Contents of Characterization Spectrograms

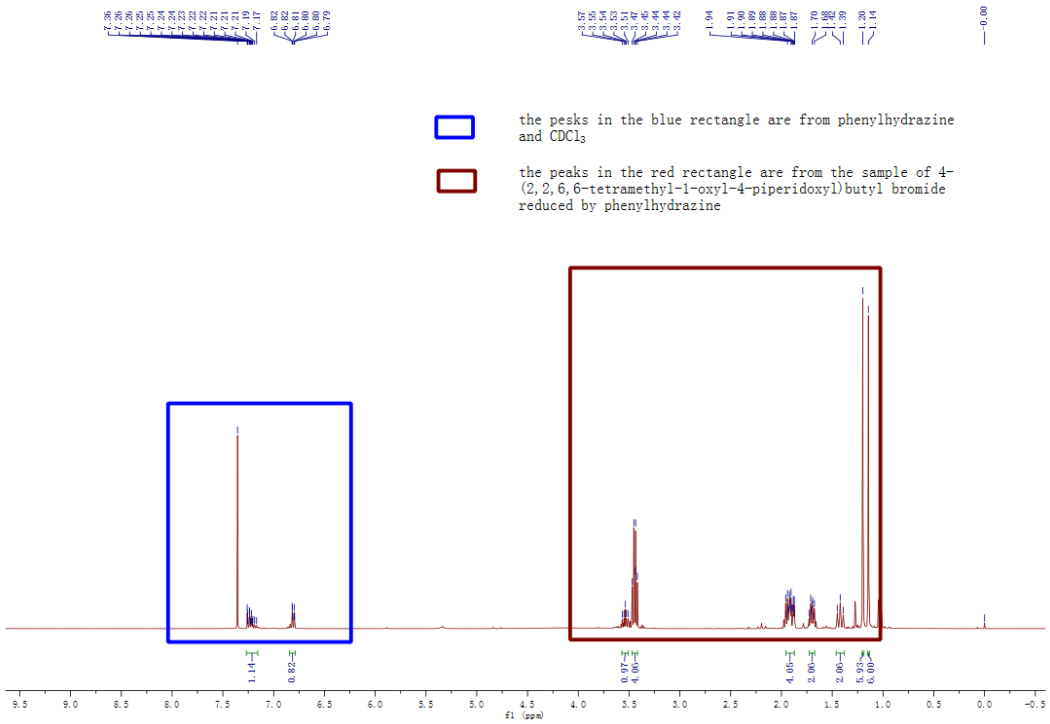


Fig1. ^{1}H NMR of the sample of 4-(2,2,6,6-Tetramethyl-1-oxyl-4-piperidoxyl) butyl bromide reduced by phenylhydrazine ($CDCl_3$)

^{1}H NMR (400 MHz; $CDCl_3$; Me_4Si) δ： 1.14 (6H, s, Piperidine-Me), 1.20 (6H, s, Piperidine-Me), 1.42 (2H, t, *J* = 11.6 Hz, Piperidine-C*H*H), 1.66-1.70 (2H, m, O-CH_2-C*H*$_2$-CH_2-CH_2-Br), 1.87-1.94 (4H, m, O-CH_2-CH_2-C*H*$_2$-CH_2-Br, Piperidine-CH*H*), 3.42-3.47 (4H, m, OCH_2, $BrCH_2$), 3.50-3.57 (1H, m, Piperidine-CH).

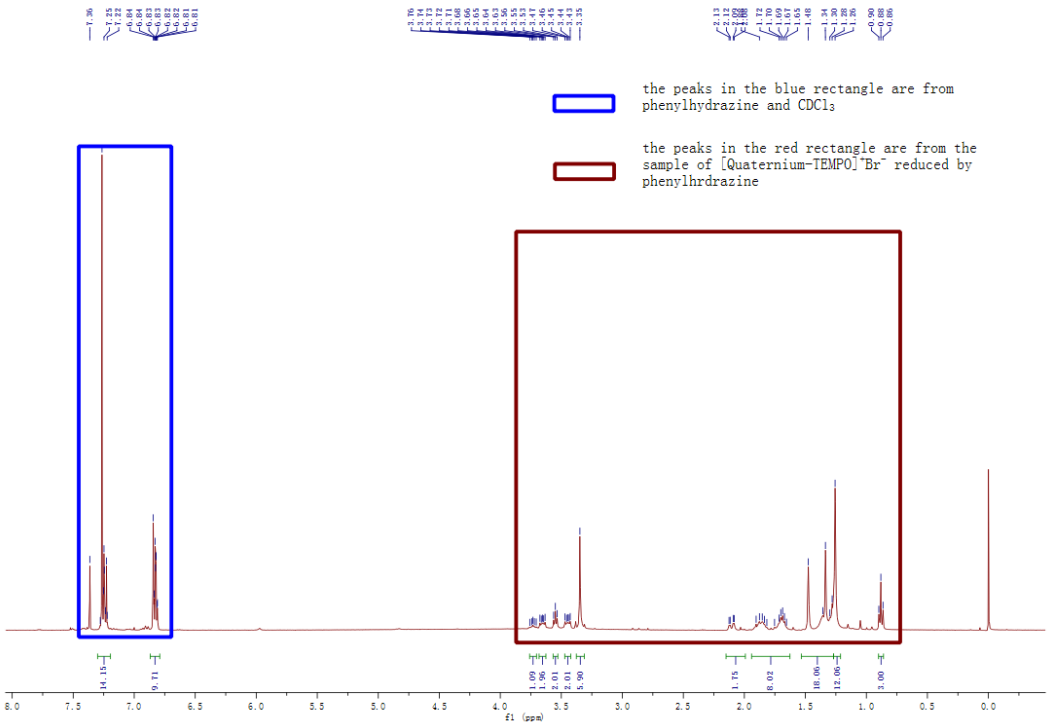


Fig2. ^{1}H NMR of the sample of [Quaternium-TEMPO]$^+$Br$^-$ reduced by phenylhydrazine ($CDCl_3$)

^{1}H NMR (400 MHz; $CDCl_3$; Me_4Si) δ: 0.88 (3H, t, J = 6.8 Hz, Me), 1.26 (12H, s, Piperidine-Me), 1.28-1.48 (18H, m, N-CH_2-CH_2-(CH_2)$_9$-CH_3), 1.65-1.88 (8H, m, Piperidine-CH_2, O-CH_2-CH_2-CH_2-CH_2-N, N-CH_2-CH_2-C_9H_{18}-CH_3), 2.00-2.13 (2H, m, O-CH_2-CH_2-CH_2-CH_2-N), 3.35 (6H, s, NMe), 3.43-3.47 (2H, m, N-CH_2-CH_2-C_9H_{18}-CH_3), 3.55 (2H, t, J = 6 Hz, O-CH_2-CH_2-CH_2-CH_2-N), 3.63-3.68 (2H, m, OCH_2), 3.71-3.76 (1H, m, Piperidine-CH).

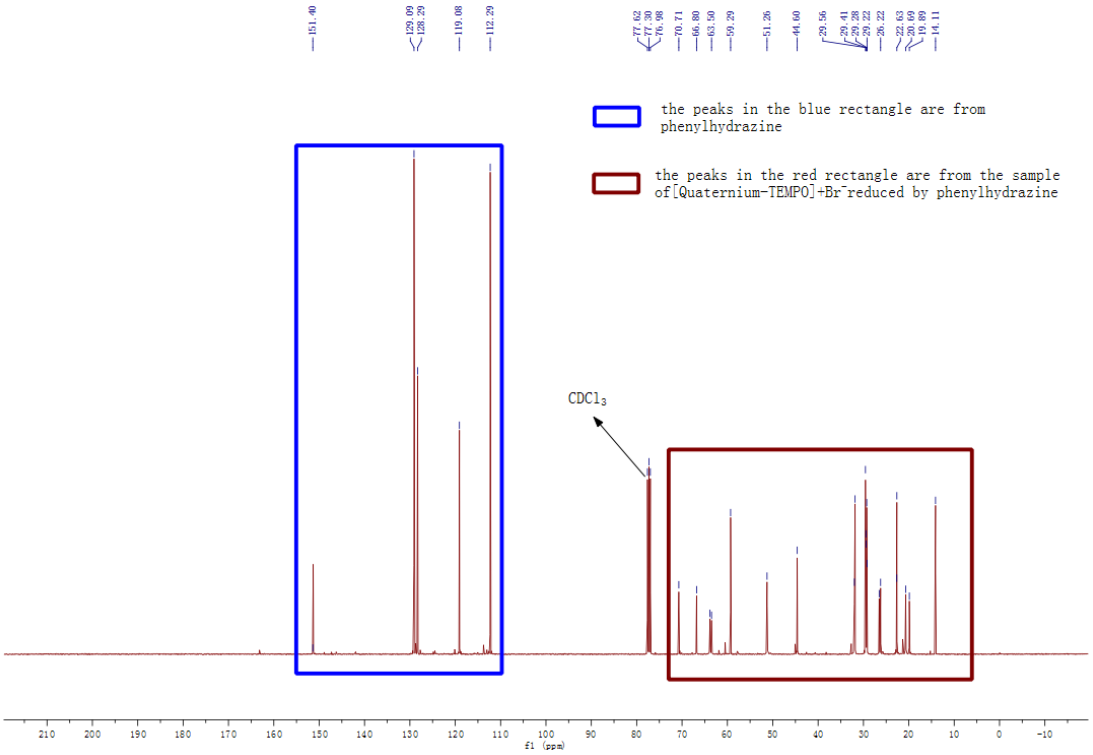


Fig3. ^{13}C NMR of the sample of [Quaternium-TEMPO]$^{+}Br^{-}$ reduced by phenylhydrazine ($CDCl_3$)

^{13}C NMR (100MHz，$CDCl_3$) δ: 14.11 (Me), 19.89 (O-CH_2-CH_2-*C*H_2-CH_2-N), 20.69 (N-CH_2-CH_2-C_8H_{16}-*C*H_2-CH_3), 22.64 (N-CH_2-*C*H_2-C_9H_{18}-CH_3), 22.66 (N-CH_2-CH_2-*C*H_2-C_8H_{16}-CH_3), 26.22 (O-CH_2-*C*H_2-CH_2-CH_2-N), 26.54 (Piperidine-Me), 29.22, 29.28, 29.41, 29.46, 29.56, 31.85, 31.99 (N-CH_2-CH_2-CH_2-(*C*H_2)$_7$-CH_2-CH_3), 44.60 (Piperidine-CH_2), 51.26 (NMe), 59.29 (Piperidine-C), 63.50 (N-*C*H_2-CH_2-C_9H_{18}-CH_3), 63.84 (O-CH_2-CH_2-CH_2-*C*H_2-N), 66.80 (Piperidine-CH),70.71(OCH_2).

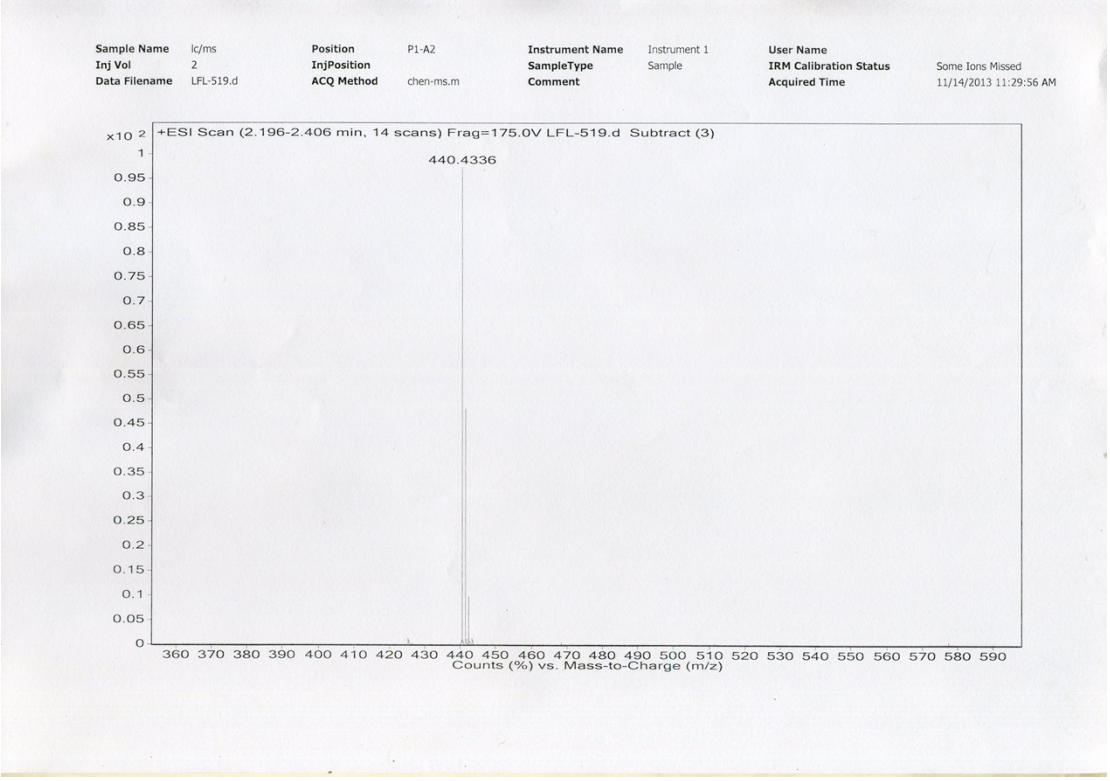


Fig4. HR-MS (ESI) of [Quaternium-TEMPO]$^+$

HR-MS (ESI): *m/z* 440.4336. $C_{27}H_{56}N_2O_2$ calculated *m/z*: 440.4342.

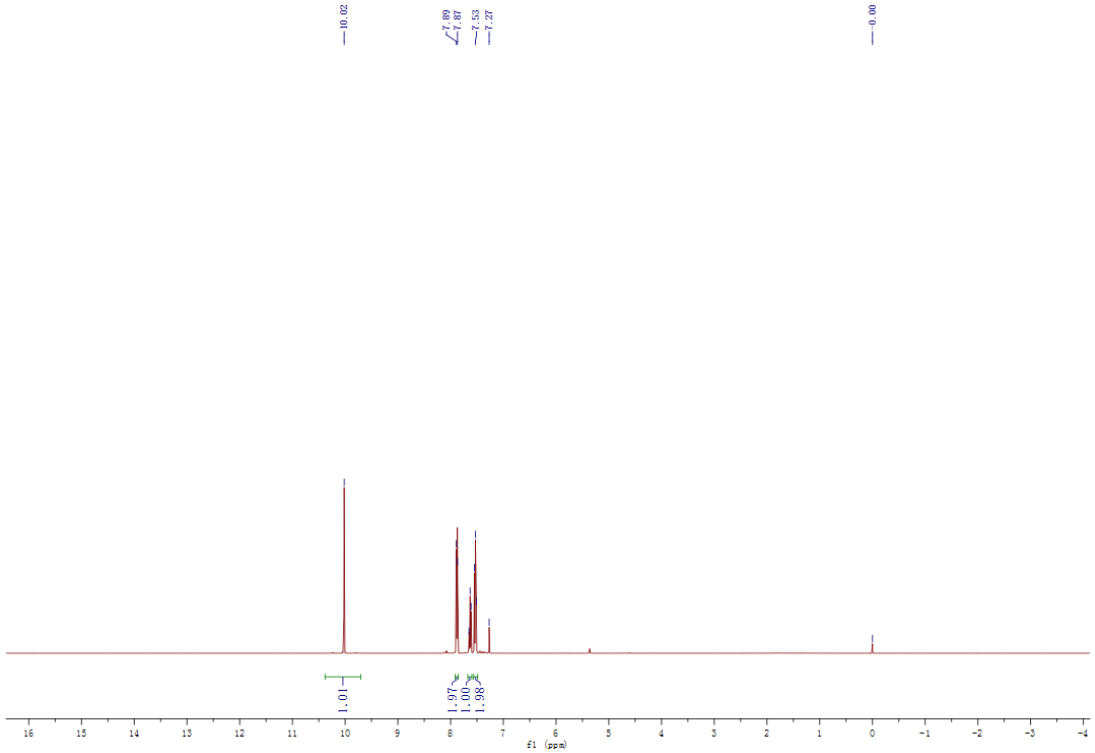


Fig5. ^{1}H NMR of Benzaldehyde (entry 1) ($CDCl_3$)

