Electronic Supplementary Material (ESI) for Green Chemistry

'Evaluation of Alternative Solvents in Common Amide Coupling Reactions: Replacement of Dichloromethane and *N*,*N*-Dimethylformamide'

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Supporting Information

1. General

1.1. Reagents

All reagents and solvents were obtained from commercial suppliers and were used without further purification unless otherwise stated.

1.2 Experimental Details

All reactions were carried out using conventional glassware at room temperature (generally approx. 18 °C) under an air atmosphere and with no special attention given to the exclusion of moisture.

1.3 Purification of Products

i) Thin layer chromatography was carried out using Merck silica plates coated with fluorescent indicator UV254. These were analysed under 254 nm UV light or developed using potassium permanganate or vanillin solution.

ii) Flash chromatography was carried out using ZEOprep 60 HYD 40-63µm silica gel or IST Isolute Flash silica cartridges.

1.4 Analysis of Products

i) Fourier Transformed Infra-Red (FTIR) spectra were obtained on a Shimadzu IRAffinity-1 machine.

ii) ^{1}H and ^{13}C NMR spectra were obtained on a Bruker AV 400 at 400 MHz and 100 MHz respectively, or a Bruker DRX 500 at 500 MHz and 125 MHz, respectively. Chemical shifts are reported in ppm and coupling constants are reported in Hz with $CDCl_3$ referenced at 7.27 (^{1}H) and 77.0 ppm (^{13}C), respectively, and DMSO-d_6 referenced at 2.52 (^{1}H) and 39.5 ppm (^{13}C), respectively.

iii) High-resolution mass spectra were obtained through analysis at the EPSRC National Mass Spectrometry Facility, University of Swansea.

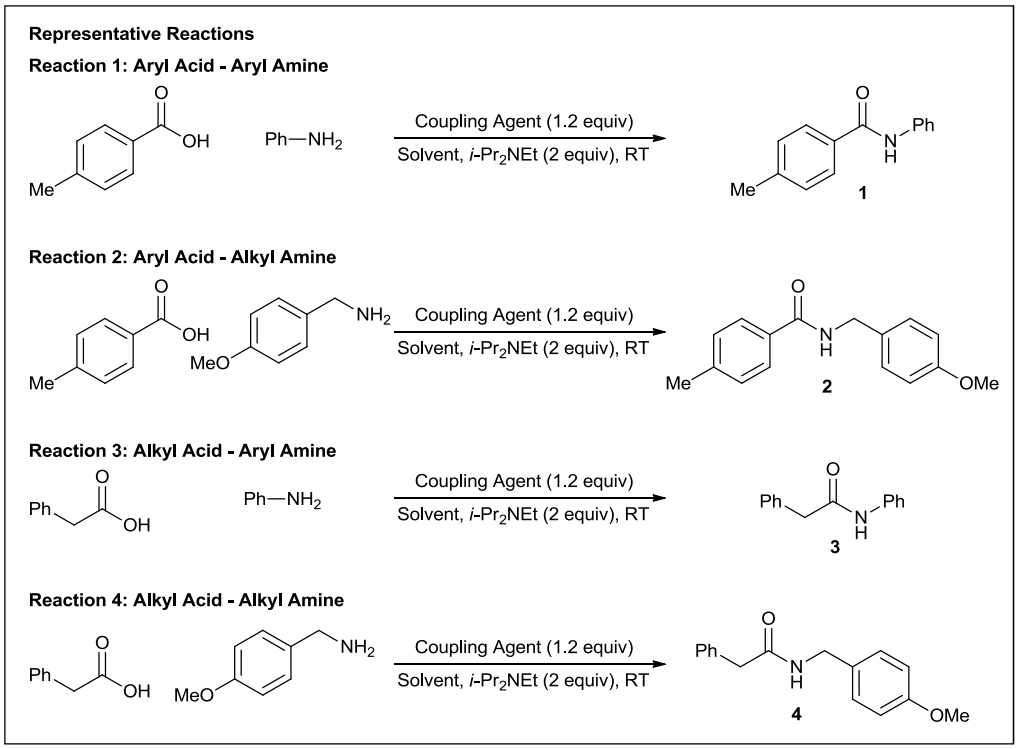
iv) HPLC analysis was carried out on an Agilent Technologies 1200 Series Analytical HPLC using a Phenomenex or Macherey-Nagel C_{18} 5 µM 4.6 x 50 mm column using MeCN/H_2O as the the mobile phase with the following gradient:

Time (min)	% MeCN	% H_2O
0	5	95
1	50	50
3	50	50
4	90	10
5	5	95
6	5	95

Conversions were obtained using an internal standard which were either dibenzyl ether (A), benzamide (B), bromobenzene (C), or ethyl 2-pyridylacetate (D).

2. Experimental Procedures

2.1 Representative Reactions



2.2 General Experimental Procedure

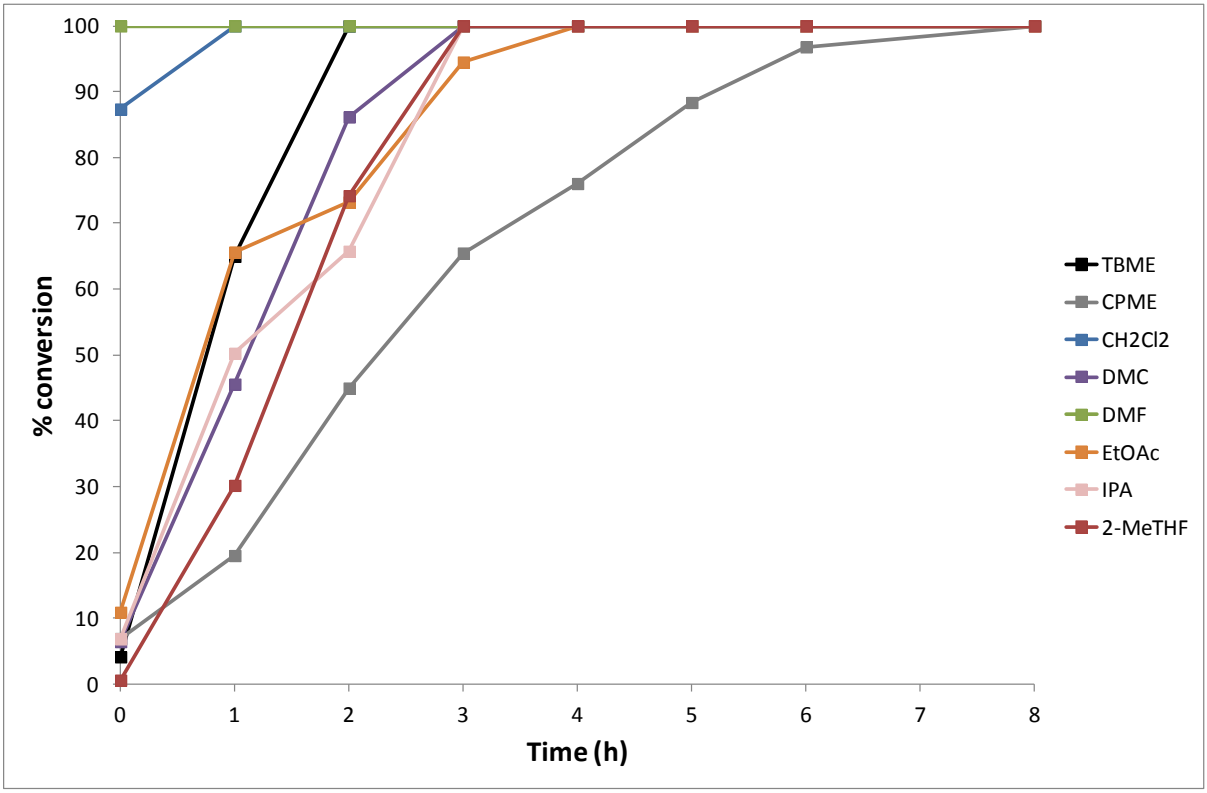
A solution of acid (1 equiv, 0.2 mmol), standard A, B, C, or D and coupling agent (1.2 equiv, 0.24 mmol) were stirred in solvent (1 mL, 0.2 M) at room temperature. DIPEA (2 equiv, 0.4 mmol) was added and the mixture was stirred for 5 minutes before addition of the amine (1.1 equiv, 0.22 mmol). The reaction was then followed by HPLC at 0 h (approx. 5 min), 1 h, 2 h, 3 h, 4 h, 5 h, 6 h, 8 h, and 24 h by removal of an aliquot (10 µL) which was diluted to 1 mL in MeCN before injection.

3. Experimental Data

3.1 Conversion vs. Time Data for Reactions 1-4 Using Specific Coupling Agents in the Range of Solvents

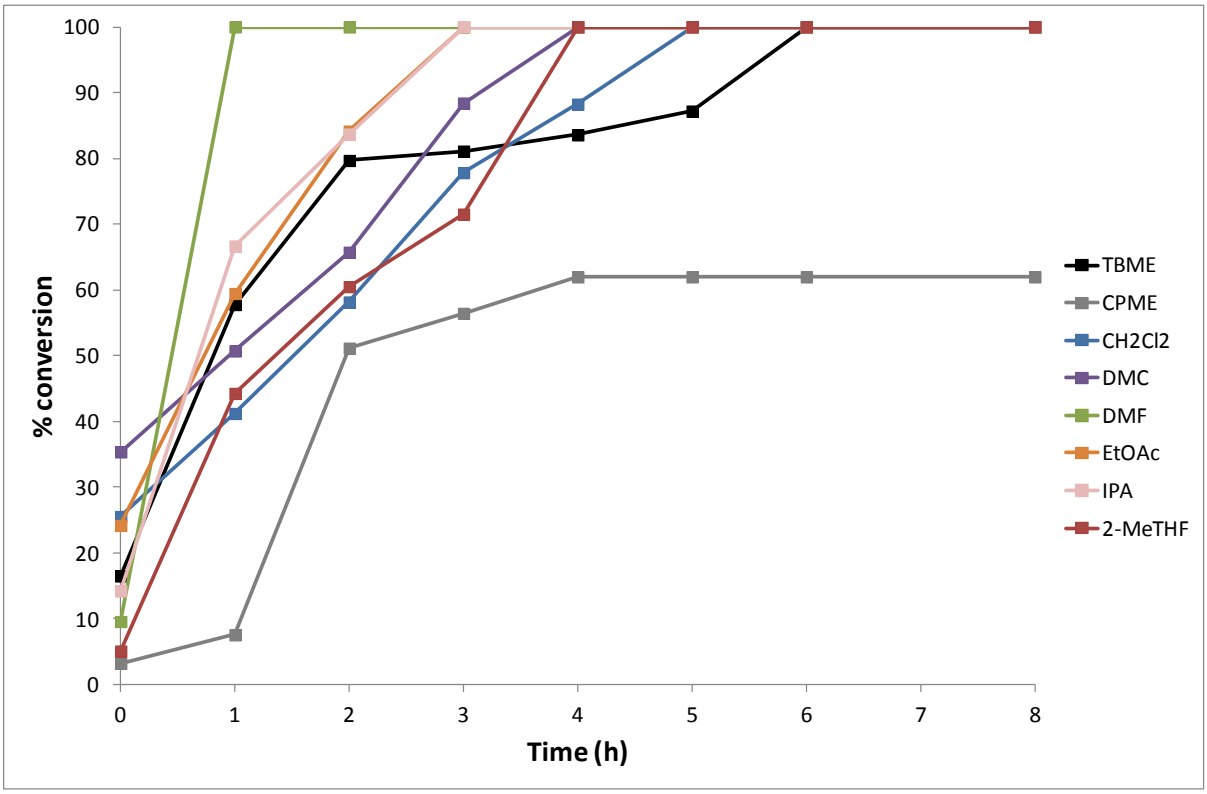
The internal standard used for each dataset is indicated in superscript at the header of each column.

Reaction 1: HATU



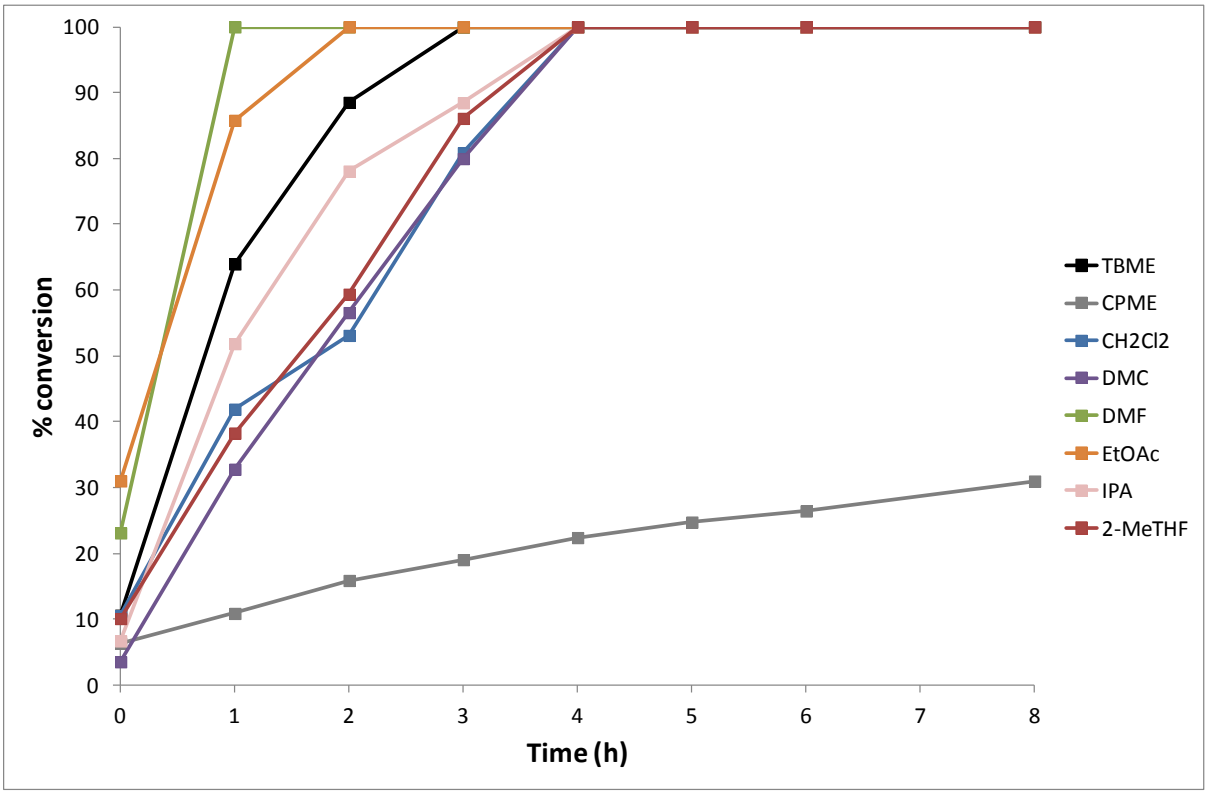
Time (h) / Solvent	$CHCl_2$[c]	2-MeTHF[c]	DMF[c]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	87.4	0.6	100.0	6.5	6.9	10.9	6.9	4.2
1	100.0	30.2	100.0	45.6	50.3	65.7	19.5	65.0
2	100.0	74.2	100.0	86.2	65.8	73.3	45.0	100.0
3	100.0	100.0	100.0	100.0	100.0	94.5	65.5	100.0
4	100.0	100.0	100.0	100.0	100.0	100.0	76.1	100.0
5	100.0	100.0	100.0	100.0	100.0	100.0	88.4	100.0
6	100.0	100.0	100.0	100.0	100.0	100.0	96.8	100.0
8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Reaction 1: COMU



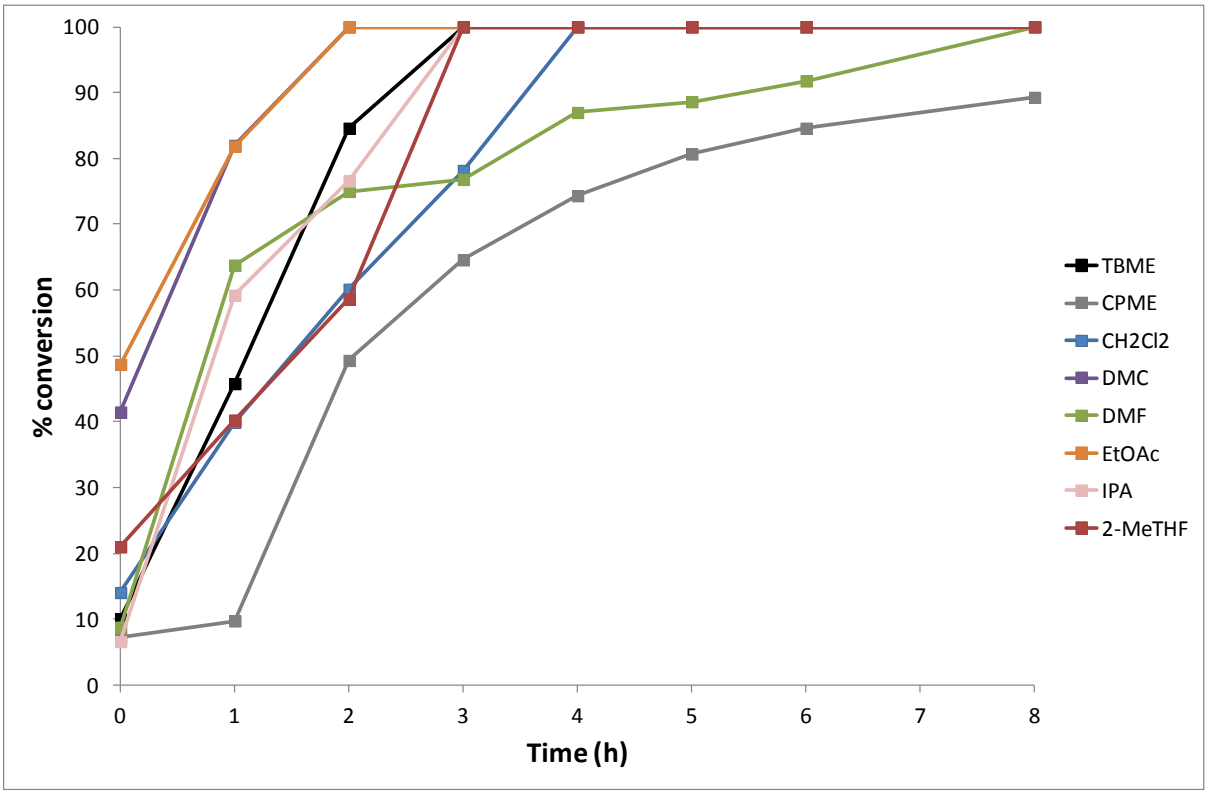
Time (h) / Solvent	$CHCl_2$[c]	2-MeTHF[c]	DMF[c]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	25.6	5.1	9.6	35.4	14.3	24.2	3.2	16.5
1	41.2	44.3	100.0	50.7	66.7	59.5	7.6	57.8
2	58.2	60.5	100.0	65.7	83.7	84.2	51.2	79.7
3	77.8	71.5	100.0	88.4	100.0	100.0	56.5	81.1
4	88.3	100.0	100.0	100.0	100.0	100.0	62.0	83.6
5	100.0	100.0	100.0	100.0	100.0	100.0	62.0	87.2
6	100.0	100.0	100.0	100.0	100.0	100.0	62.0	100.0
8	100.0	100.0	100.0	100.0	100.0	100.0	62.0	100.0
24	100.0	100.0	100.0	100.0	100.0	100.0	62.0	100.0

Reaction 1: DIC/HOBt



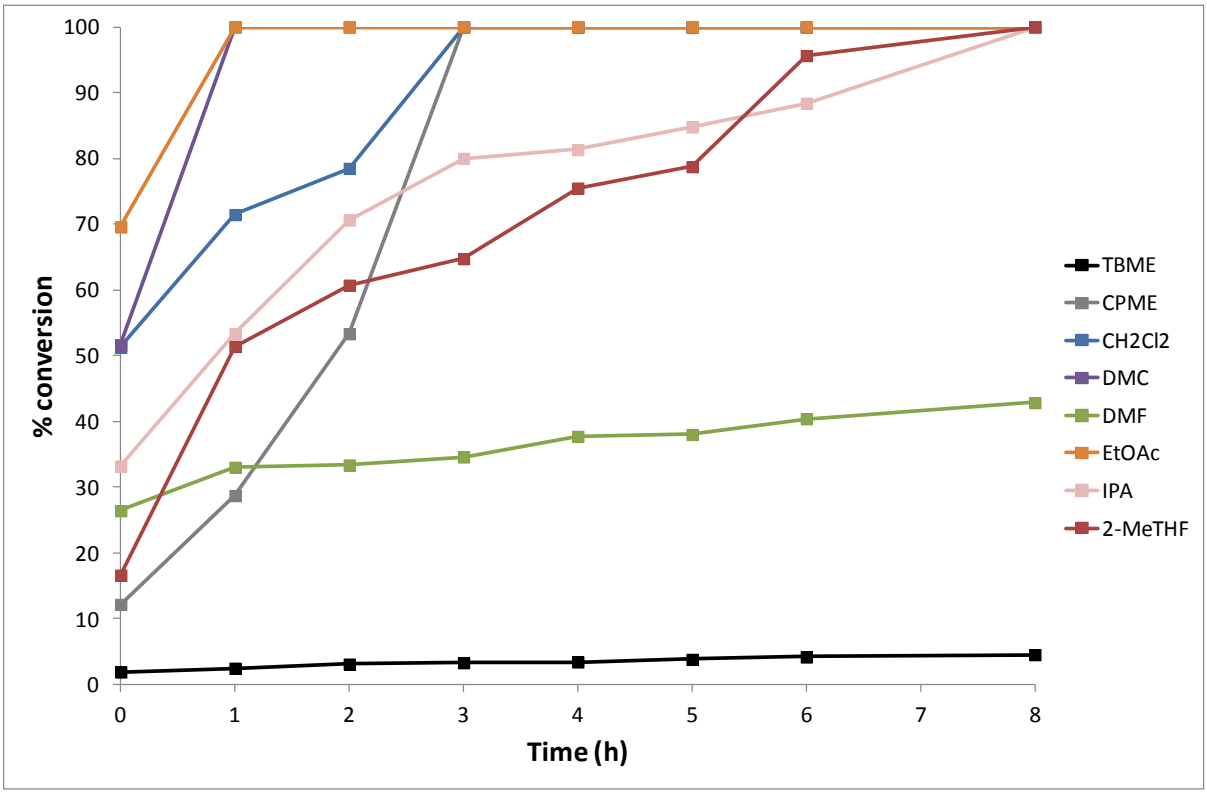
Time (h) / Solvent	$CHCl_2$[c]	2-MeTHF[c]	DMF[c]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	10.5	10.1	23.1	3.6	6.7	31.0	6.4	10.6
1	41.9	38.3	100.0	32.8	51.9	85.8	10.9	64.0
2	53.1	59.4	100.0	56.6	78.1	100.0	15.9	88.5
3	80.9	86.1	100.0	80.0	88.5	100.0	19.1	100.0
4	100.0	100.0	100.0	100.0	100.0	100.0	22.4	100.0
5	100.0	100.0	100.0	100.0	100.0	100.0	24.8	100.0
6	100.0	100.0	100.0	100.0	100.0	100.0	26.5	100.0
8	100.0	100.0	100.0	100.0	100.0	100.0	31.0	100.0
24	100.0	100.0	100.0	100.0	100.0	100.0	31.0	100.0

Reaction 1: PyBOP



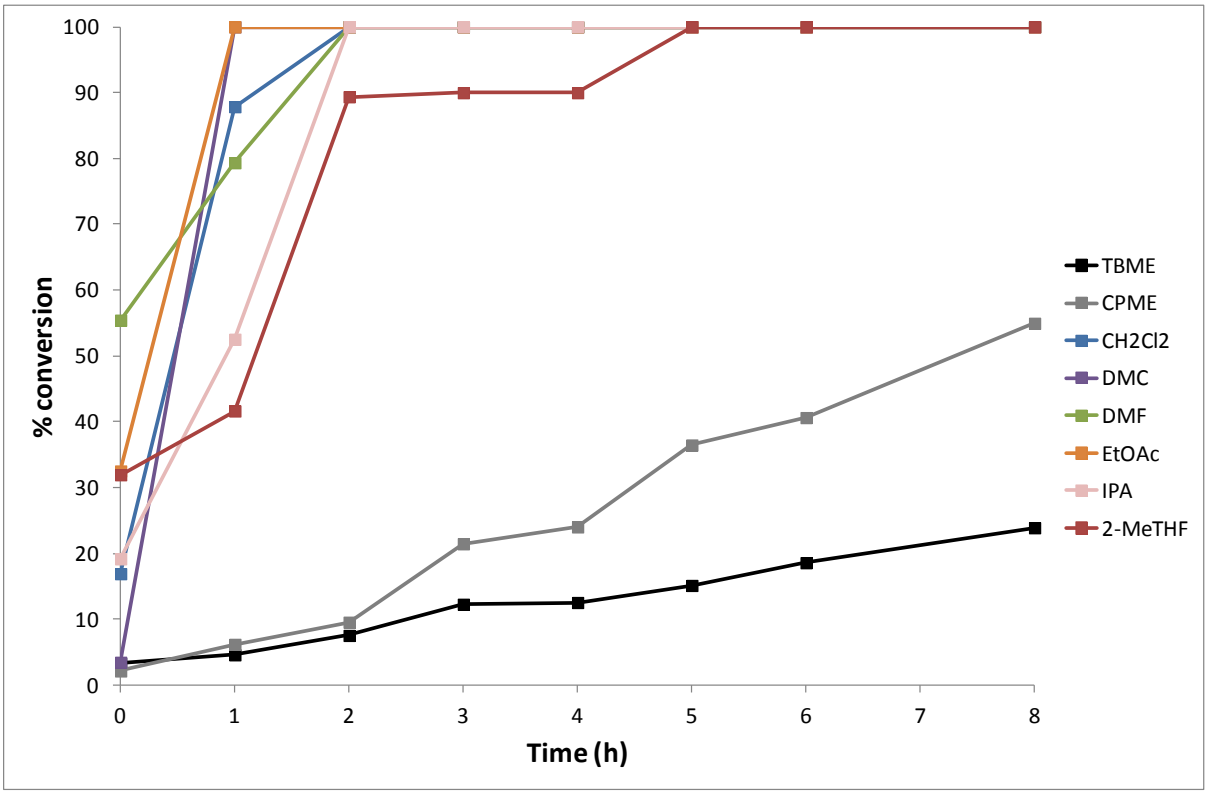
Time (h) / Solvent	$CHCl_2$[c]	2-MeTHF[c]	DMF[a]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	14.1	21.0	8.8	41.5	6.6	48.7	7.3	10.1
1	39.9	40.3	63.8	82.0	59.3	81.9	9.8	45.8
2	60.1	58.6	75.0	100.0	76.6	100.0	49.3	84.6
3	78.2	100.0	76.8	100.0	100.0	100.0	64.6	100.0
4	100.0	100.0	87.0	100.0	100.0	100.0	74.4	100.0
5	100.0	100.0	88.6	100.0	100.0	100.0	80.7	100.0
6	100.0	100.0	91.8	100.0	100.0	100.0	84.6	100.0
8	100.0	100.0	100.0	100.0	100.0	100.0	89.3	100.0
24	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Reaction 1: T3P



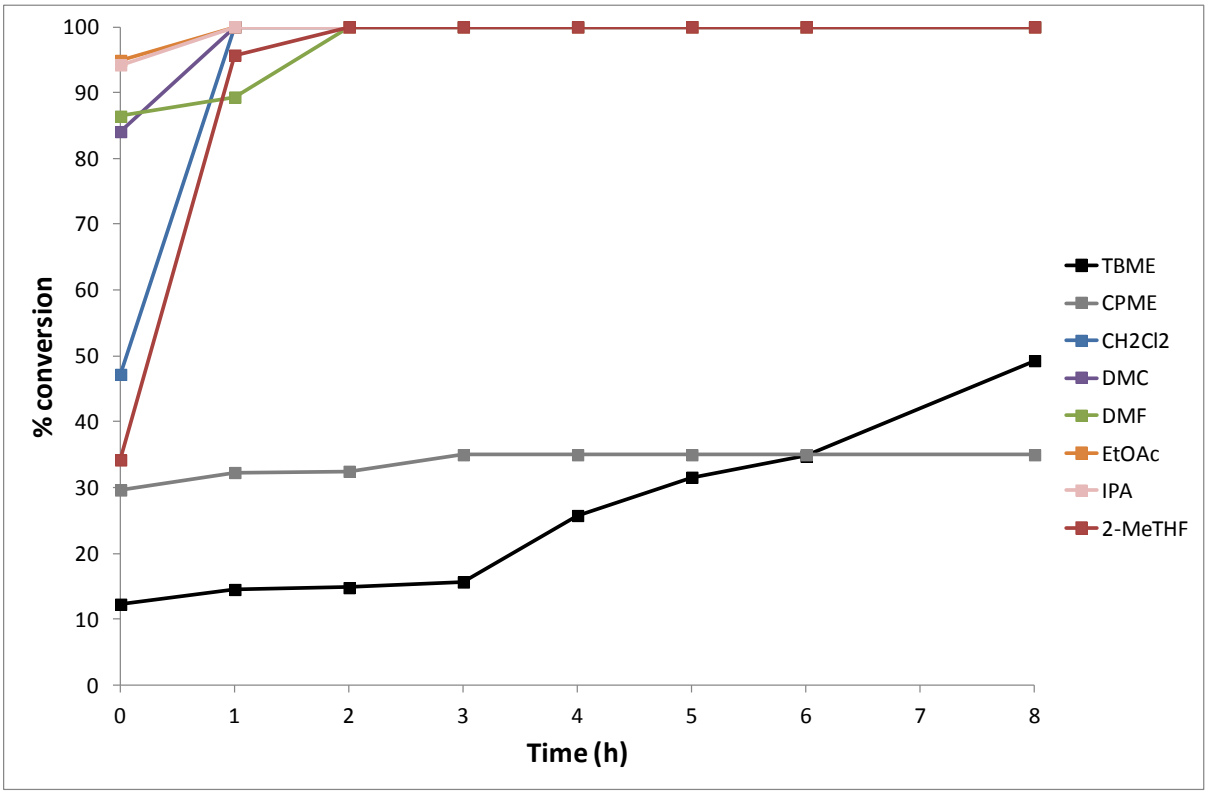
Time (h) / Solvent	$CHCl_2$[c]	2-MeTHF[c]	DMF[c]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	51.3	16.6	26.5	51.6	33.2	69.6	12.2	1.9
1	71.5	51.4	33.0	100.0	53.4	100.0	28.7	2.5
2	78.5	60.7	33.4	100.0	70.6	100.0	53.4	3.1
3	100.0	64.8	34.6	100.0	80.0	100.0	100.0	3.3
4	100.0	75.5	37.7	100.0	81.3	100.0	100.0	3.5
5	100.0	78.8	38.0	100.0	84.8	100.0	100.0	3.8
6	100.0	95.6	40.4	100.0	88.4	100.0	100.0	4.2
8	100.0	100.0	42.9	100.0	100.0	100.0	100.0	4.6
24	100.0	100.0	44.1	100.0	100.0	100.0	100.0	5.6

