Supporting Information

Cu(I)/Ionic liquids Promoted the Conversion of Carbon Dioxide into Oxazolidinones at Room Temperature

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Section 1: Synthetic Procedures of the ILs

$[P_{4444}][Im]$, $[P_{4444}][Triz]$ and $[P_{4444}][Ind]$ were synthesized and purified by the following procedures[1-2]. As an example, the procedure for the preparation of $[P_{4444}][Im]$ was described. First, $[P_{4444}]OH$ (tetrabutylphosphonium hydroxide) was obtained from the raw material $[P_{4444}]Br$ through the anion-cation exchange resin (water : ethanol=1:1). Equimolar Im was added, and the mixture was then stirred for 12 h at room temperature. After that, the solvent was distilled off at 45 ℃ by rotary evaporation. The obtained products were dried for at least 24 h under reduced pressure. The chemical structures of these ILs were confirmed by ^{1}H NMR and ^{13}C NMR spectroscopy. The data of products is consistent with the previously reported experimental results [3].

$[P_{4444}][Im]$. orange oil; ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.56 (s, 1 H), 6.95 (s, 2 H), 2.30-2.14 (m, 8 H), 1.51-1.34 (m, 16 H), 0.88 (t, J = 8.0 Hz, 12 H) ppm; ^{13}C NMR ($CDCl_3$, 150 MHz) δ: 135.04, 23.68, 18.79, 18.48, 13.02 ppm.

$[P_{4444}][Triz]$. orange oil; ^{1}H NMR (DMSO-d_6, 400 MHz) δ: 17.67 (s, 2H), 2.22－2.12 (m, 8H), 1.51－1.34 (m, 16H), 0.92 (t, J=7.2 Hz, 12H) ppm; ^{13}C NMR ($CDCl_3$, 150 MHz) δ: 146.63, 145.89, 23.72, 23.62, 23.24, 18.50, 18.19, 13.17 ppm.

$[P_{4444}][Ind]$. orange oil; ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.89 (s, 1H), 7.57 (d, J=8.0 Hz, 1H),7.06－6.75 (m, 3H), 2.22－2.11 (m, 8H), 1.52－1.34 (m, 16H), 0.92 (t, J= 6.8 Hz, 12H) ppm; ^{13}C NMR ($CDCl_3$, 150 MHz) δ: 158.86, 140.33, 133.76, 126.08, 123.06, 120.37, 110.58, 23.89, 23.54, 18.88, 18.58, 13.40 ppm.

Section 2: Figures

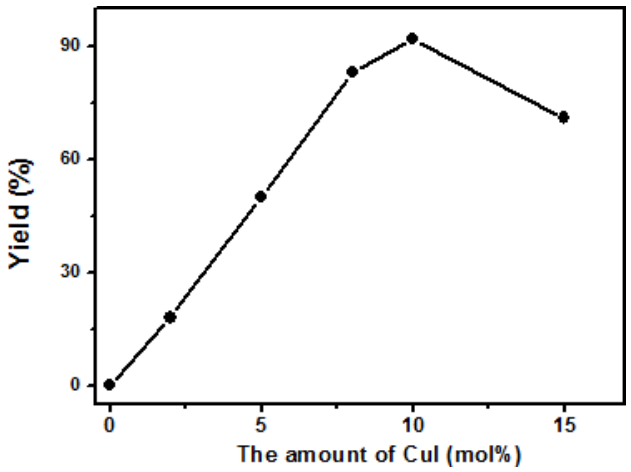


Figure S1. Influence of CuI amount on the yield of oxazolidinones. Reaction conditions: 1a (1 mmol), 2a (1mmol), $[P_{4444}][Im]$ (10 mol%), CO_2 (1atm), 30 ˚C, 24 h. The yields were determined by ^1H NMR spectroscopy.

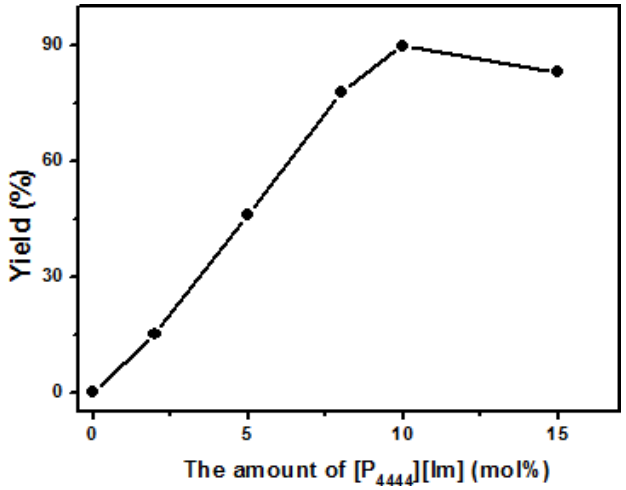
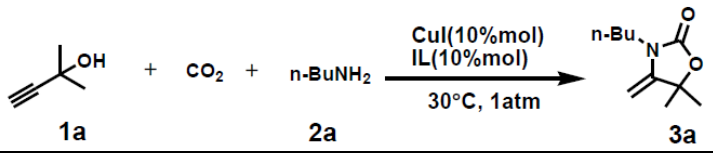


Figure S2. Influence of $[P_{4444}][Im]$ amount on the yield of oxazolidinones. Reaction conditions: 1a (1 mmol), 2a (1mmol), CuI (10 mol%), CO_2 (1atm), 30 ˚C, 24 h. The yields were determined by ^1H NMR spectroscopy.