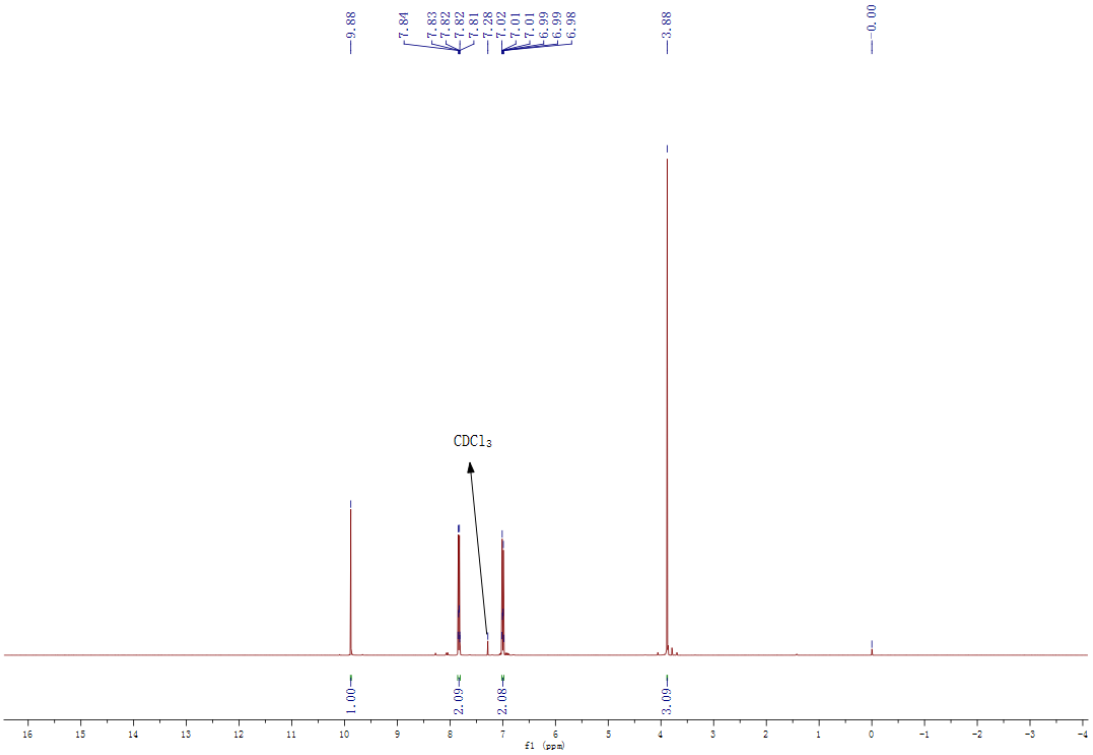


Fig6. ^{1}H NMR of 4-Methoxybenzaldehyde (entry 2) ($CDCl_3$)

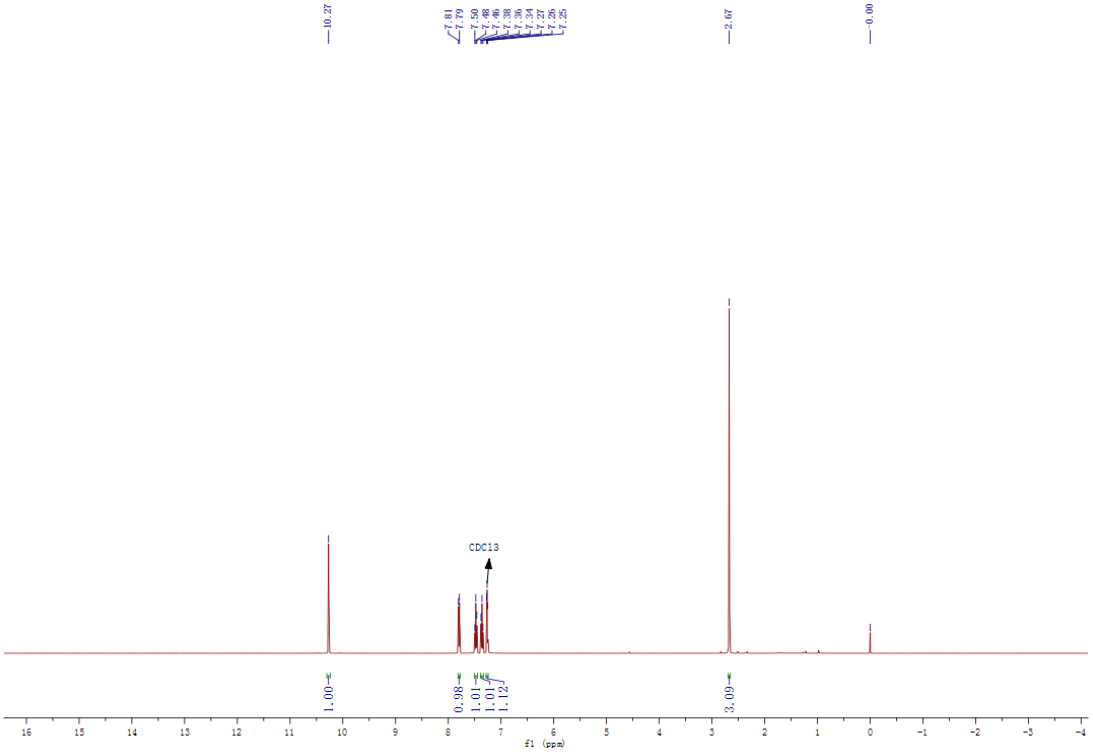


Fig7. ^{1}H NMR of 2-Methoxybenzaldehyde (entry 3) ($CDCl_3$)

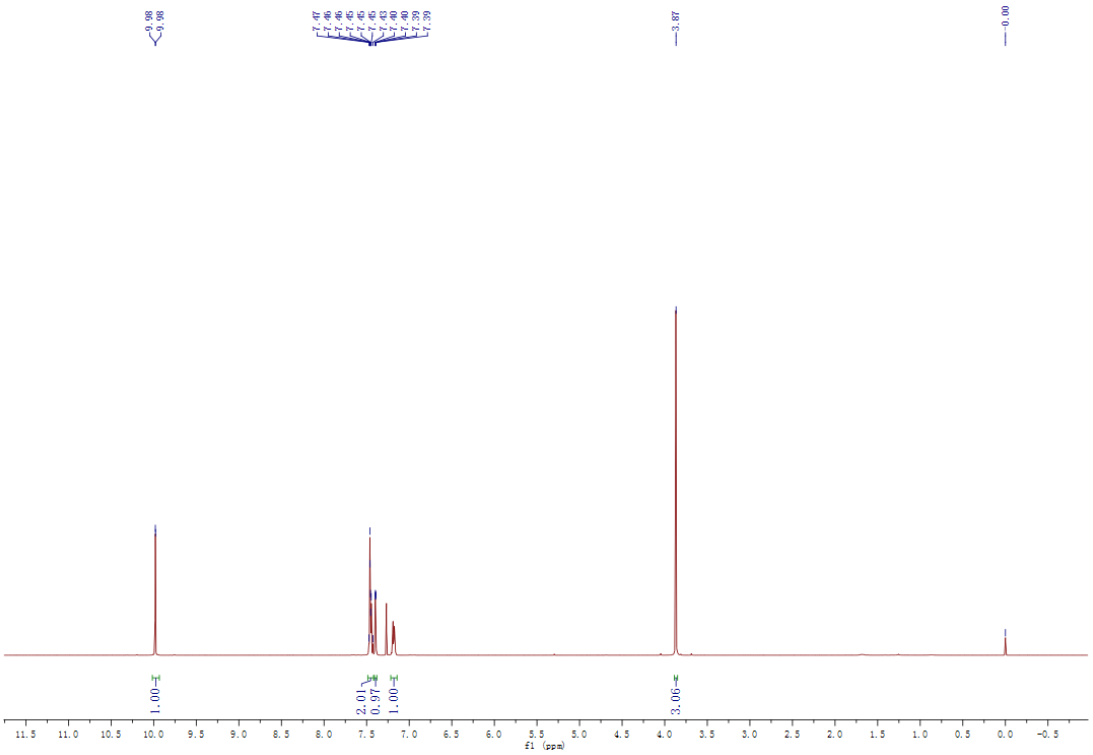


Fig8. ^{1}H NMR of 3-Methoxybenzaldehyde (entry 4) ($CDCl_3$)

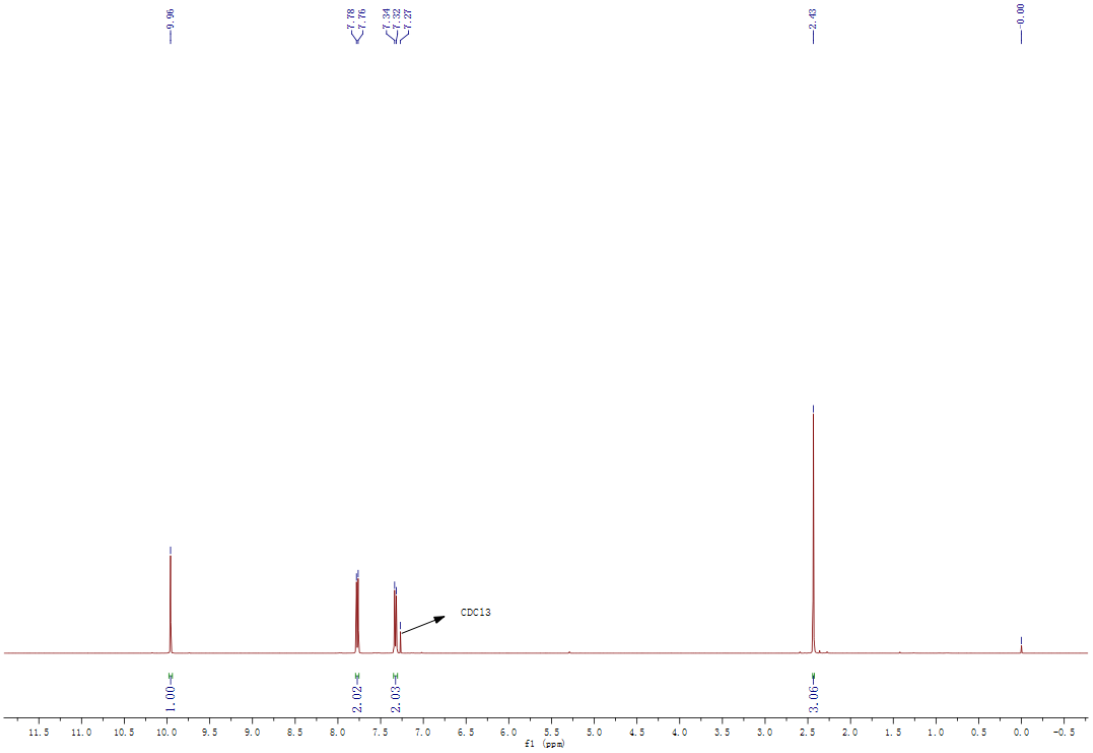


Fig9. ^{1}H NMR of 4-Methylbenzaldehyde (entry 5) ($CDCl_3$)

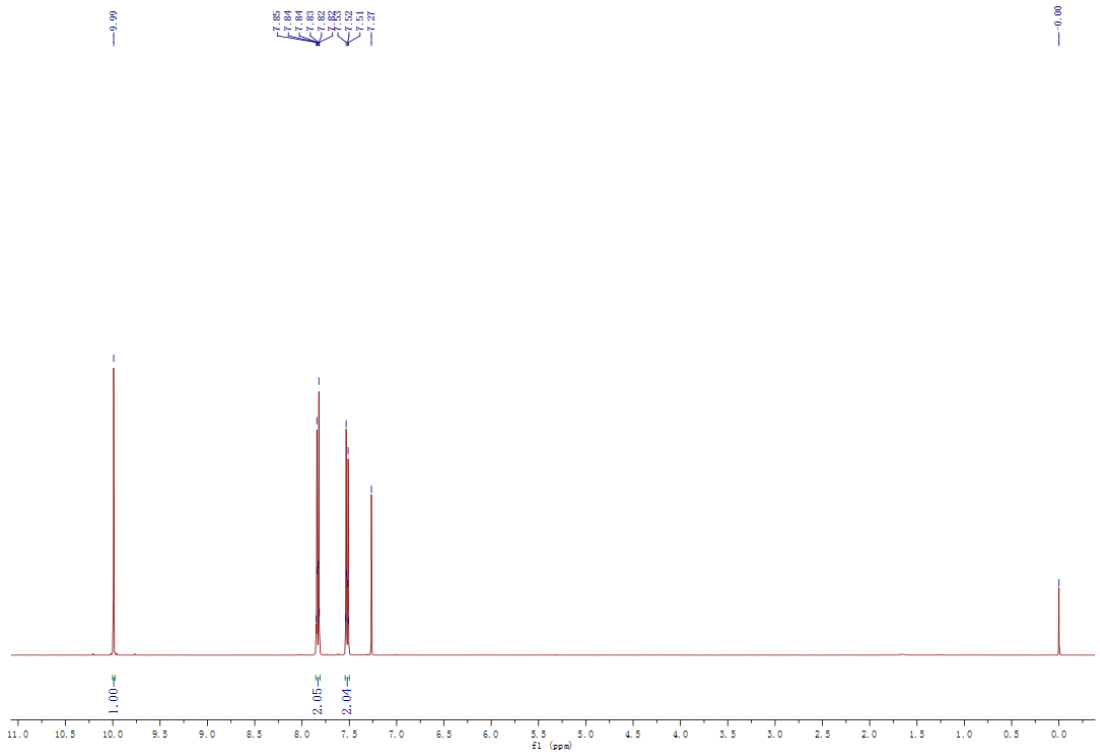


Fig10. ^{1}H NMR of 4-Chlorobenzaldehyde (entry 6) ($CDCl_3$)

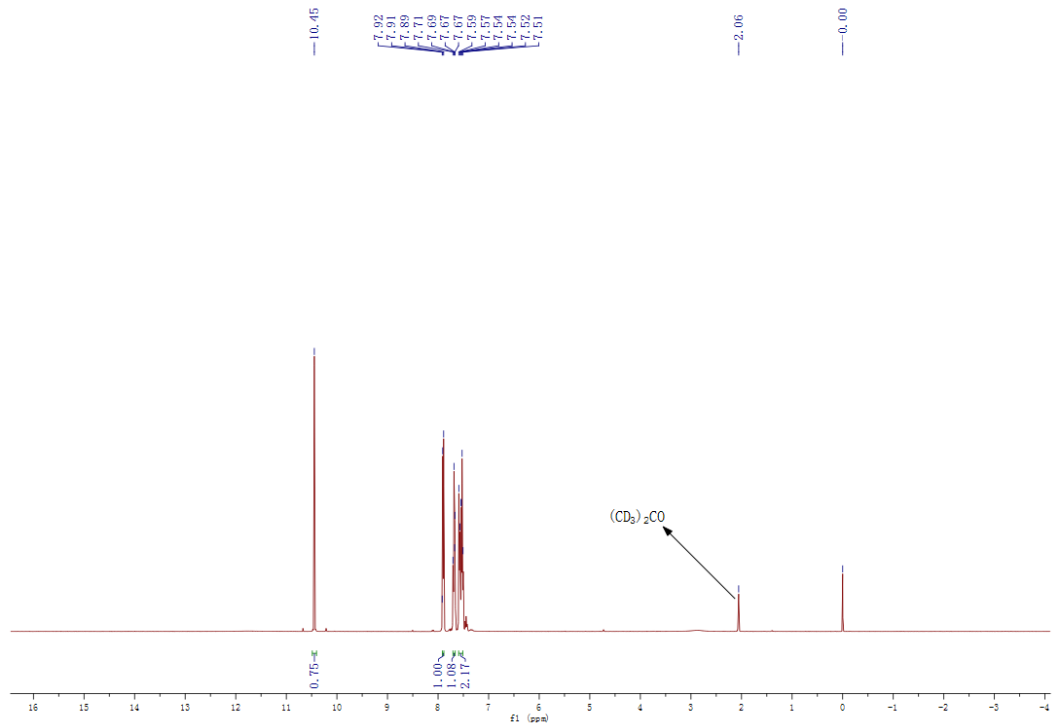


Fig11. ^{1}H NMR of 2-Chlorobenzaldehyde (entry 7) ($(CD_3)_2CO$)

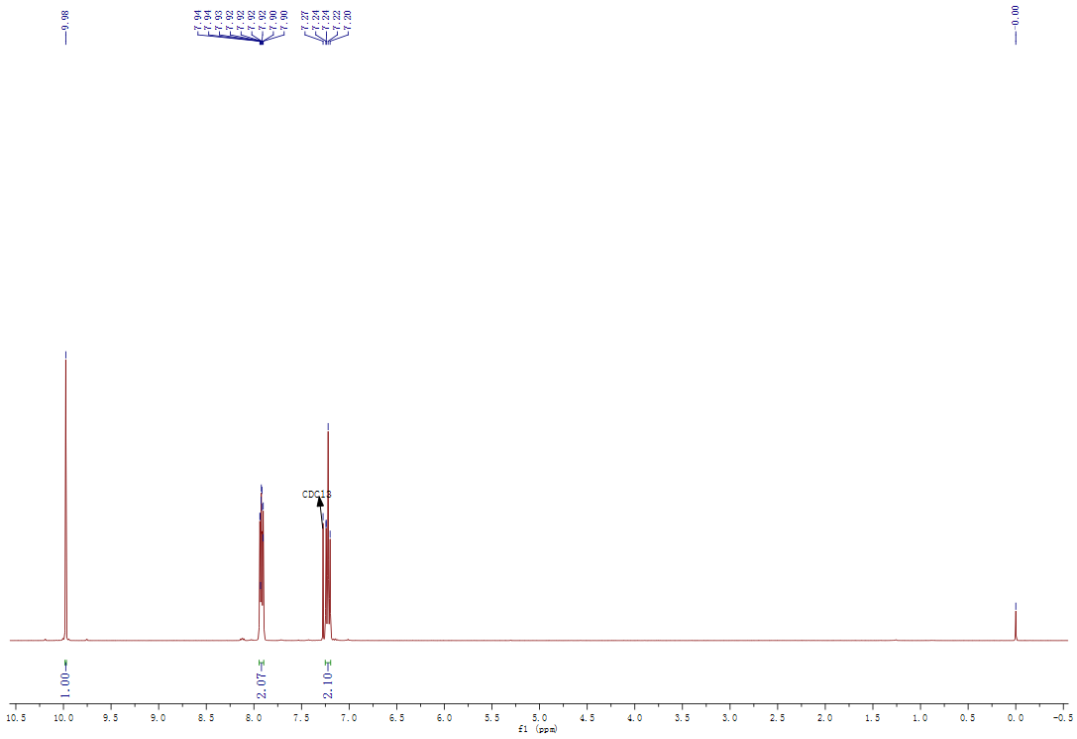


Fig12. ^{1}H NMR of 4-Fluorobenzaldehyde (entry 8) ($CDCl_3$)