Reaction 2: HATU



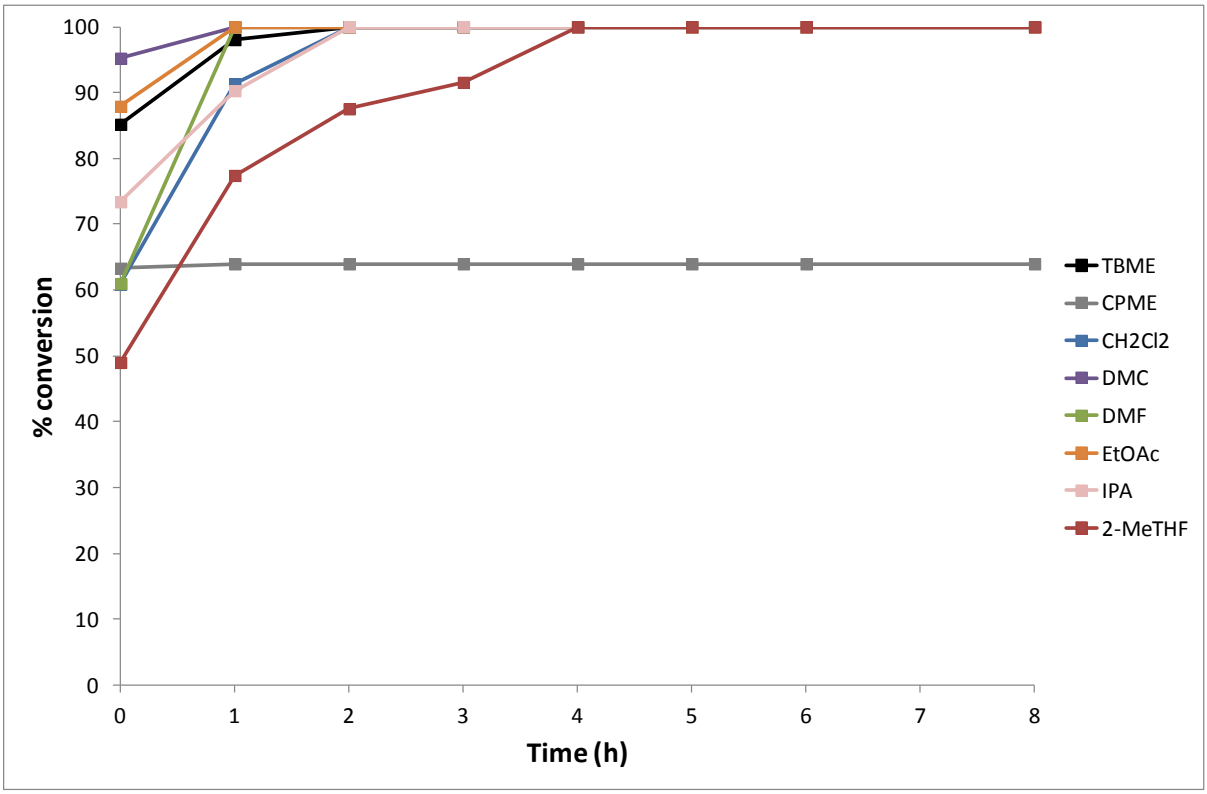
Time (h) / Solvent	$CHCl_2$[c]	2-MeTHF[a]	DMF[c]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	16.9	32.0	55.4	3.5	19.2	32.5	2.2	3.3
1	87.9	41.7	79.4	100.0	52.5	100.0	6.2	4.6
2	100.0	89.4	100.0	100.0	100.0	100.0	9.6	7.6
3	100.0	90.0	100.0	100.0	100.0	100.0	21.5	12.3
4	100.0	90.0	100.0	100.0	100.0	100.0	24.0	12.6
5	100.0	100.0	100.0	100.0	100.0	100.0	36.5	15.1
6	100.0	100.0	100.0	100.0	100.0	100.0	40.6	18.6
8	100.0	100.0	100.0	100.0	100.0	100.0	55.0	23.9
24	100.0	100.0	100.0	100.0	100.0	100.0	77.9	70.4

Reaction 2: COMU



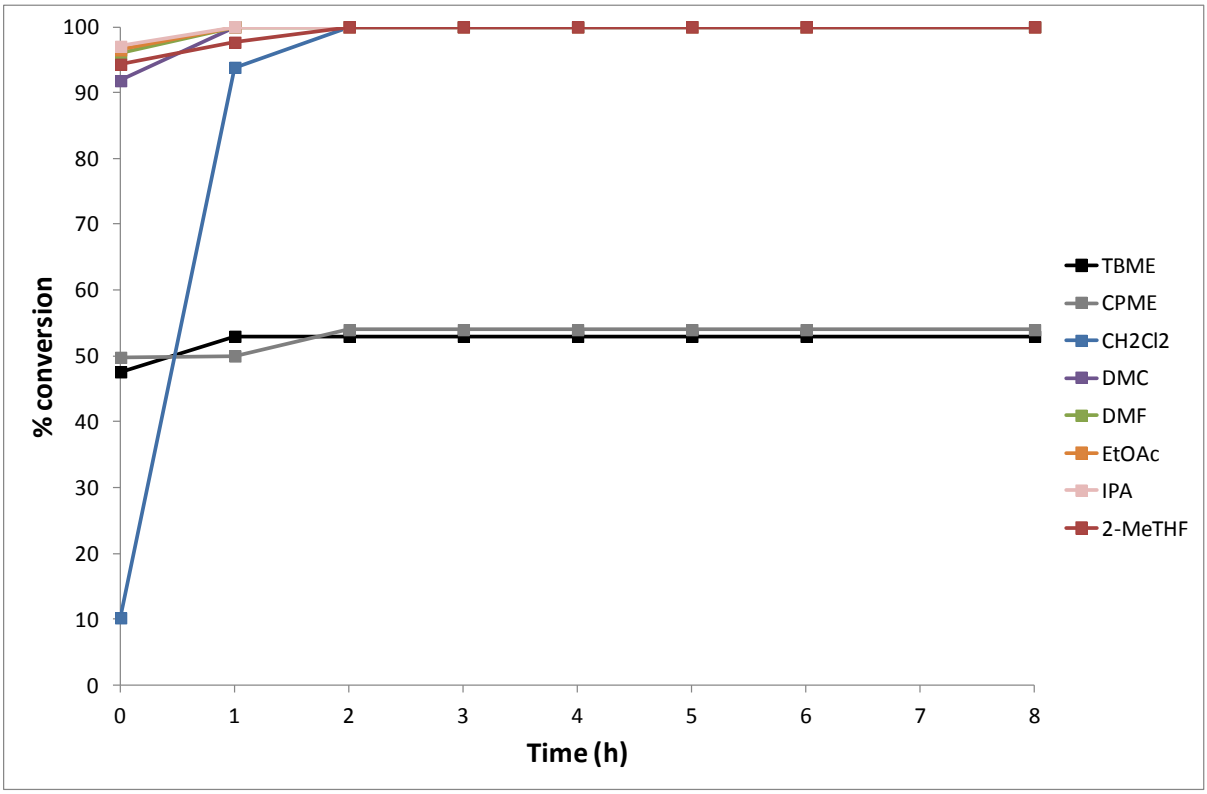
Time (h) / Solvent	$CHCl_2$[a]	2-MeTHF[a]	DMF[a]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	47.2	34.2	86.4	84.1	94.2	94.9	29.6	12.3
1	100.0	95.7	89.3	100.0	100.0	100.0	32.3	14.5
2	100.0	100.0	100.0	100.0	100.0	100.0	32.5	14.8
3	100.0	100.0	100.0	100.0	100.0	100.0	35.0	15.7
4	100.0	100.0	100.0	100.0	100.0	100.0	35.0	25.8
5	100.0	100.0	100.0	100.0	100.0	100.0	35.0	31.6
6	100.0	100.0	100.0	100.0	100.0	100.0	35.0	34.8
8	100.0	100.0	100.0	100.0	100.0	100.0	35.0	49.3
24	100.0	100.0	100.0	100.0	100.0	100.0	35.0	49.3

Reaction 2: DIC/HOBt



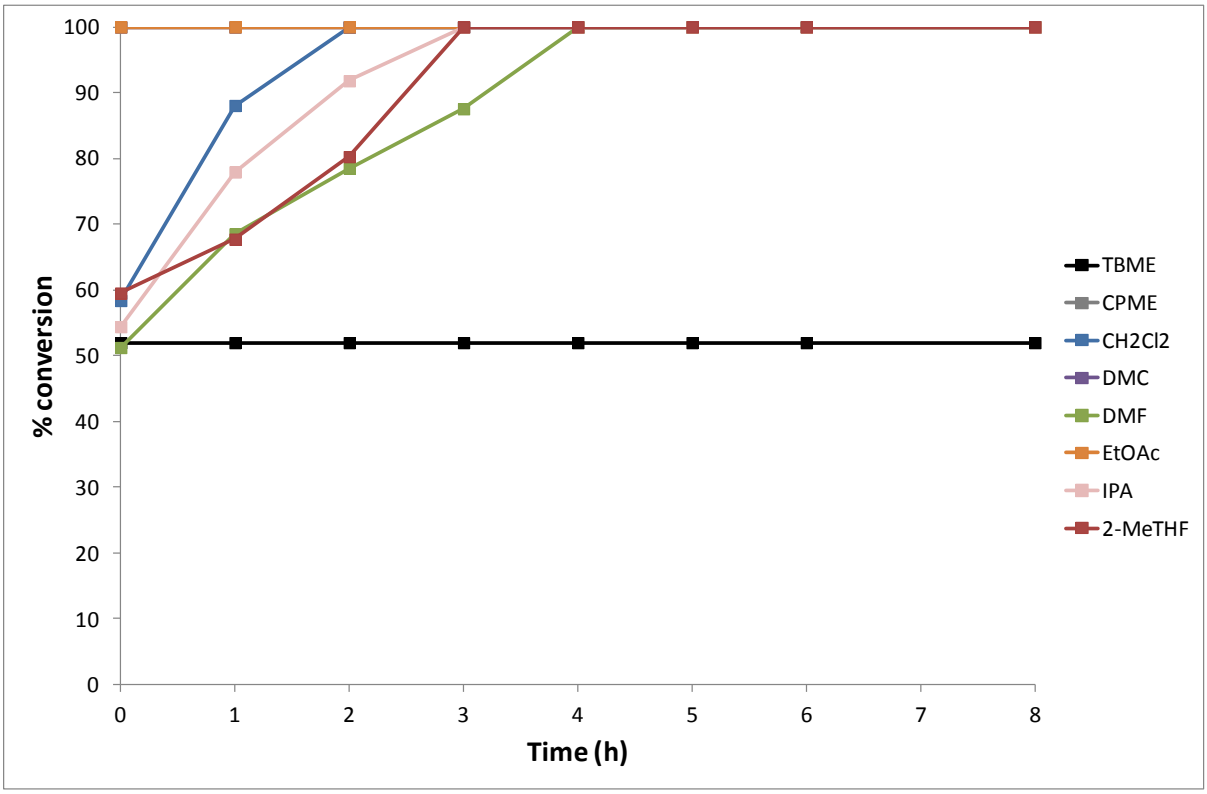
Time (h) / Solvent	$CHCl_2$[c]	2-MeTHF[a]	DMF[c]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	60.9	49.0	61.0	95.2	73.4	87.9	63.3	85.2
1	91.3	77.4	100.0	100.0	90.3	100.0	64.0	98.1
2	100.0	87.6	100.0	100.0	100.0	100.0	64.0	100.0
3	100.0	91.6	100.0	100.0	100.0	100.0	64.0	100.0
4	100.0	100.0	100.0	100.0	100.0	100.0	64.0	100.0
5	100.0	100.0	100.0	100.0	100.0	100.0	64.0	100.0
6	100.0	100.0	100.0	100.0	100.0	100.0	64.0	100.0
8	100.0	100.0	100.0	100.0	100.0	100.0	64.0	100.0
24	100.0	100.0	100.0	100.0	100.0	100.0	64.0	100.0

Reaction 2: PyBOP



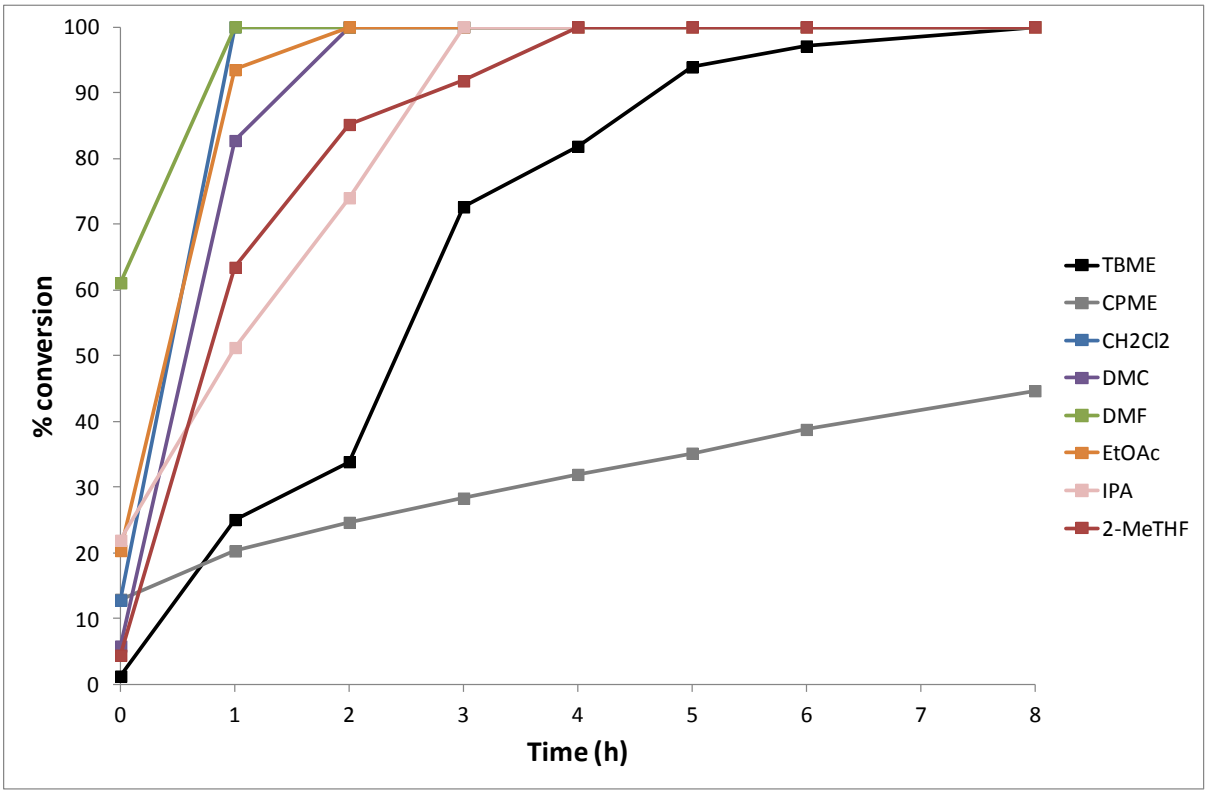
Time (h) / Solvent	$CHCl_2$[a]	2-MeTHF[a]	DMF[a]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	10.2	94.3	96.0	91.8	97.0	96.5	49.8	47.6
1	93.9	97.7	100.0	100.0	100.0	100.0	50.0	53.0
2	100.0	100.0	100.0	100.0	100.0	100.0	54.0	53.0
3	100.0	100.0	100.0	100.0	100.0	100.0	54.0	53.0
4	100.0	100.0	100.0	100.0	100.0	100.0	54.0	53.0
5	100.0	100.0	100.0	100.0	100.0	100.0	54.0	53.0
6	100.0	100.0	100.0	100.0	100.0	100.0	54.0	53.0
8	100.0	100.0	100.0	100.0	100.0	100.0	54.0	53.0
24	100.0	100.0	100.0	100.0	100.0	100.0	54.0	53.0

Reaction 2: T3P



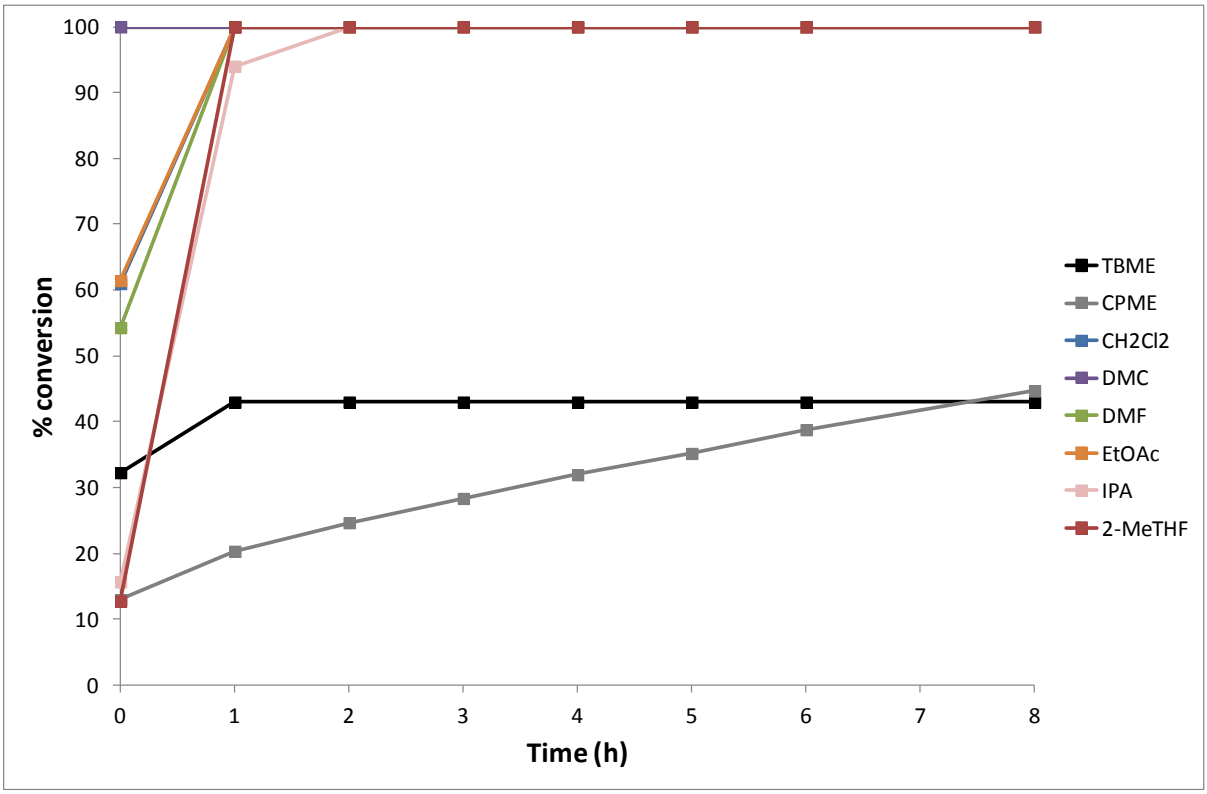
Time (h) / Solvent	$CHCl_2$[c]	2-MeTHF[a]	DMF[c]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	58.4	59.5	51.3	100.0	54.4	100.0	100.0	52.0
1	88.1	67.7	68.5	100.0	77.9	100.0	100.0	52.0
2	100.0	80.3	78.5	100.0	91.8	100.0	100.0	52.0
3	100.0	100.0	87.6	100.0	100.0	100.0	100.0	52.0
4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	52.0
5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	52.0
6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	52.0
8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	52.0
24	100.0	100.0	100.0	100.0	100.0	100.0	100.0	52.0

Reaction 3: HATU



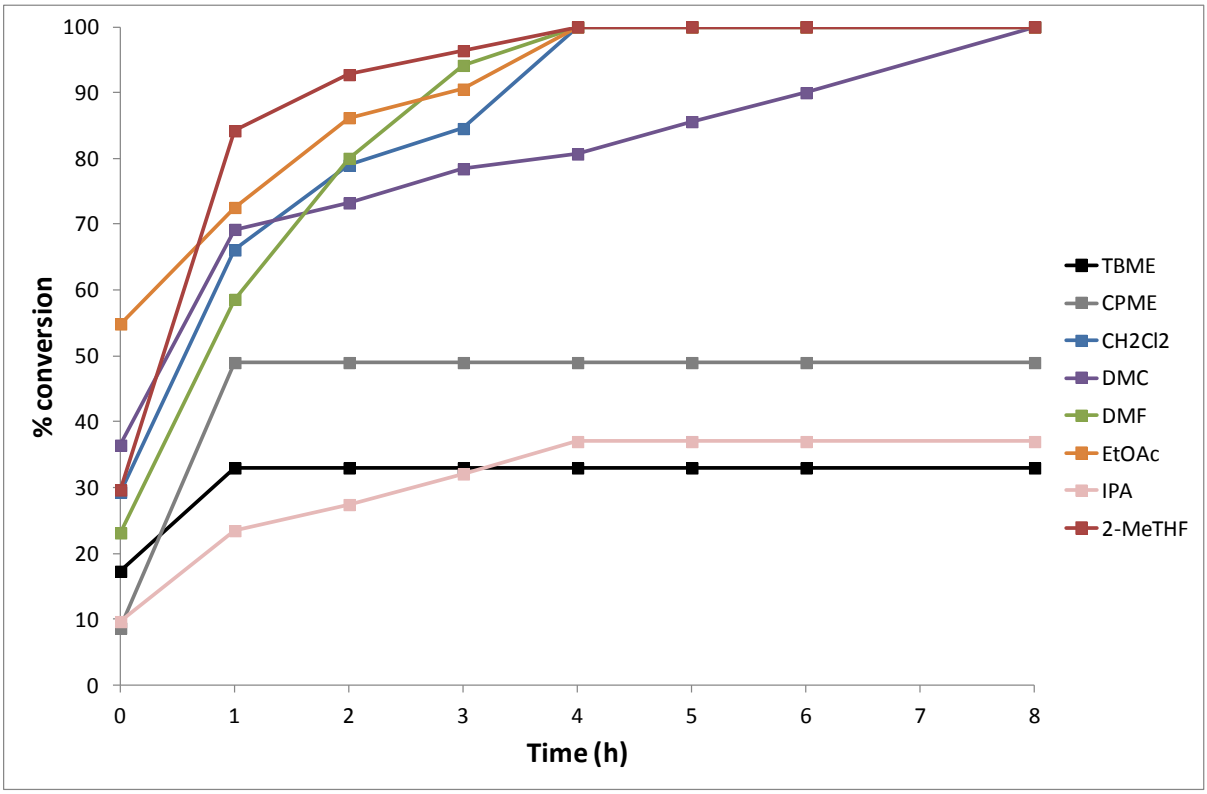
Time (h) / Solvent	$CHCl_2$[a]	2-MeTHF[a]	DMF[a]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	12.9	4.5	61.1	5.9	22.0	20.4	13.0	1.3
1	100	63.5	100.0	82.7	51.3	93.5	20.3	25.1
2	100	85.2	100.0	100.0	74.0	100.0	24.7	33.9
3	100	91.8	100.0	100.0	100.0	100.0	28.4	72.6
4	100	100.0	100.0	100.0	100.0	100.0	32.0	81.9
5	100	100.0	100.0	100.0	100.0	100.0	35.2	93.9
6	100	100.0	100.0	100.0	100.0	100.0	38.8	97.1
8	100	100.0	100.0	100.0	100.0	100.0	44.7	100.0
24	100	100.0	100.0	100.0	100.0	100.0	52.4	100.0

Reaction 3: COMU



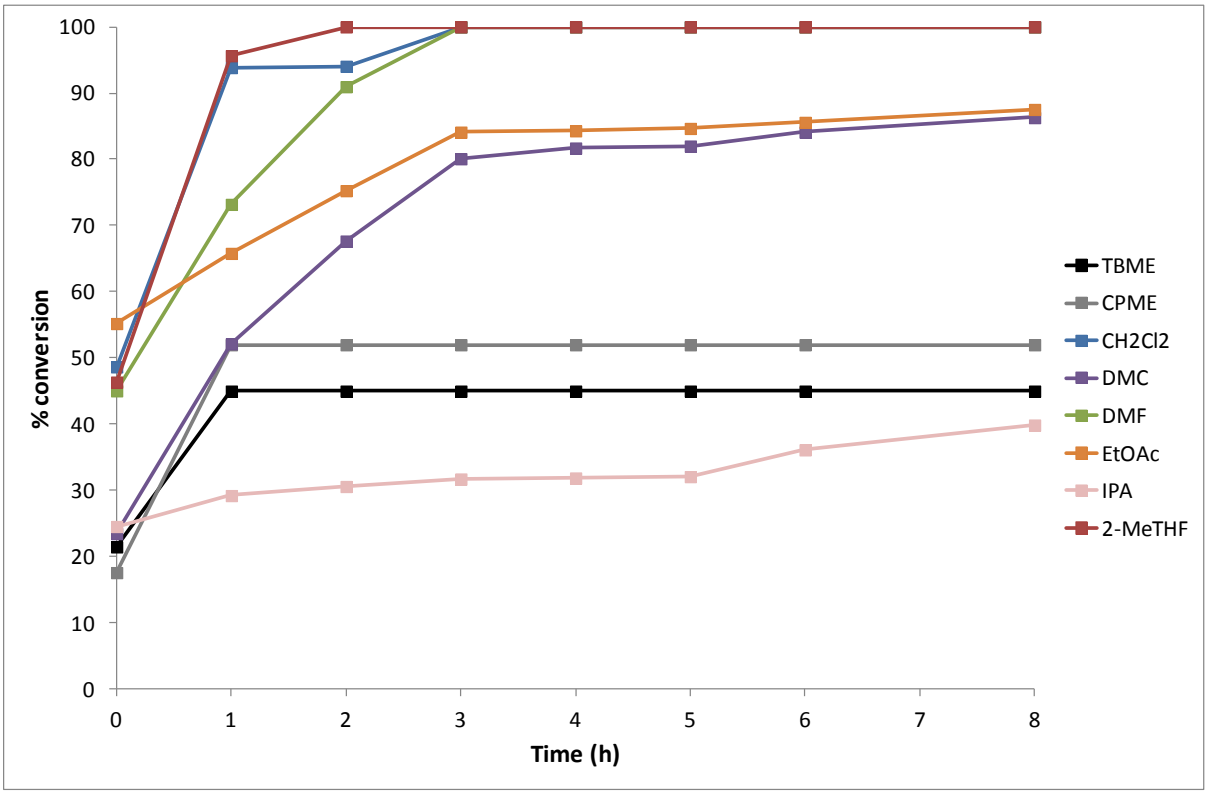
Time (h) / Solvent	$CHCl_2$[b]	2-MeTHF[a]	DMF[c]	DMC[b]	IPA[b]	EtOAc[d]	CPME[c]	TBME[c]
0	61.0	12.8	54.3	100.0	15.7	61.5	12.5	32.3
1	100.0	95.6	100.0	100.0	94.0	100.0	32.4	43.0
2	100.0	100.0	100.0	100.0	100.0	100.0	36.5	43.0
3	100.0	100.0	100.0	100.0	100.0	100.0	37.9	43.0
4	100.0	100.0	100.0	100.0	100.0	100.0	38.3	43.0
5	100.0	100.0	100.0	100.0	100.0	100.0	38.8	43.0
6	100.0	100.0	100.0	100.0	100.0	100.0	38.9	43.0
8	100.0	100.0	100.0	100.0	100.0	100.0	40.9	43.0
24	100.0	100.0	100.0	100.0	100.0	100.0	48.3	43.0