Table S1. The effect pKa of different ionic liquids on the synthesis of 3-butyl-5,5-dimethyl-4-methyleneoxazolidin-2-one (3a) from atmospheric CO_2 [a]

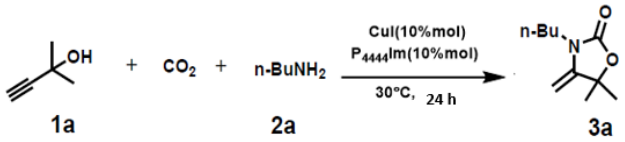


1a 2a 3a

Entry	IL	pKa of IL in DMSO[4]	Yield/ % [b]
4	[P4444][Im]	18.6	91
5	[P4444][Triz]	13.9	70
6	[P4444][Ind]	--	41
7	[P4444][CF3COO	3.45	35
8	P4444]NO3	0.9	30
9	[P4444]Br	--	28

[a] Reaction condition: 2-methylbut-3-yn-2-ol (1a, 1.2 mmol), n-Butylamine (2a, 1.2mmol), CuI (0.10 mol), IL (0.10 mol),CO2 (0.1 MPa, 99.999%), 24 h, 30 °C; b The isolated yieid.

Table S2. Effect of CO2 pressure on the isolated yield of 3a.



1a 2a 3a

Entry	CO2 pressure	Yield (%) [b]
1	0	0
2	0.3	33
3	0.5	52
4	0.7	63
5	1.0	90

Reaction conditions: 1a (1 mmol), 2a (1 mmol), CuI (0.1 mmol), [P4444][Im] (0.1 mmol), 30 °C, 24 h

Section 3: References

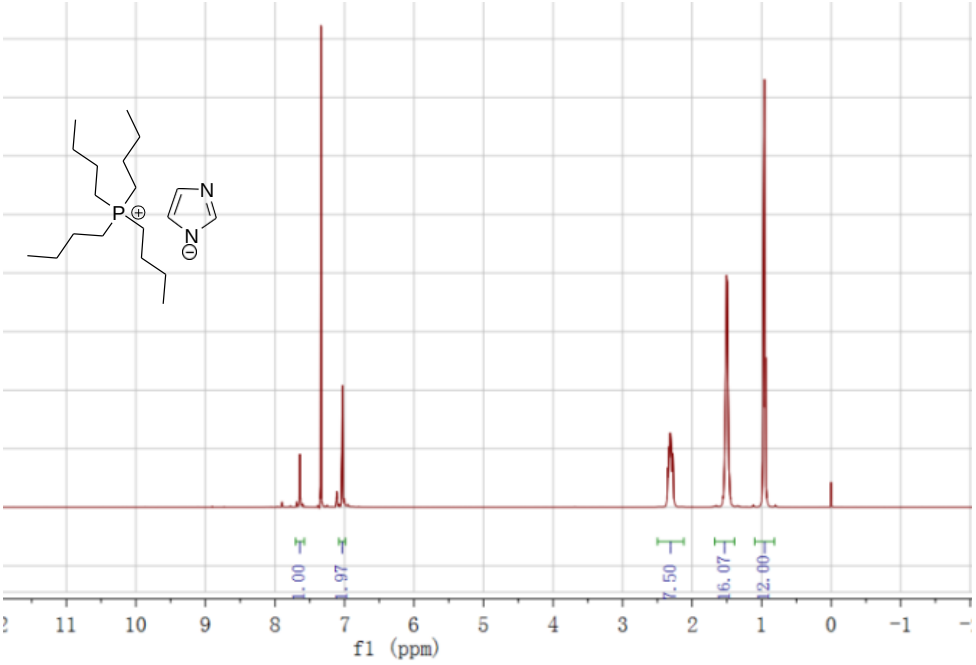
[1] Pei, X.; Xiong, D.; Pei, Y.; Wang, H.; Wang, J. Switchable oil–water phase separation of ionic liquid-based microemulsions by CO_2. *Green Chem*. **2018**, *20*, 4236-4244.

