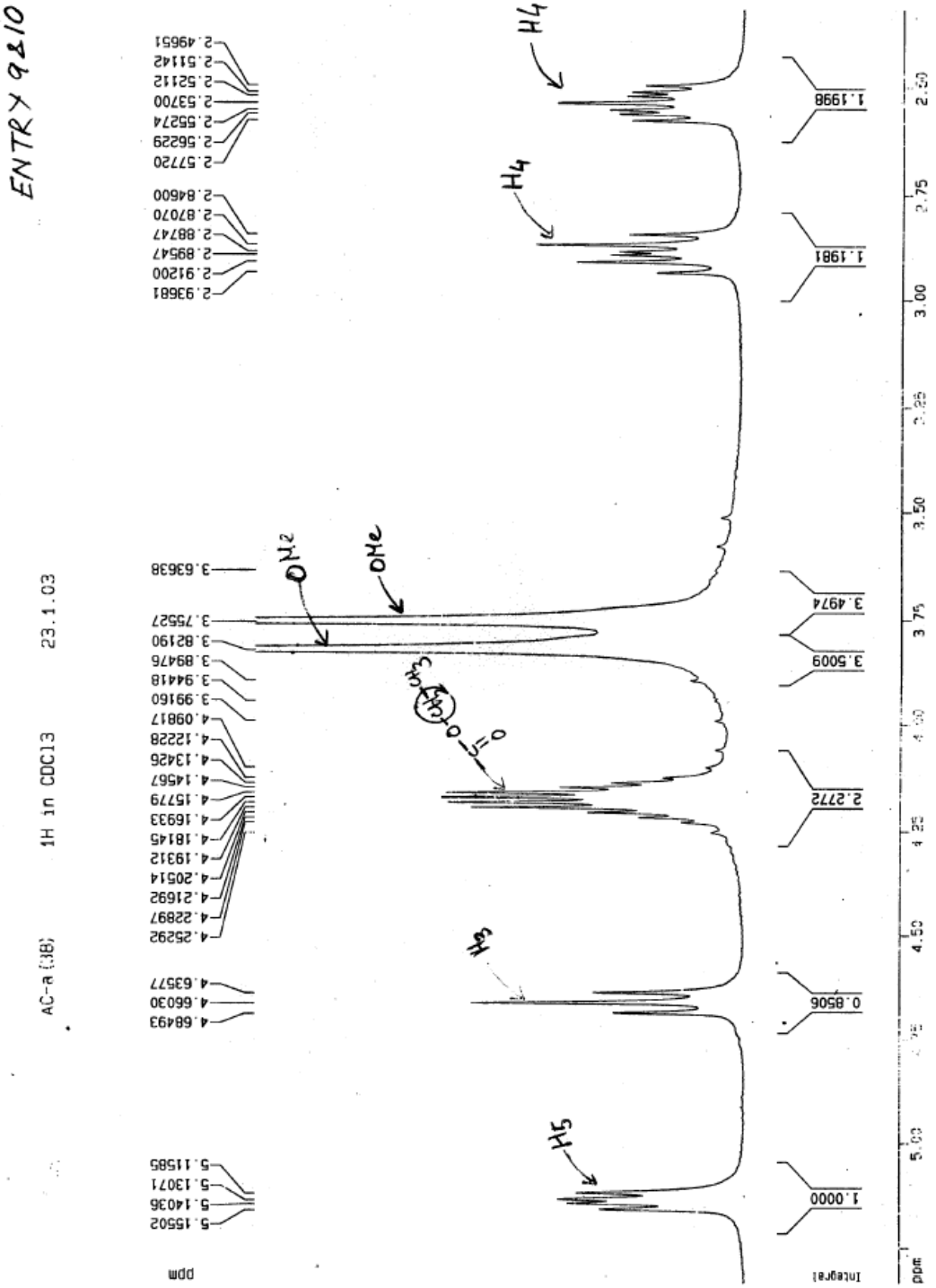


EIMS spectrum of cinnamaldehyde of nitrone.