Reaction 3: DIC/HOBt



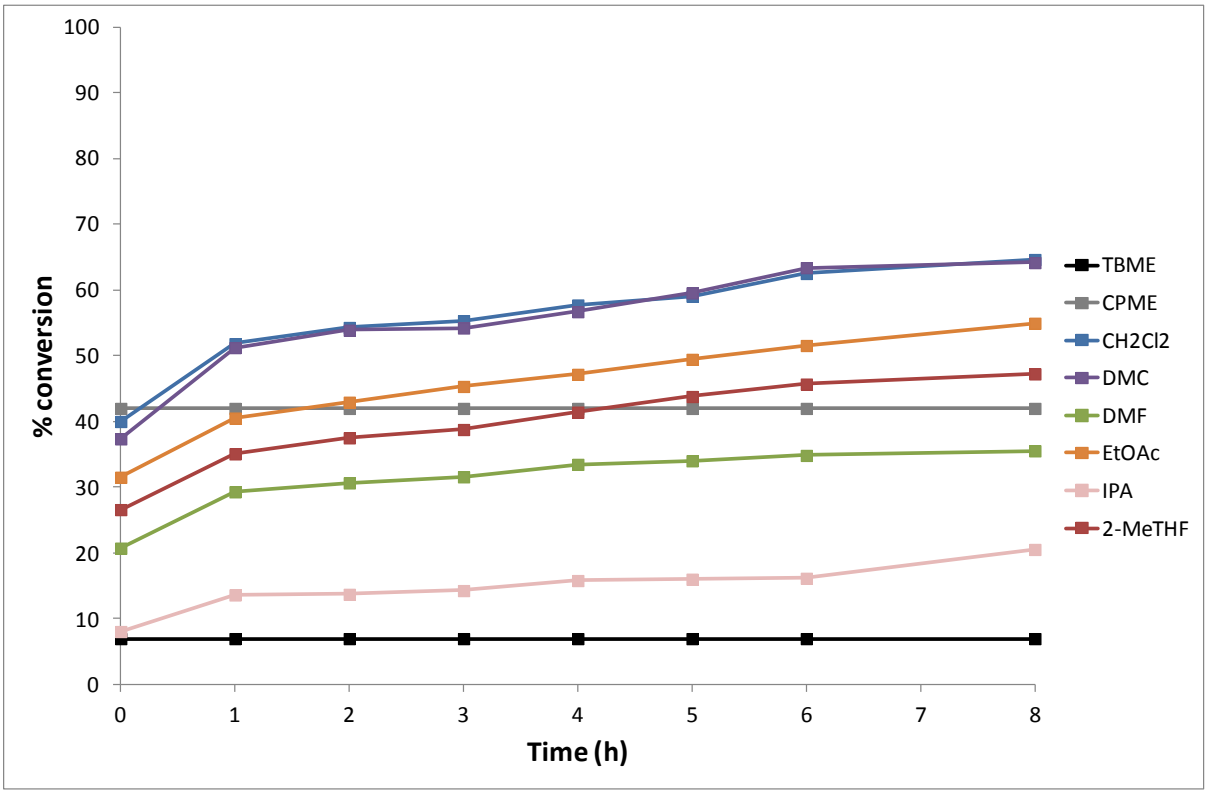
Time (h) / Solvent	$CHCl_2$[c]	2-MeTHF[a]	DMF[c]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	29.3	29.6	23.1	36.5	9.7	54.9	8.7	17.3
1	66.1	84.2	58.6	69.2	23.5	72.6	49.0	33.0
2	79.0	92.7	80.0	73.3	27.4	86.2	49.0	33.0
3	84.6	96.4	94.1	78.4	32.1	90.5	49.0	33.0
4	100.0	100.0	100.0	80.7	37.0	100.0	49.0	33.0
5	100.0	100.0	100.0	85.6	37.0	100.0	49.0	33.0
6	100.0	100.0	100.0	90.0	37.0	100.0	49.0	33.0
8	100.0	100.0	100.0	100.0	37.0	100.0	49.0	33.0
24	100.0	100.0	100.0	100.0	37.0	100.0	49.0	33.0

Reaction 3: PyBOP



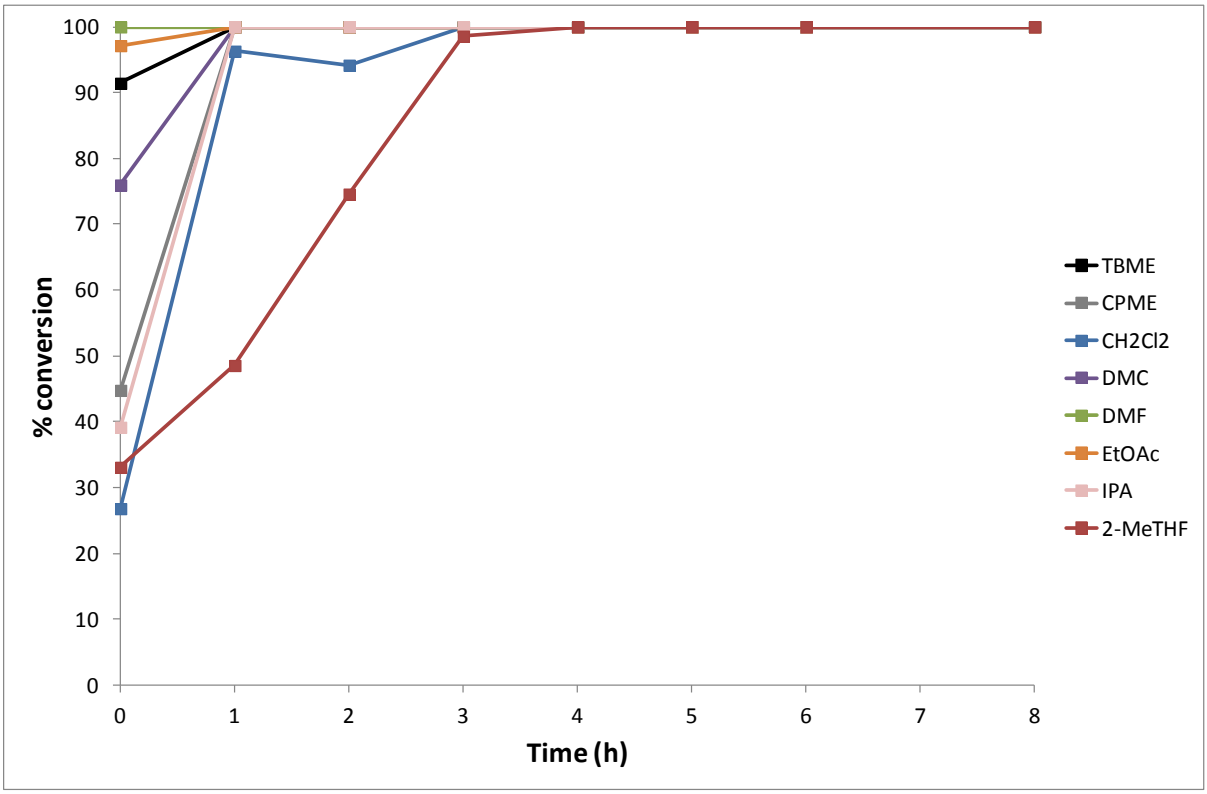
Time (h) / Solvent	$CHCl_2$[a]	2-MeTHF[a]	DMF[c]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	48.7	46.4	45.0	23.5	24.6	55.2	17.6	21.5
1	93.9	95.6	73.2	52.1	29.2	65.8	52.0	45.0
2	94.1	100.0	91.0	67.7	30.6	75.3	52.0	45.0
3	100.0	100.0	100.0	80.1	31.7	84.1	52.0	45.0
4	100.0	100.0	100.0	81.7	31.9	84.3	52.0	45.0
5	100.0	100.0	100.0	82.0	32.1	84.7	52.0	45.0
6	100.0	100.0	100.0	84.1	36.1	85.6	52.0	45.0
8	100.0	100.0	100.0	86.3	39.9	87.5	52.0	45.0
24	100.0	100.0	100.0	100.0	40.1	88.7	52.0	45.0

Reaction 3: T3P



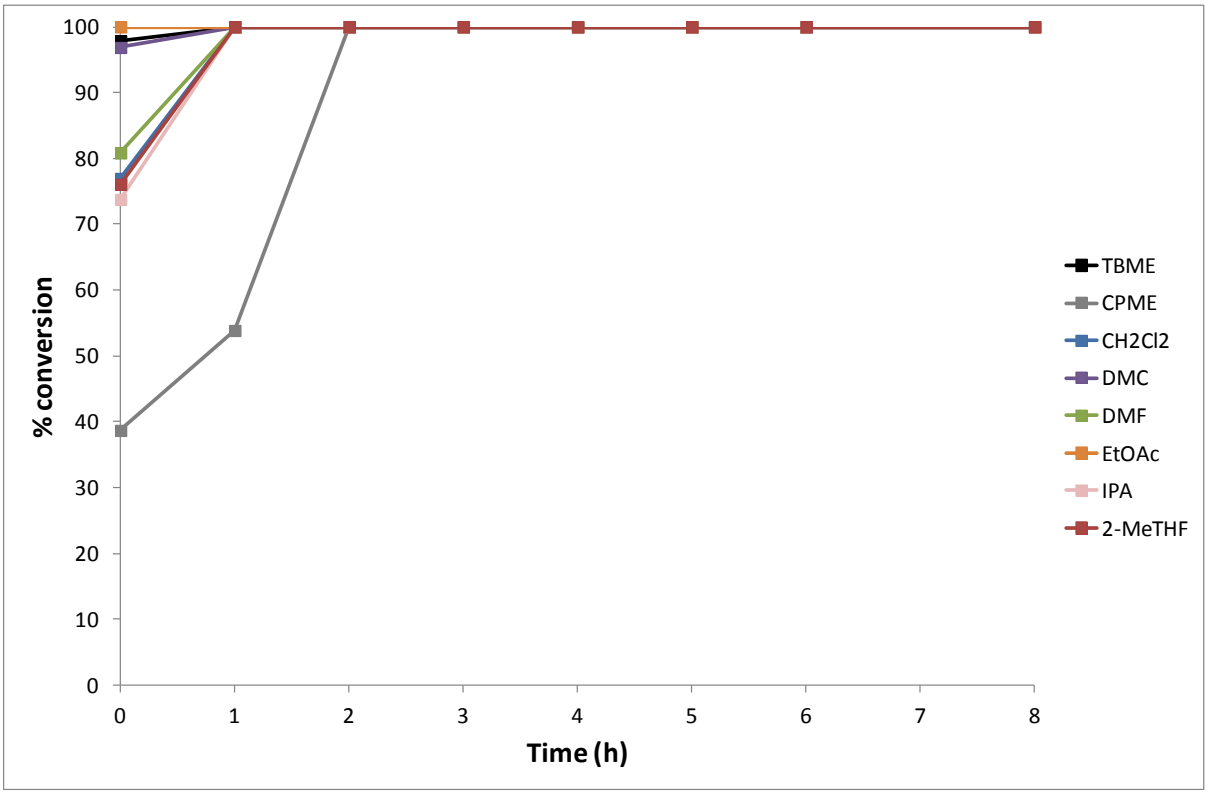
Time (h) / Solvent	$CHCl_2$[a]	2-MeTHF[a]	DMF[a]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	40.0	26.6	20.8	37.4	8.1	31.5	42.0	7.0
1	51.8	35.1	29.3	51.2	13.6	40.5	42.0	7.0
2	54.3	37.5	30.7	53.9	13.7	42.9	42.0	7.0
3	55.3	38.8	31.6	54.2	14.3	45.3	42.0	7.0
4	57.7	41.4	33.5	56.7	15.8	47.2	42.0	7.0
5	59.1	43.8	34.0	59.6	16.0	49.5	42.0	7.0
6	62.5	45.7	34.9	63.4	16.2	51.6	42.0	7.0
8	64.6	47.3	35.6	64.2	20.6	55.0	42.0	7.0
24	66.7	48.2	38.7	66.0	22.8	58.5	42.0	7.0

Reaction 4: HATU



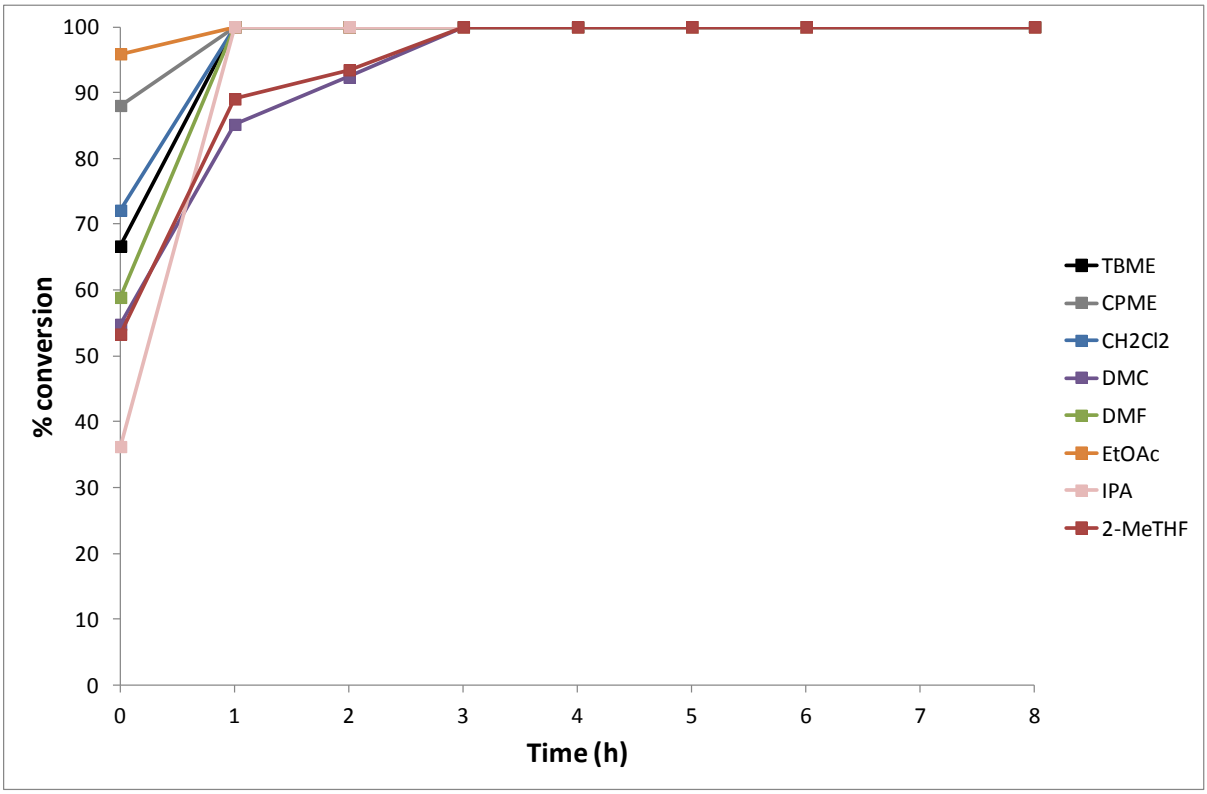
Time (h) / Solvent	$CHCl_2$[a]	2-MeTHF[c]	DMF[c]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	26.8	33.1	100.0	76.0	39.2	97.2	44.8	91.4
1	96.3	48.6	100.0	100.0	100.0	100.0	100.0	100
2	94.2	74.6	100.0	100.0	100.0	100.0	100.0	100
3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100
4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100
5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100
6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100
8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100
24	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100

Reaction 4: COMU



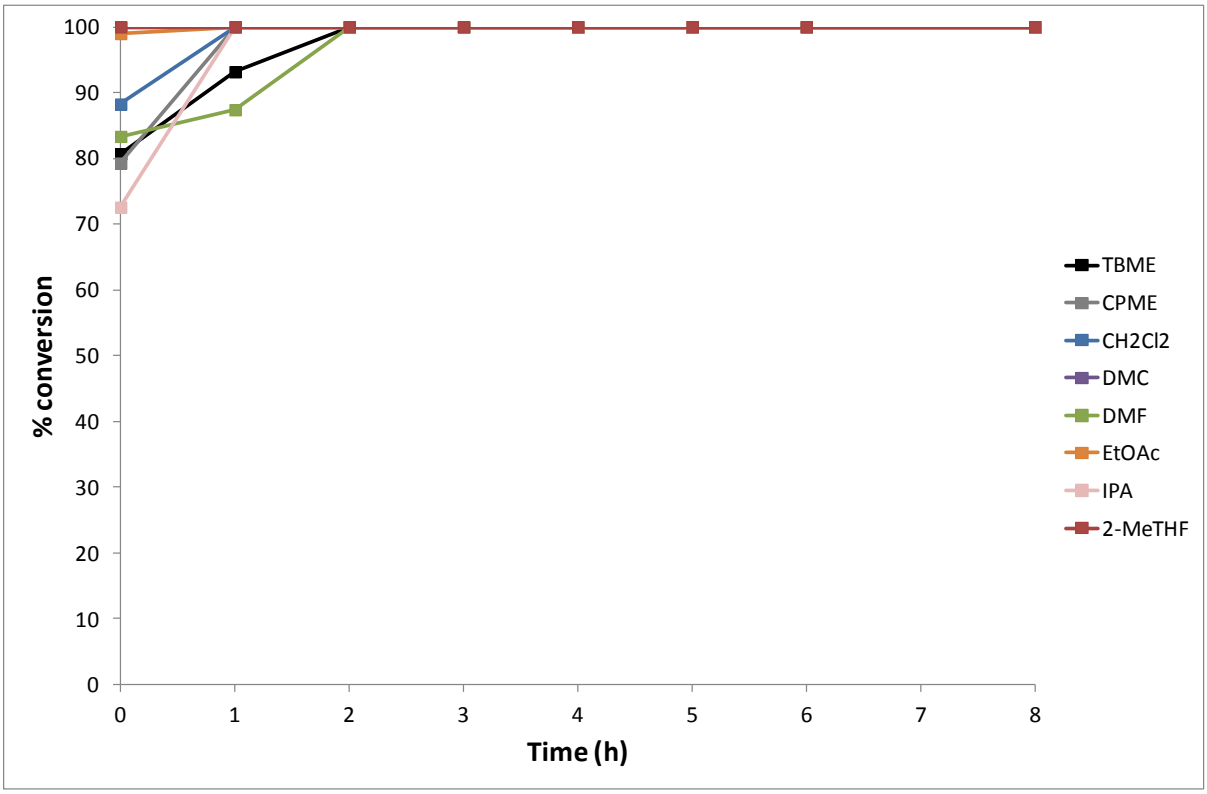
Time (h) / Solvent	$CHCl_2$[a]	2-MeTHF[c]	DMF[a]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	77.0	76.1	80.9	96.9	73.8	100.0	38.7	97.9
1	100.0	100.0	100.0	100.0	100.0	100.0	53.9	100
2	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100
3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100
4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100
5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100
6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100
8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100
24	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100

Reaction 4: DIC/HOBt



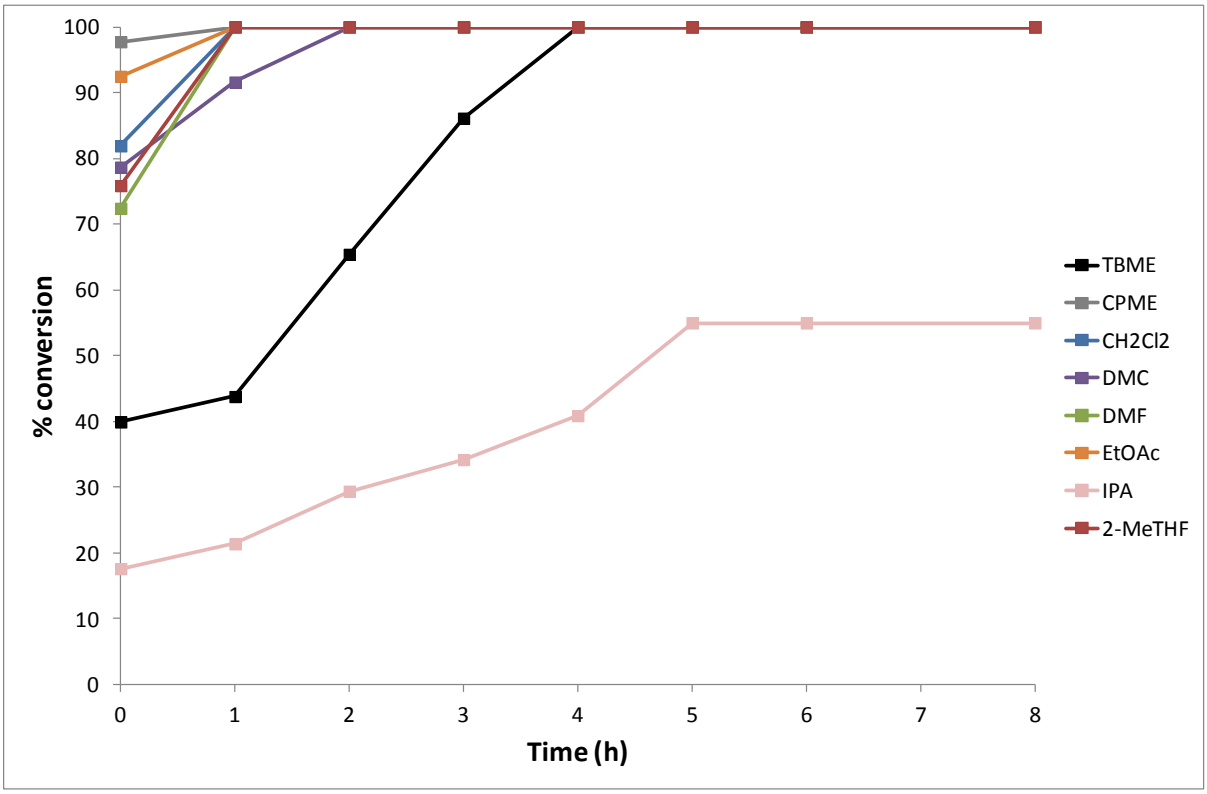
Time (h) / Solvent	$CHCl_2$[c]	2-MeTHF[a]	DMF[c]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	72.1	58.9	53.3	54.8	36.2	95.9	88.1	66.7
1	100.0	100.0	89.1	85.2	100.0	100.0	100.0	100.0
2	100.0	100.0	93.5	92.4	100.0	100.0	100.0	100.0
3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Reaction 4: PyBOP



Time (h) / Solvent	$CHCl_2$[c]	2-MeTHF[c]	DMF[a]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	88.3	100.0	83.4	100.0	72.6	99.0	79.3	80.7
1	100.0	100.0	87.4	100.0	100.0	100.0	100.0	93.2
2	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

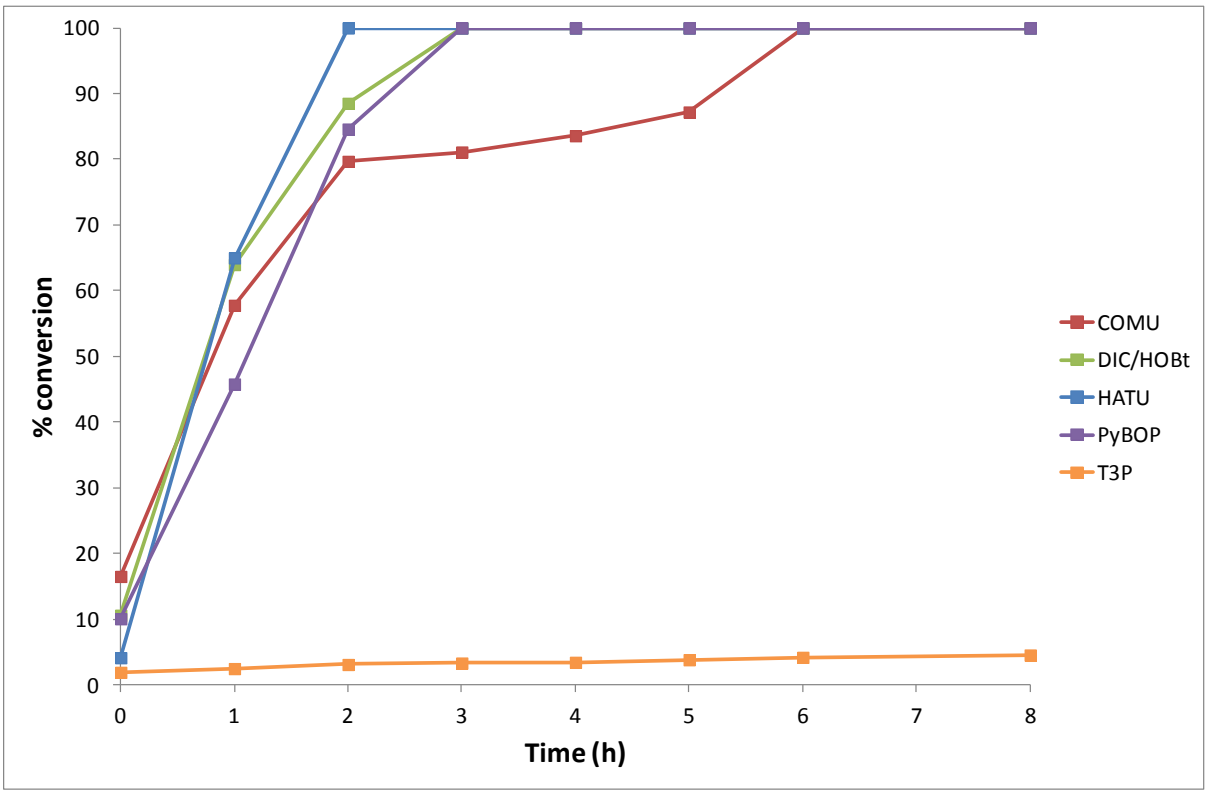
Reaction 4: T3P



Time (h) / Solvent	$CHCl_2$[a]	2-MeTHF[c]	DMF[c]	DMC[c]	IPA[c]	EtOAc[c]	CPME[c]	TBME[c]
0	81.9	75.9	72.4	78.7	17.6	92.5	97.8	39.9
1	100.0	100.0	100.0	91.6	21.4	100.0	100.0	43.8
2	100.0	100.0	100.0	100.0	29.4	100.0	100.0	65.4
3	100.0	100.0	100.0	100.0	34.2	100.0	100.0	86.1
4	100.0	100.0	100.0	100.0	40.9	100.0	100.0	100.0
5	100.0	100.0	100.0	100.0	55.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	55.0	100.0	100.0	100.0
8	100.0	100.0	100.0	100.0	55.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	55.0	100.0	100.0	100.0

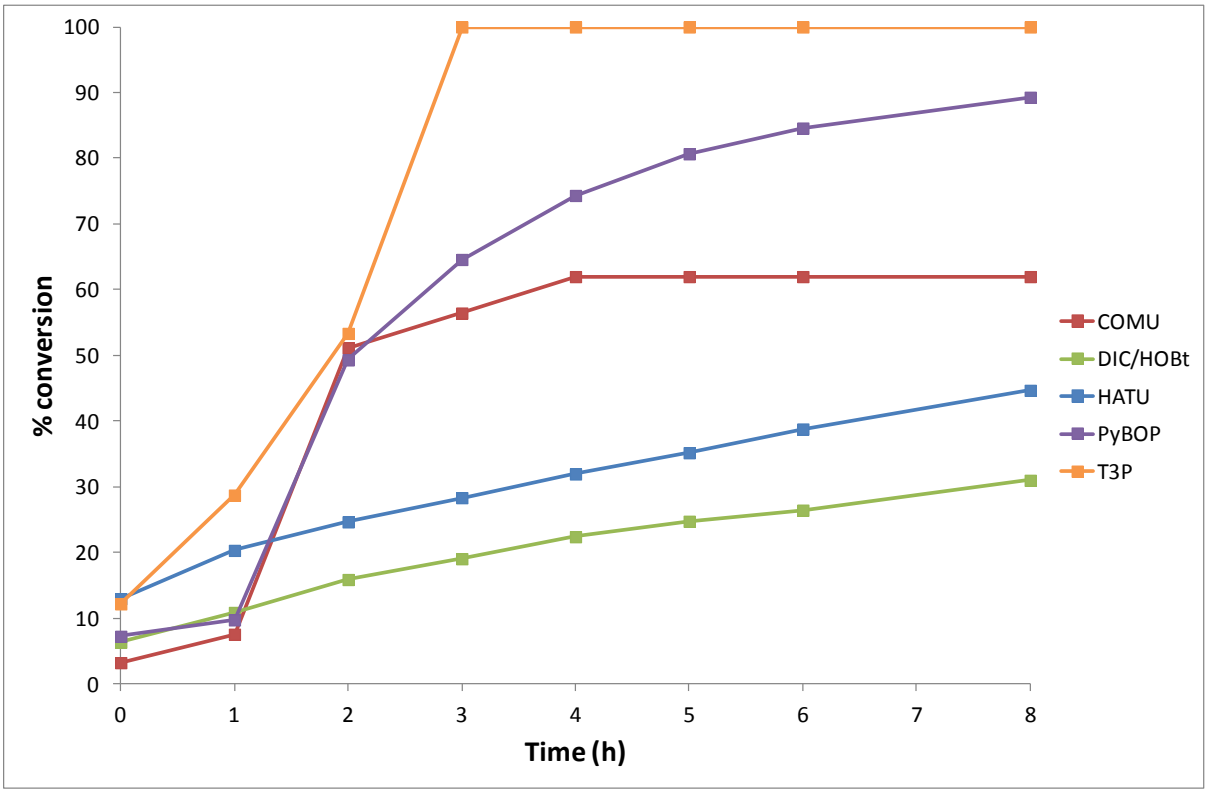
3.2 Conversion vs. Time Data for Reactions 1-4 Using the Range of Coupling Agents in a Specific Solvent