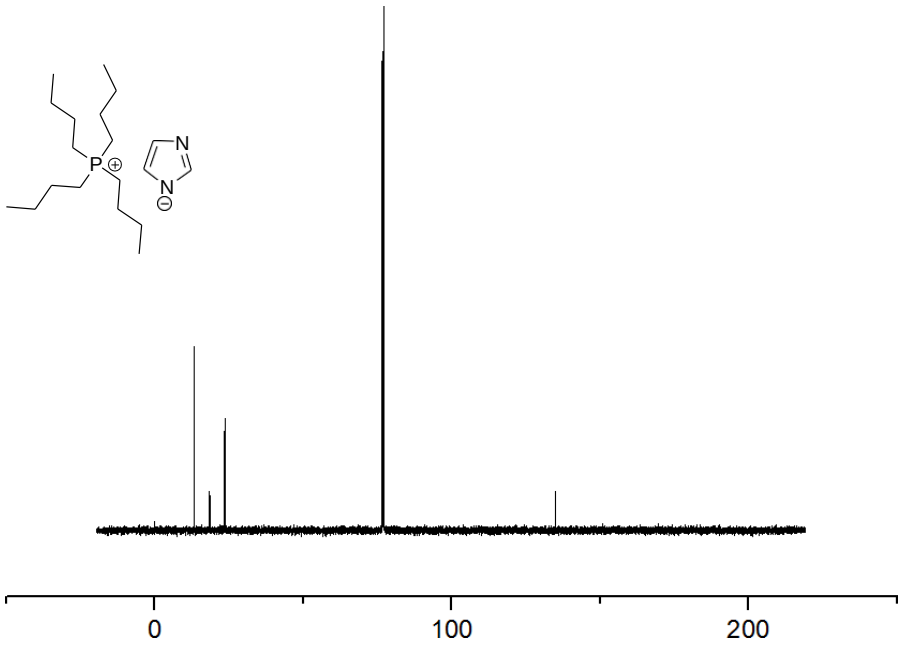
[2] Shi, Y.; Xiong, D.; Wang, H.; Zhao, Y.; Wang, J. Reversible switching of amphiphilic self- assemblies of ionic liquids between micelle and vesicle by CO_2. *Langmuir*, **2016**, *32*, 6895-6901.

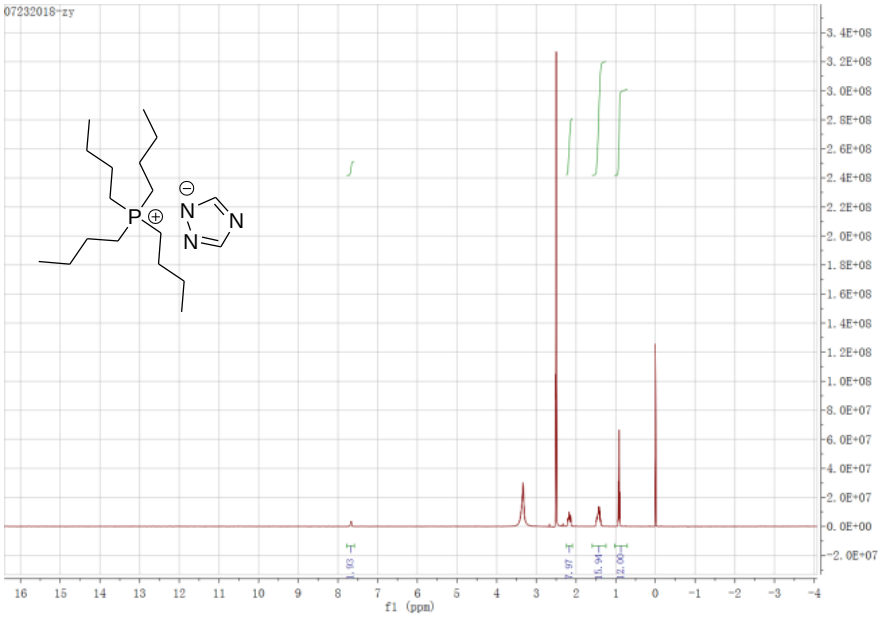
[3] Zhao, Y.; Yang, Z.; Yu, B.; Zhang, H.; Xu, H.; Hao, L.; Han, B.; Liu, Z. Task specific ionic liquid and CO_2-cocatalysed efficient hydration of propargylic alcohols to a-hydroxy ketones. *Chem. Sci.* **2015**, *6*, 2297-2301.

[4] Bordwell, F. G. Equilibrium acidities in dimethyl sulfoxide solution. *Acc. Chem. Res.* **1988**, *21*, 456-463.