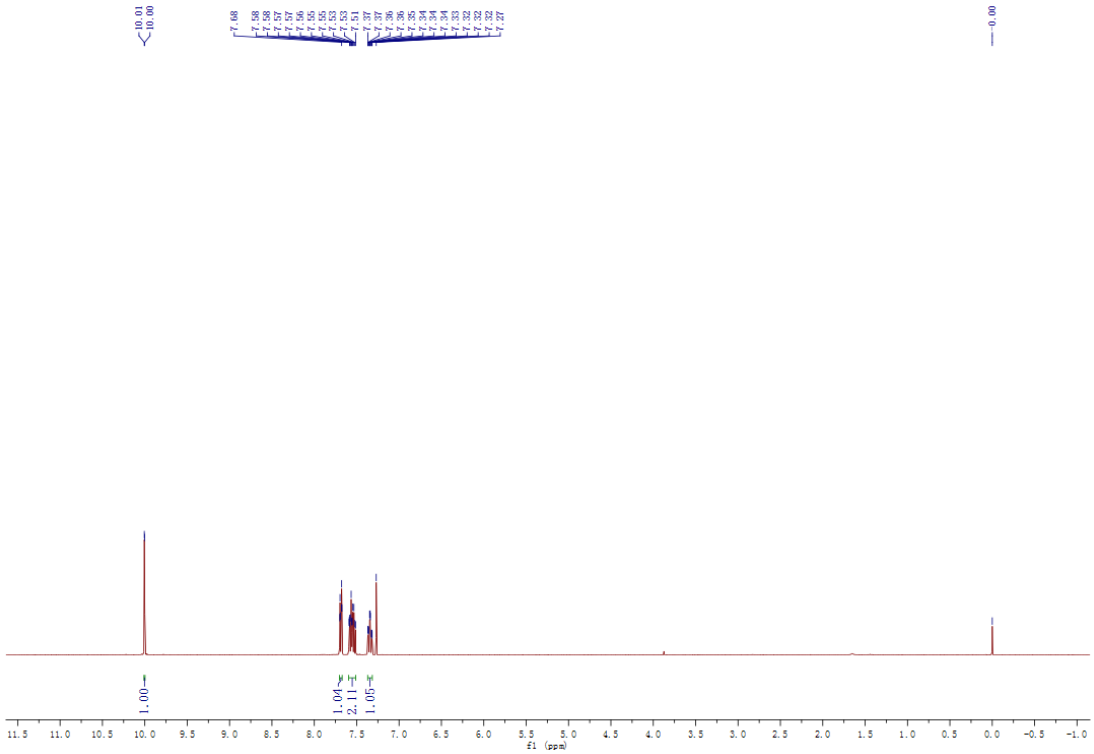


Fig13. ^{1}H NMR of 2-Fluorobenzaldehyde (entry 9) ($CDCl_3$)

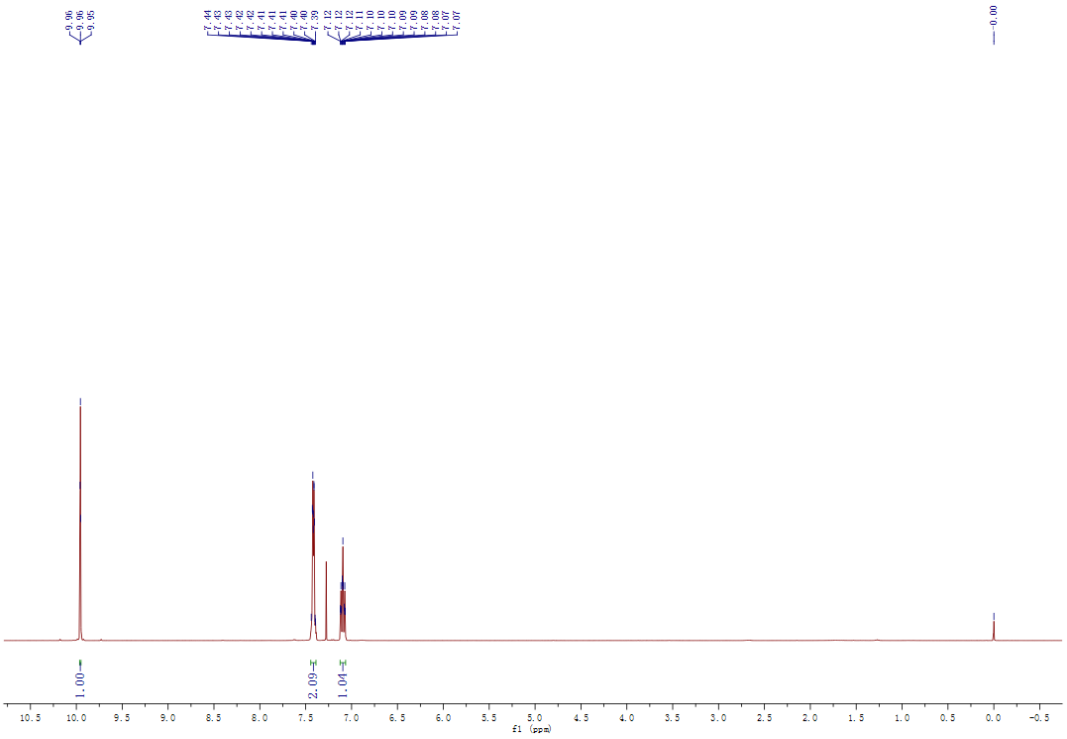


Fig14. ^{1}H NMR of 3,5-Difluorobenzaldehyde (entry 10) ($CDCl_3$)

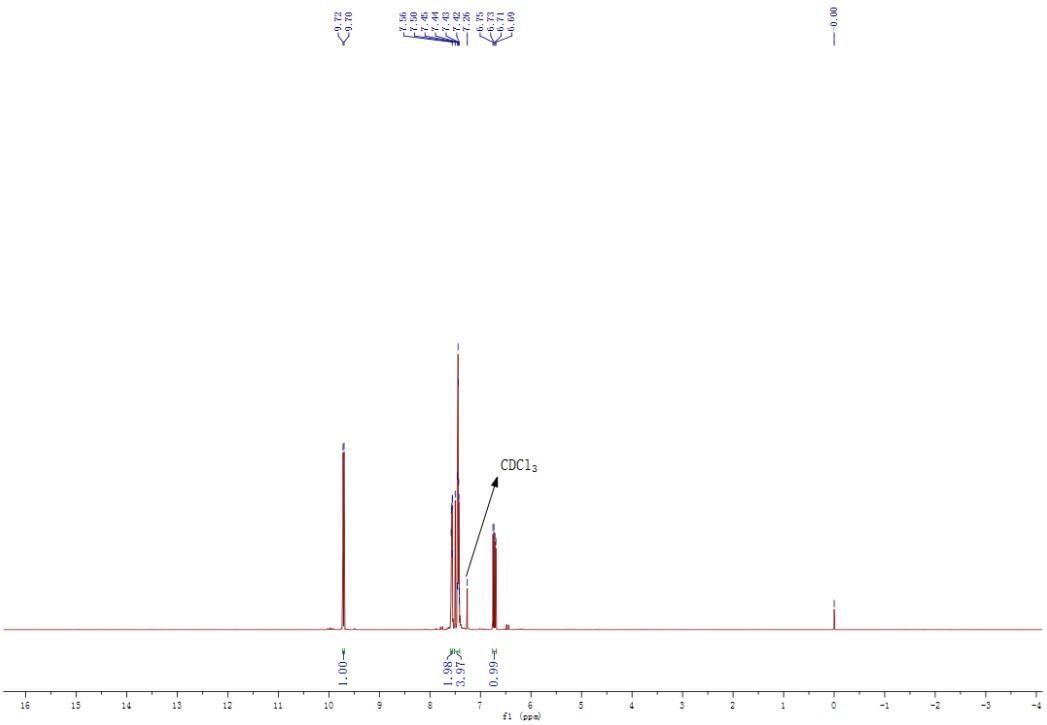


Fig15. ^{1}H NMR of Cinnamaldehyde (entry 11) ($CDCl_3$)

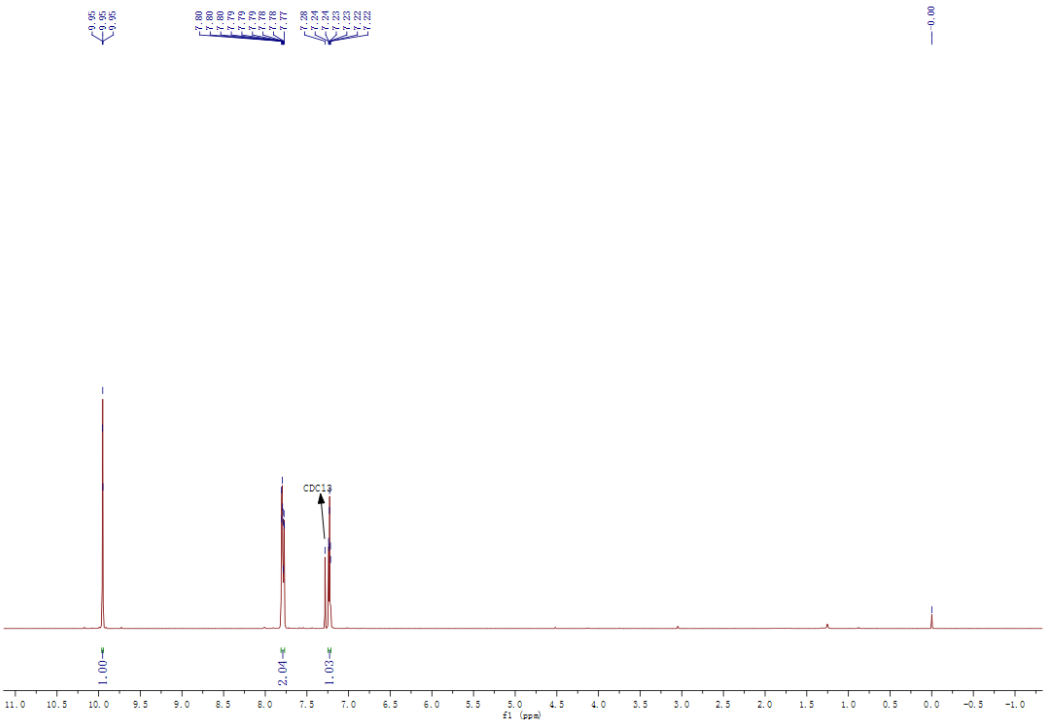


Fig16. ^{1}H NMR of 2-Thenaldehyde (entry 12) ($CDCl_3$)

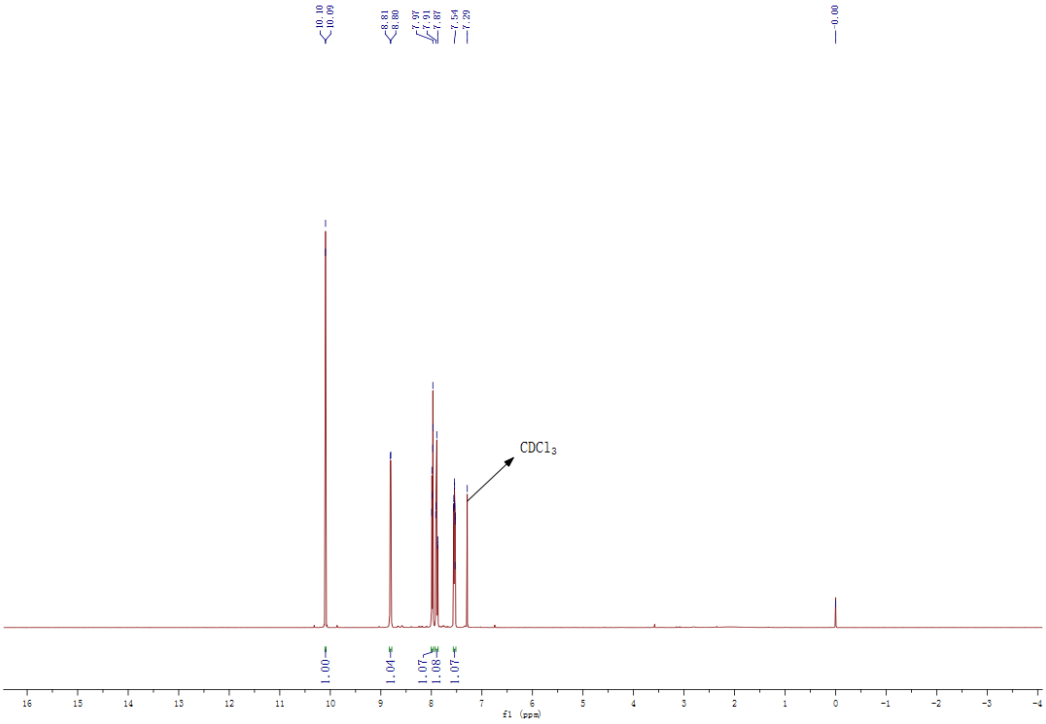


Fig17. ^{1}H NMR of 2-pyridinecarboxaldehyde (entry 13) ($CDCl_3$)

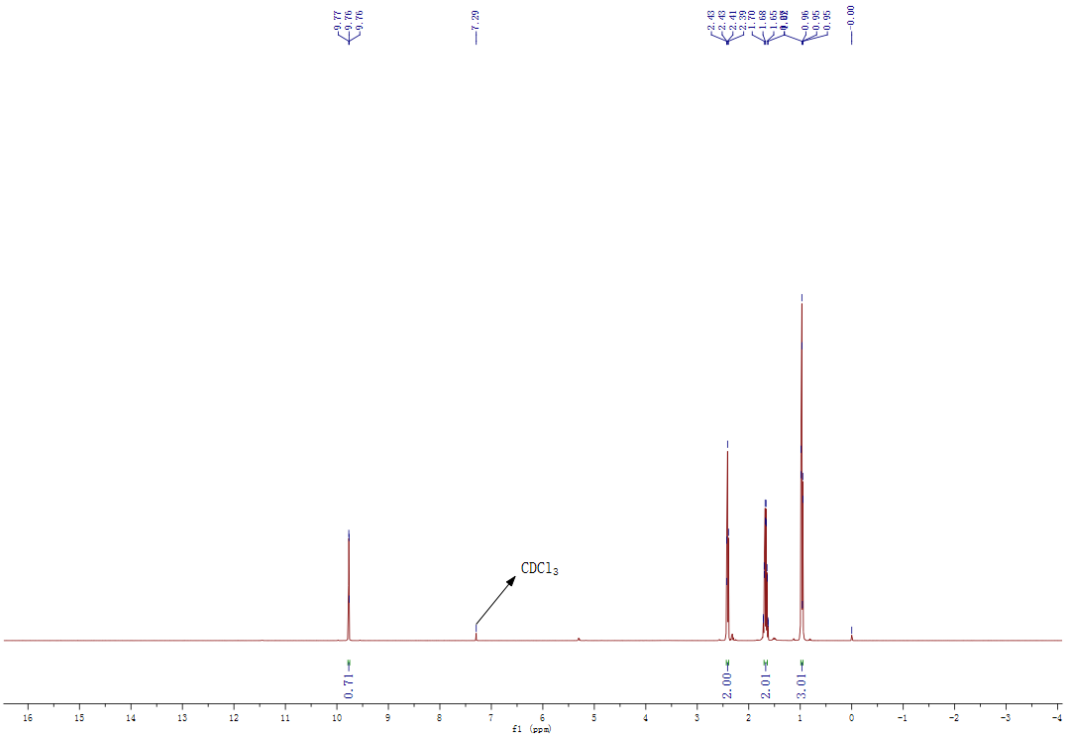


Fig18. ^{1}H NMR of Butanal (entry 14) ($CDCl_3$)

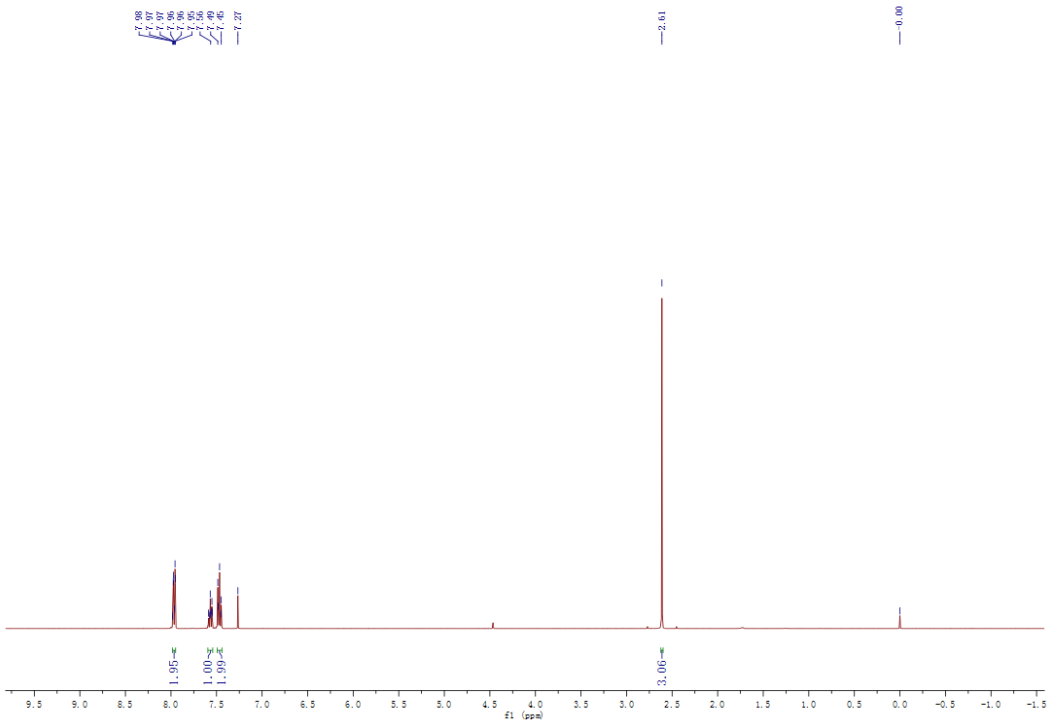


Fig19. ^{1}H NMR of Acetophenone (entry 15) ($CDCl_3$)