Reaction 1: TBME



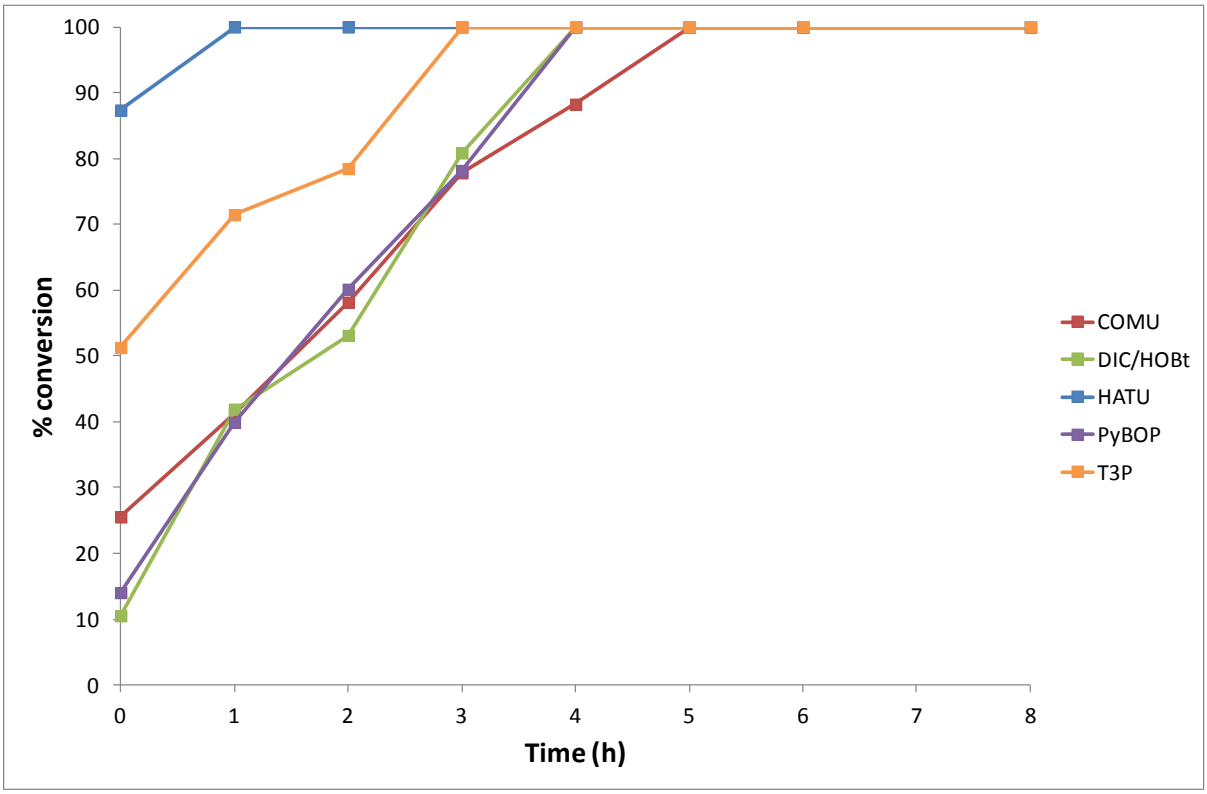
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	16.5	10.6	4.2	10.1	1.9
1	57.8	64.0	65.0	45.8	2.5
2	79.7	88.5	100.0	84.6	3.1
3	81.1	100.0	100.0	100.0	3.3
4	83.6	100.0	100.0	100.0	3.5
5	87.2	100.0	100.0	100.0	3.8
6	100.0	100.0	100.0	100.0	4.2
8	100.0	100.0	100.0	100.0	4.6
24	100.0	100.0	100.0	100.0	5.6

Reaction 1: CPME



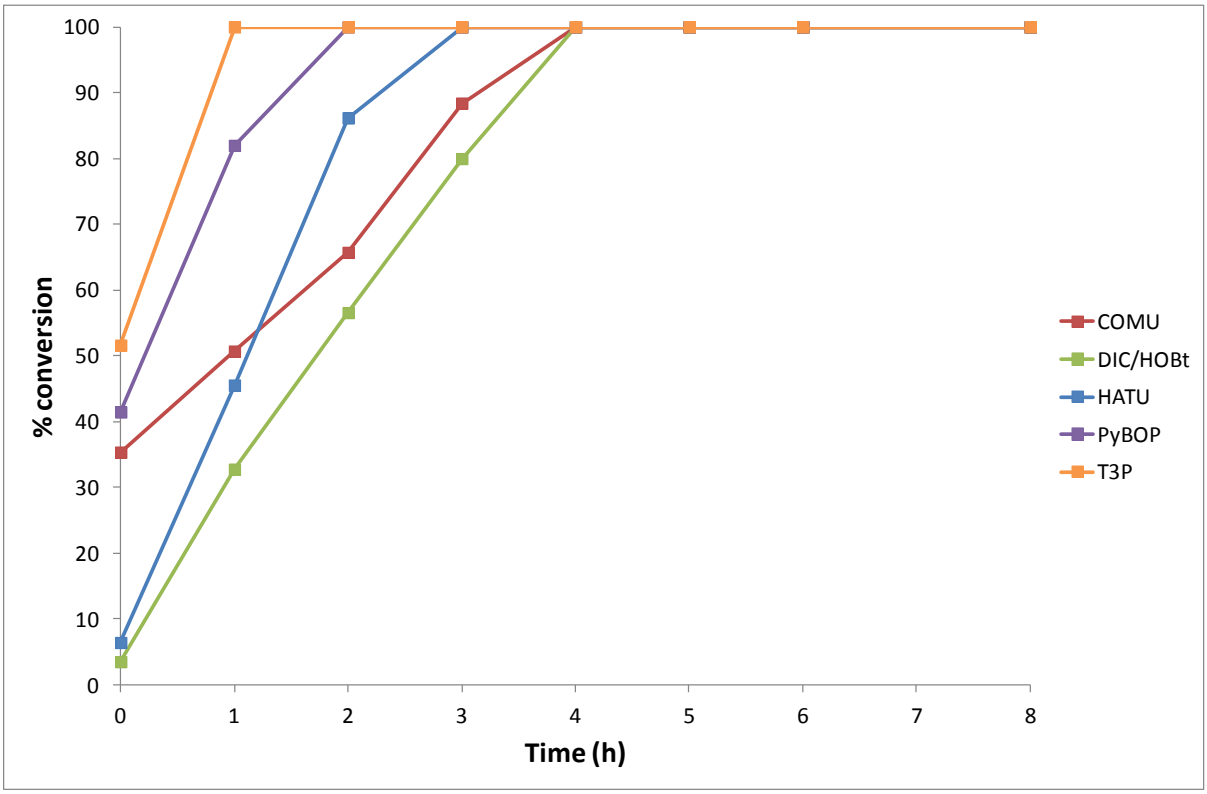
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	3.2	6.4	6.9	7.3	12.2
1	7.6	10.9	19.5	9.8	28.7
2	51.2	15.9	45.0	49.3	53.4
3	56.5	19.1	65.5	64.6	100.0
4	62.0	22.4	76.1	74.4	100.0
5	62.0	24.8	88.4	80.7	100.0
6	62.0	26.5	96.8	84.6	100.0
8	62.0	31.0	100.0	89.3	100.0
24	62.0	31.0	100.0	100.0	100.0

Reaction 1: CH_2Cl_2



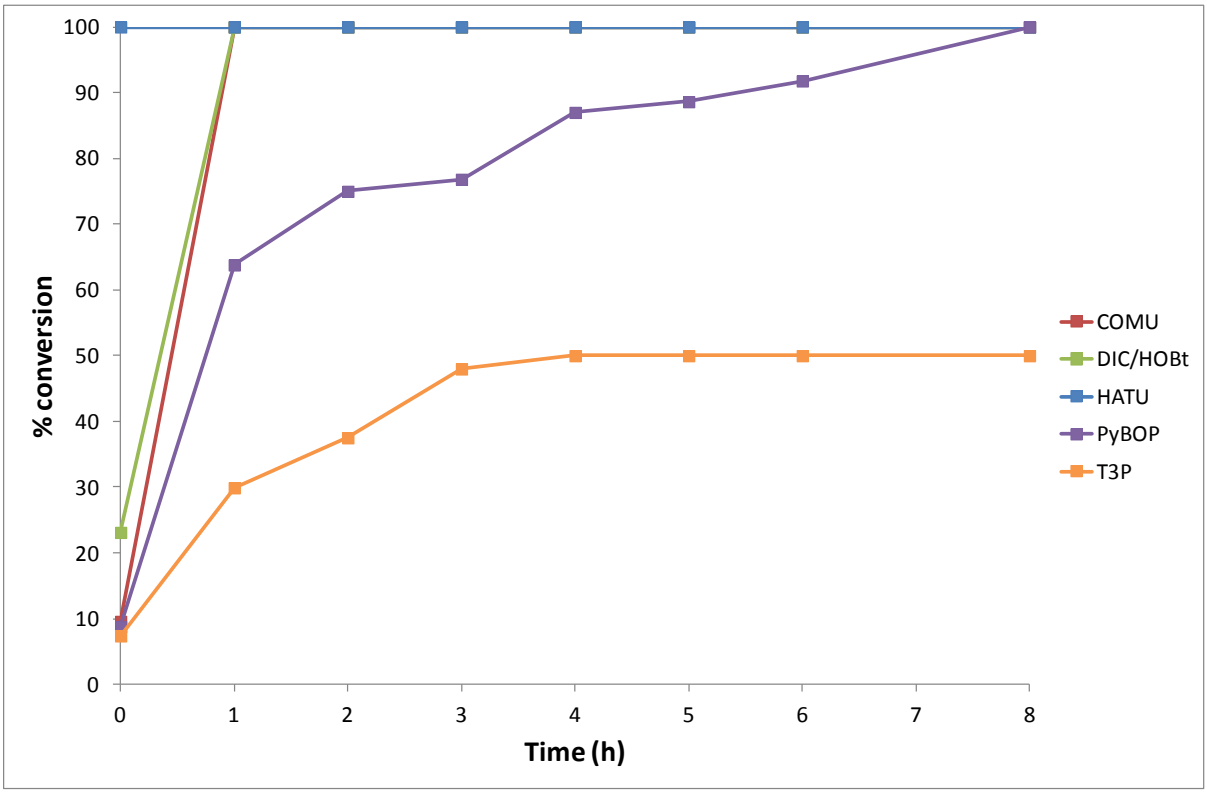
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	25.6	10.5	87.4	14.1	51.3
1	41.2	41.9	100.0	39.9	71.5
2	58.2	53.1	100.0	60.1	78.5
3	77.8	80.9	100.0	78.2	100.0
4	88.3	100.0	100.0	100.0	100.0
5	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0

Reaction 1: DMC



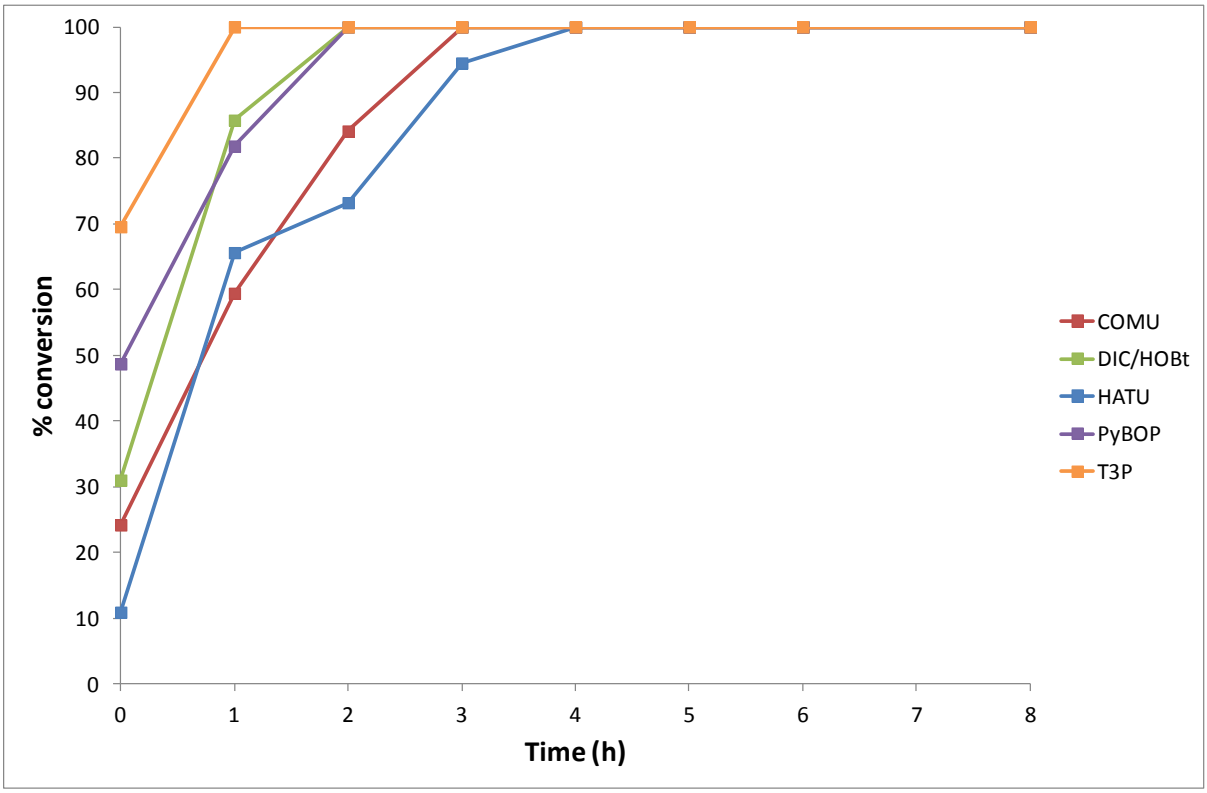
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	35.4	3.6	6.5	41.5	51.6
1	50.7	32.8	45.6	82.0	100.0
2	65.7	56.6	86.2	100.0	100.0
3	88.4	80.0	100.0	100.0	100.0
4	100.0	100.0	100.0	100.0	100.0
5	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0

Reaction 1: DMF



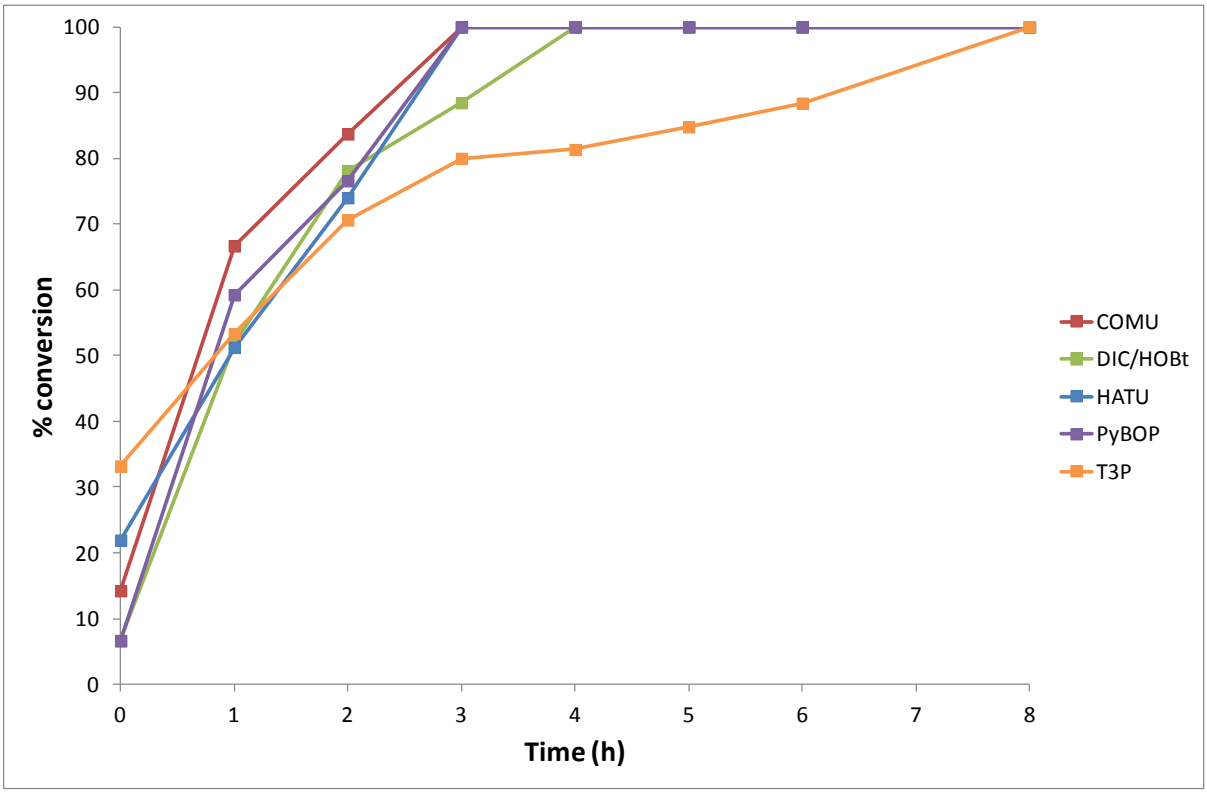
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	9.6	23.1	100.0	8.8	7.4
1	100.0	100.0	100.0	63.8	29.9
2	100.0	100.0	100.0	75.0	37.5
3	100.0	100.0	100.0	76.8	48.0
4	100.0	100.0	100.0	87.0	50.0
5	100.0	100.0	100.0	88.6	50.0
6	100.0	100.0	100.0	91.8	50.0
8	100.0	100.0	100.0	100.0	50.0
24	100.0	100.0	100.0	100.0	50.0

Reaction 1: EtOAc



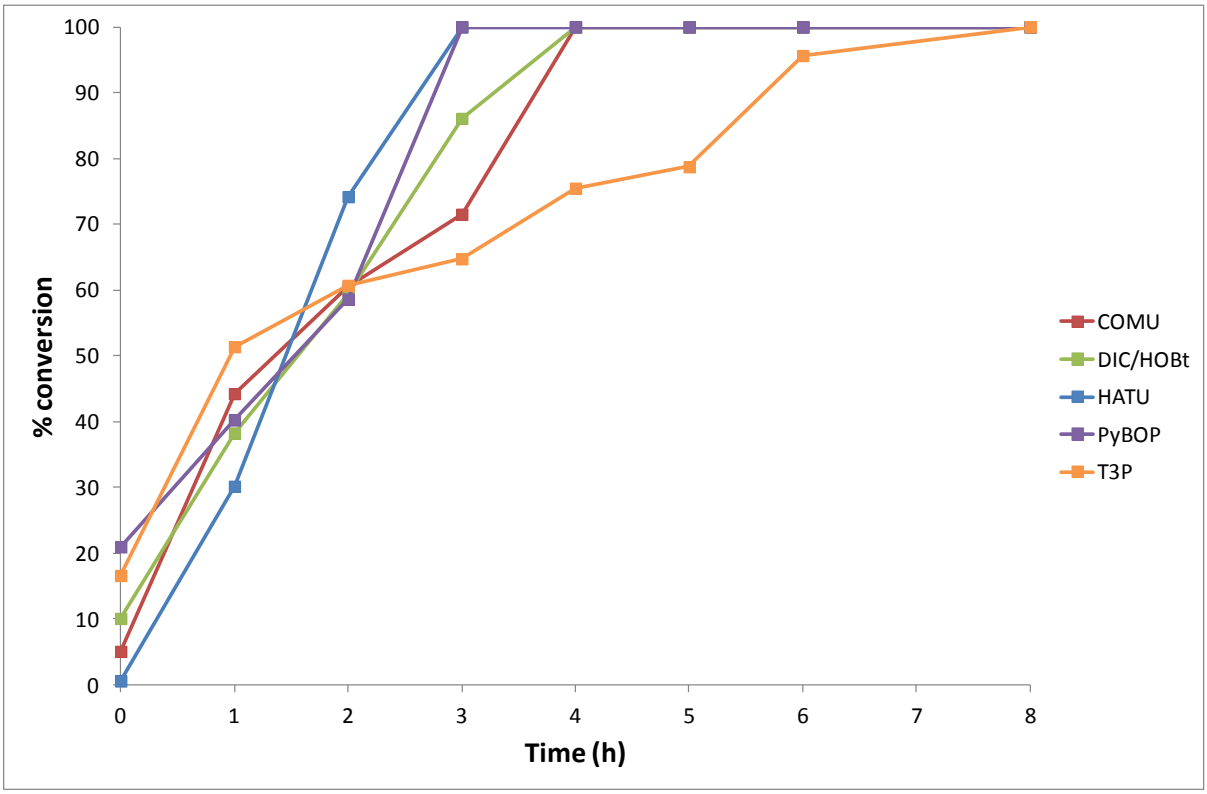
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	24.2	31.0	10.9	48.7	69.6
1	59.5	85.8	65.7	81.9	100.0
2	84.2	100.0	73.3	100.0	100.0
3	100.0	100.0	94.5	100.0	100.0
4	100.0	100.0	100.0	100.0	100.0
5	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0

Reaction 1: IPA



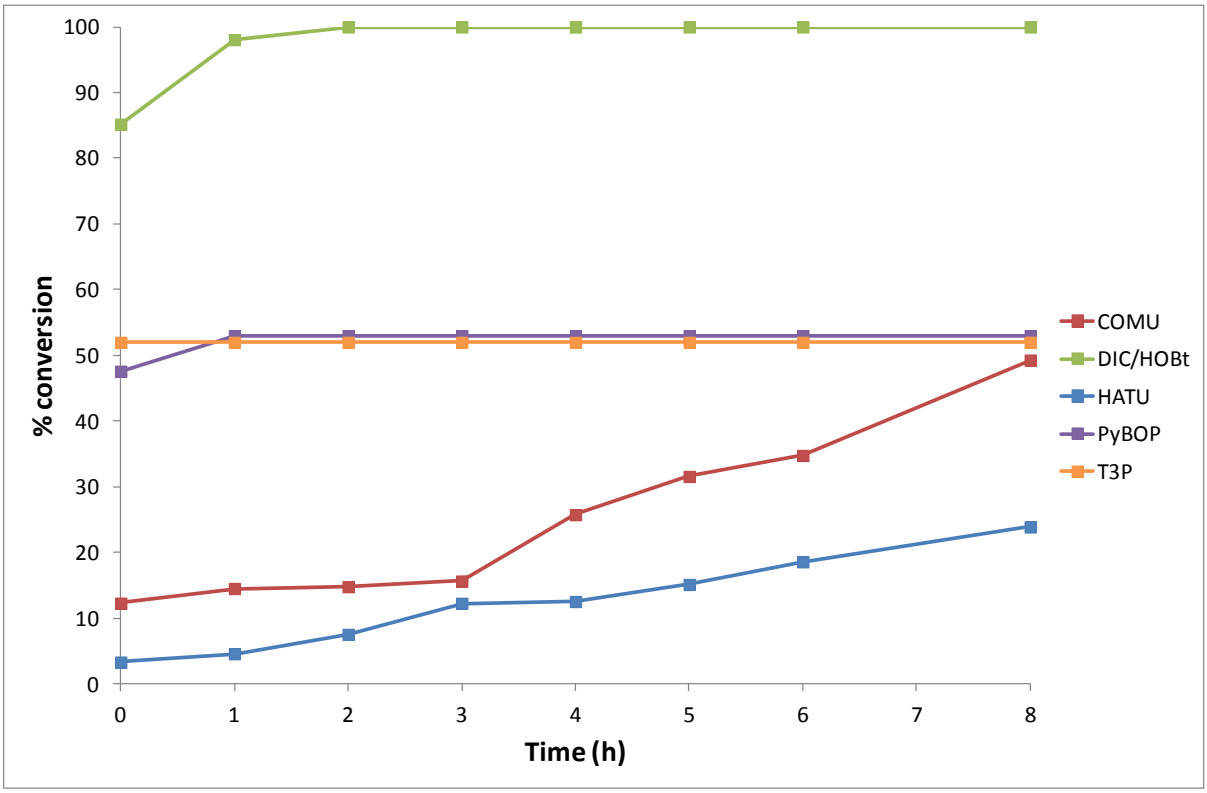
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	14.3	6.7	6.9	6.6	33.2
1	66.7	51.9	50.3	59.3	53.4
2	83.7	78.1	65.8	76.6	70.6
3	100.0	88.5	100.0	100.0	80.0
4	100.0	100.0	100.0	100.0	81.3
5	100.0	100.0	100.0	100.0	84.8
6	100.0	100.0	100.0	100.0	88.4
8	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0

Reaction 1: 2-MeTHF



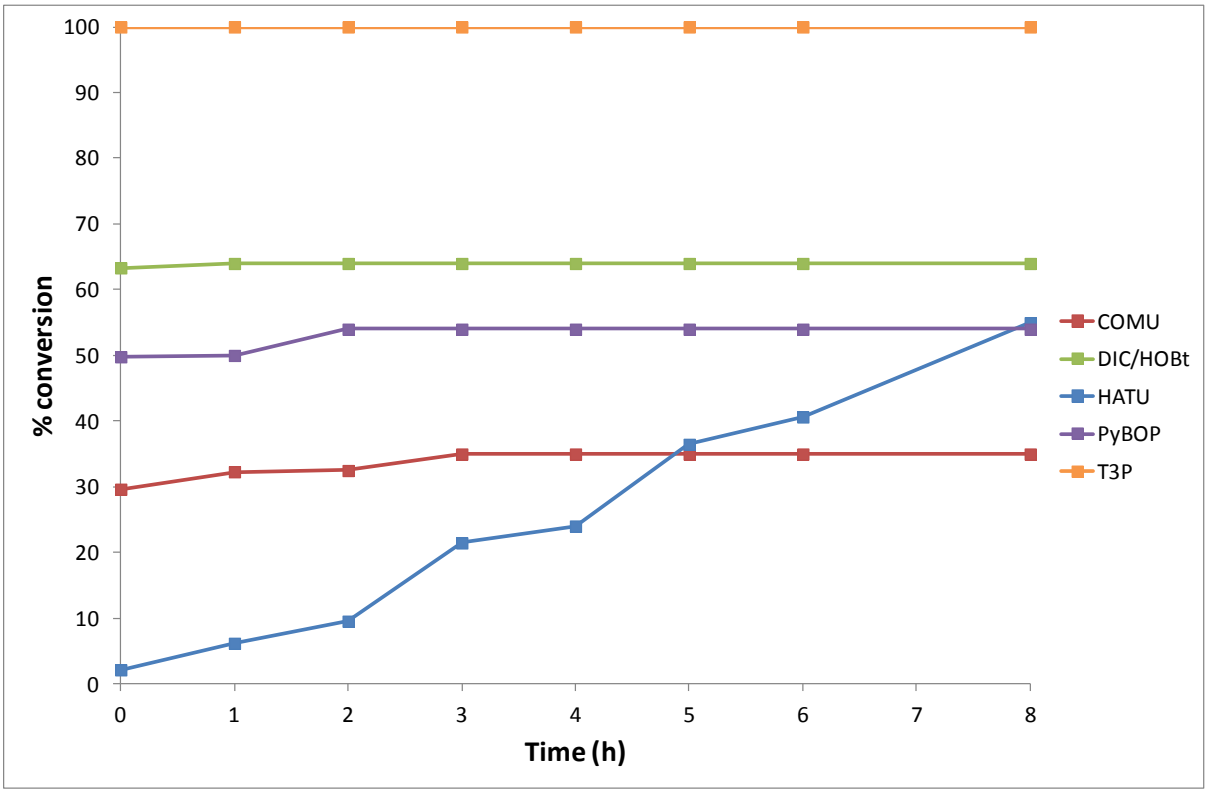
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	5.1	10.1	0.6	21.0	16.6
1	44.3	38.3	30.2	40.3	51.4
2	60.5	59.4	74.2	58.6	60.7
3	71.5	86.1	100.0	100.0	64.8
4	100.0	100.0	100.0	100.0	75.5
5	100.0	100.0	100.0	100.0	78.8
6	100.0	100.0	100.0	100.0	95.6
8	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0