^{1}H NMR spectrum of 3-(2,5-Dimethoxy-phenyl)-2-phenyl-isoxazolidine-5-carboxylic acid ethyl ester

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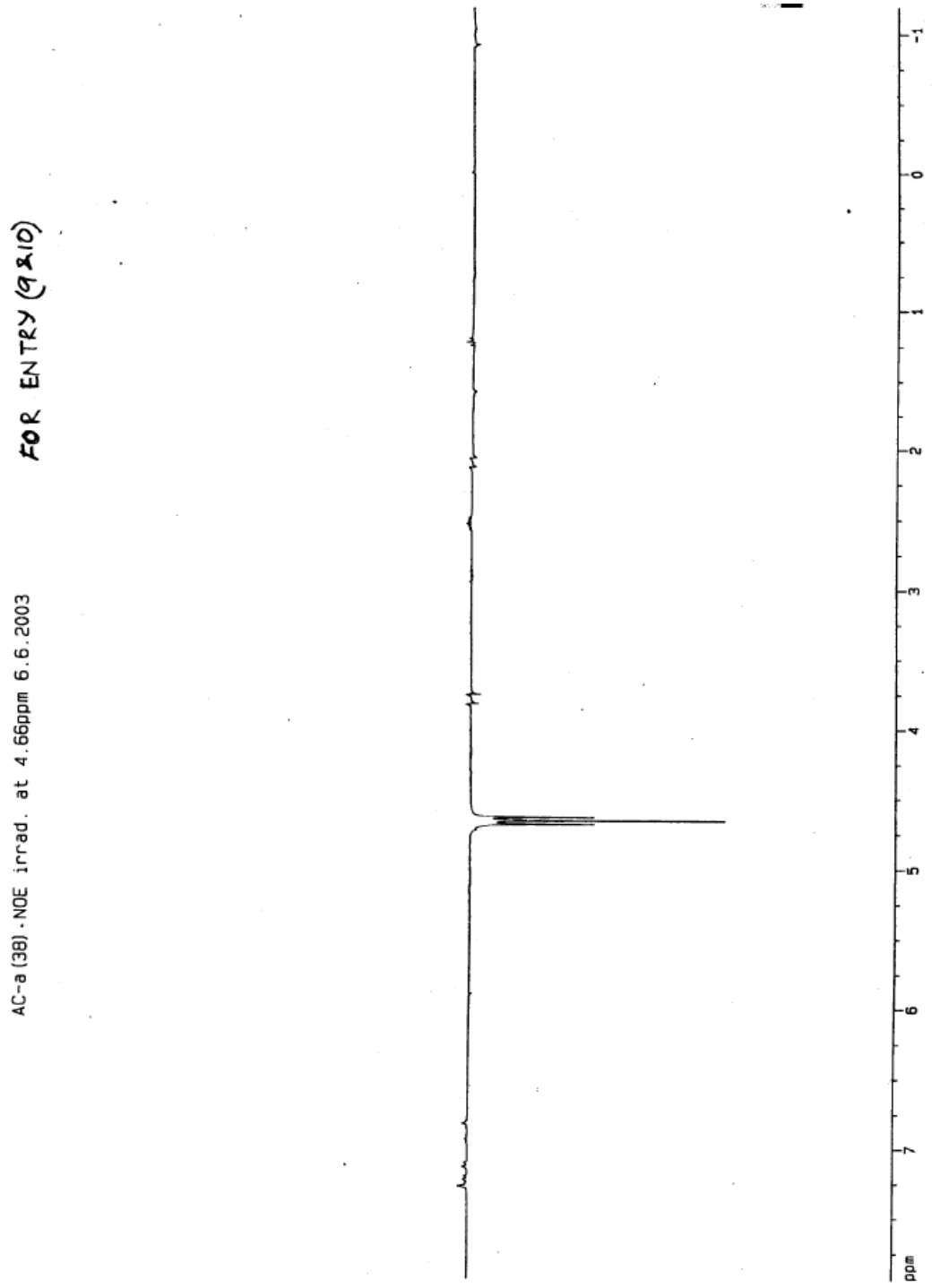
^{1}H NMR spectrum NOE after irradiation of C3 proton.



^{1}H NMR spectrum NOE after irradiation of C5 proton