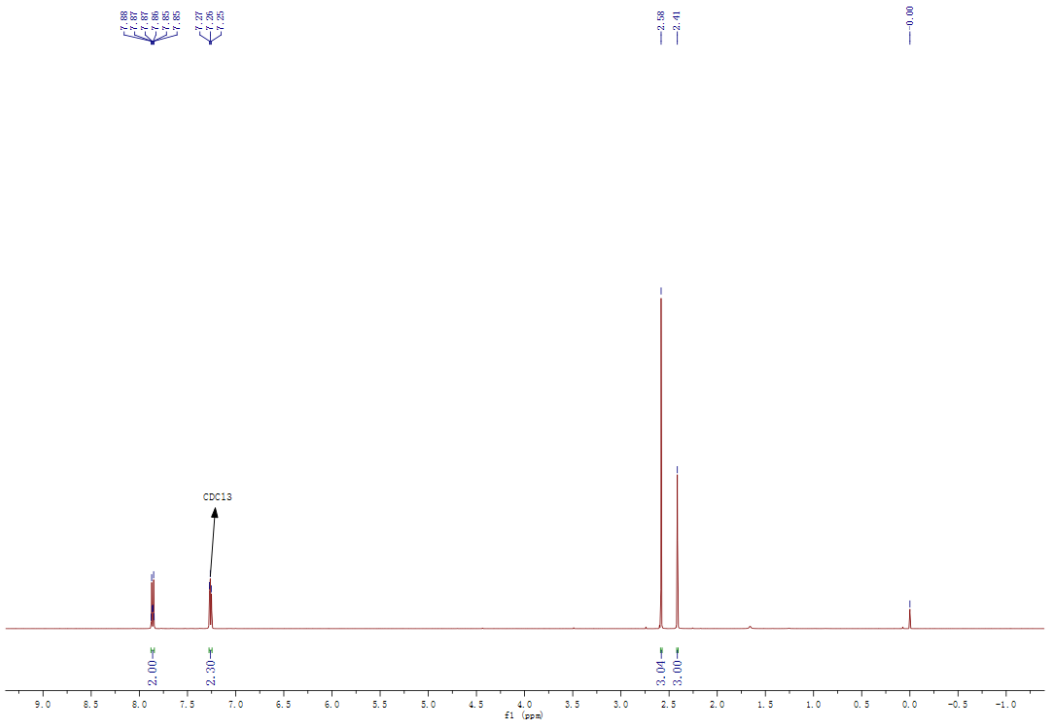


Fig20. ^{1}H NMR of 4-Methylacetophenone (entry 16) ($CDCl_3$)

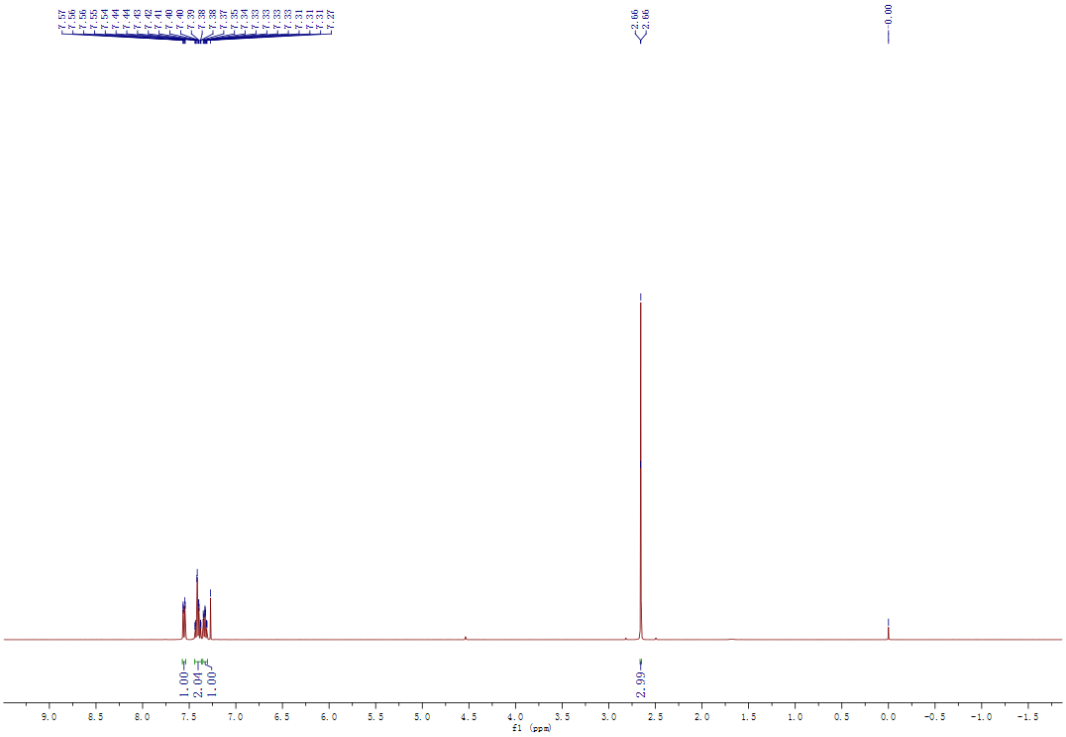


Fig21. ^{1}H NMR of 2-Chloroacetophenone (entry 17) ($CDCl_3$)

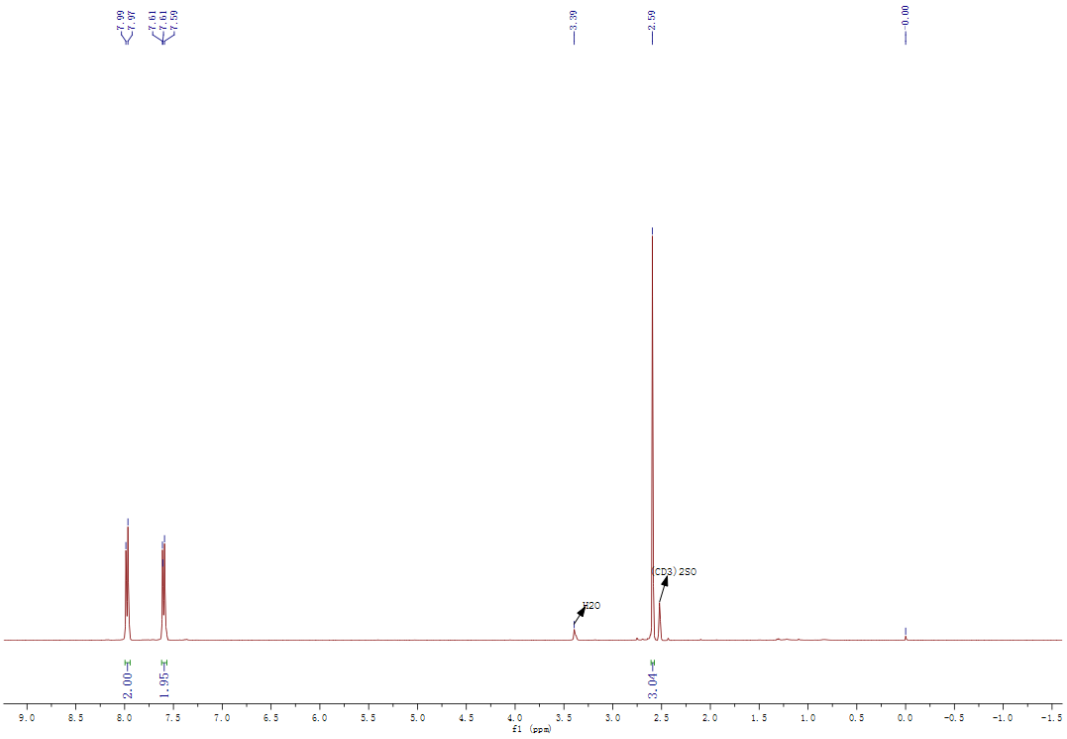


Fig22. ^{1}H NMR of 4-Chloroacetophenone (entry 18) ($(CD_3)_2SO$)

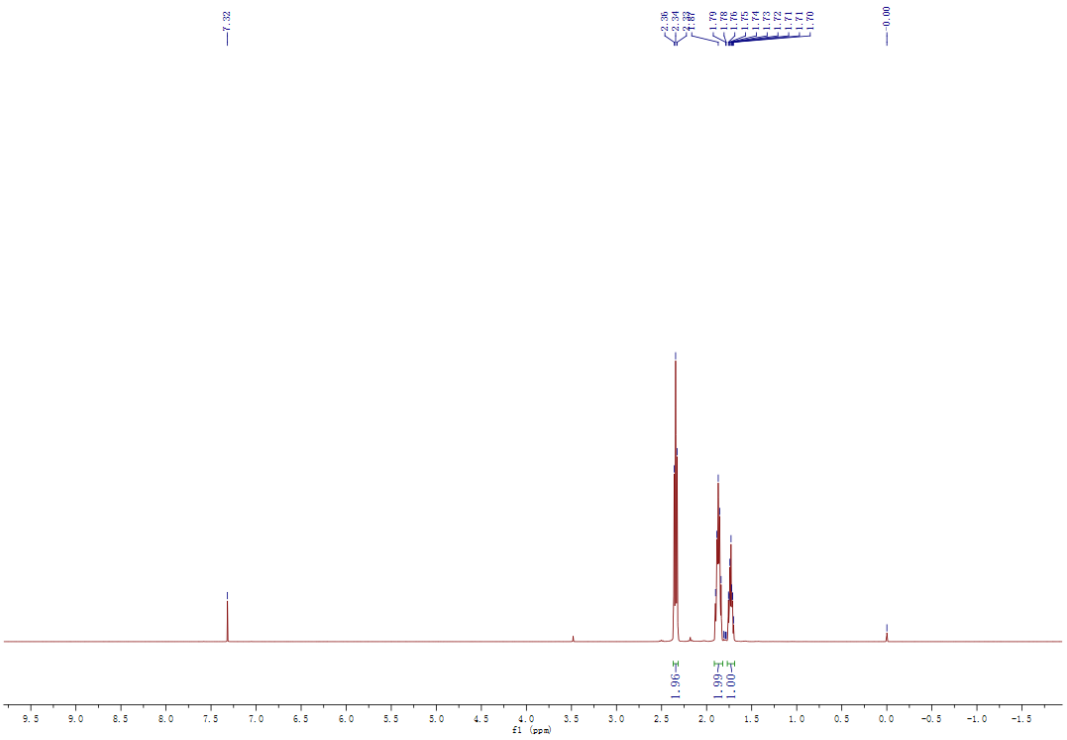


Fig23. ^{1}H NMR of Cyclohexanone (entry 19) ($CDCl_3$)

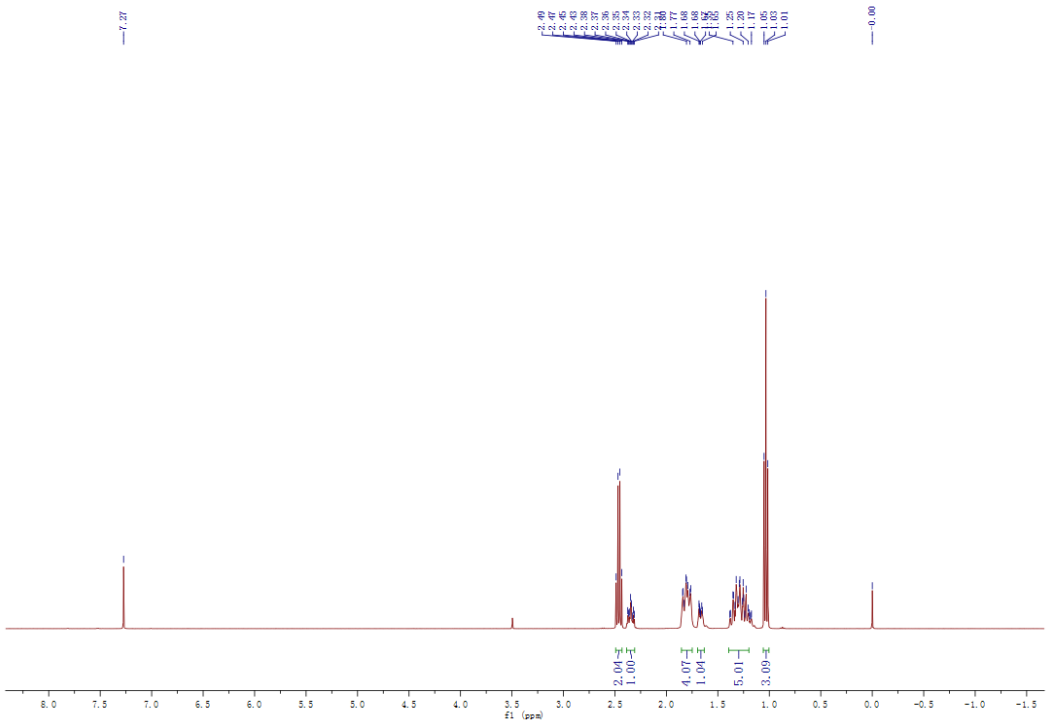


Fig24. ^{1}H NMR of 2-Octanone (entry 20) ($CDCl_3$)

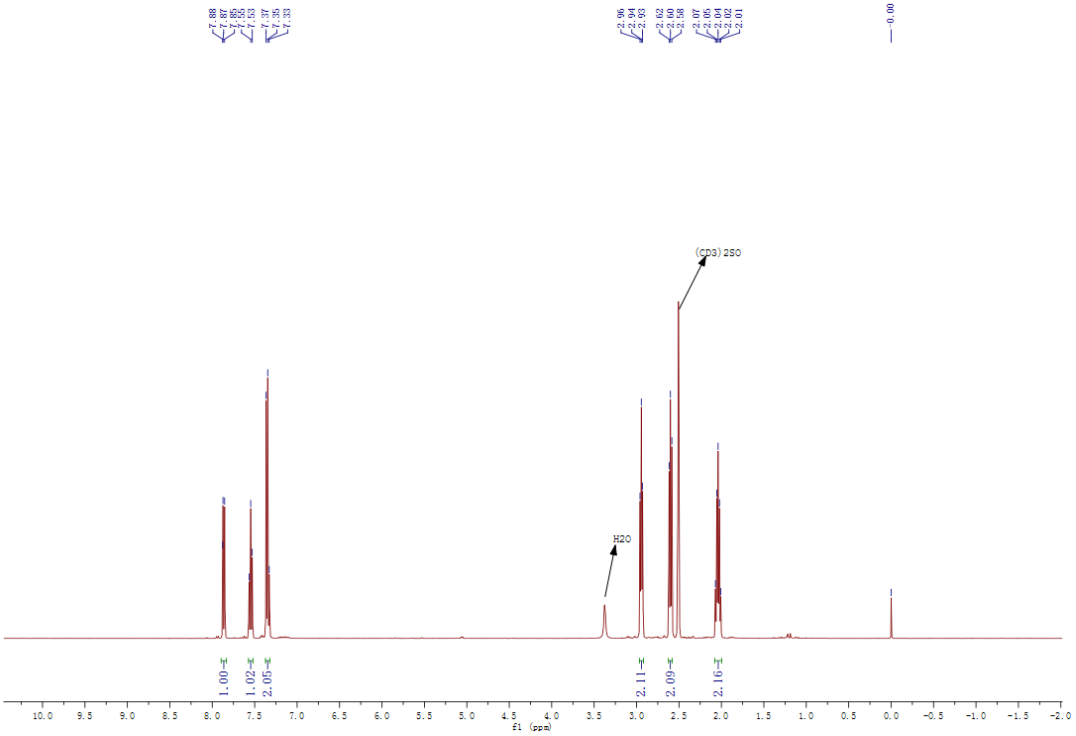
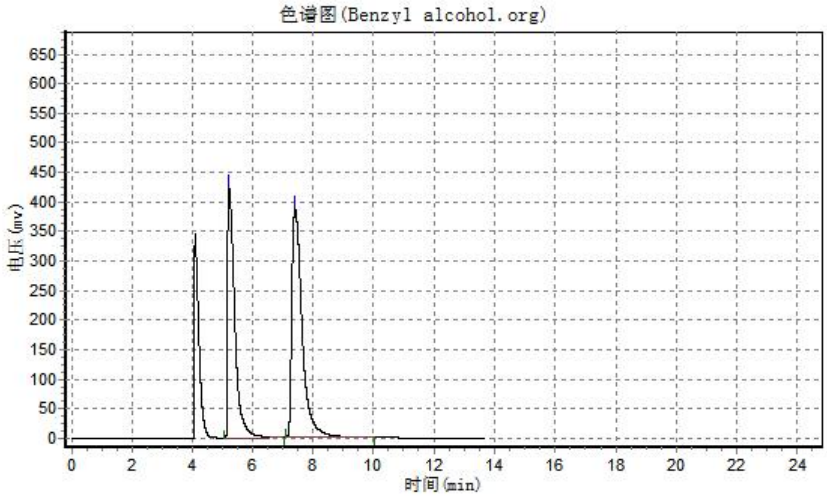


Fig25. ^{1}H NMR of 1,2,3,4-Tetrahydro-1-naphthalenone (entry 21) ($(CD_3)_2SO$)

Contents of GC analysis chromatograms

Attention: The first peak in the GC chromatograms below is from the diluent (acetonitrile) in the analysis.