Section 4: NMR Spectra



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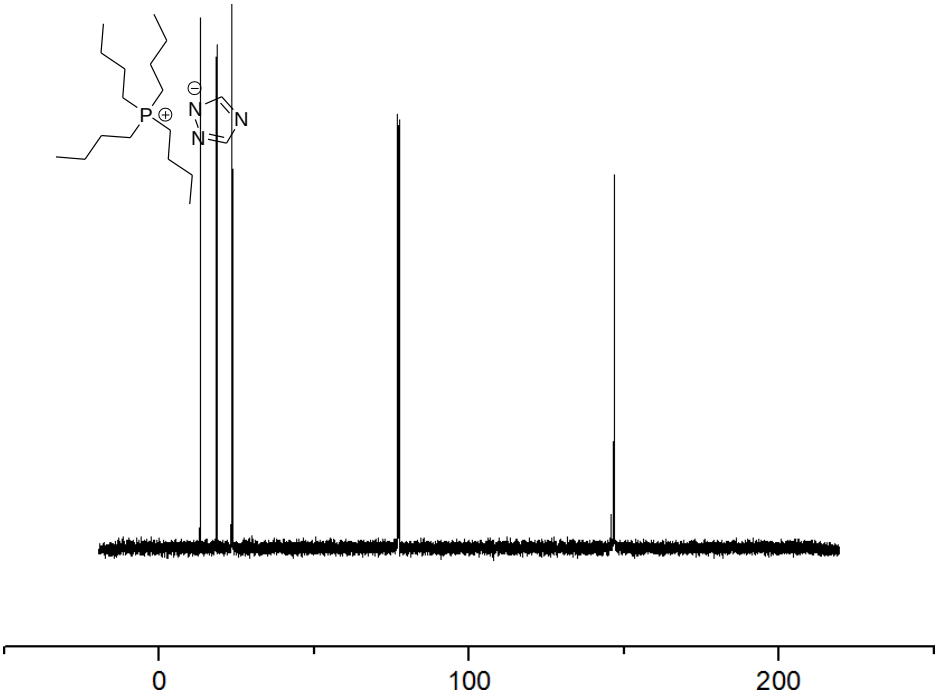
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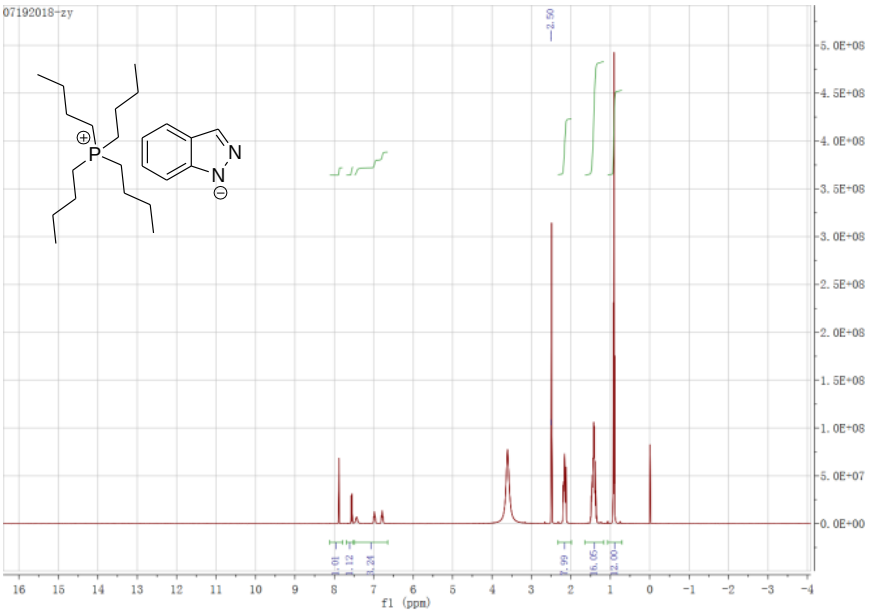
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f1 (ppm)