Reaction 2: TBME



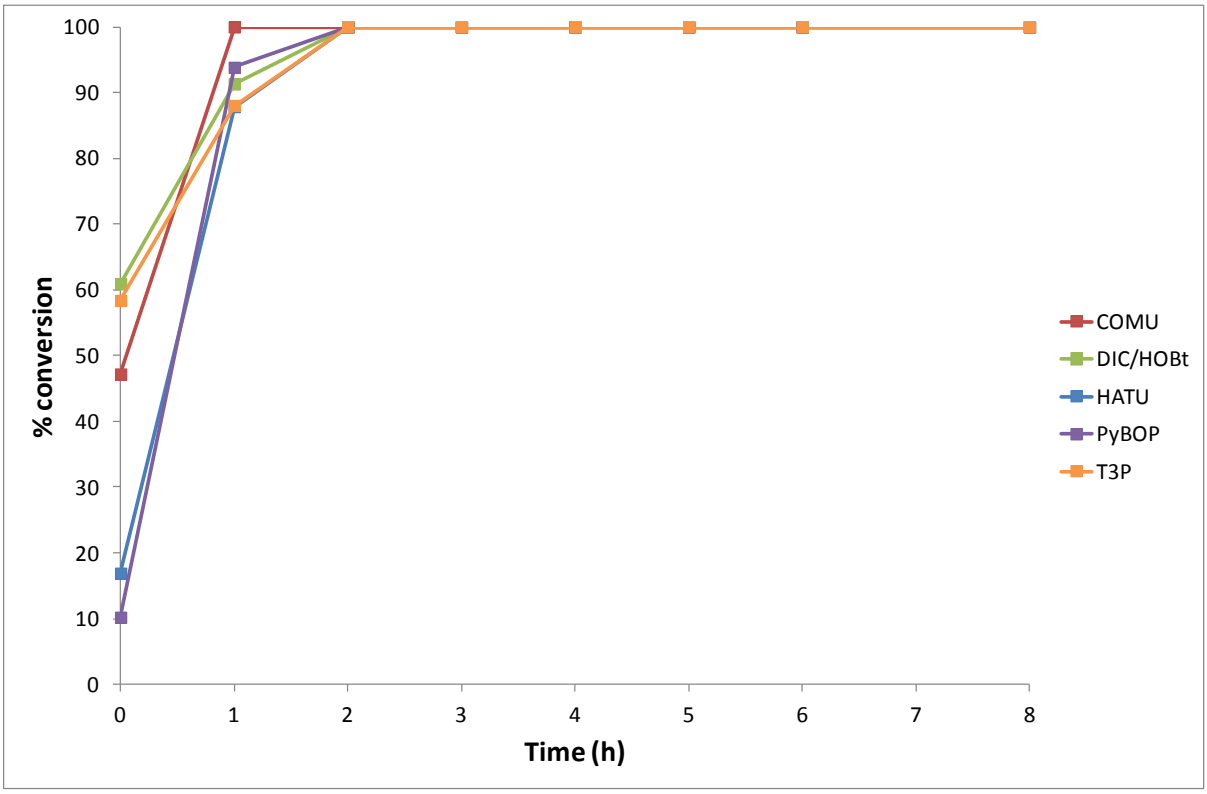
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	12.3	85.2	3.3	47.6	52.0
1	14.5	98.1	4.6	53.0	52.0
2	14.8	100.0	7.6	53.0	52.0
3	15.7	100.0	12.3	53.0	52.0
4	25.8	100.0	12.6	53.0	52.0
5	31.6	100.0	15.1	53.0	52.0
6	34.8	100.0	18.6	53.0	52.0
8	49.3	100.0	23.9	53.0	52.0
24	49.3	100.0	70.4	53.0	52.0

Reaction 2: CPME



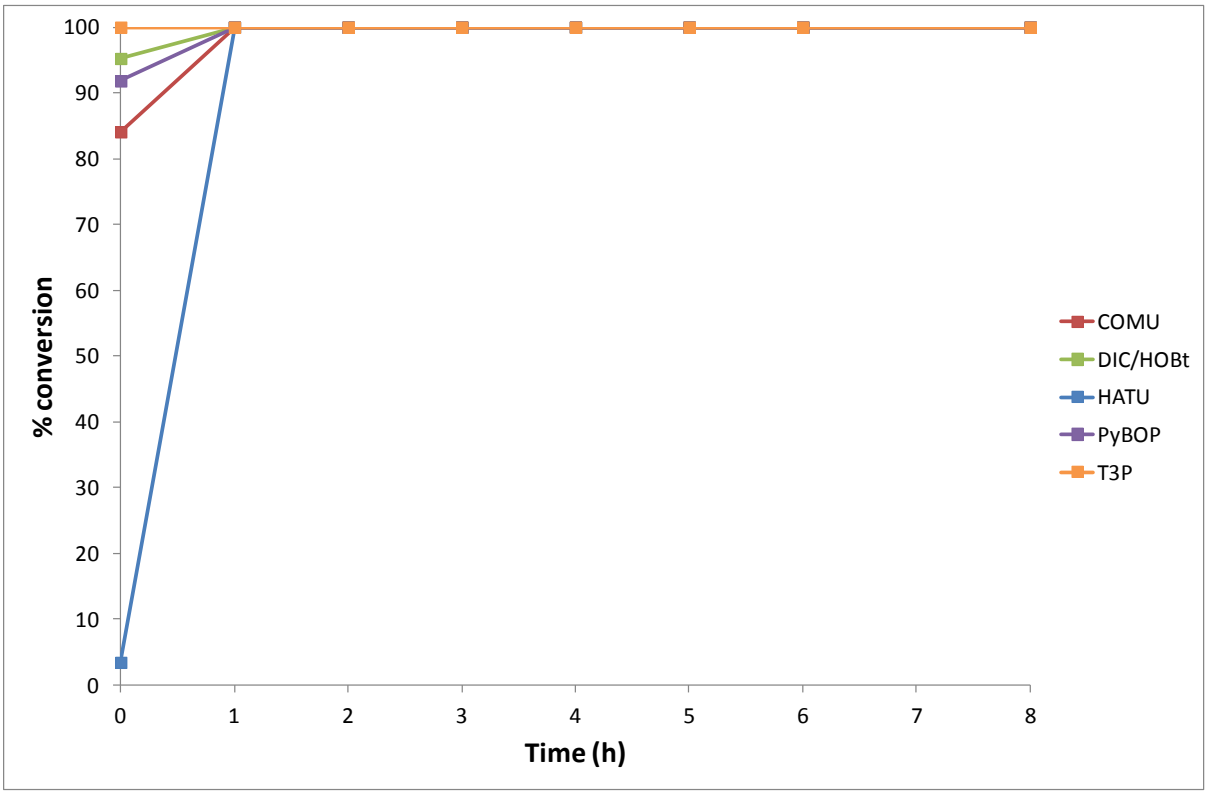
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	29.6	63.3	2.2	49.8	100.0
1	32.3	64.0	6.2	50.0	100.0
2	32.5	64.0	9.6	54.0	100.0
3	35.0	64.0	21.5	54.0	100.0
4	35.0	64.0	24.0	54.0	100.0
5	35.0	64.0	36.5	54.0	100.0
6	35.0	64.0	40.6	54.0	100.0
8	35.0	64.0	55.0	54.0	100.0
24	35.0	64.0	77.9	54.0	100.0

Reaction 2: CH_2Cl_2



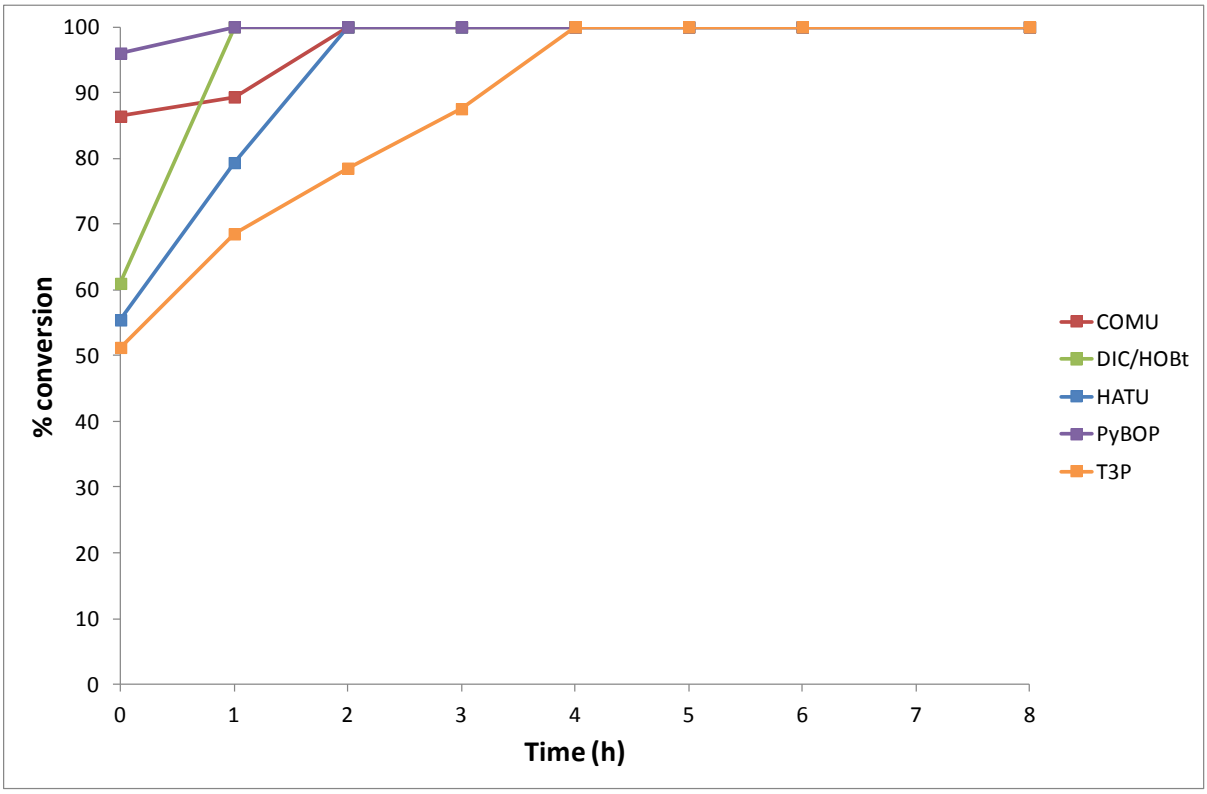
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	47.2	60.9	16.9	10.2	58.4
1	100.0	91.3	87.9	93.9	88.1
2	100.0	100.0	100.0	100.0	100.0
3	100.0	100.0	100.0	100.0	100.0
4	100.0	100.0	100.0	100.0	100.0
5	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0

Reaction 2: DMC



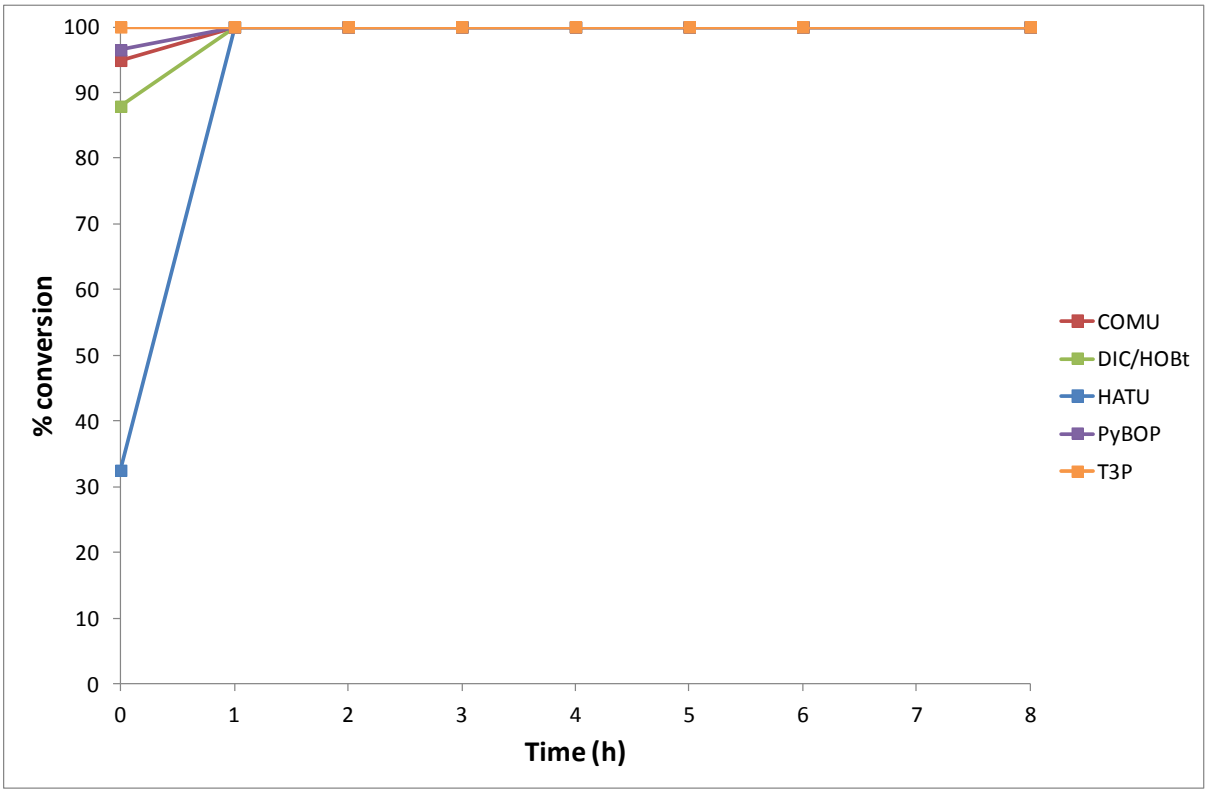
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	84.1	95.2	3.5	91.8	100.0
1	100.0	100.0	100.0	100.0	100.0
2	100.0	100.0	100.0	100.0	100.0
3	100.0	100.0	100.0	100.0	100.0
4	100.0	100.0	100.0	100.0	100.0
5	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0

Reaction 2: DMF



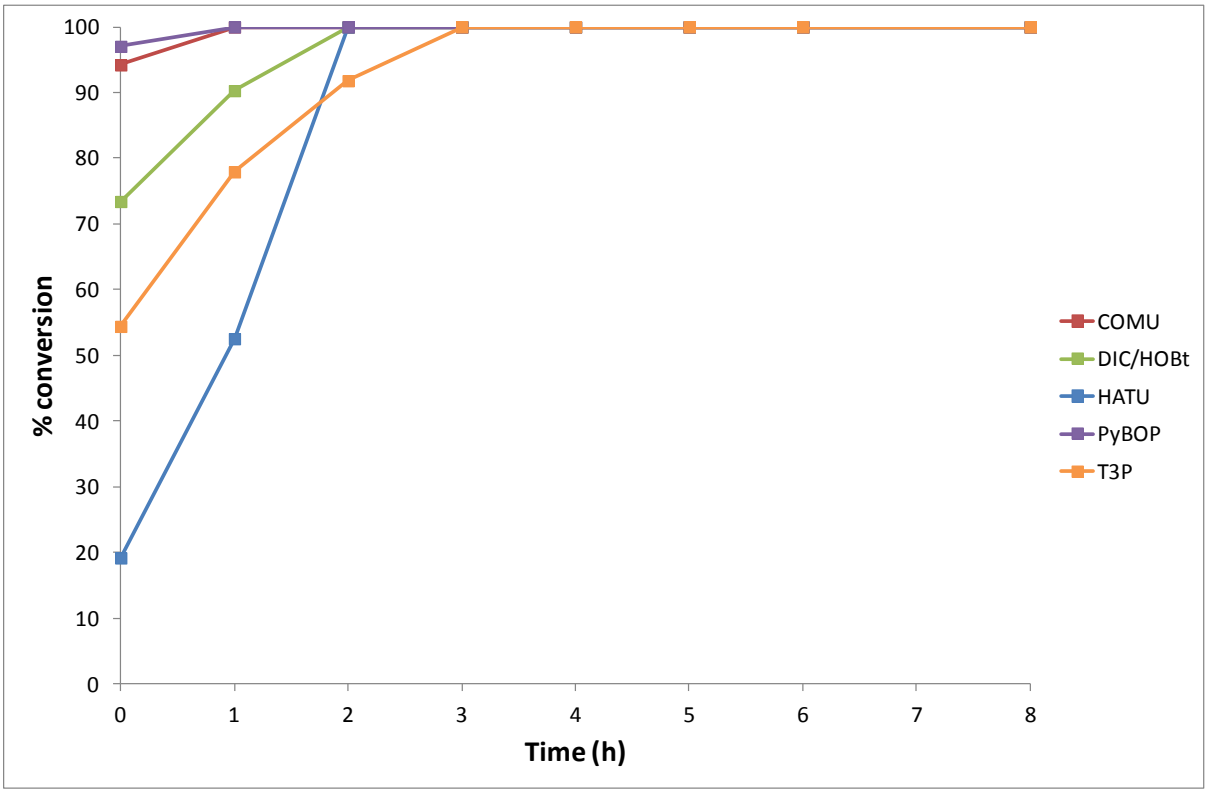
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	86.4	61.0	55.4	96.0	51.3
1	89.3	100.0	79.4	100.0	68.5
2	100.0	100.0	100.0	100.0	78.5
3	100.0	100.0	100.0	100.0	87.6
4	100.0	100.0	100.0	100.0	100.0
5	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0

Reaction 2: EtOAc



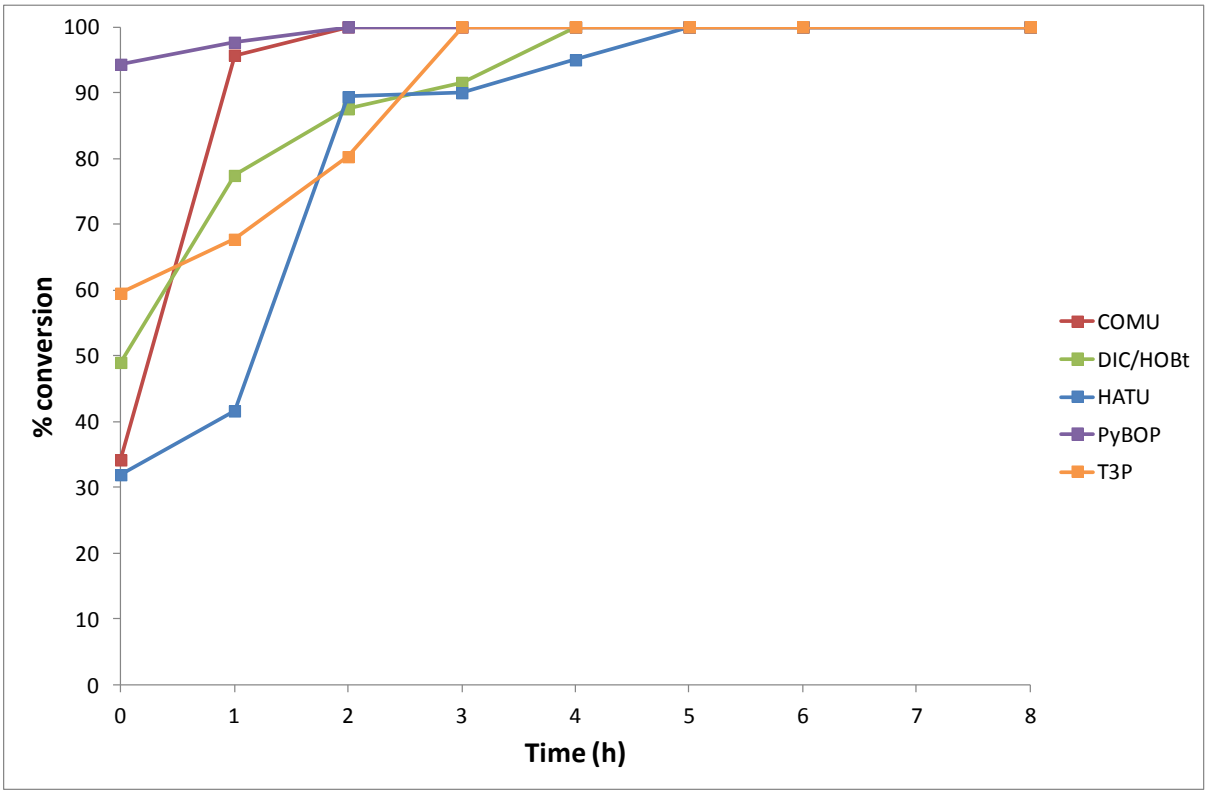
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	94.9	87.9	32.5	96.5	100.0
1	100.0	100.0	100.0	100.0	100.0
2	100.0	100.0	100.0	100.0	100.0
3	100.0	100.0	100.0	100.0	100.0
4	100.0	100.0	100.0	100.0	100.0
5	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0

Reaction 2: IPA



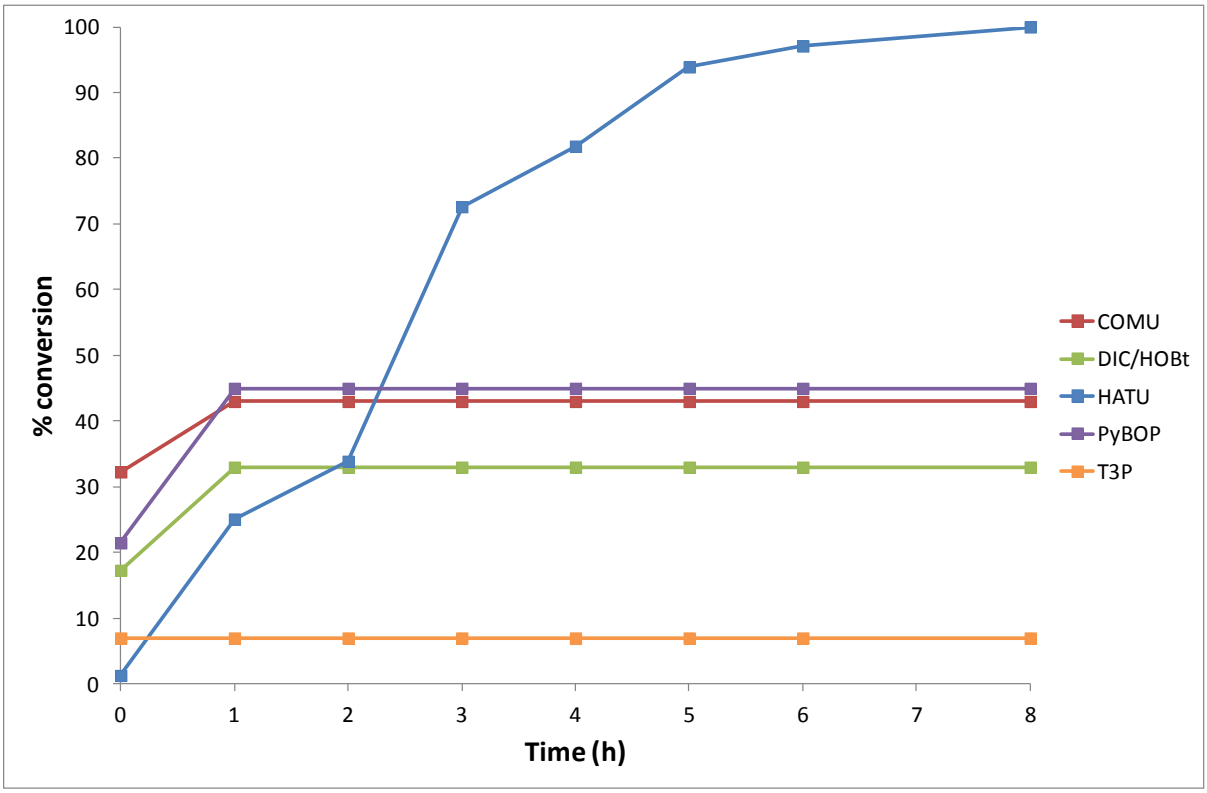
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	94.2	73.4	19.2	97.0	54.4
1	100.0	90.3	52.5	100.0	77.9
2	100.0	100.0	100.0	100.0	91.8
3	100.0	100.0	100.0	100.0	100.0
4	100.0	100.0	100.0	100.0	100.0
5	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0

Reaction 2: 2-MeTHF



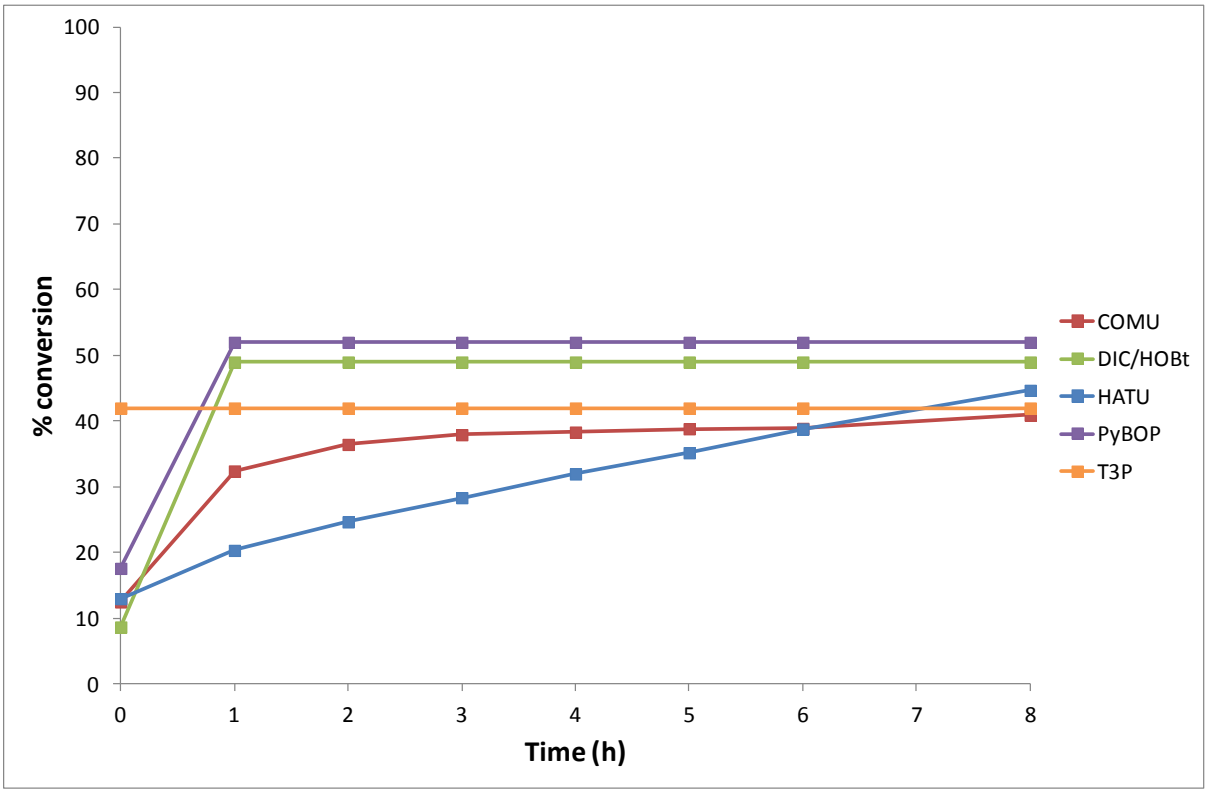
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	34.2	49.0	32.0	94.3	59.5
1	95.7	77.4	41.7	97.7	67.7
2	100.0	87.6	89.4	100.0	80.3
3	100.0	91.6	90.0	100.0	100.0
4	100.0	100.0	95.0	100.0	100.0
5	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0

Reaction 3: TBME



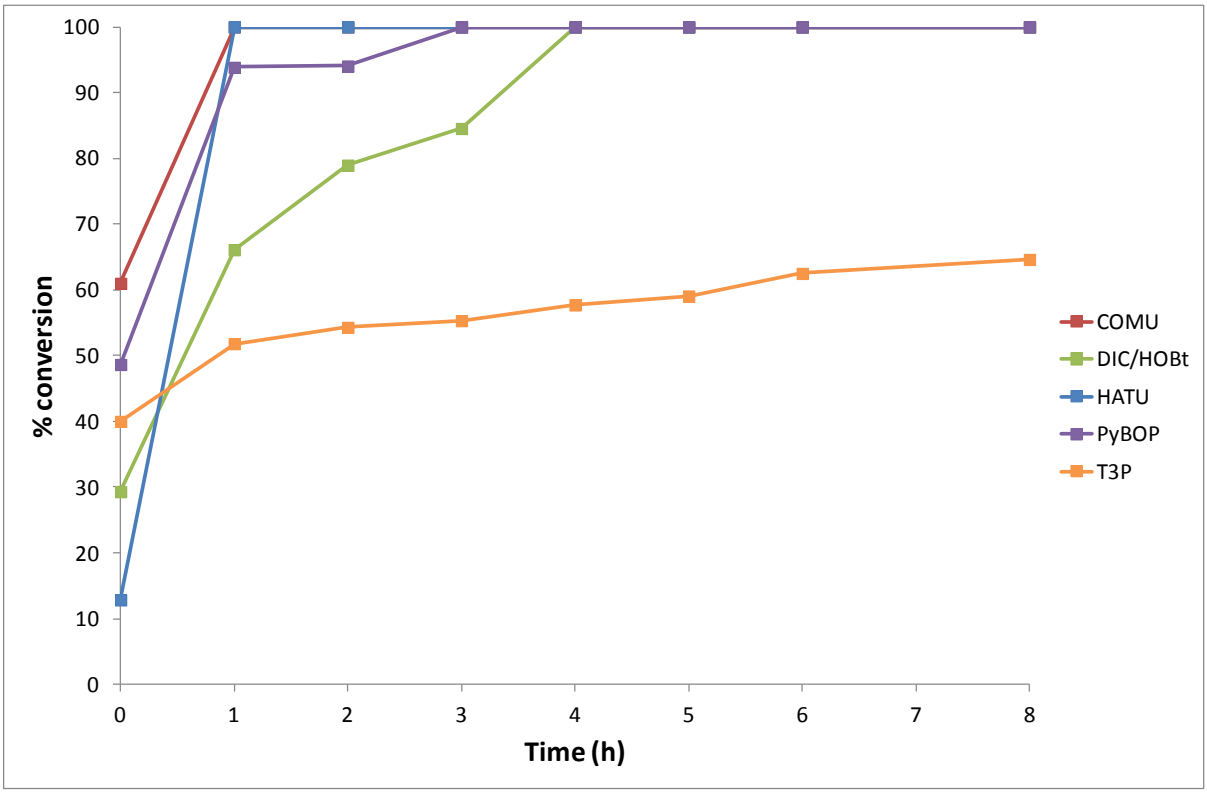
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	32.3	17.3	1.3	21.5	7.0
1	43.0	33.0	25.1	45.0	7.0
2	43.0	33.0	33.9	45.0	7.0
3	43.0	33.0	72.6	45.0	7.0
4	43.0	33.0	81.9	45.0	7.0
5	43.0	33.0	93.9	45.0	7.0
6	43.0	33.0	97.1	45.0	7.0
8	43.0	33.0	100.0	45.0	7.0
24	43.0	33.0	100.0	45.0	7.0