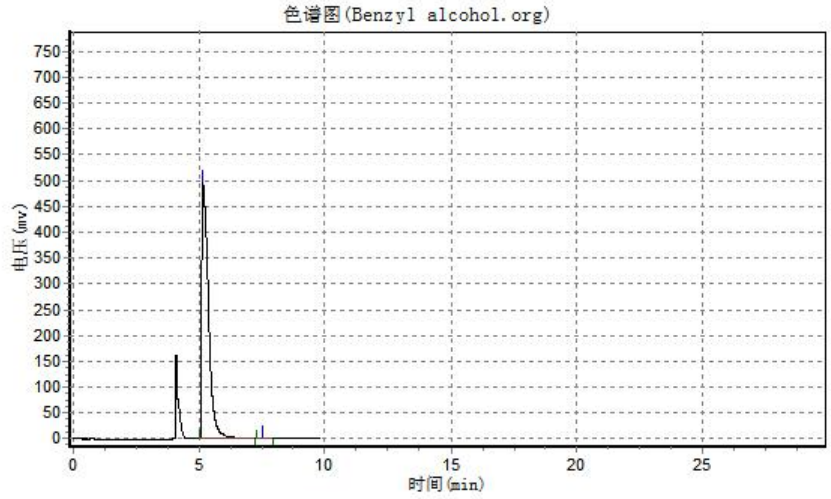


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		5.215	424895.906	7031087.500	43.0456
2		7.407	387427.656	9302973.000	56.9544
总计			812323.563	16334060.500	100.0000

Fig.1 GC chromatogram of Benzyl alcohol during the oxidation reaction (entry 1)

Column temperature 190 ℃, pressure of the carrier gas 0.07Mpa.

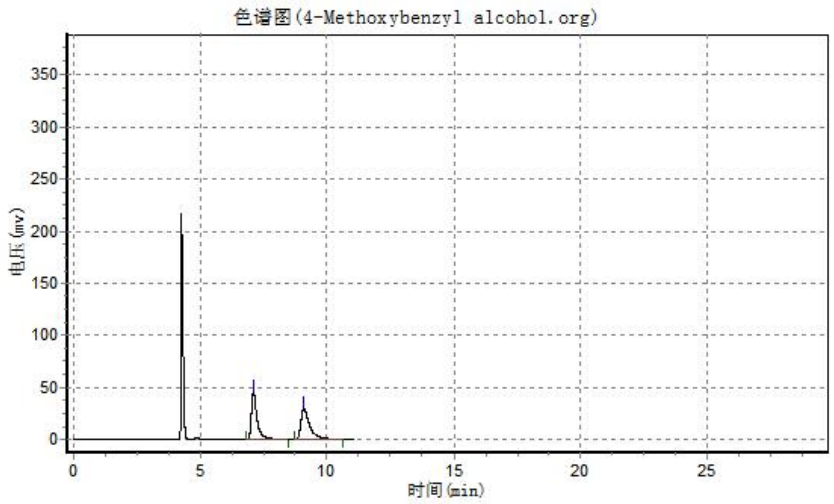


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		5.148	497150.031	9121717.000	99.8705
2		7.540	684.766	11827.200	0.1295
总计			497834.797	9133544.200	100.0000

Fig.2 GC chromatogram of Benzyl alcohol at the end of the oxidation reaction (entry 1)

Column temperature 190 ℃, pressure of the carrier gas 0.07Mpa.

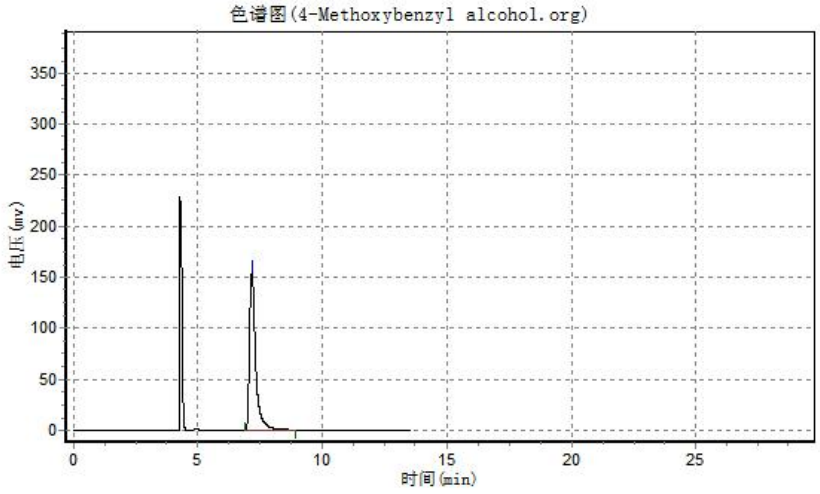


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		7.098	45883.430	743076.813	49.7487
2		9.107	29796.615	750582.375	50.2512
总计			75680.045	1493659.188	100.0000

Fig.3 GC chromatogram of 4-Methoxybenzyl alcohol during the oxidation reaction (Entry 2)

Column temperature 220 ℃, pressure of the carrier gas 0.07Mpa.

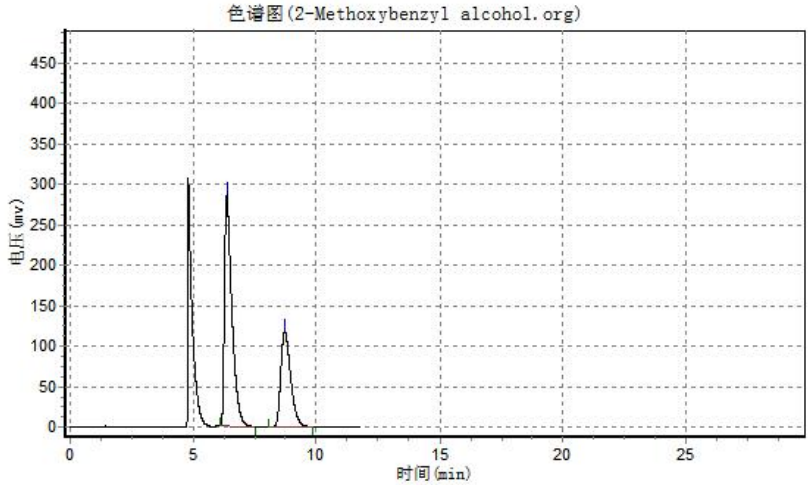


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		7.182	153652.500	2691614.500	100.0000
总计			153652.500	2691614.500	100.0000

Fig.4 GC chromatogram of 4-Methoxybenzyl alcohol at the end of the oxidation reaction (entry 2)

Column temperature 220 ℃, pressure of the carrier gas 0.07Mpa.

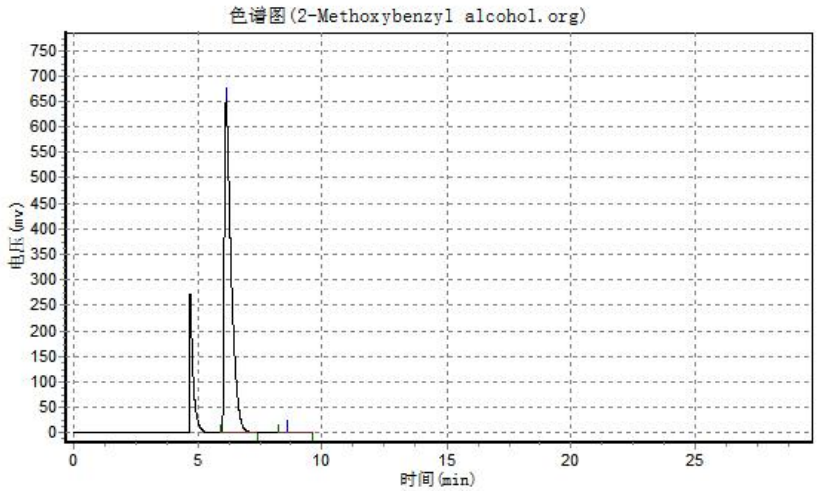


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		6.368	285799.750	6000752.500	64.4420
2		8.712	118893.313	3311117.750	35.5580
总计			404693.063	9311870.250	100.0000

Fig.5 GC chromatogram of 2-Methoxybenzyl alcohol during the oxidation reaction (entry 3)

Column temperature 220 ℃, pressure of the carrier gas 0.05Mpa.

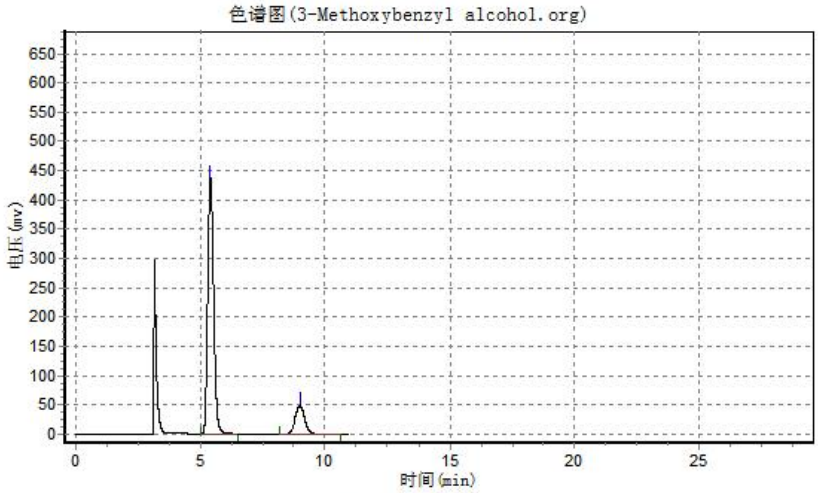


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		6.123	650438.188	12372660.000	99.8666
2		8.565	460.000	16533.102	0.1334
总计			650898.188	12389193.102	100.0000

Fig.6 GC chromatogram of 2-Methoxybenzyl alcohol at the end of the oxidation reaction (entry 3)

Column temperature 220 ℃, pressure of the carrier gas 0.05Mpa.



分析结果表

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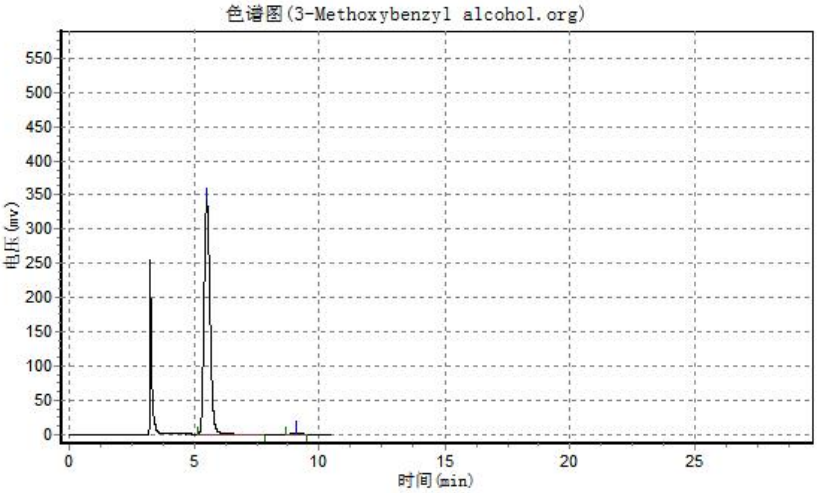
1		5.410	437453.719	7247124.500	84.5164
2		9.022	49470.352	1327685.875	15.4836
总计			486924.070	8574810.375	100.0000

Fig.7 GC chromatogram of 3-Methoxybenzyl alcohol during the oxidation reaction (entry 4)

Column temperature 220 ℃, pressure of the carrier gas 0.07Mpa.

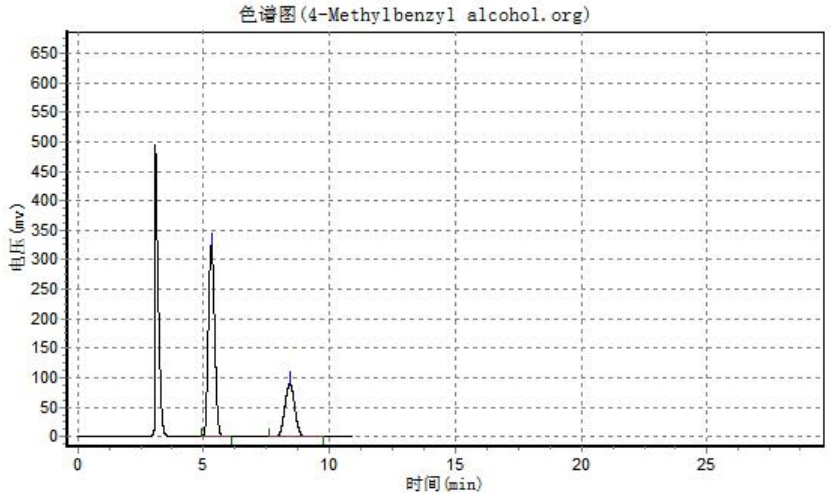


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		5.487	342089.500	5665389.000	99.1494
2		9.065	1925.250	48600.996	0.8506
总计			344014.750	5713989.996	100.0000

Fig.8 GC chromatogram of 3-Methoxybenzyl alcohol at the end of the oxidation reaction (entry 4)

Column temperature 220 ℃, pressure of the carrier gas 0.07Mpa.

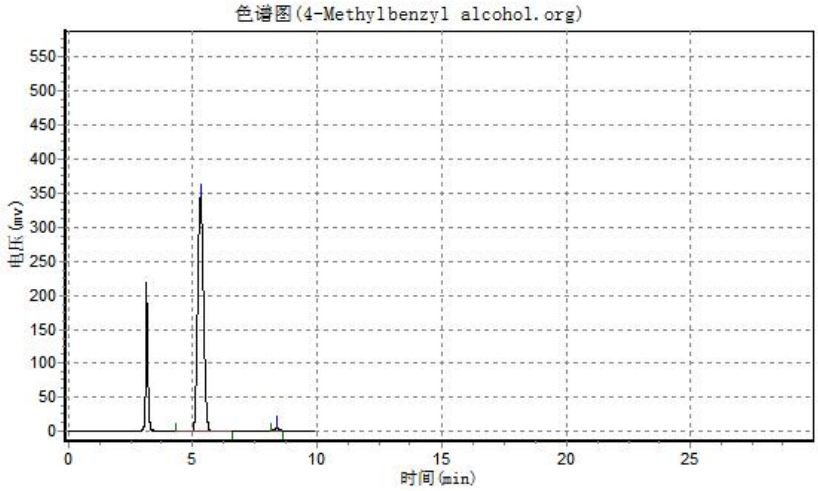


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		5.330	323592.219	5711378.000	70.0048
2		8.455	89658.828	2447175.500	29.9952
总计			413251.047	8158553.500	100.0000

Fig.9 GC chromatogram of 4-Methxybenzyl alcohol during the oxidation reaction (entry 5)

Column temperature 190 ℃, pressure of the carrier gas 0.07Mpa.

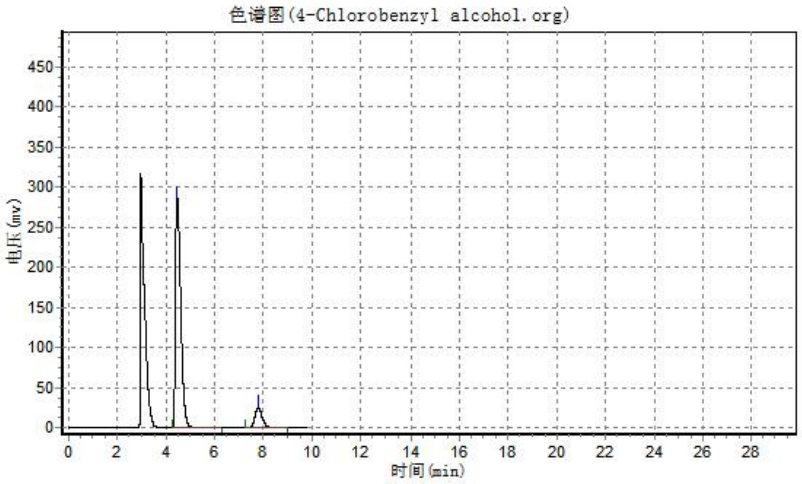


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		5.325	345426.250	5669639.000	99.1649
2		8.392	2729.000	47744.199	0.8351
总计			348155.250	5717383.199	100.0000

Fig.10 GC chromatogram of 4-Methxybenzyl alcohol at the end of the oxidation reaction (entry 5)

Column temperature 190 ℃, pressure of the carrier gas 0.07Mpa.

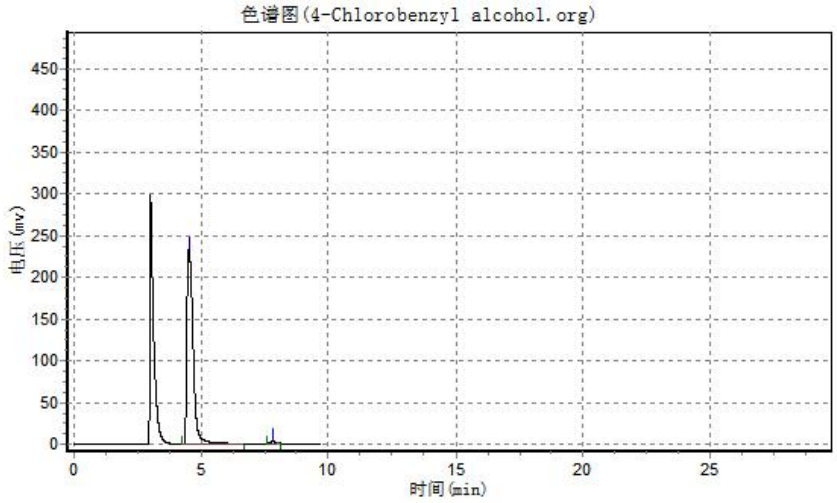


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		4.465	285031.438	4358265.500	89.6072
2		7.790	25109.770	505480.094	10.3928
总计			310141.207	4863745.594	100.0000

Fig.11 GC chromatogram of 4-Chlorobenzyl alcohol during the oxidation reaction (entry 6)

Column temperature 200 ℃, pressure of the carrier gas 0.07Mpa.