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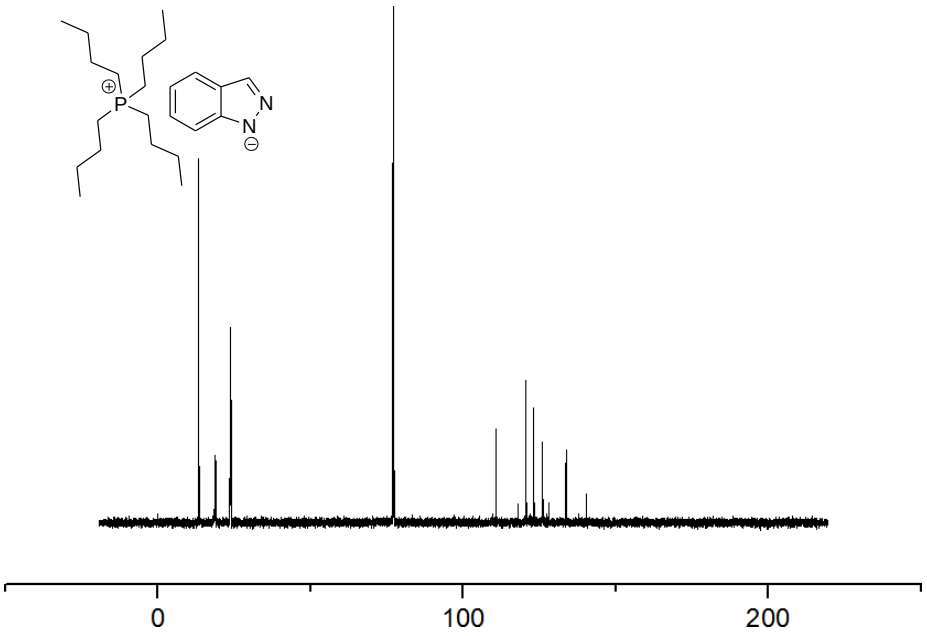
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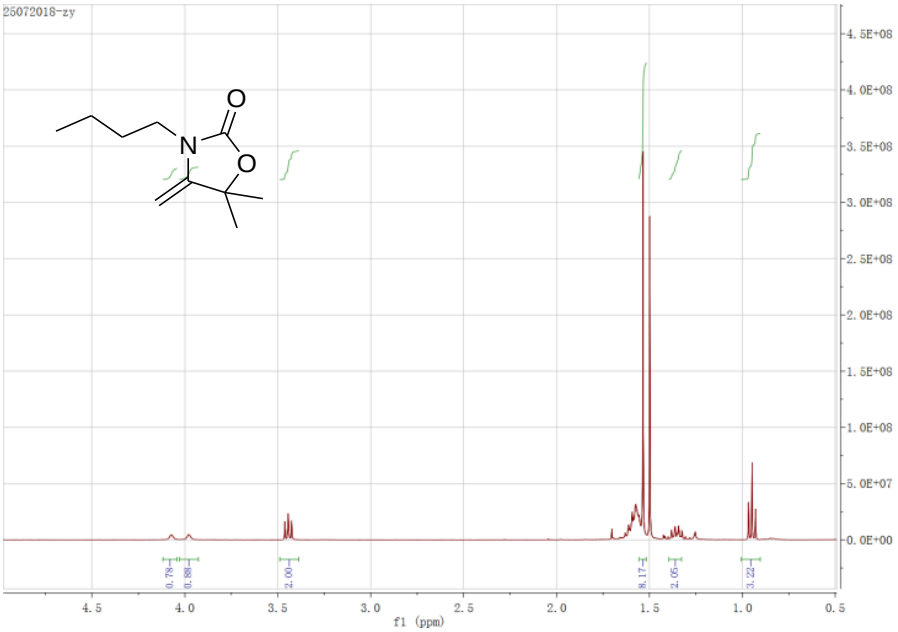
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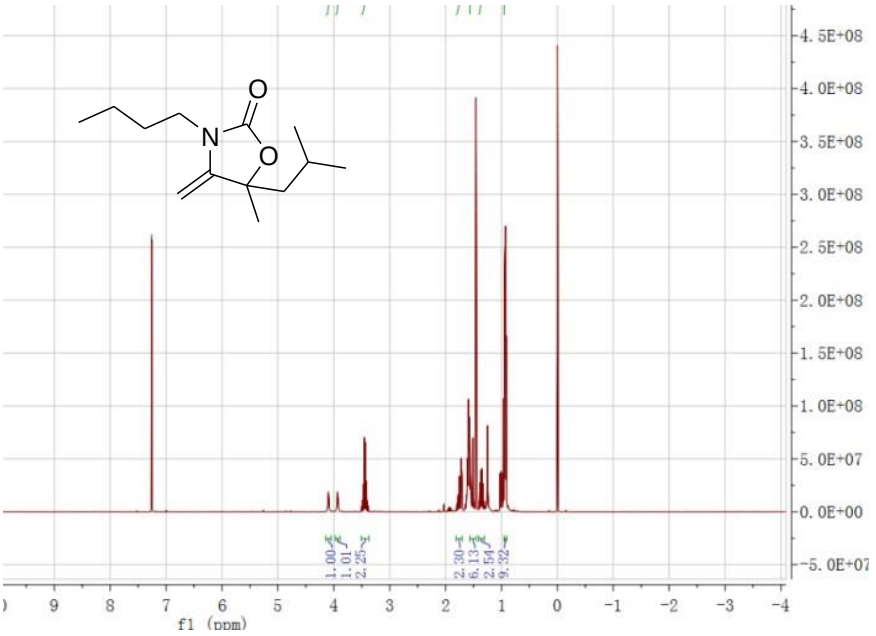