Reaction 3: CPME



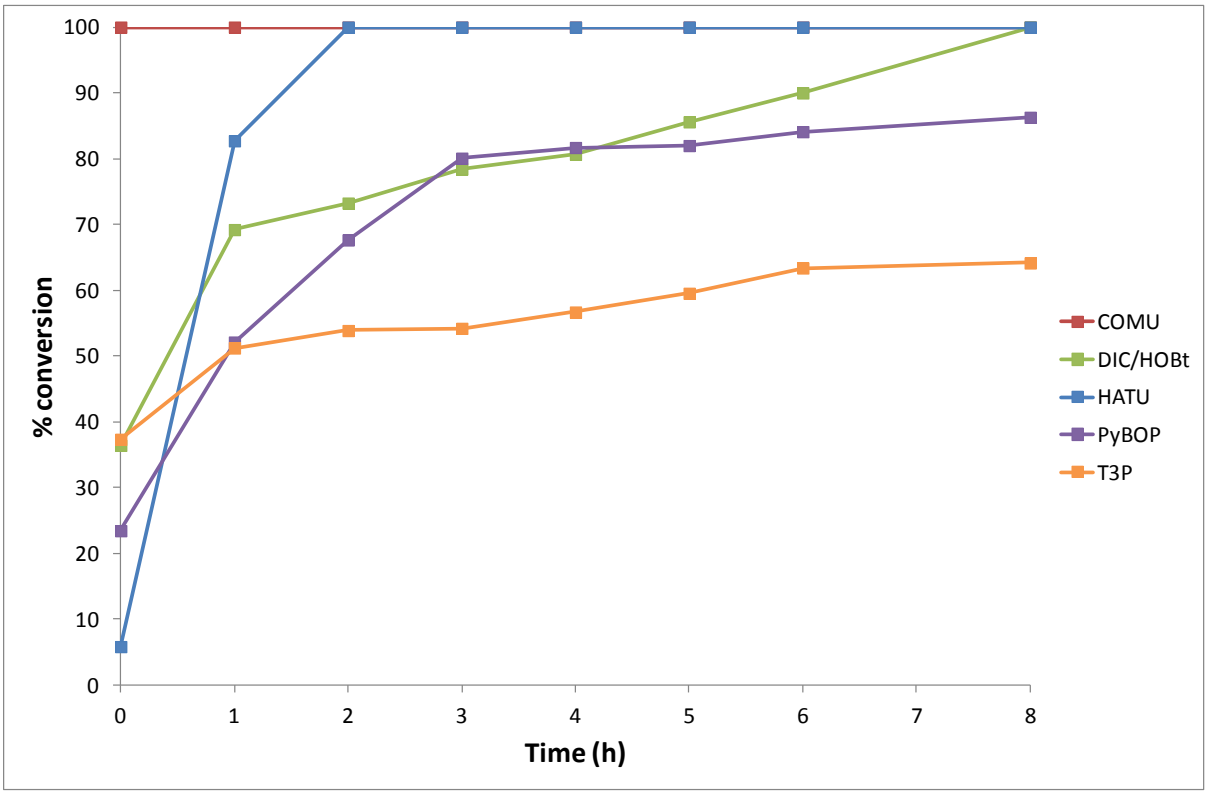
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	12.5	8.7	13.0	17.6	42.0
1	32.4	49.0	20.3	52.0	42.0
2	36.5	49.0	24.7	52.0	42.0
3	37.9	49.0	28.4	52.0	42.0
4	38.3	49.0	32.0	52.0	42.0
5	38.8	49.0	35.2	52.0	42.0
6	38.9	49.0	38.8	52.0	42.0
8	40.9	49.0	44.7	52.0	42.0
24	48.3	49.0	52.4	52.0	42.0

Reaction 3: CH_2Cl_2



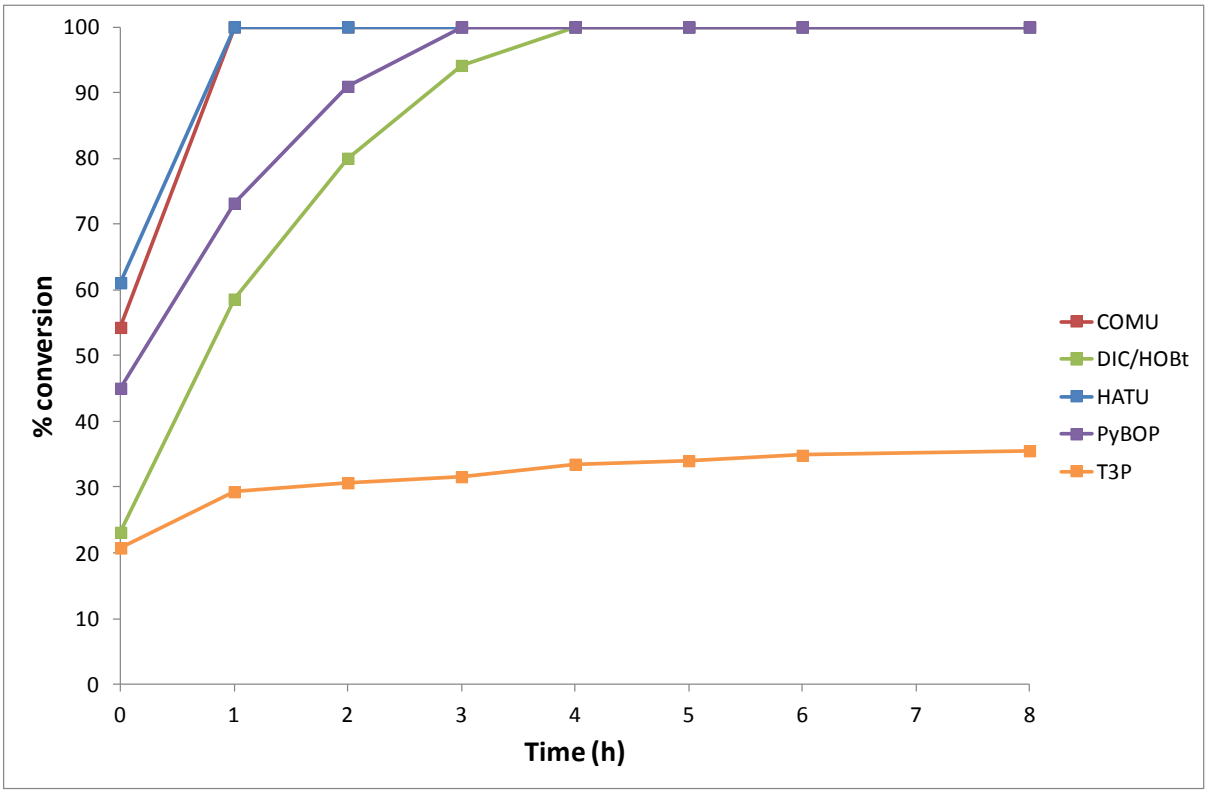
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	61.0	29.3	12.9	48.7	40.0
1	100.0	66.1	100.0	93.9	51.8
2	100.0	79.0	100.0	94.1	54.3
3	100.0	84.6	100.0	100.0	55.3
4	100.0	100.0	100.0	100.0	57.7
5	100.0	100.0	100.0	100.0	59.1
6	100.0	100.0	100.0	100.0	62.5
8	100.0	100.0	100.0	100.0	64.6
24	100.0	100.0	100.0	100.0	66.7

Reaction 3: DMC



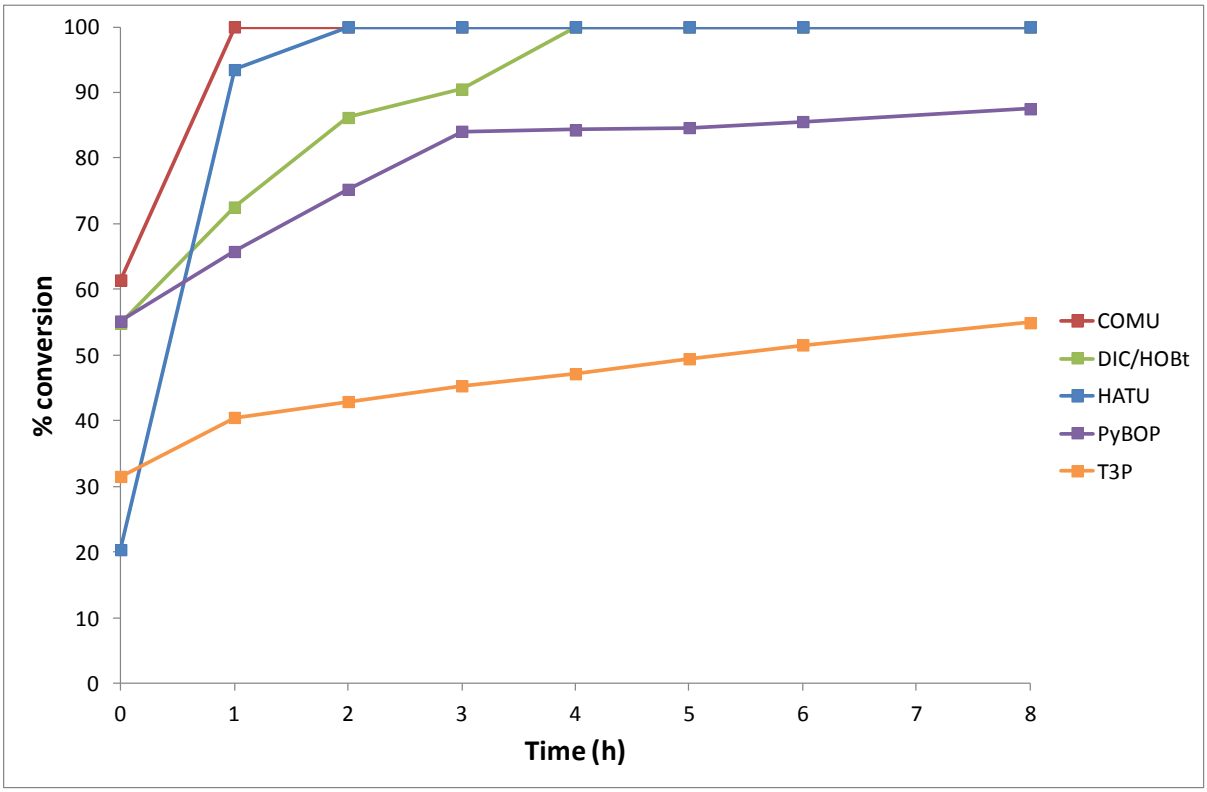
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	100.0	36.5	5.9	23.5	37.4
1	100.0	69.2	82.7	52.1	51.2
2	100.0	73.3	100.0	67.7	53.9
3	100.0	78.4	100.0	80.1	54.2
4	100.0	80.7	100.0	81.7	56.7
5	100.0	85.6	100.0	82.0	59.6
6	100.0	90.0	100.0	84.1	63.4
8	100.0	100.0	100.0	86.3	64.2
24	100.0	100.0	100.0	100.0	66.0

Reaction 3: DMF



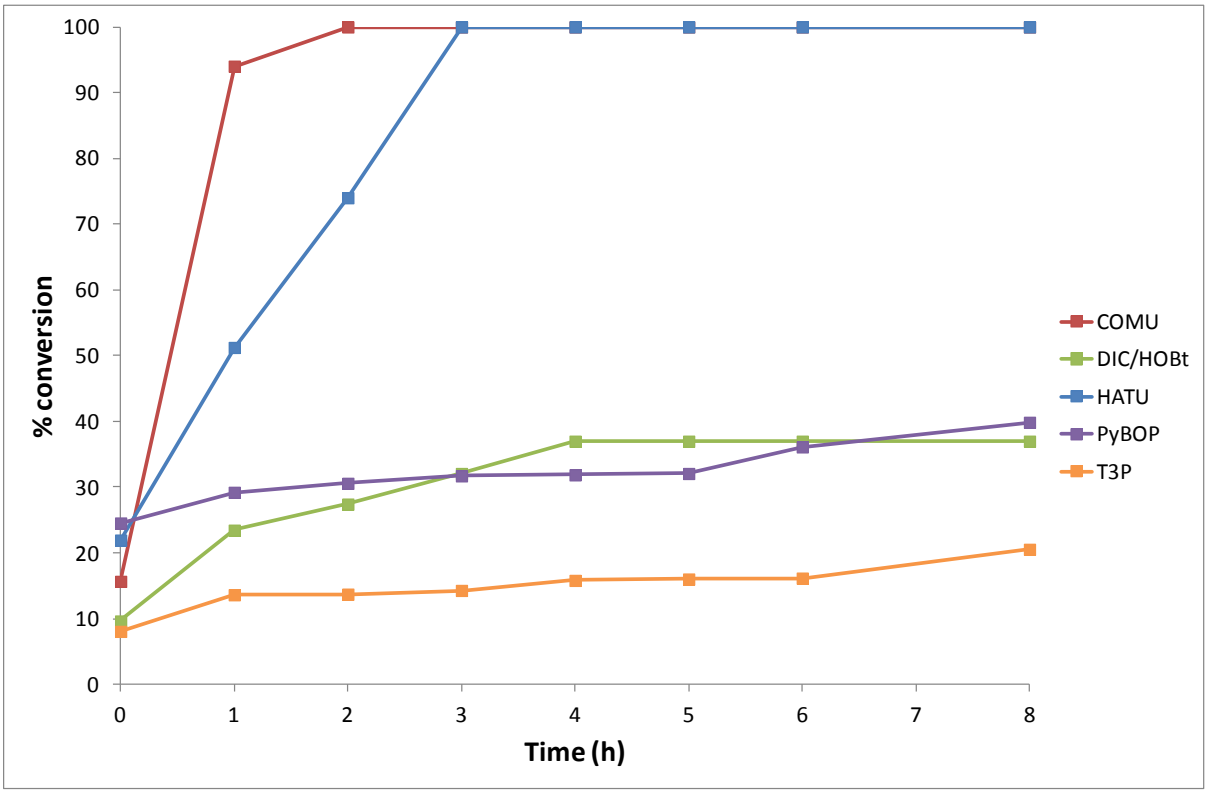
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	54.3	23.1	61.1	45.0	20.8
1	100.0	58.6	100.0	73.2	29.3
2	100.0	80.0	100.0	91.0	30.7
3	100.0	94.1	100.0	100.0	31.6
4	100.0	100.0	100.0	100.0	33.5
5	100.0	100.0	100.0	100.0	34.0
6	100.0	100.0	100.0	100.0	34.9
8	100.0	100.0	100.0	100.0	35.6
24	100.0	100.0	100.0	100.0	38.7

Reaction 3: EtOAc



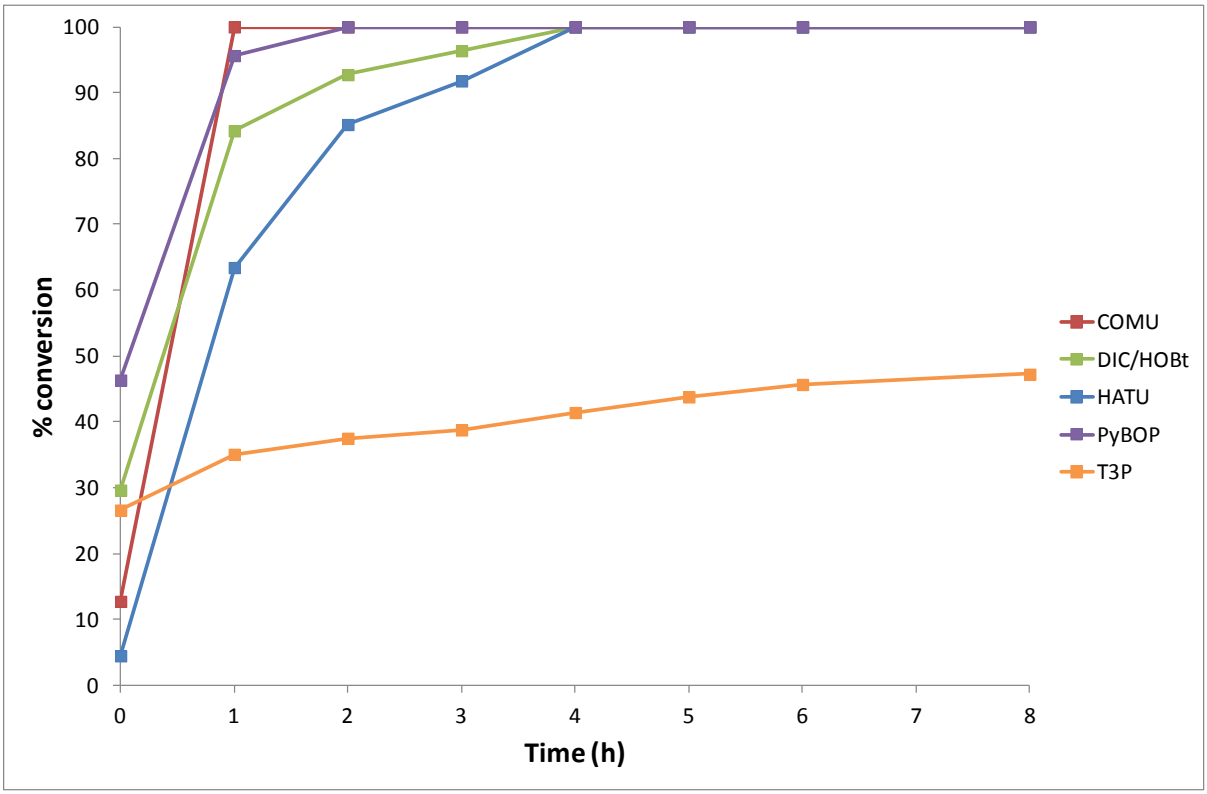
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	61.5	54.9	20.4	55.2	31.5
1	100.0	72.6	93.5	65.8	40.5
2	100.0	86.2	100.0	75.3	42.9
3	100.0	90.5	100.0	84.1	45.3
4	100.0	100.0	100.0	84.3	47.2
5	100.0	100.0	100.0	84.7	49.5
6	100.0	100.0	100.0	85.6	51.6
8	100.0	100.0	100.0	87.5	55.0
24	100.0	100.0	100.0	88.7	58.5

Reaction 3: IPA



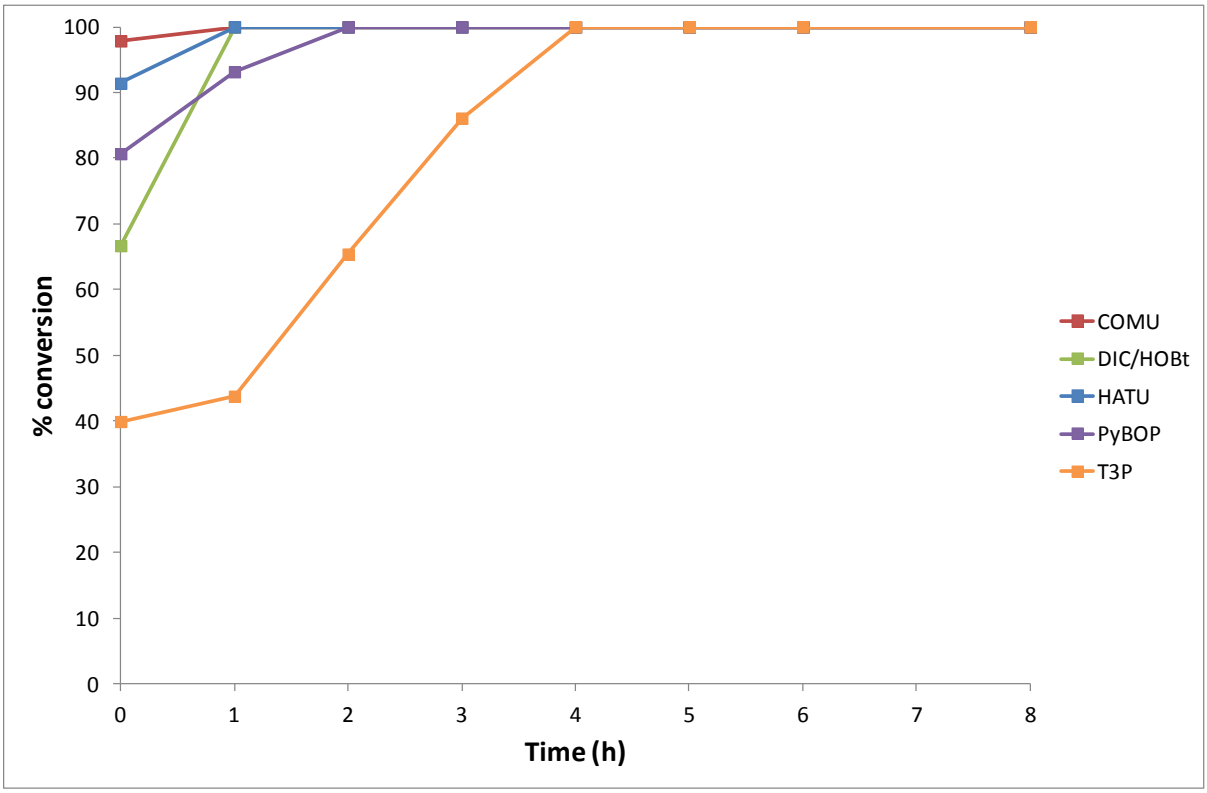
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	15.7	9.7	22.0	24.6	8.1
1	94.0	23.5	51.3	29.2	13.6
2	100.0	27.4	74.0	30.6	13.7
3	100.0	32.1	100.0	31.7	14.3
4	100.0	37.0	100.0	31.9	15.8
5	100.0	37.0	100.0	32.1	16.0
6	100.0	37.0	100.0	36.1	16.2
8	100.0	37.0	100.0	39.9	20.6
24	100.0	37.0	100.0	40.1	22.8

Reaction 3: 2-MeTHF



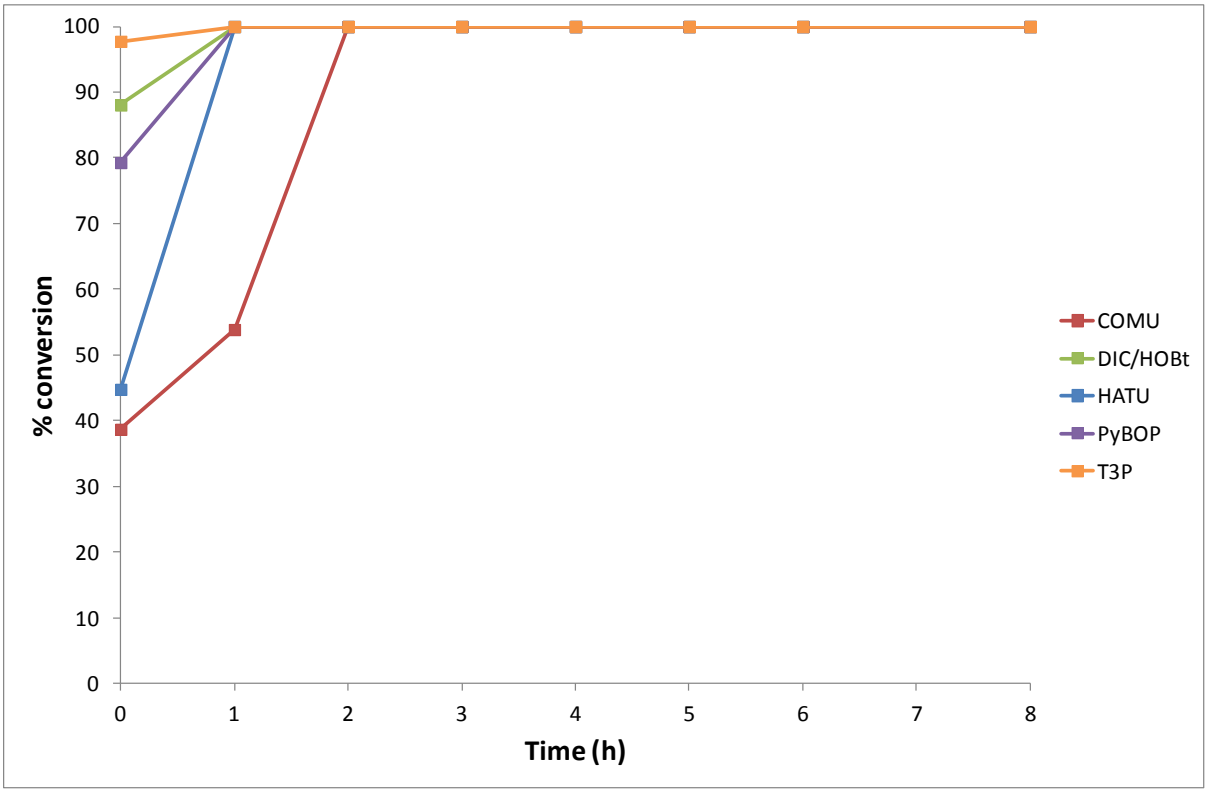
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	12.8	29.6	4.5	46.4	26.6
1	100.0	84.2	63.5	95.6	35.1
2	100.0	92.7	85.2	100.0	37.5
3	100.0	96.4	91.8	100.0	38.8
4	100.0	100.0	100.0	100.0	41.4
5	100.0	100.0	100.0	100.0	43.8
6	100.0	100.0	100.0	100.0	45.7
8	100.0	100.0	100.0	100.0	47.3
24	100.0	100.0	100.0	100.0	48.2

Reaction 4: TBME



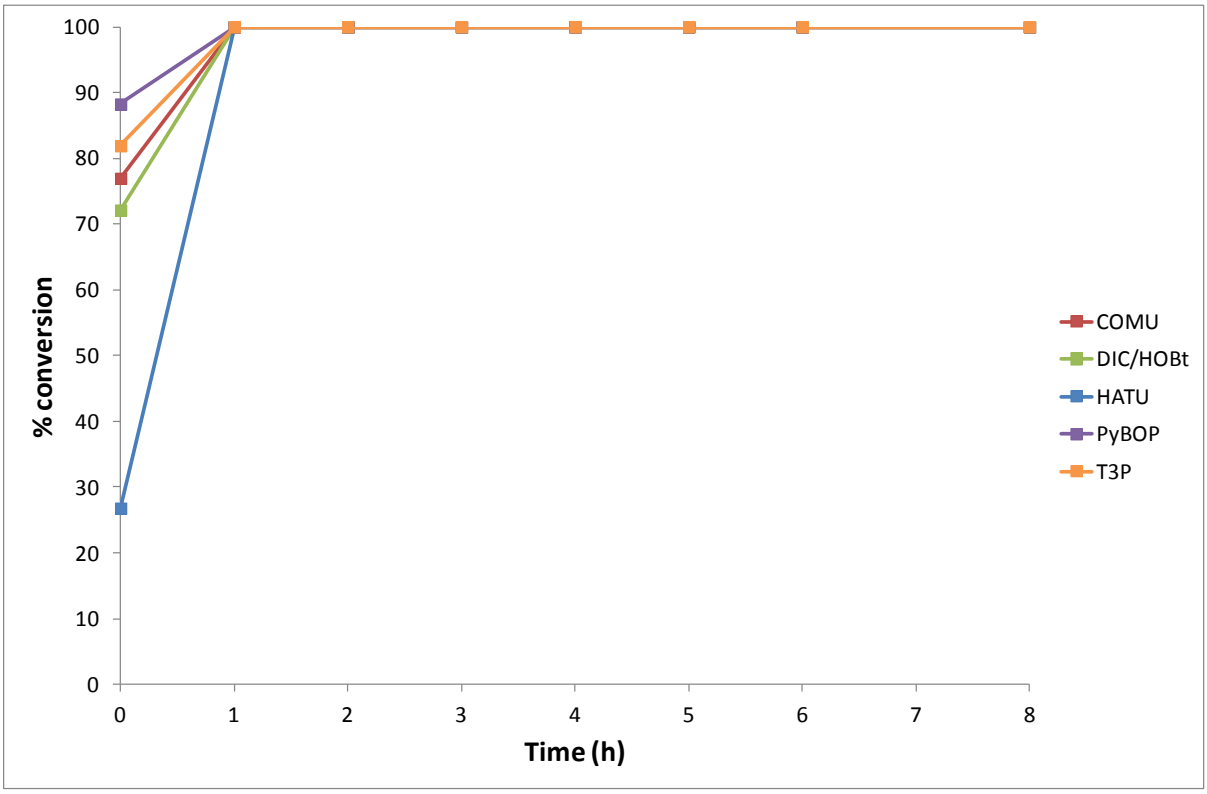
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	97.9	66.7	91.4	80.7	39.9
1	100	100.0	100	93.2	43.8
2	100	100.0	100	100.0	65.4
3	100	100.0	100	100.0	86.1
4	100	100.0	100	100.0	100.0
5	100	100.0	100	100.0	100.0
6	100	100.0	100	100.0	100.0
8	100	100.0	100	100.0	100.0
24	100	100.0	100	100.0	100.0