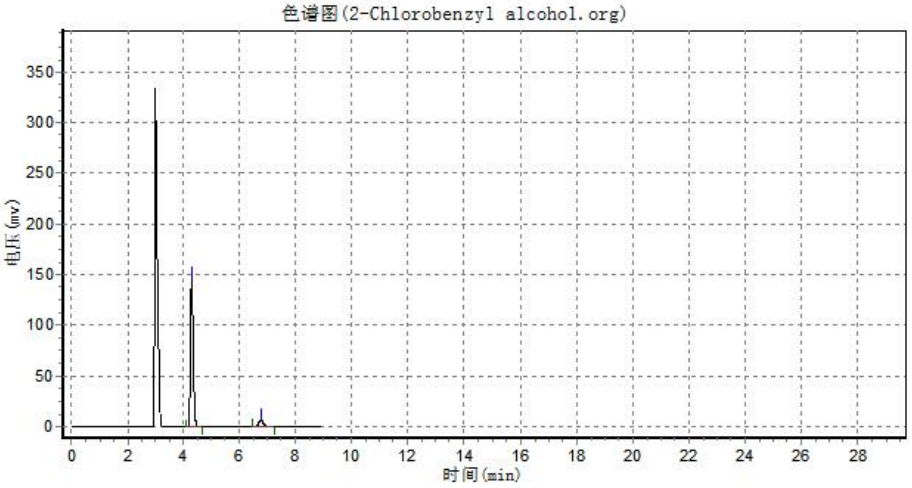


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		4.508	233071.375	3999809.000	99.0888
2		7.810	2071.781	36781.699	0.9112
总计			235143.156	4036590.699	100.0000

Fig.12 GC chromatogram of 4-Chlorobenzyl alcohol at the end of the oxidation reaction (entry 6)

Column temperature 200 ℃, pressure of the carrier gas 0.07Mpa.

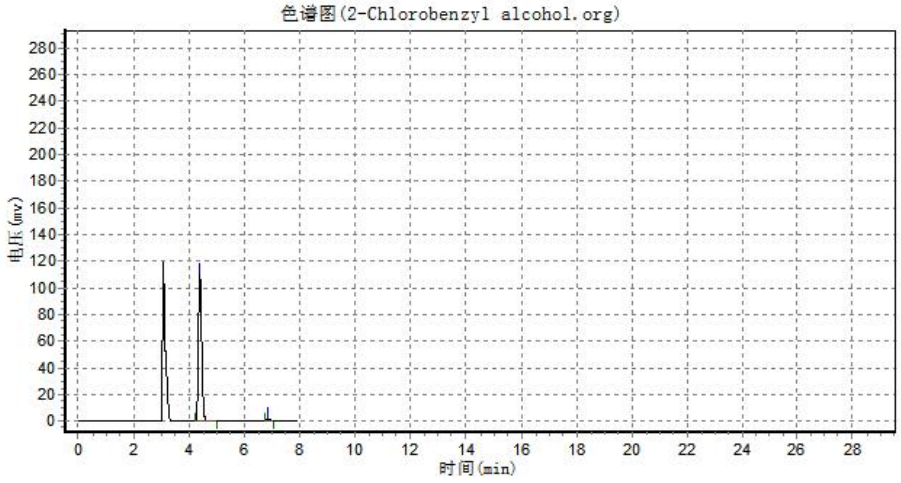


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		4.282	145484.469	1007665.188	92.3382
2		6.757	6836.340	83611.297	7.6618
总计			152320.809	1091276.484	100.0000

Fig.13 GC chromatogram of 2-Chlorobenzyl alcohol during the oxidation reaction (entry 7)

Column temperature 200 ℃, pressure of the carrier gas 0.07Mpa.

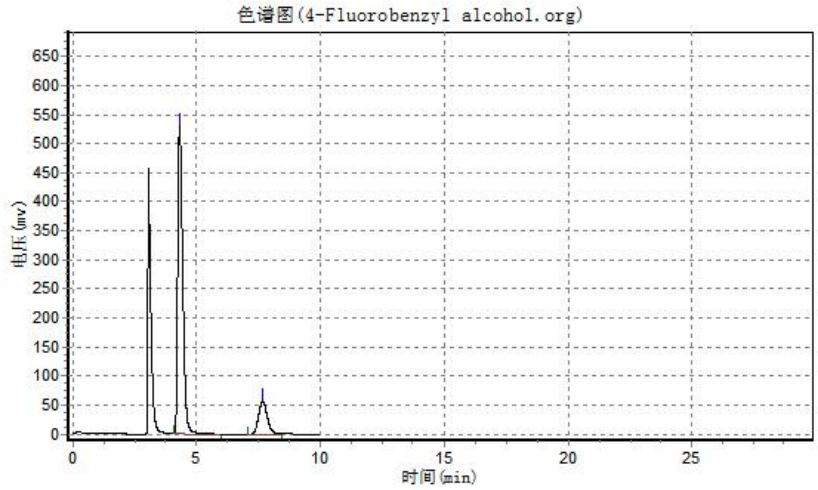


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		4.372	109465.141	905054.063	99.0759
2		6.862	944.988	8441.850	0.9241
总计			110410.128	913495.912	100.0000

Fig.14 GC chromatogram of 2-Chlorobenzyl alcohol at the end of the oxidation reaction (entry 7)

Column temperature 200 ℃, pressure of the carrier gas 0.07Mpa.

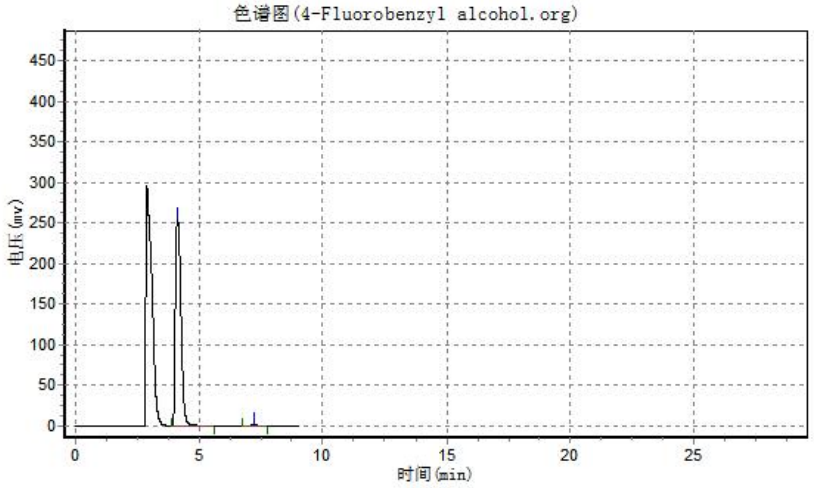


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		4.323	530055.875	7437329.000	83.8629
2		7.682	56644.910	1399934.875	15.7856
总计			587915.554	8868434.859	100.0000

Fig.15 GC chromatogram of 4-Fluorobenzyl alcohol during the oxidation reaction (entry 8)

Column temperature 190 ℃, pressure of the carrier gas 0.07Mpa.

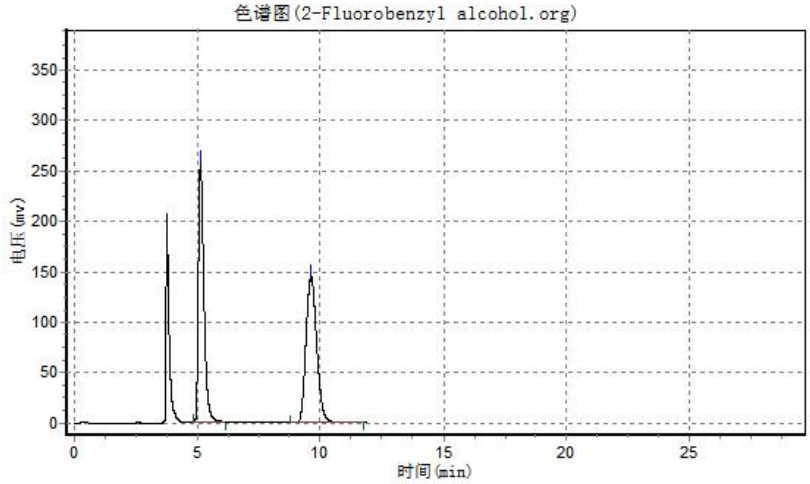


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		4.132	254874.375	3997335.000	99.7924
2		7.223	420.344	8316.600	0.2076
总计			255294.719	4005651.600	100.0000

Fig.16 GC chromatogram of 4-Fluorobenzyl alcohol at the end of the oxidation reaction (entry 8)

Column temperature 190 ℃, pressure of the carrier gas 0.07Mpa.

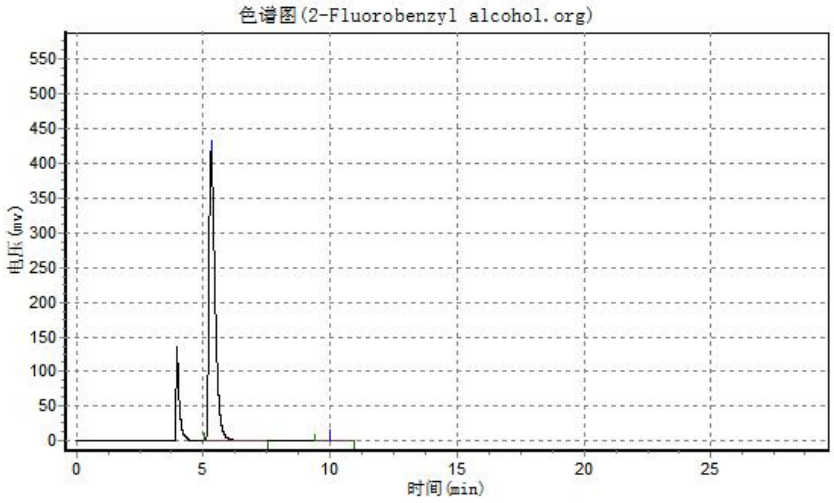


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		5.103	257170.531	4018910.000	47.6346
2		9.638	144855.438	4418048.500	52.3654
总计			402025.969	8436958.500	100.0000

Fig.17 GC chromatogram of 2-Fluorobenzyl alcohol during the oxidation reaction (entry 9)

Column temperature 190 ℃, pressure of the carrier gas 0.06Mpa.

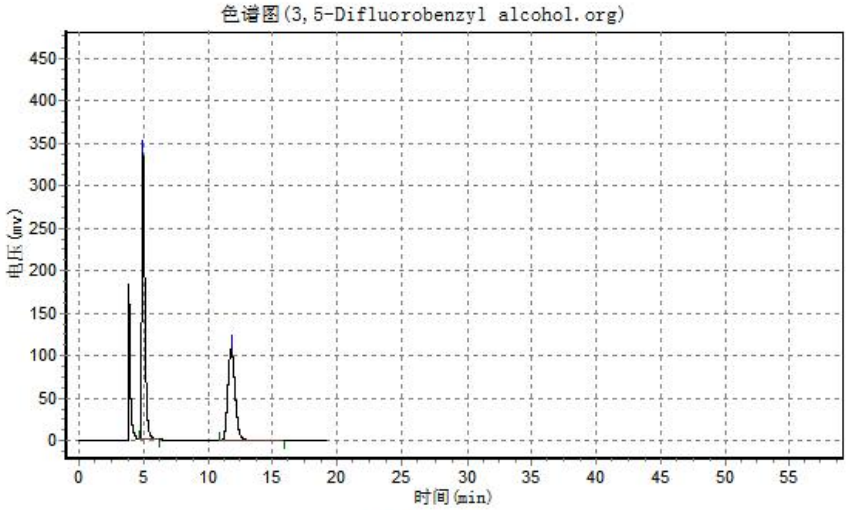


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		5.332	416325.844	7015899.500	99.6844
2		10.040	621.868	22213.100	0.3156
总计			416947.712	7038112.600	100.0000

Fig.18 GC chromatogram of 2-Fluorobenzyl alcohol at the end of the oxidation reaction (entry 9)

Column temperature 190 ℃, pressure of the carrier gas 0.06Mpa.

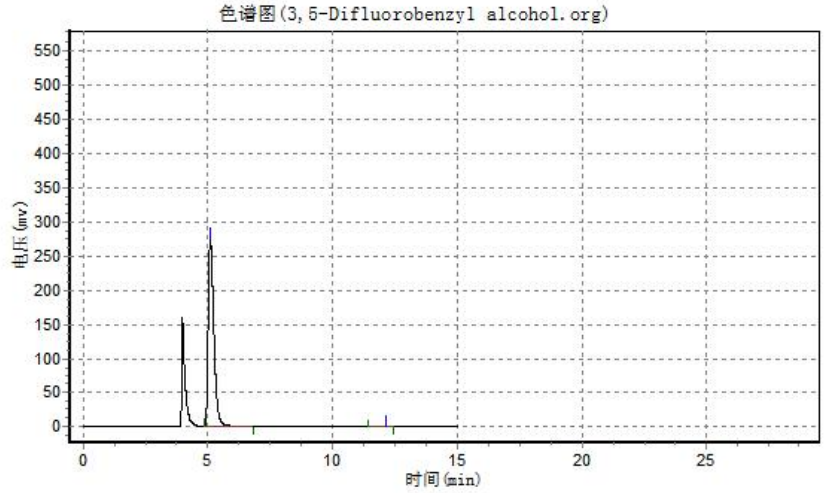


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		4.932	336437.406	5508594.500	56.2222
2		11.790	108780.055	4289304.500	43.7778
总计			445217.461	9797899.000	100.0000

Fig.19 GC chromatogram of 3,5-Difluorobenzyl alcohol during the oxidation reaction (entry 10)

Column temperature 180 ℃, pressure of the carrier gas 0.07Mpa.

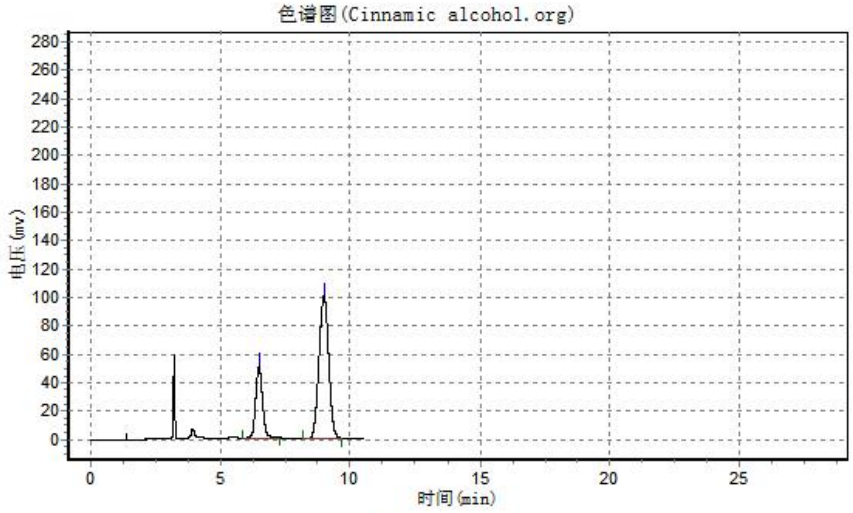


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		5.113	271474.219	4318657.000	99.8691
2		12.193	164.894	5662.092	0.1309
总计			271639.113	4324319.092	100.0000

Fig.20 GC chromatogram of 3,5-Difluorobenzyl alcohol at the end of the oxidation reaction(entry 10)

Column temperature 180 ℃, pressure of the carrier gas 0.07Mpa.



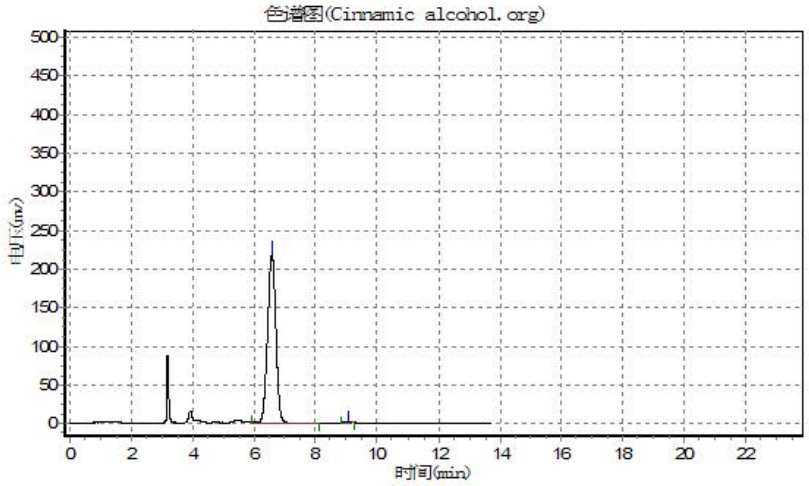
分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		6.495	50708.320	933817.375	26.2352
2		8.998	100567.930	2625590.500	73.7648
总计			151276.250	3559407.875	100.0000

Fig.21 GC chromatogram of Cinnamic alcohol during the oxidation reaction (entry 11)

The peaks before that of cinnamaldehyde are from the impurities of cinnamic alcohol, not from oxidation by-products.