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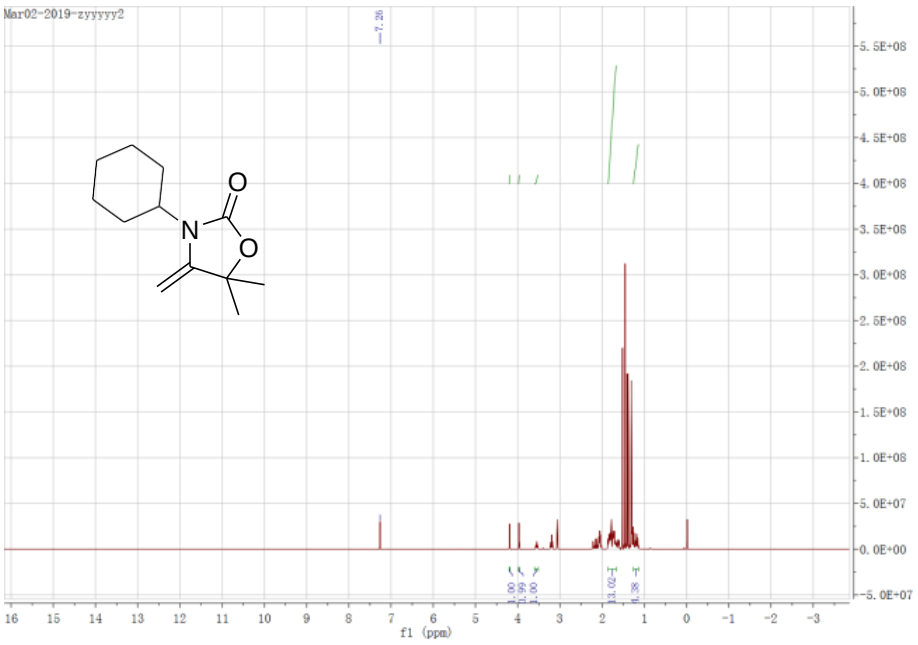
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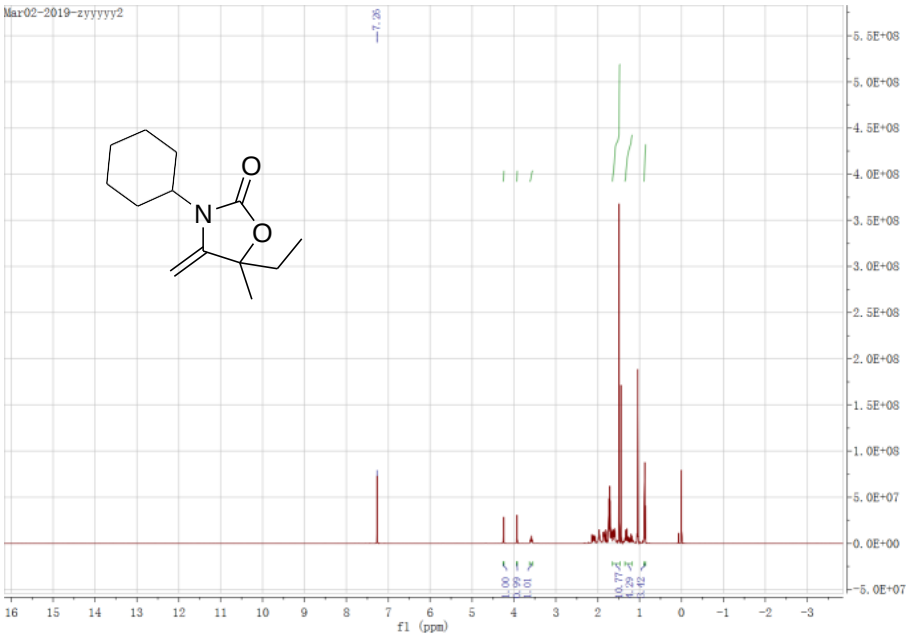
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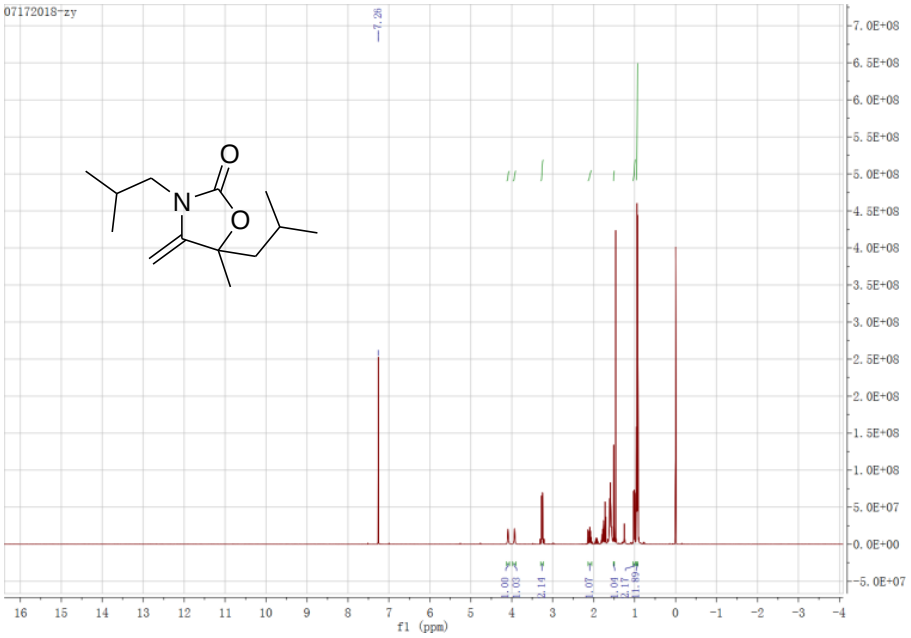