Reaction 4: CPME



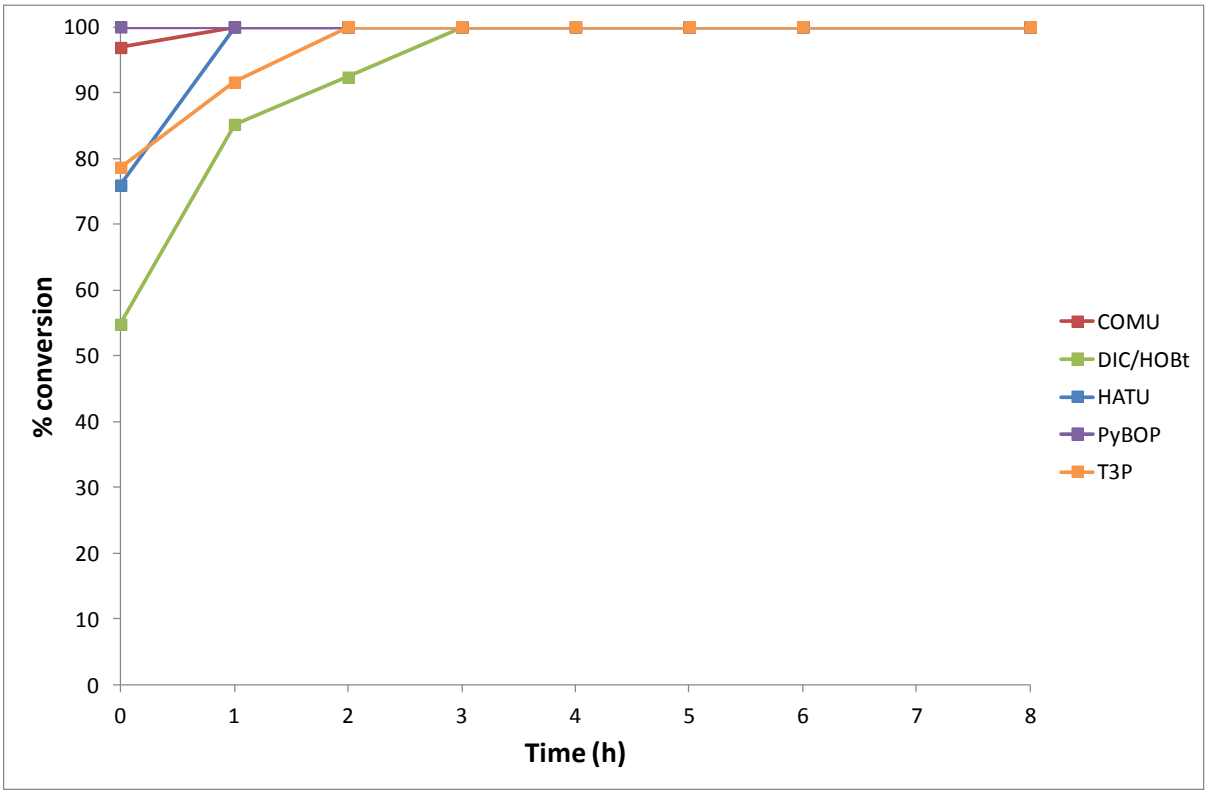
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	38.7	88.1	44.8	79.3	97.8
1	53.9	100.0	100.0	100.0	100.0
2	100.0	100.0	100.0	100.0	100.0
3	100.0	100.0	100.0	100.0	100.0
4	100.0	100.0	100.0	100.0	100.0
5	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0

Reaction 4: CH_2Cl_2



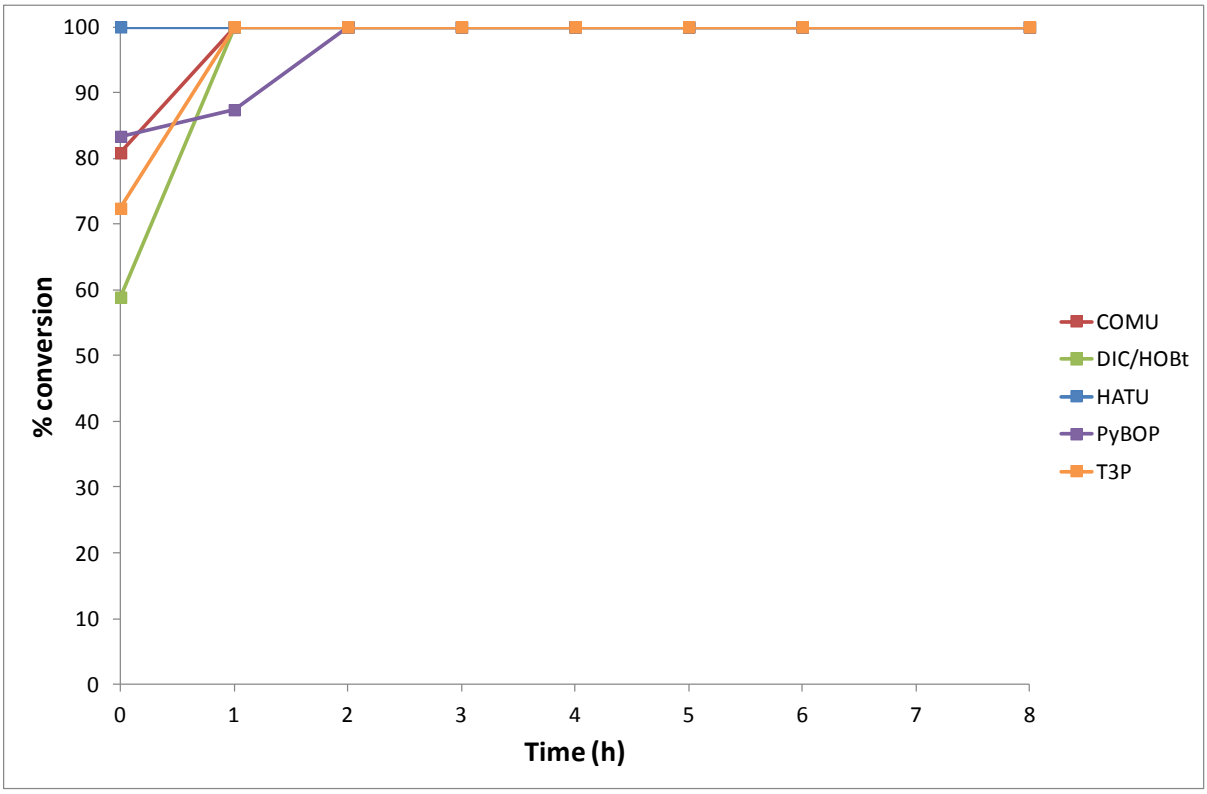
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	77.0	72.1	26.8	88.3	81.9
1	100.0	100.0	100.0	100.0	100.0
2	100.0	100.0	100.0	100.0	100.0
3	100.0	100.0	100.0	100.0	100.0
4	100.0	100.0	100.0	100.0	100.0
5	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0

Reaction 4: DMC



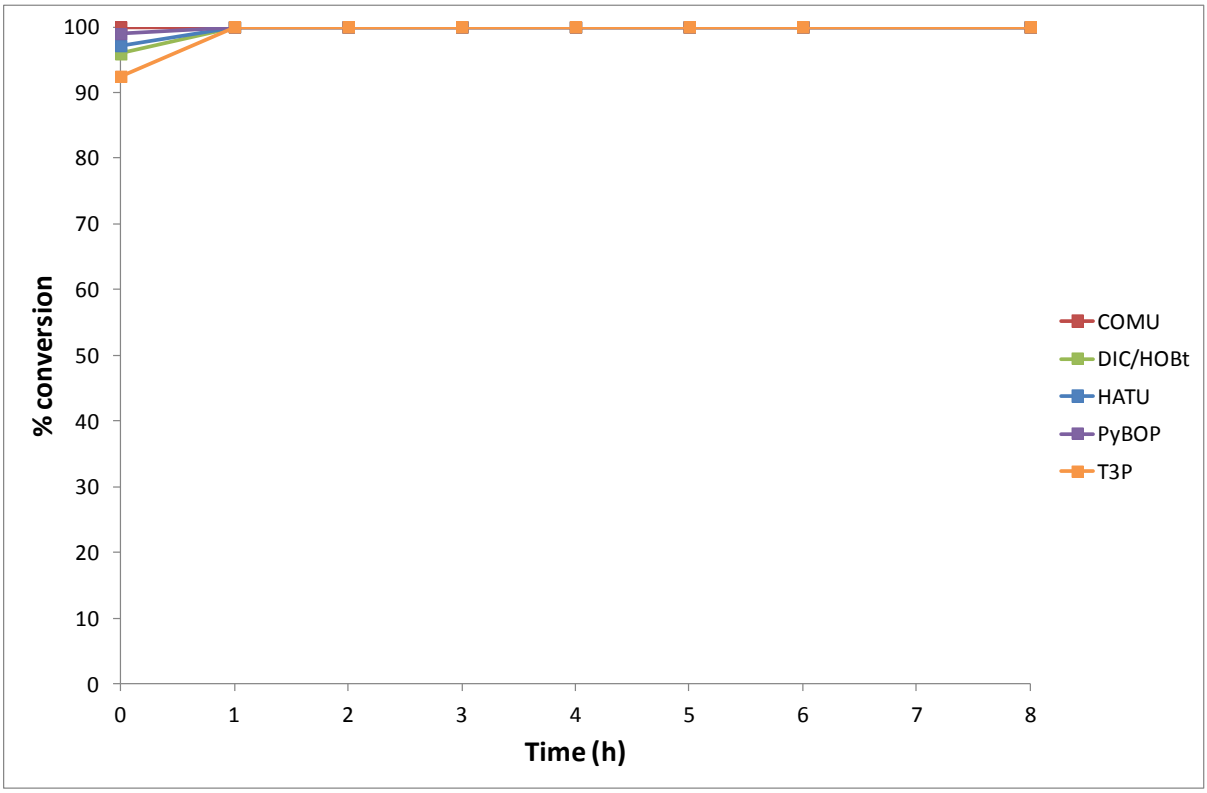
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	96.9	54.8	76.0	100.0	78.7
1	100.0	85.2	100.0	100.0	91.6
2	100.0	92.4	100.0	100.0	100.0
3	100.0	100.0	100.0	100.0	100.0
4	100.0	100.0	100.0	100.0	100.0
5	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0

Reaction 4: DMF



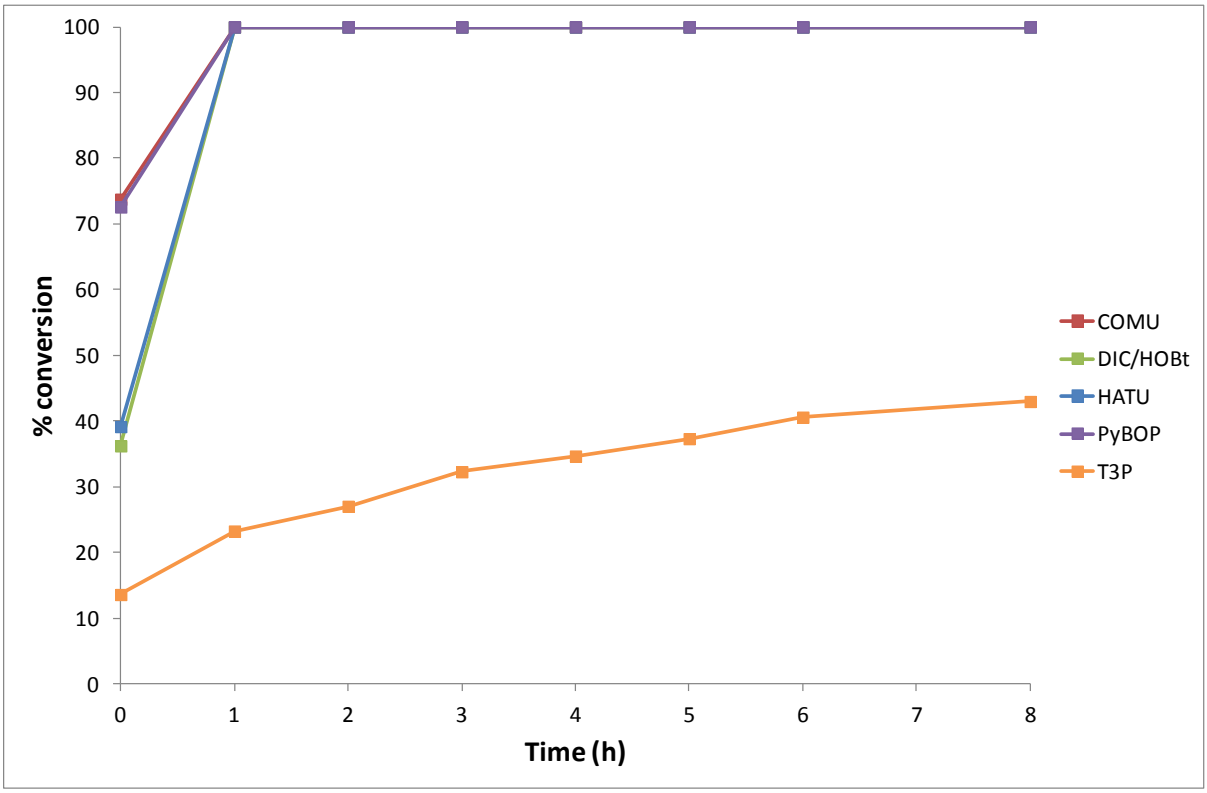
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	80.9	58.9	100.0	83.4	72.4
1	100.0	100.0	100.0	87.4	100.0
2	100.0	100.0	100.0	100.0	100.0
3	100.0	100.0	100.0	100.0	100.0
4	100.0	100.0	100.0	100.0	100.0
5	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0

Reaction 4: EtOAc



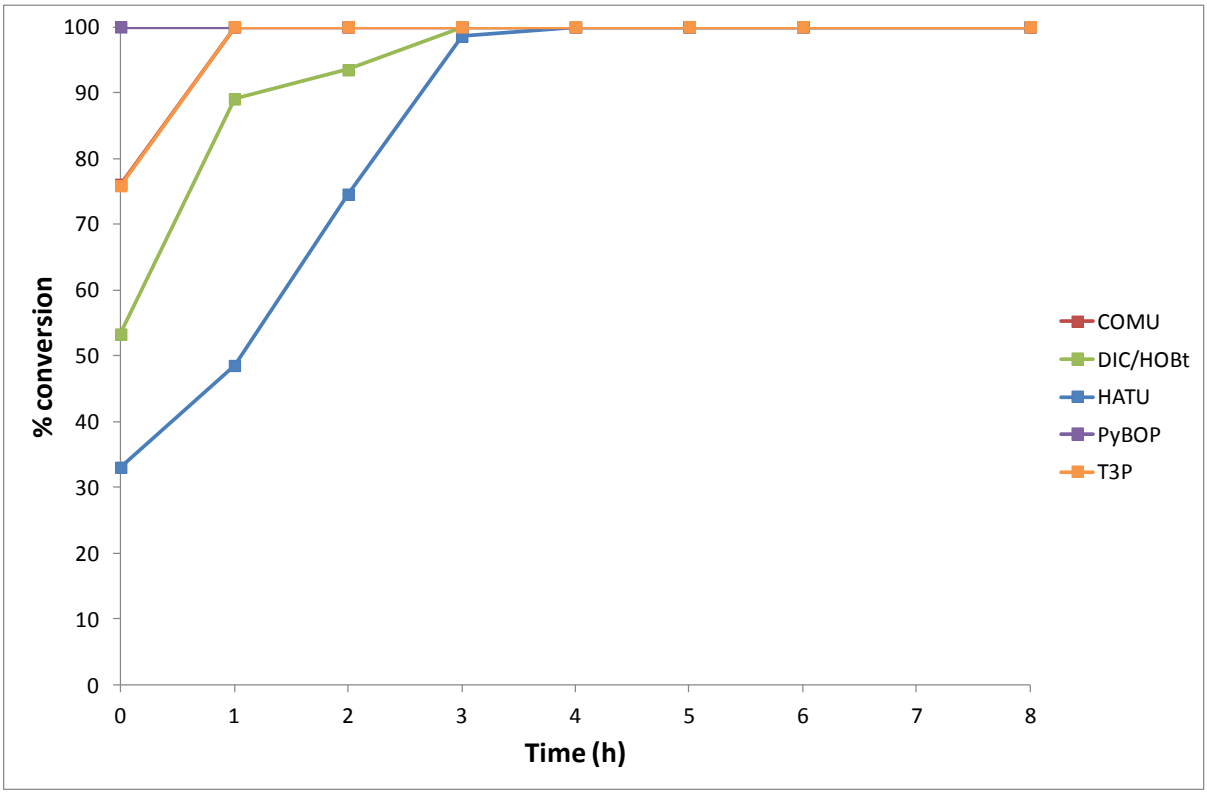
Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	100.0	95.9	97.2	99.0	92.5
1	100.0	100.0	100.0	100.0	100.0
2	100.0	100.0	100.0	100.0	100.0
3	100.0	100.0	100.0	100.0	100.0
4	100.0	100.0	100.0	100.0	100.0
5	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0

Reaction 4: IPA



Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	73.8	36.2	39.2	72.6	13.6
1	100.0	100.0	100.0	100.0	23.3
2	100.0	100.0	100.0	100.0	27.0
3	100.0	100.0	100.0	100.0	32.3
4	100.0	100.0	100.0	100.0	34.7
5	100.0	100.0	100.0	100.0	37.3
6	100.0	100.0	100.0	100.0	40.6
8	100.0	100.0	100.0	100.0	43.0
24	100.0	100.0	100.0	100.0	62.8

Reaction 4: 2-MeTHF



Time (h) / Coupling agent	COMU	DIC/HOBt	HATU	PyBOP	T3P
0	76.1	53.3	33.1	100.0	75.9
1	100.0	89.1	48.6	100.0	100.0
2	100.0	93.5	74.6	100.0	100.0
3	100.0	100.0	98.6	100.0	100.0
4	100.0	100.0	100.0	100.0	100.0
5	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	100.0	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0

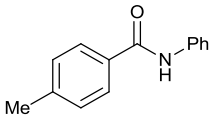
3.3 Compound Library – PCA Contributors

Physicochemical parameters were computed using KNIME version 2.6.0.[1] Briefly, an sdf file representing the compound library was generated from ChemDraw. This was loaded into KNIME and a workflow was subsequently generated using the Chemistry Development Kit (CDK) community node to calculate PSA, HBA, HBD, MW, and rotatable bonds. XLogP was determined separately and combined with the other descriptors. The outputs for compounds **5-14** are given below.

Compound ID	H-Bond Acceptors	H-Bond Donors	Rotatable Bonds	Polar Surface Area	Molecular Weight	XLogP
5	3	1	5	51.22	276.0666	0.769
6	4	1	4	54.88	267.0619	-0.01
7	2	1	5	51.47	231.0895	0.942
8	4	2	5	72.19	332.016	0.871
9	4	1	5	68.54	245.0688	0.666
10	2	0	3	20.31	329.0415	1.776
11	3	0	3	36.69	256.1212	1.435
12	7	2	10	93.73	322.1529	1.315
13	5	1	6	58.64	304.1787	2.428
14	3	1	3	41.99	290.0055	1.307

3.4 Charaterisation Data for Amide Products

Compound 1: 4-Methyl-*N*-phenylbenzamide



4-Methyl-*N*-phenylbenzamide
Chemical Formula: $C_{14}H_{13}NO$
Molecular Weight: 211.2591

Appearance: White solid.

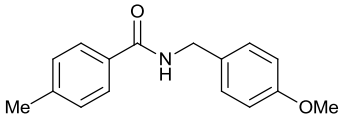
υ_{max} (neat): 3348, 2918, 2852, 1649, 825 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$) δ: 2.41 (s, 3H), 7.14 (t, 1H, *J* = 7.6 Hz), 7.24 (d, 2H, *J* = 8.0 Hz), 7.35 (t, 2H, *J* = 8.8 Hz), 7.65 (dd, 2H, *J* = 7.6, 2.8 Hz), 7.76 (d, 2H, *J* = 8.4 Hz), 8.05 (br s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 21.4, 120.3, 124.3, 127.0, 128.9, 129.3, 132.0, 138.0, 142.2, 165.9.

HRMS ($C_{14}H_{13}NO$) $[M+H^+]$ requires 212.1070, found $[M+H^+]$ 212.1069.

Compound 2: *N*-(4-Methoxybenzyl)-4-methylbenzamide



N-(4-Methoxybenzyl)-4-methylbenzamide
Chemical Formula: $C_{16}H_{17}NO_2$
Molecular Weight: 255.3117

Appearance: Pale yellow crystalline solid.

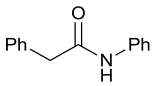
υ_{max} (neat): 3246, 2918, 2833, 1033, 1633, 839 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$) δ: 2.37 (s, 3H), 3.77 (s, 3H), 4.52 (d, 2H, *J* = 4.4 Hz), 6.78 (br s, 1H), 6.84 (d, 2H, *J* = 8.8 Hz), 7.18 (d, 2H, *J* = 8.0 Hz), 7.24 (d, 2H, *J* = 8.8 Hz), 7.68 (d, 2H, *J* = 8.4 Hz).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 21.3, 43.4, 55.2, 114.0, 126.9, 129.0, 129.1, 130.3, 131.4, 141.7, 158.9, 167.4.

HRMS ($C_{16}H_{17}NO_2$) [M+H$^+$] requires 256.1332, found [M+H$^+$] 256.1334.

Compound 3: *N*,2-Diphenylacetamide



N,2-Diphenylacetamide
Chemical Formula: $C_{14}H_{13}NO$
Molecular Weight: 211.2591

Appearance: White solid.

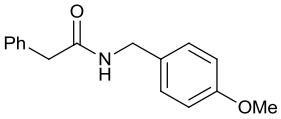
υ_{max} (neat): 3254, 2920, 2850, 1656, 1440, 1159 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$) δ: 3.74 (s, 2H), 7.09 (t, 1H, *J* = 7.6 Hz), 7.24 (br s, 1H), 7.29 (t, 2H, *J* = 8.4 Hz), 7.34-7.44 (m, 7H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 44.8, 119.9, 124.5, 127.6, 128.9, 129.2, 129.5, 134.4, 137.6, 169.2.

HRMS ($C_{14}H_{13}NO$) [M+H$^+$] requires 212.1070, found [M+H$^+$] 212.1070.

Compound 4: *N*-(4-Methoxybenzyl)-2-phenylacetamide



N-(4-Methoxybenzyl)-2-phenylacetamide
Chemical Formula: $C_{16}H_{17}NO_2$
Molecular Weight: 255.3117

Appearance: White solid.

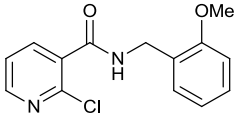
υ_{max} (neat): 3238, 2920, 2850, 1649, 1026, 815 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$) δ: 3.62 (s, 2H), 3.79 (s, 3H), 4.36 (d, 2H), 5.62 (br s, 1H), 6.83 (d, 2H, *J* = 8.4 Hz), 7.11 (d, 2H, *J* = 8.4 Hz), 7.26-7.31 (m, 4H), 7.33-7.37 (m, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 29.7, 43.0, 43.8, 114.0, 127.3, 128.8, 129.0, 129.4, 130.1, 134.8, 158.9, 170.8.

HRMS ($C_{16}H_{17}NO_2$) [M+H$^+$] requires 256.1332, found [M+H$^+$] 256.1334.

Compound 5: 2-Chloro-*N*-(2-Methoxybenzyl)nicotinamide



2-Chloro-*N*-(2-methoxybenzyl)nicotinamide
Chemical Formula: $C_{14}H_{13}ClN_2O_2$
Molecular Weight: 276.7182

Appearance: White solid.

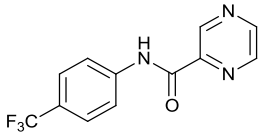
υ_{max} (neat): 3248, 2916, 2833, 1633, 1244, 746 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$) δ: 3.76 (s, 3H), 4.51 (d, 2H, *J* = 5.5 Hz), 6.84 (d, 2H, *J* = 8.5 Hz), 7.01 (br s, 1H), 7.23-7.27 (m, 3H), 7.94 (dd, 1H, *J* = 7.5, 2.0 Hz), 8.34 (dd, 1H, *J* = 7.5, 2.0 Hz).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 43.6, 55.2, 114.0, 122.6, 129.1, 129.3, 131.4, 139.3, 147.0, 150.6, 159.0, 164.6.

HRMS ($C_{14}H_{13}ClN_2O_2$) [M+H$^+$] requires 277.0738, found [M+H$^+$] 277.0741.

Compound 6: *N*-(4-(Trifluoromethyl)phenyl)pyrazine-2-carboxamide



N-(4-(Trifluoromethyl)phenyl)pyrazine-2-carboxamide
Chemical Formula: $C_{12}H_8F_3N_3O$
Molecular Weight: 267.2066

Appearance: Pale yellow solid.

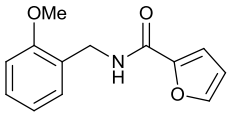
υ_{max} (neat): 3253, 2920, 2850, 1633, 1244 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 7.66 (d, 2H, *J* = 8.8 Hz), 7.90 (d, 2H, *J* = 8.8 Hz), 8.62 (dd, 1H, *J* = 4.0, 1.6 Hz), 8.85 (d, 1H, *J* = 6.0 Hz), 9.53 (d, 1H, *J* = 1.6 Hz), 9.84 (br s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 119.0, 123.5 (^1J = 270 Hz), 126.0, (^3J = 4 Hz), 126.4 (^2J = 24 Hz), 139.7, 141.9, 143.4, 144.3, 147.4, 160.5.

HRMS ($C_{12}H_8N_3O$) $[M+H^+]$ requires 268.0692, found $[M+H^+]$ 268.0697.

Compound 7: *N*-(2-Methoxybenzyl)furan-3-carboxamide



N-(2-Methoxybenzyl)furan-2-carboxamide
Chemical Formula: $C_{13}H_{13}NO_3$
Molecular Weight: 231.2472

Appearance: Yellow-orange solid.

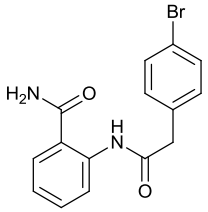
υ_{max} (neat): 3242, 2918, 2833, 1633, 1244, 1033 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 3.89 (s, 3H), 4.62 (d, 2H, *J* = 6.0 Hz), 6.48 (dd, 1H, *J* = 2.0, 1.6 Hz), 6.89-6.96 (m, 3H), 7.11 (dd, 1H, *J* = 2.4, 0.8 Hz), 7.28 (dt, 1H, *J* = 7.6, 1.6 Hz), 7.34 (dd, 1H, *J* = 7.2, 1.6 Hz), 7.42 (dd, 1H, *J* = 1.6, 0.8 Hz).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 38.9, 55.3, 110.3, 112.0, 114.1, 120.7, 125.9, 128.9, 129.8, 143.7, 148.1, 157.6, 158.1.

HRMS ($C_{13}H_{13}NO_3$) $[M+H^+]$ requires 232.0968, found $[M+H^+]$ 232.0969.

Compound 8: 2-(2-(4-Bromophenyl)acetamido)benzamide



2-(2-(4-bromophenyl)acetamido)benzamide
Chemical Formula: $C_{15}H_{13}BrN_2O_2$
Molecular Weight: 333.1799

Appearance: White solid.

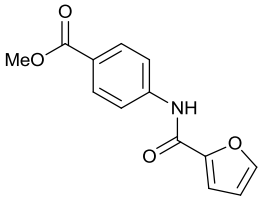
υ_{max} (neat): 3259, 3061, 3001, 2918, 2833, 1631, 1610, 1236, 1174, 1033 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 3.69 (s, 2H), 5.89 (br s, 1H), 6.10 (br s, 1H), 7.08 (dt, 1H, *J* = 7.5, 1.5 Hz), 7.26 (d, 2H, *J* = 8.5), 7.48-7.51 (m, 4H), 8.63 (d, 1H), 11.3 (br s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 45.0, 118.5, 121.3, 121.5, 122.9, 127.2, 131.2, 131.9, 133.4, 133.5, 140.1, 169.3, 171.2.

HRMS ($C_{15}H_{13}BrN_2O_2$) $[M+H^+]$ requires 333.0233, found $[M+H^+]$ 333.0237.

Compound 9: Methyl 4-(furan-2-carboxamido)benzoate



Methyl 4-(furan-2-carboxamido)benzoate
Chemical Formula: $C_{13}H_{11}NO_4$
Molecular Weight: 245.2307

Appearance: White solid.