Column temperature 220 ℃, pressure of the carrier gas 0.07Mpa.



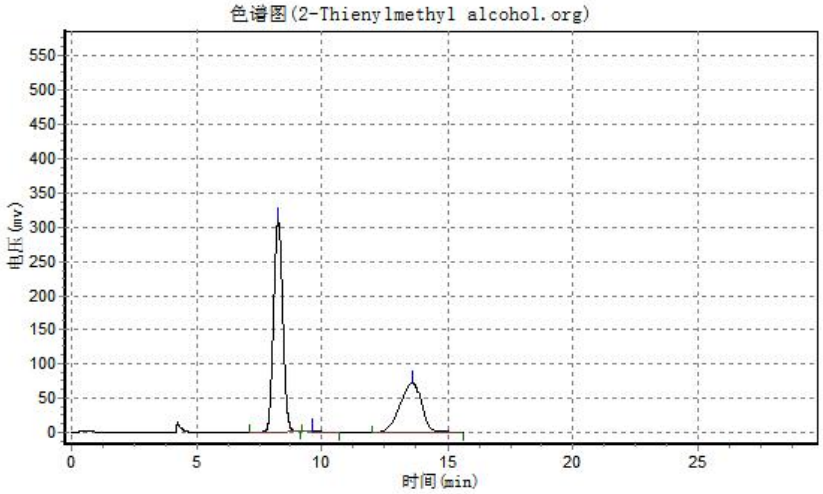
分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		6.580	218829.063	4075351.750	99.5837
2		9.085	1095.710	17035.602	0.4163
总计			219924.772	4092387.352	100.0000

Fig.22 GC chromatogram of Cinnamic alcohol at the end of the oxidation reaction (entry 11)

The peaks before that of cinnamaldehyde are from the impurities of cinnamic alcohol, not from oxidation by-products.

Column temperature 220 ℃, pressure of the carrier gas 0.07Mpa.

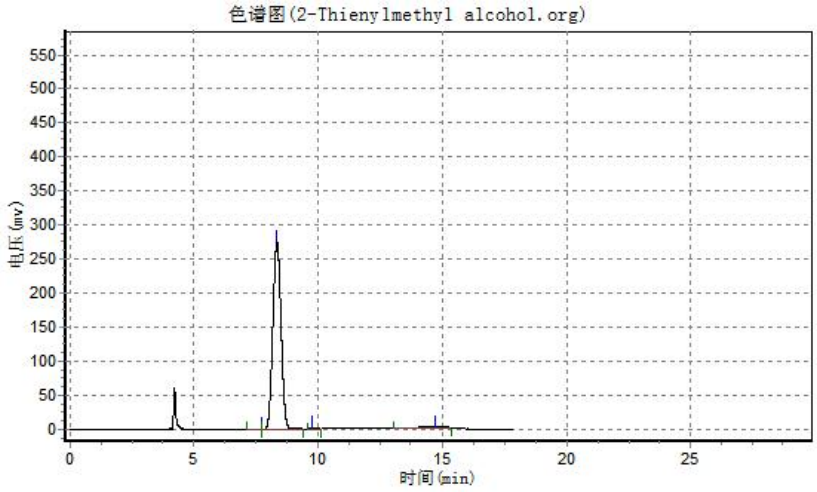


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		8.252	309990.125	7885910.500	64.8545
2		9.613	999.341	27778.900	0.2285
3		13.620	73096.953	4245690.500	34.9170
总计			384086.419	12159379.900	100.0000

Fig.23 GC chromatogram of 2-Thienylmethyl alcohol during the oxidation reaction (entry 12)

Column temperature 180 ℃, pressure of the carrier gas 0.05Mpa.

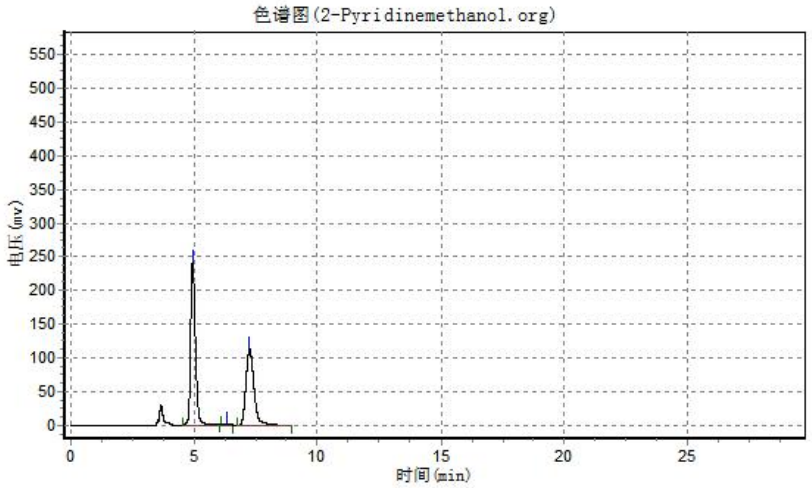


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		7.722	277.419	5116.313	0.0788
2		8.352	274746.469	6368023.000	98.1396
3		9.793	1338.101	38269.980	0.5898
4		14.685	1615.438	77330.617	1.1918
总计			277977.427	6488739.910	100.0000

Fig.24 GC chromatogram of 2-Thienylmethyl alcohol at the end of the oxidation reaction (entry 12)

Column temperature 180 ℃, pressure of the carrier gas 0.05Mpa.

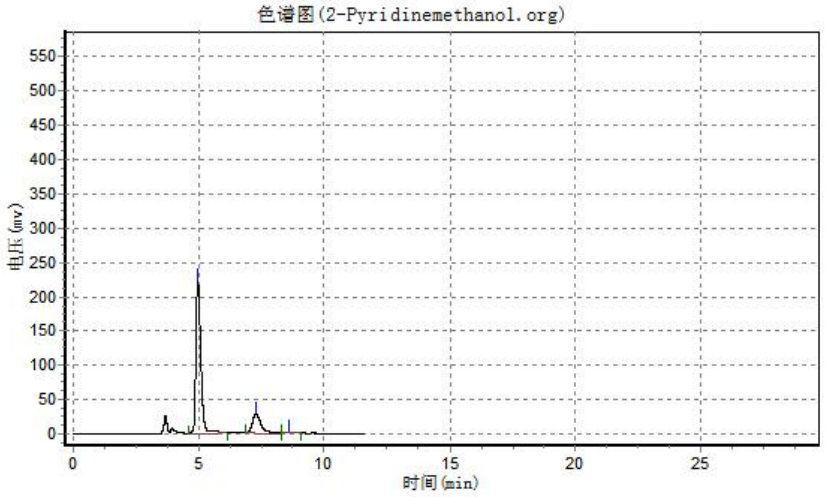


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		4.932	242425.641	3317229.000	56.1067
2		6.307	1667.761	31820.006	0.5382
3		7.248	113607.781	2563305.750	43.3551
总计			357701.183	5912354.756	100.0000

Fig.25 GC chromatogram of 2-Pyridinemethanol during the oxidation reaction (entry 13)

Column temperature 200 ℃, pressure of the carrier gas 0.06Mpa.

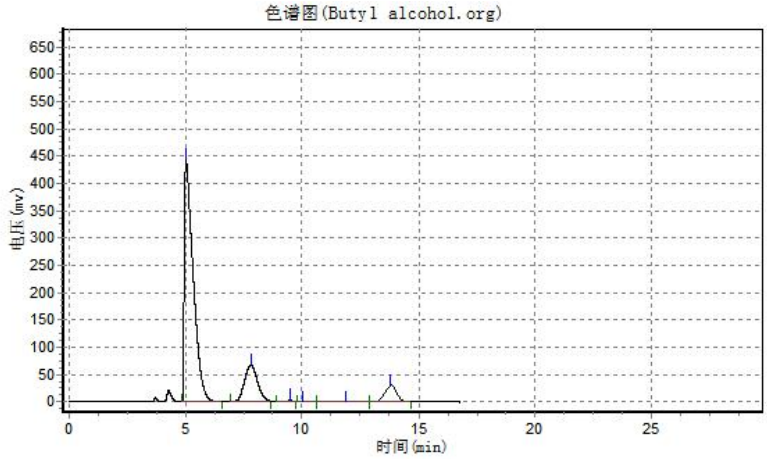


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		4.948	222387.016	3034811.500	81.6869
2		7.277	27996.998	657239.750	17.6907
3		8.587	932.000	23123.203	0.6224
总计			251316.014	3715174.453	100.0000

Fig.26 GC chromatogram of 2-Pyridinemethanol at the end of the oxidation reaction (entry 13)

Column temperature 200 ℃, pressure of the carrier gas 0.06Mpa.

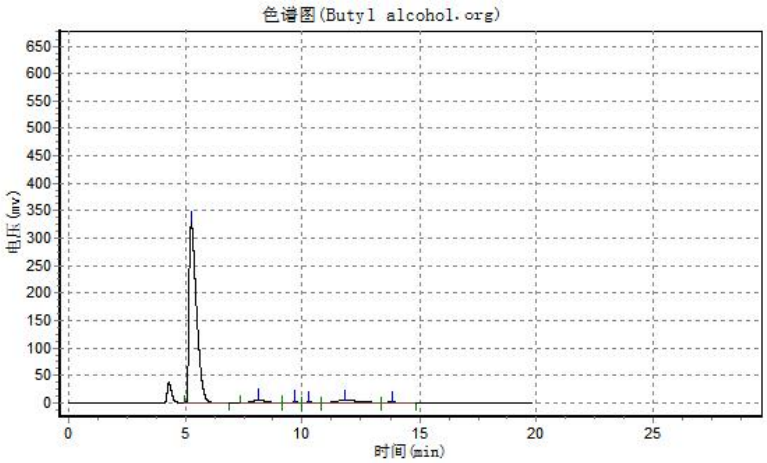


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		5.010	443248.188	11705907.000	75.3489
2		7.818	67211.484	2612646.500	16.8172
3		9.473	3368.980	76097.477	0.4898
4		10.055	1660.689	44571.164	0.2869
5		11.880	748.368	49637.137	0.3195
6		13.815	30427.277	1046748.813	6.7377
总计			546664.987	15535608.090	100.0000

Fig.27 GC chromatogram of Butyl alcohol during the oxidation reaction (entry 14)

Column temperature 80 ºC for nine minutes, and then heated up to 130 for ten minutes, pressure of the carrier gas 0.05Mpa.

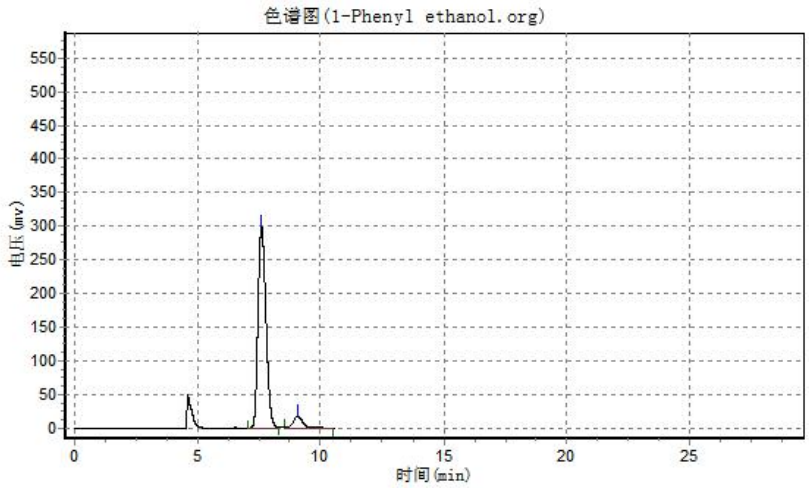


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		5.267	327694.063	7277973.500	91.4639
2		8.135	4920.243	193511.000	2.4319
3		9.682	1614.617	38230.555	0.4805
4		10.282	1463.491	38255.066	0.4808
5		11.883	5831.147	364483.750	4.5805
6		13.827	1169.062	44758.121	0.5625
总计			342692.623	7957211.992	100.0000

Fig.28 GC chromatogram of Butyl alcohol at the end of the oxidation reaction (entry 14)

Column temperature 80 ºC for nine minutes, and then heated up to 130 for ten minutes, pressure of the carrier gas 0.05Mpa.

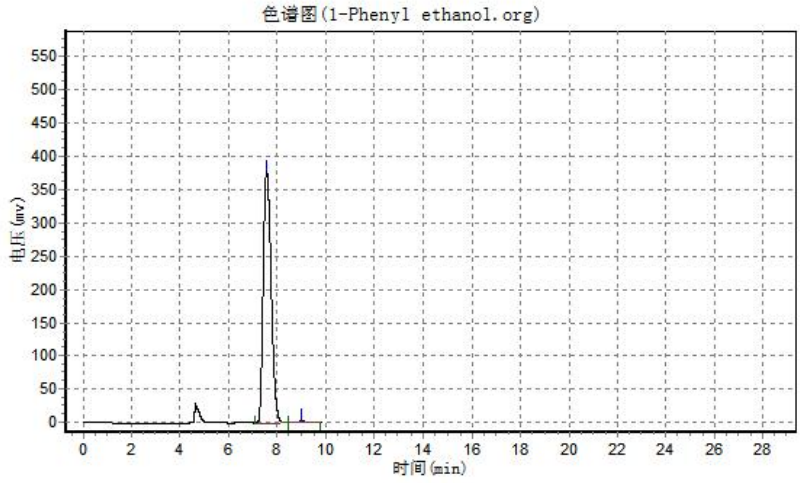


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		7.623	299075.938	6712977.500	93.3371
2		9.098	17621.625	479207.688	6.6629
总计			316697.563	7192185.188	100.0000

Fig.29 GC chromatogram of 1-Phenyl ethanol during the oxidation reaction (entry 15)

Column temperature 190 ℃, pressure of the carrier gas 0.05Mpa.

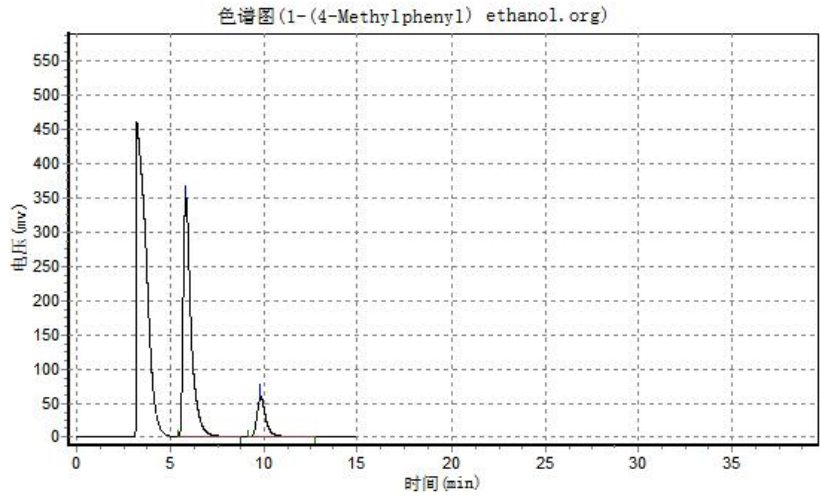


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		7.590	378003.969	8543892.000	99.3962
2		9.032	1991.797	51904.500	0.6038
总计			379995.766	8595796.500	100.0000

Fig.30 GC chromatogram of 1-Phenyl ethanol at the end of the oxidation reaction (entry 15)

Column temperature 190 ℃, pressure of the carrier gas 0.05Mpa.

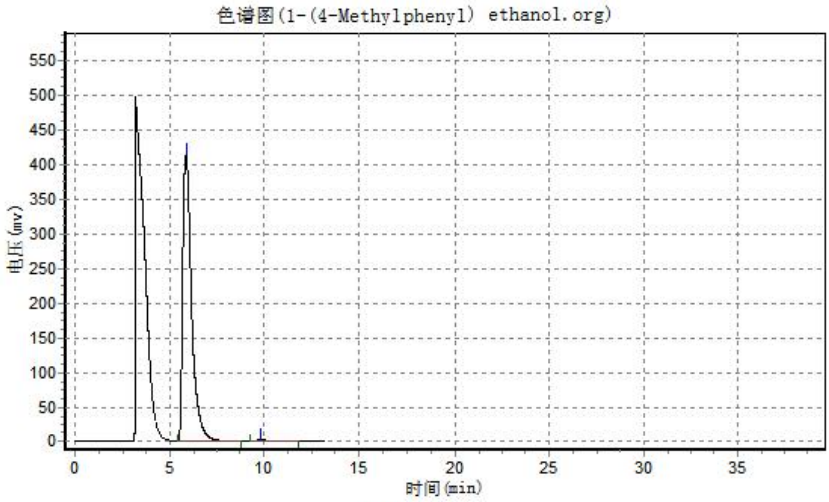


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		5.813	348807.813	10428237.000	84.2092
2		9.818	58448.250	1955484.750	15.7908
总计			407256.063	12383721.750	100.0000

Fig.31 GC chromatogram of 1-(4-Methylphenyl) ethanol during the oxidation reaction (entry 16)

Column temperature 190 ℃, pressure of the carrier gas 0.05Mpa.