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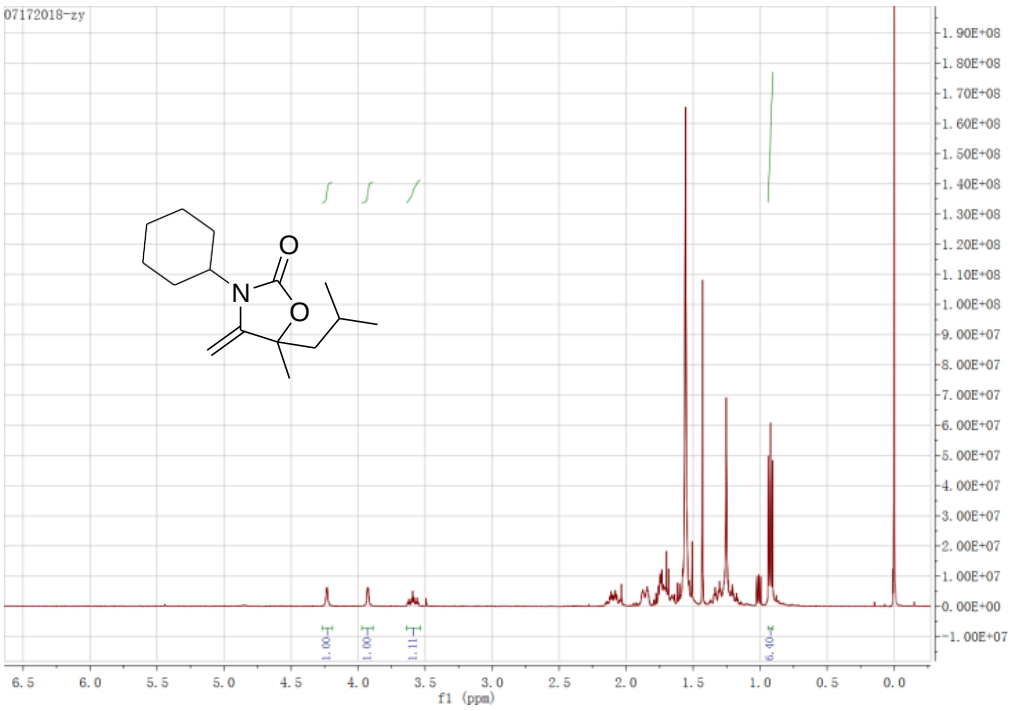
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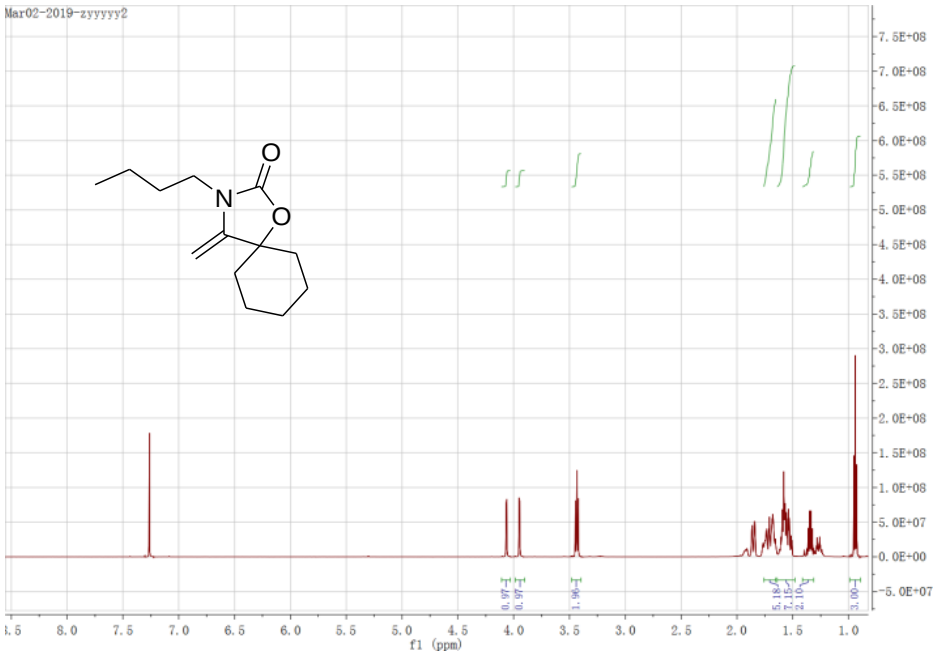
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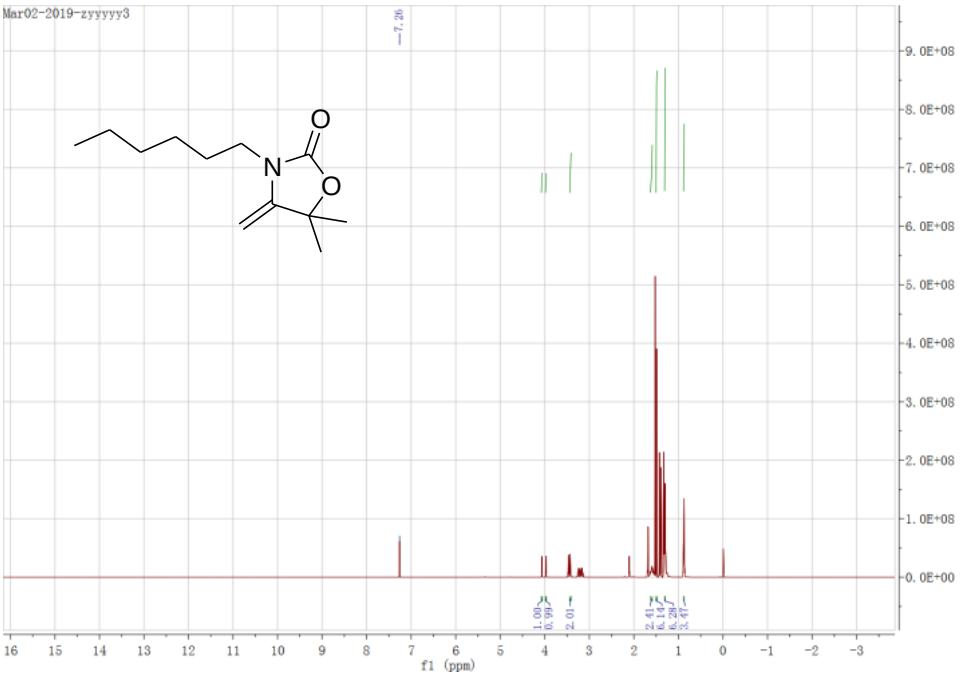
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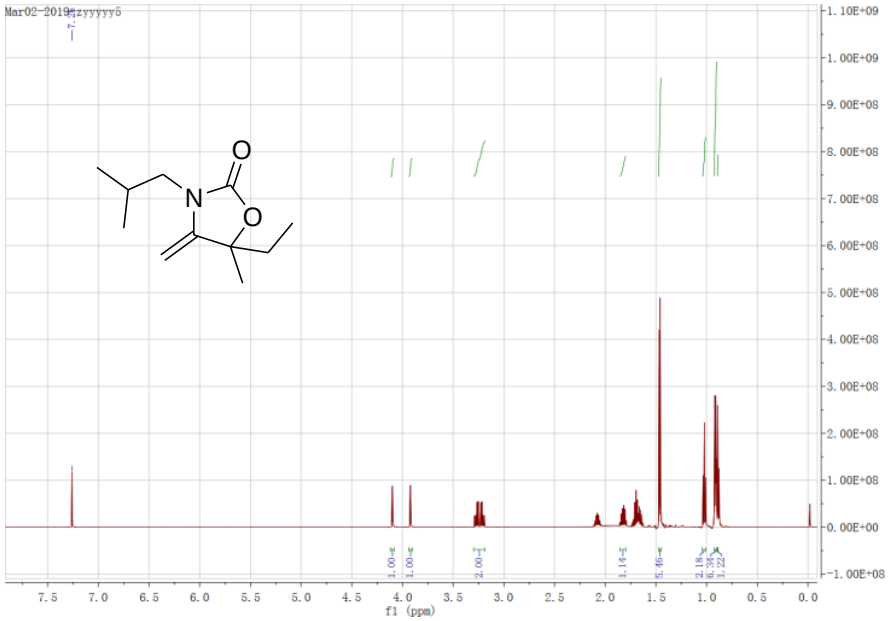
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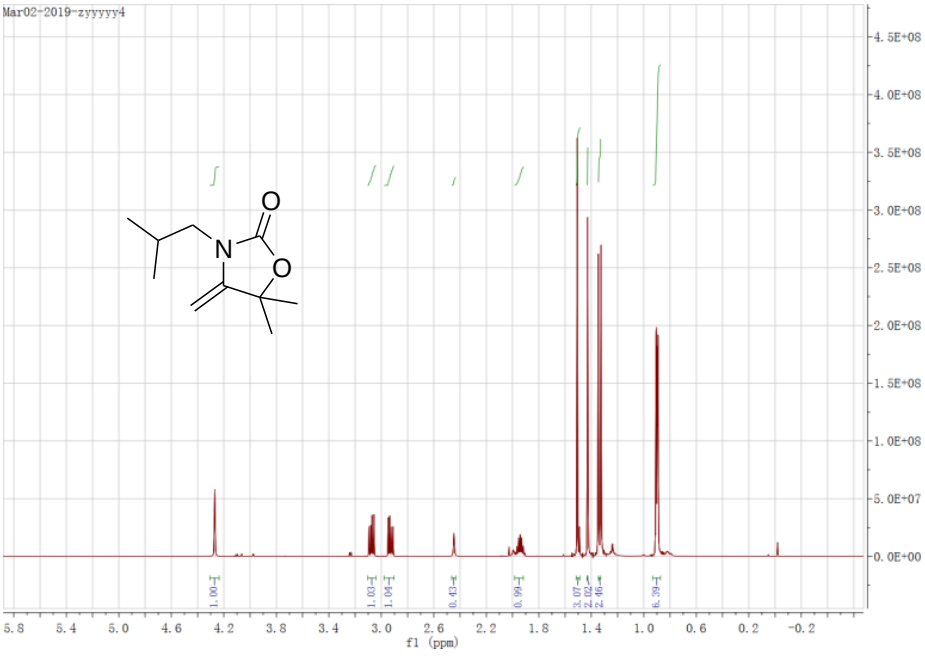
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