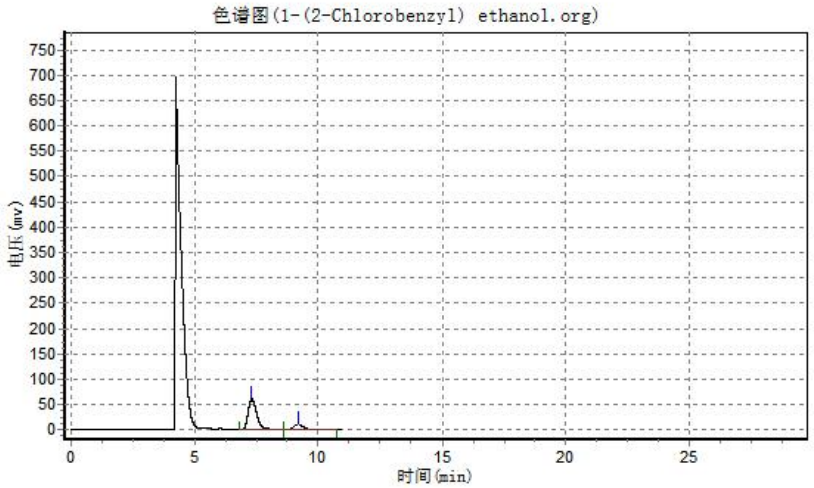


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		5.873	412634.813	13586706.000	99.1399
2		9.815	3403.510	117875.203	0.8601
总计			416038.322	13704581.203	100.0000

Fig.32 GC chromatogram of 1-(4-Methylphenyl) ethanol at the end of the oxidation reaction (entry 16)

Column temperature 190 ℃, pressure of the carrier gas 0.05Mpa.

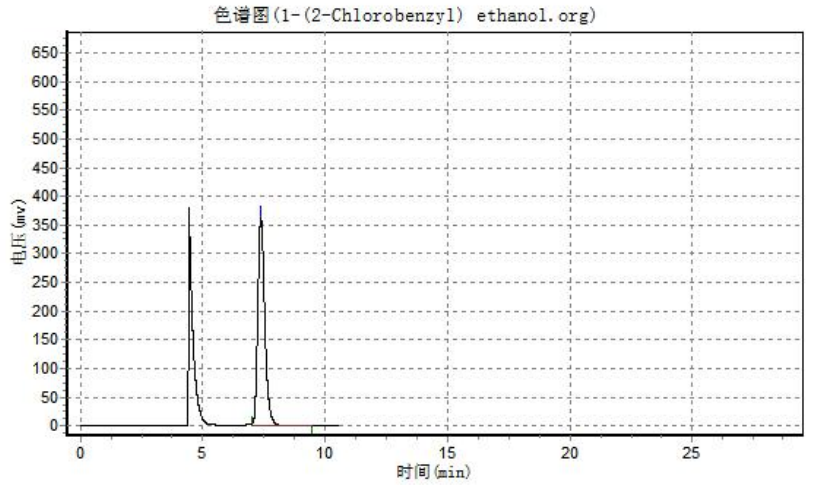


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		7.307	61829.156	1493178.500	81.5734
2		9.182	11417.462	337293.688	18.4266
总计			73246.618	1830472.188	100.0000

Fig.33 GC chromatogram of 1-(2-Chlorobenzyl) ethanol during the oxidation reaction (entry 17)

Column temperature 200 ℃, pressure of the carrier gas 0.05Mpa.

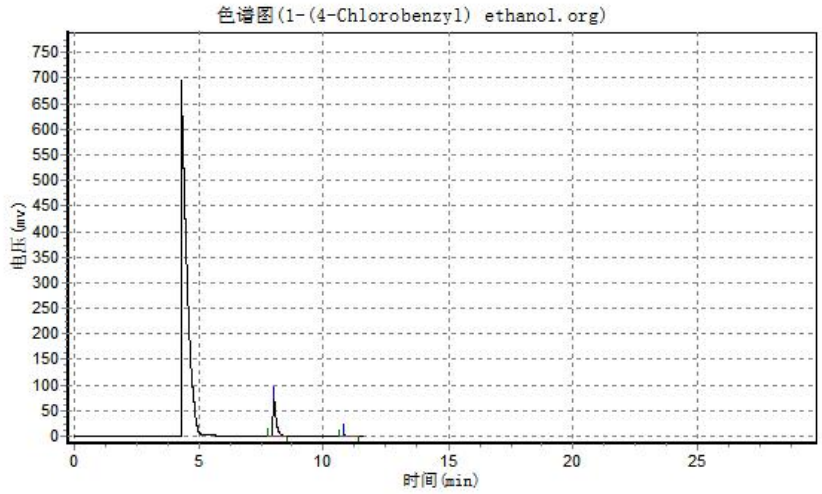


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		7.388	362473.594	7204524.500	100.0000
总计			362473.594	7204524.500	100.0000

Fig.34 GC chromatogram of 1-(2-Chlorobenzyl) ethanol at the end of the oxidation reaction (entry 17)

Column temperature 200 ℃, pressure of the carrier gas 0.05Mpa.

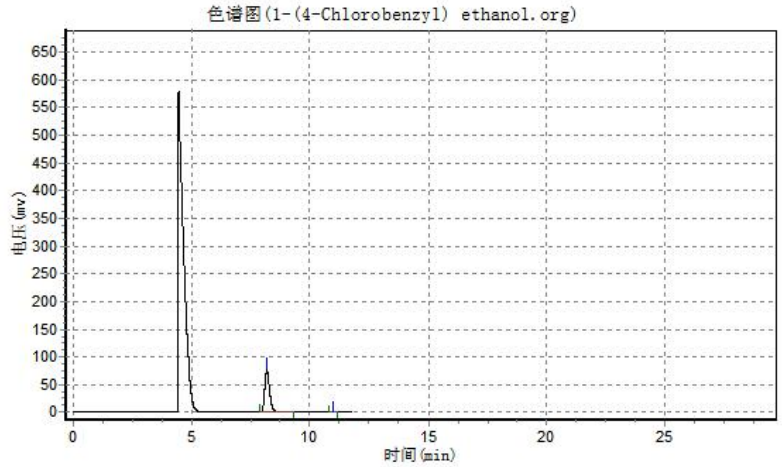


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		8.017	73835.141	676720.750	93.6884
2		10.815	4480.933	45589.500	6.3116
总计			78316.073	722310.250	100.0000

Fig.35 GC chromatogram of 1-(4-Chlorobenzyl) ethanol during the oxidation reaction (entry 18)

Column temperature 220 ℃, pressure of the carrier gas 0.05Mpa.

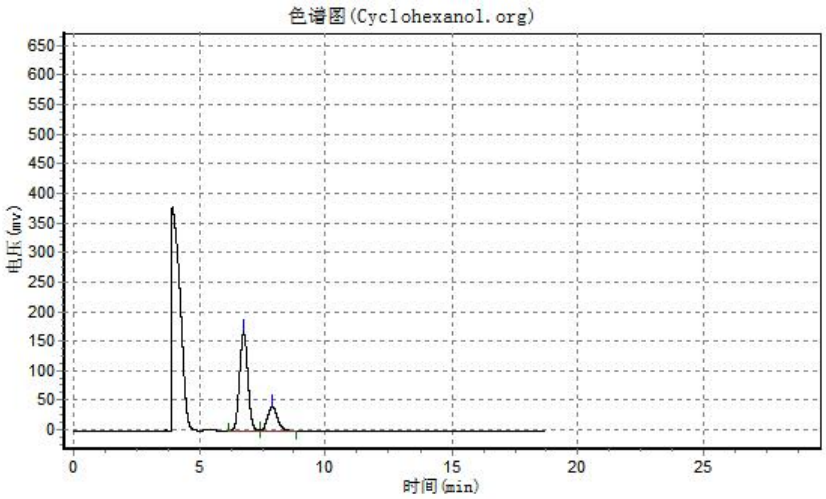


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		8.180	76253.844	1114635.125	99.3173
2		10.967	624.603	7662.400	0.6827
总计			76878.447	1122297.525	100.0000

Fig.36 GC chromatogram of 1-(4-Chlorobenzyl) ethanol at the end of the oxidation reaction (entry 18)

Column temperature 220 ℃, pressure of the carrier gas 0.05Mpa.

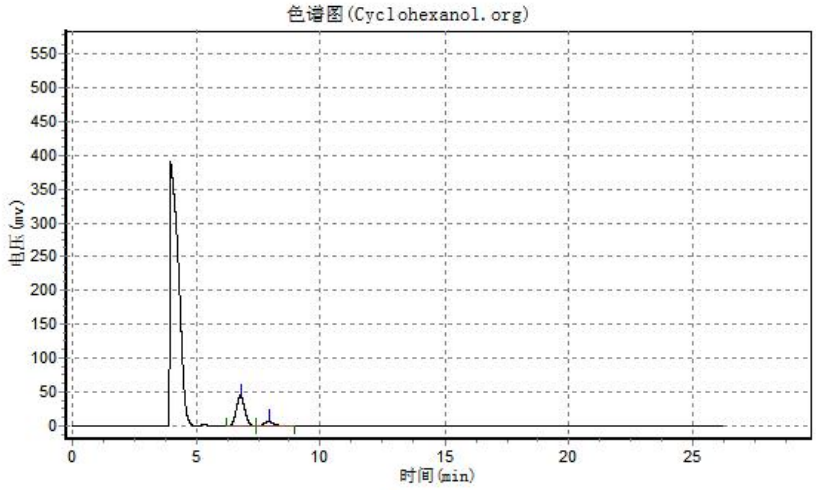


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		6.773	166566.969	3811774.000	77.7560
2		7.895	40816.520	1090450.625	22.2440
总计			207383.488	4902224.625	100.0000

Fig.37 GC chromatogram of Cyclohexanol during the oxidation reaction (entry 19)

Column temperature 130 ℃, pressure of the carrier gas 0.05Mpa.

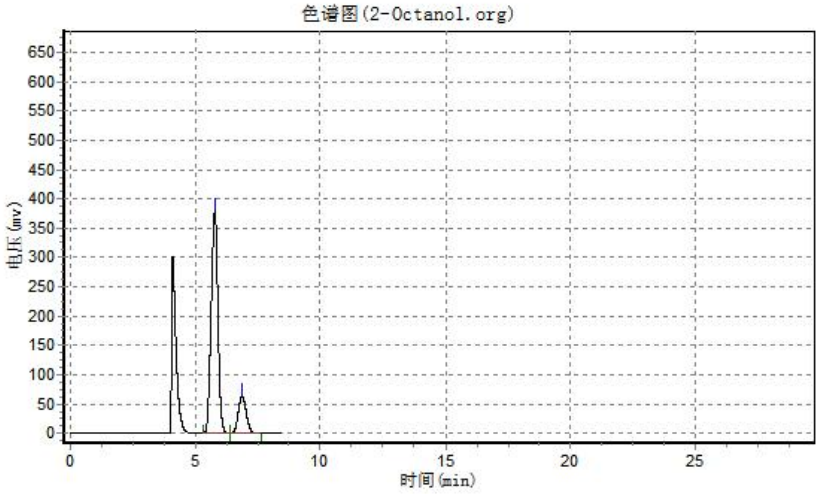


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		6.773	44956.000	1065849.125	86.1400
2		7.915	6080.000	171496.094	13.8600
总计			51036.000	1237345.219	100.0000

Fig.38 GC chromatogram of Cyclohexanol at the end of the oxidation reaction (entry 19)

Column temperature 130 ℃, pressure of the carrier gas 0.05Mpa.

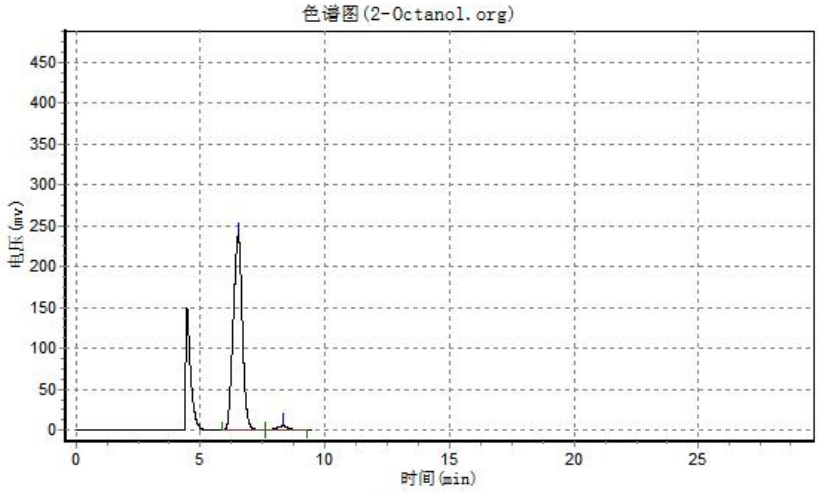


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		5.770	379129.875	7089576.000	83.3407
2		6.863	63079.438	1417165.875	16.6593
总计			442209.313	8506741.875	100.0000

Fig.39 GC chromatogram of 2-Octanol during the oxidation reaction (entry 20)

Column temperature 130 ℃, pressure of the carrier gas 0.05Mpa.

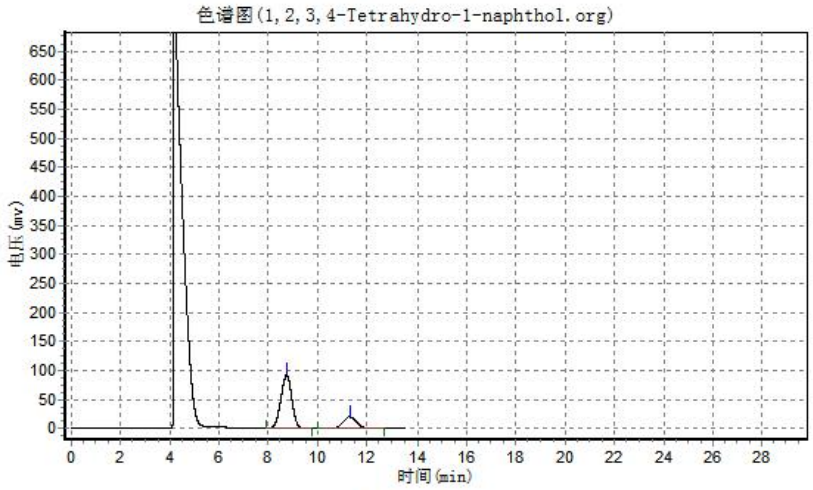


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		6.538	237979.391	6046603.000	97.0681
2		8.323	5360.894	182632.000	2.9319
总计			243340.285	6229235.000	100.0000

Fig.40 GC chromatogram of 2-Octanol at the end of the oxidation reaction (entry 20)

Column temperature 130 ℃, pressure of the carrier gas 0.05Mpa.

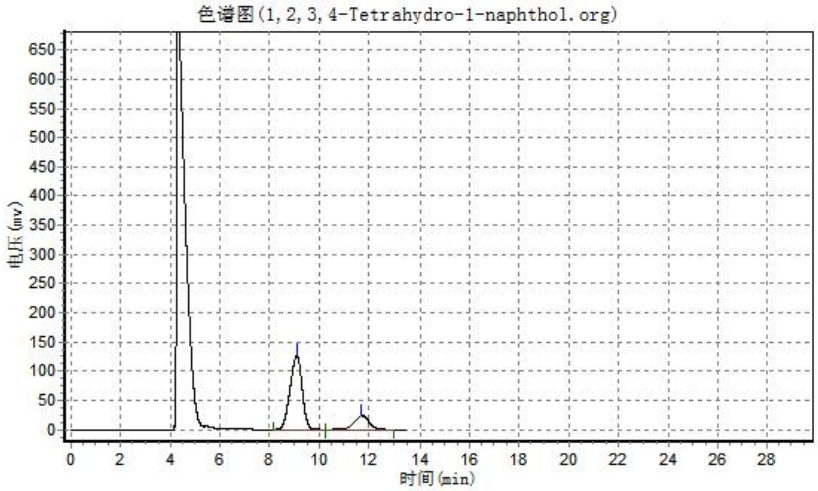


分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		8.757	92403.992	2820720.500	78.2793
2		11.298	19958.123	782686.125	21.7207
总计			112362.115	3603406.625	100.0000

Fig.41 GC chromatogram of 1,2,3,4-Tetrahydro-1-naphthol during the oxidation reaction (entry 21)

Column temperature 210 ℃, pressure of the carrier gas 0.05Mpa.



分析结果表

峰号	峰名	保留时间	峰高	峰面积	含量
1		9.107	127236.914	4258014.500	80.7984
2		11.715	23967.617	1011912.000	19.2016
总计			151204.531	5269926.500	100.0000

Fig.42 GC chromatogram of 1,2,3,4-Tetrahydro-1-naphthol at the end of the oxidation reaction (entry 21)

Column temperature 210 ℃, pressure of the carrier gas 0.05Mpa.

Effect of temperature on catalytic activity

Table 6. Effect of temperature on the DES-TEMPO/$Fe(NO_3)_3$ catalyzed aerobic oxidation of benzyl alcohol[a]

T(ºC)	Time(h)	Conv.[b] (%)	Select.[b] (%)	TON[c]	TOF[d] (h^{-1})
80	0.5	>99	>99	39.6	79.2
70	1	>99	>99	39.6	39.6
60	1.5	>99	>99	39.6	26.4
50	2	>99	>99	39.6	19.8
45	2.25	>99	>99	39.6	17.6
40	9	31.5	>99	12.6	1.4
25	1	8.1	>99	3.2	3.2

[a] Reaction conditions: benzyl alcohol 10 mmol, 1.25%DES-TEMPO, 3%$Fe(NO_3)_3$, atmospheric oxygen pressure. [b] Conversions and selectivity were determined by GC (area normalization method). [c] TON = moles of product/2(moles of DES-TEMPO). [d] TOF = TON/ reaction time.