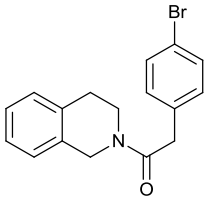
υ_{max} (neat): 3246, 2918, 2833, 1633, 1610, 1244, 748 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 3.90 (s, 3H), 6.57 (dd, 1H, *J* = 3.5, 2.0 Hz), 7.27 (d, 1H, *J* = 7.0 Hz), 7.51 (dd, 1H, *J* = 2.0, 0.5), 7.75 (d, 2H, *J* = 8.5 Hz), 8.04 (d, 2H, *J* = 8.5 Hz), 8.30 (br s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 52.0, 112.8, 115.9, 119.0, 125.8, 130.9, 141.6, 144.5, 147.4, 156.0, 166.5.

HRMS ($C_{13}H_{11}NO_4$) [M+H^+] requires 246.0761, found [M+H^+] 246.0763.

Compound 10: 2-(4-Bromophenyl)-1-(3,4-dihydroisoquinolin-2(1*H*)-yl)ethanone



2-(4-Bromophenyl)-1-(3,4-dihydroisoquinolin-2(1*H*)-yl)ethanone
Chemical Formula: $C_{17}H_{16}BrNO$
Molecular Weight: 330.2190

Appearance: White solid.

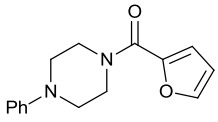
υ_{max} (neat): 2918, 2833, 1633, 1244, 746 cm^{-1}.

^1H NMR (400 MHz, DMSO-d_6, 80 °C) δ: 2.80 (t, 2H, *J* = 6.0 Hz), 3.72 (t, 2H, *J* = 6.0 Hz), 3.79 (s, 2H), 4.65 (br s, 2H), 7.16 (br s, 4H), 7.22 (d, 2H, *J* = 8.0 Hz), 7.47 (t, 2H, *J* = 8.0 Hz).

^{13}C NMR (125 MHz, $CDCl_3$, 77 °C) δ: 27.9, 28.6, 42.9, 43.7, 46.7, 119.4, 119.5, 126.1, 126.11 126.2, 126.3, 126.4, 126.5, 128.3, 128.5, 131.0, 131.0, 131.5, 131.6, 133.2, 133.5, 134.4, 134.7, 135.3, 135.4. Variable temperature ^{13}C NMR up to 90 °C failed to resolve the rotameric carbons.

HRMS ($C_{17}H_{16}BrNO$) [M+H^+] requires 330.0488, found [M+H^+] 330.0492.

Compound 11: Furan-3-yl(4-phenylpiperazin-1-yl)methanone



Furan-2-yl(4-phenylpiperazin-1-yl)methanone
Chemical Formula: $C_{15}H_{16}N_2O_2$
Molecular Weight: 256.2997

Appearance: Red-brown gummy solid.

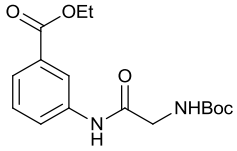
υ_{max} (neat): 2916, 2848, 1633, 1236, 1010, 750 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 3.26 (t, 4H, *J* = 5.0 Hz), 3.99 (br s, 4H), 6.51 (dd, 1H, *J* = 5.0, 1.5 Hz), 6.93 (t, 1H, *J* = 7.5 Hz), 6.97 (d, 2H, *J* = 8.0 Hz), 7.07 (d, 1H, *J* = 3.5 Hz), 7.30 (dt, 2H, *J* = 8.0, 1.0 Hz), 7.51 (d, 1H, *J* = 1.0 Hz).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 29.7, 31.9, 49.7, 111.4, 116.6, 116.7, 120.6, 129.3, 143.8, 147.9, 150.9, 159.1.

HRMS ($C_{15}H_{16}N_2O_2$) [M+H^+] requires 257.1290, found [M+H^+] 257.1287.

Compound 12: Ethyl 3-(2-((*tert*-butoxycarbonyl)amino)acetamido)benzoate



Ethyl 3-(2-((*tert*-butoxycarbonyl)amino)acetamido)benzoate
Chemical Formula: $C_{16}H_{22}N_2O_5$
Molecular Weight: 322.3563

Appearance: Opaque oil.

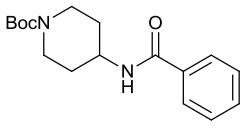
υ_{max} (neat): 3323, 2978, 2933, 1710, 1681, 1284, 1161 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 1.34 (t, 3H, *J* = 7.2 Hz), 1.44 (s, 9H), 4.00 (d, 2H, *J* = 4.4 Hz), 4.33 (q, 2H, *J* = 7.2 Hz), 5.74 (br s, 1H), 7.33 (t, 1H, *J* = 8.0 Hz), 7.74 (d, 1H, *J* = 8.0 Hz), 7.85 (d, 1H, *J* = 8.0 Hz), 8.05 (s, 1H), 8.93 (br s, 1H, NH).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 14.1, 28.2, 45.0, 61.1, 80.4, 120.8, 124.4, 125.3, 128.9, 131.0, 137.8, 156.5, 166.2, 168.3.

HRMS ($C_{16}H_{22}N_2O_5$) [M+H^+] requires 323.1601, found [M+H^+] 323.1606.

Compound 13: *tert*-Butyl 4-benzamidopiperidine-1-carboxylate



tert-Butyl 4-benzamidopiperidine-1-carboxylate
Chemical Formula: $C_{17}H_{24}N_2O_3$
Molecular Weight: 304.3841

Appearance: Off-white solid.

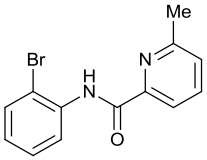
υ_{max} (neat): 3261, 2918, 2833, 1631, 1612, 839 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 1.36-1.46 (m, 11H), 2.01 (dd, 2H, *J* = 12.4, 2.8 Hz), 2.90 (dt, 2H, *J* = 12.0, 2.4 Hz), 4.07-4.17 (m, 3H), 6.17 (d, 1H, *J* = 7.6 Hz), 7.39-7.43 (m, 2H), 7.47-7.51 (m, 1H), 7.75-7.78 dd, 2H, *J* = 7.2, 1.6 Hz).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 28.4, 32.1, 42.7, 47.2, 79.7, 126.9, 128.5, 131.5, 134.5, 154.7, 166.9.

HRMS ($C_{17}H_{24}N_2O_3$) [M+H^+] requires 305.1860, found [M+H^+] 305.1862.

Compound 14: *N*-(2-Bromophenyl)-6-methylpicolinamide



N-(2-Bromophenyl)-6-methylpicolinamide
Chemical Formula: $C_{13}H_{11}BrN_2O$
Molecular Weight: 291.1432

Appearance: White solid.

υ_{max} (neat): 3253, 2918, 2852, 1633, 839 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 2.66 (s, 3H), 7.01 (dt, 1H, ArH, *J* = 8.0, 1.6 Hz), 7.34-7.40 (m, 2H), 7.60 (dd, 1H, *J* = 8.0, 1.6 Hz), 7.79 (t, 1H, *J* = 7.6 Hz), 8.09 (d, 1H, *J* = 7.6 Hz), 8.66 (dd, 1H, *J* = 8.0, 1.6 Hz), 10.86 (br s, 1H).

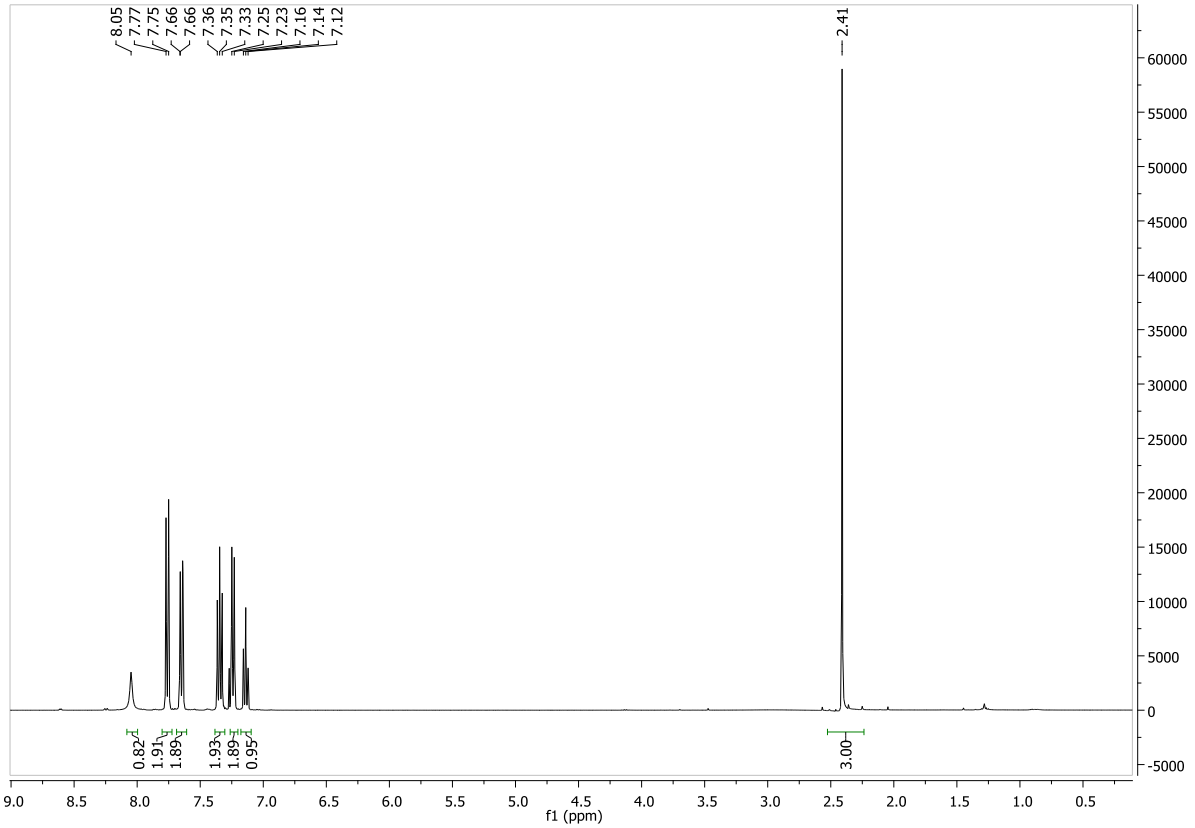
^{13}C NMR (100 MHz, $CDCl_3$) δ: 24.3, 113.8, 119.4, 121.1, 124.9, 126.3, 128.3, 132.4, 136.0, 137.7, 148.9, 157.3, 162.4.

HRMS ($C_{13}H_{11}BrN_2O$) [M+H^+] requires 291.0128, found [M+H^+] 291.0132.

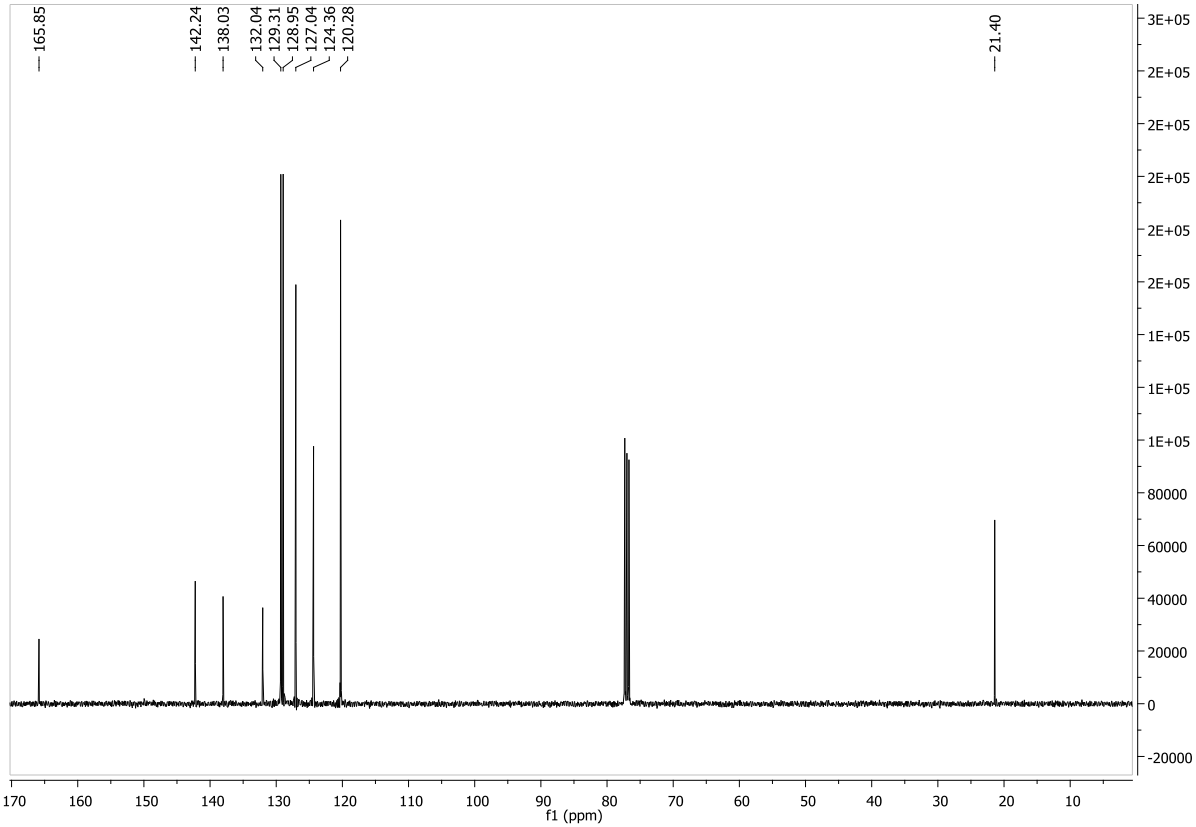
3.5 IR, ^{1}H NMR, ^{13}C NMR, HRMS, and HPLC Spectra for Compounds 1-14

Compound 1: 4-Methyl-*N*-phenylbenzamide

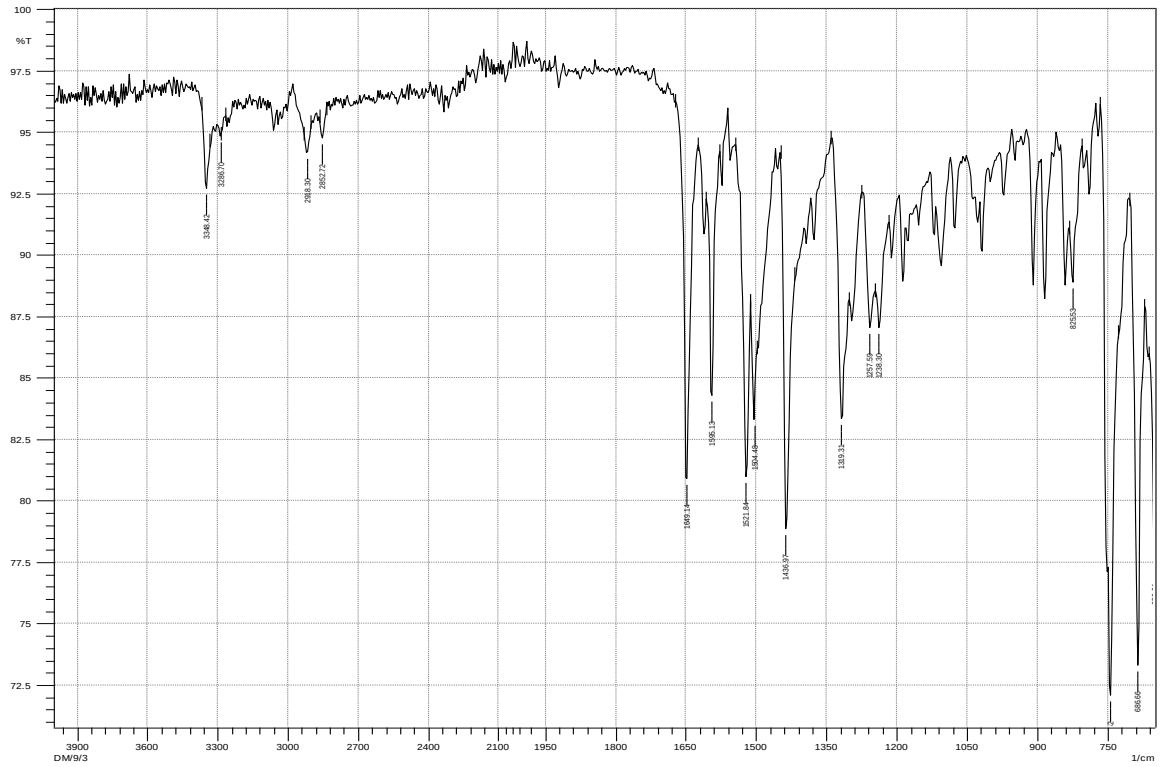
^{1}H NMR:



^{13}C NMR:



FTIR:

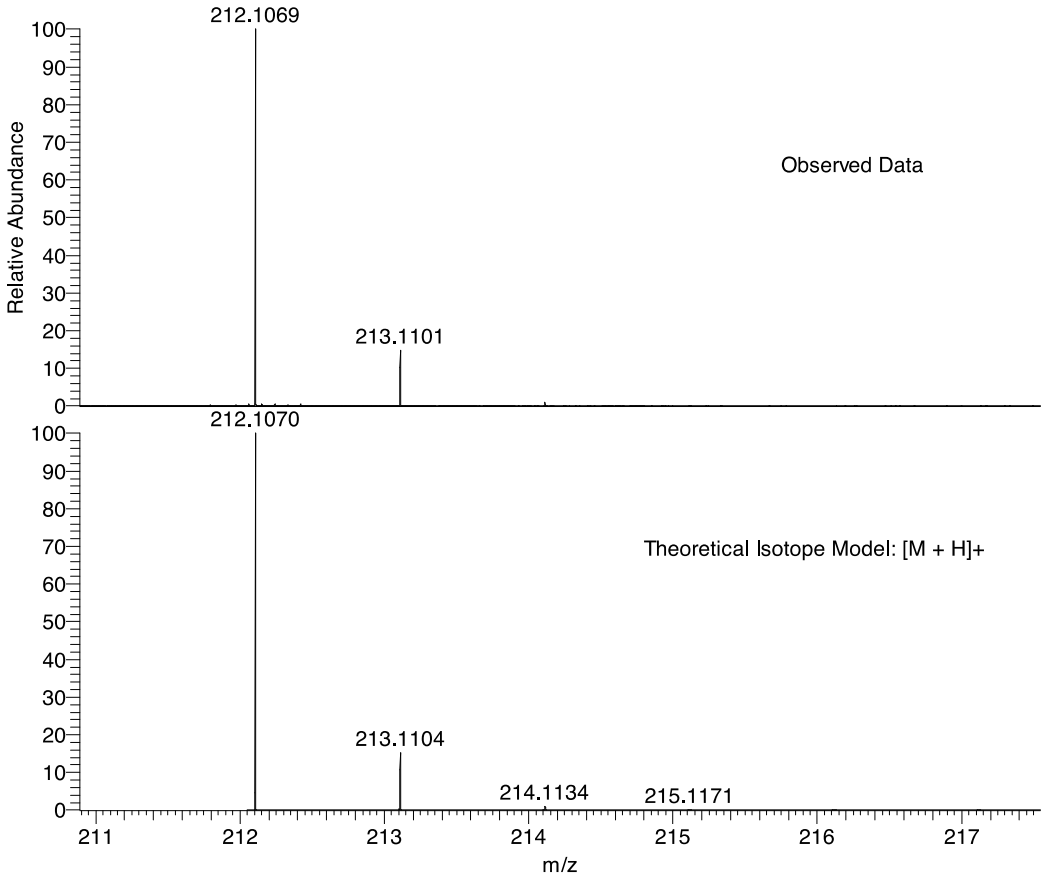


HRMS:

DM93 MW=211?
(MeOH)/MeOH + NH4OAc

EPSRC National Centre Swansea
LTQ Orbitrap XL

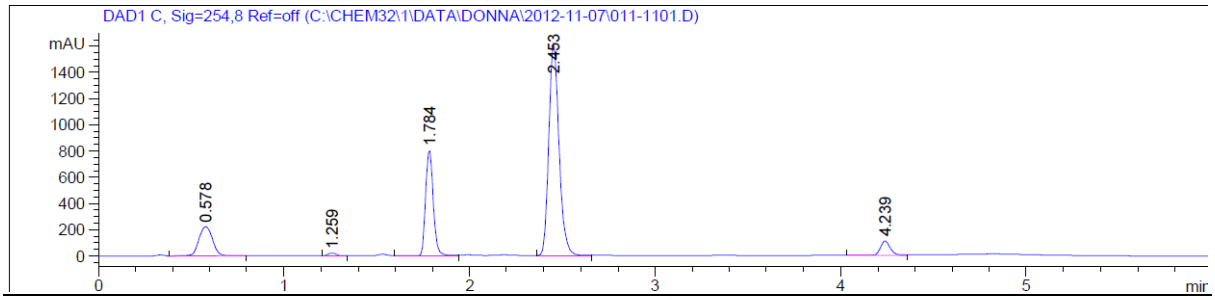
Donna MacMillan
31/10/2012 15:37:31



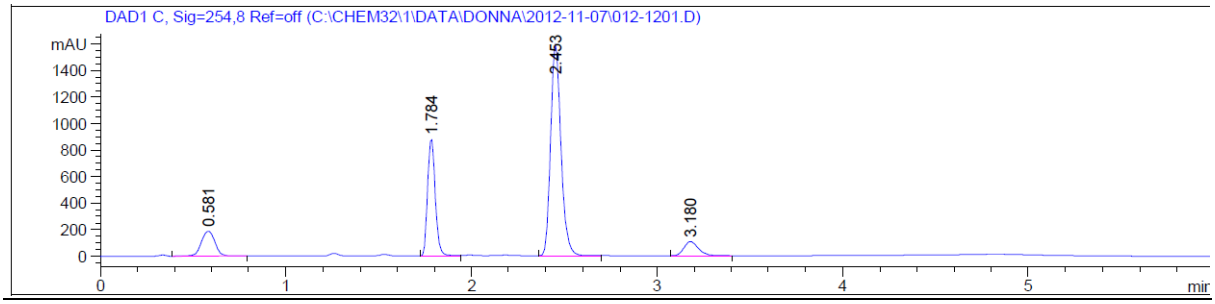
NL:
9.56E7
STRWAT014-OJ-HNESP-2#30-50 RT: 0.75-1.28 AV: 20 T: FTMS + p NSI Full ms [120.00-2000.00]

NL:
2.00E4
$C_{14}H_{13}NOH$:
$C_{14}H_{14}N_1O_1$
p (gss, s /p:40) Chrg 1
R: 100000 Res .Pwr . @FWHM

HPLC assay:



Dibenzyl ether standard

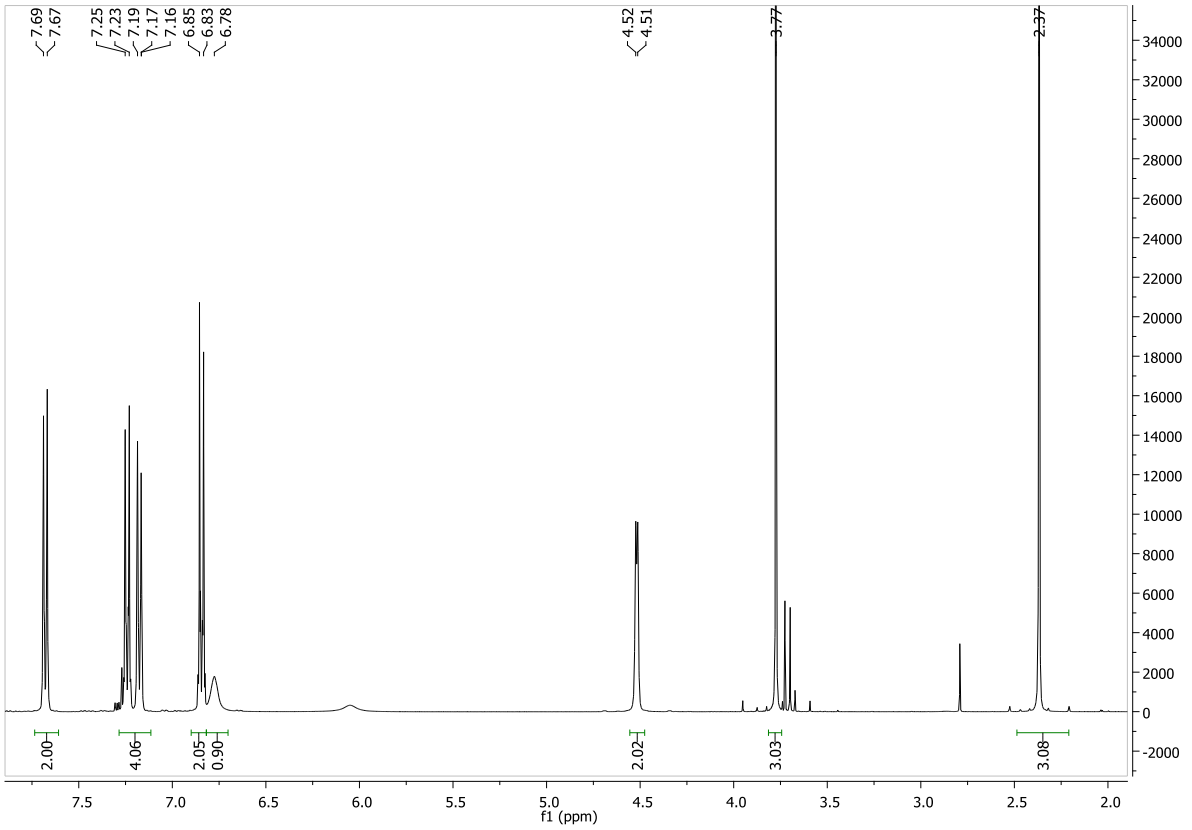


Bromobenzene standard

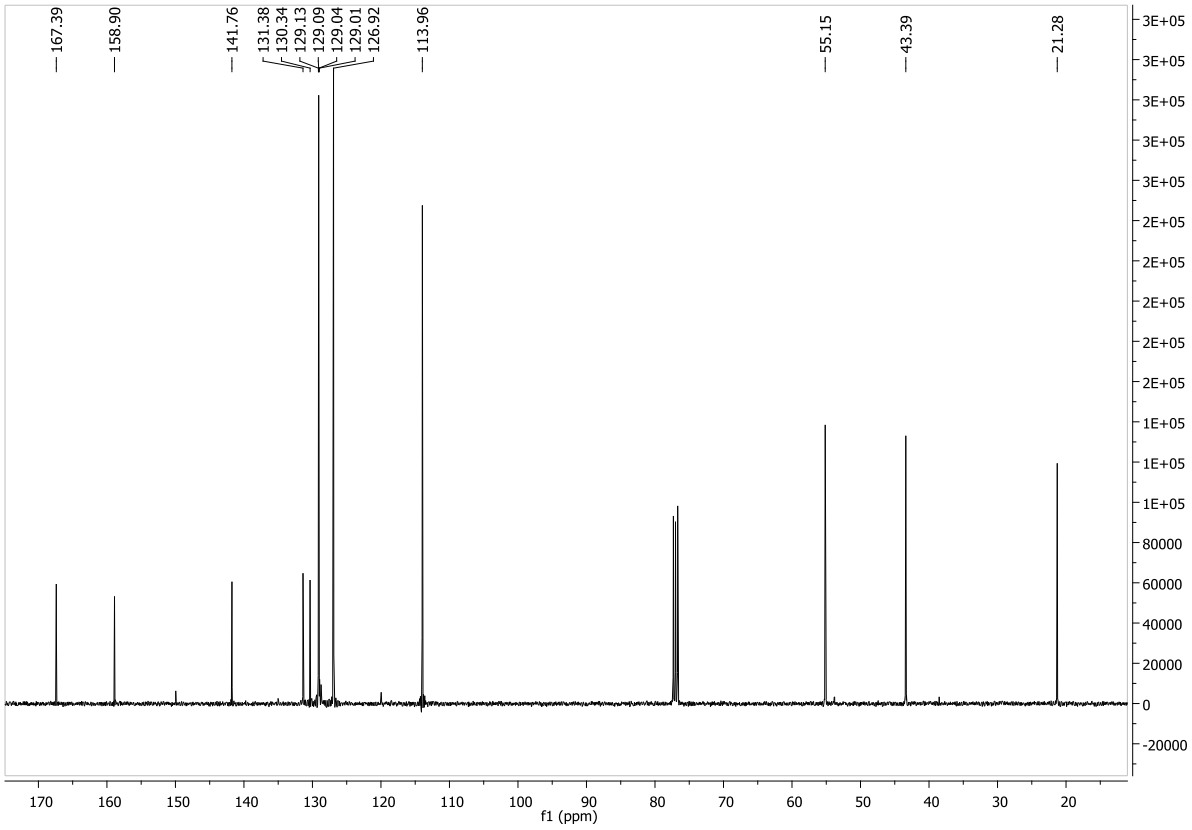
Substrate	R_t (min)
Toluic acid	1.78
Aniline	0.58
Compound 1: 4-Methyl-*N*-phenylbenzamide	2.46
Dibenzyl ether (standard)	4.24
Bromobenzene (standard)	3.18

Compound 2: *N*-(4-Methoxybenzyl)-4-methylbenzamide

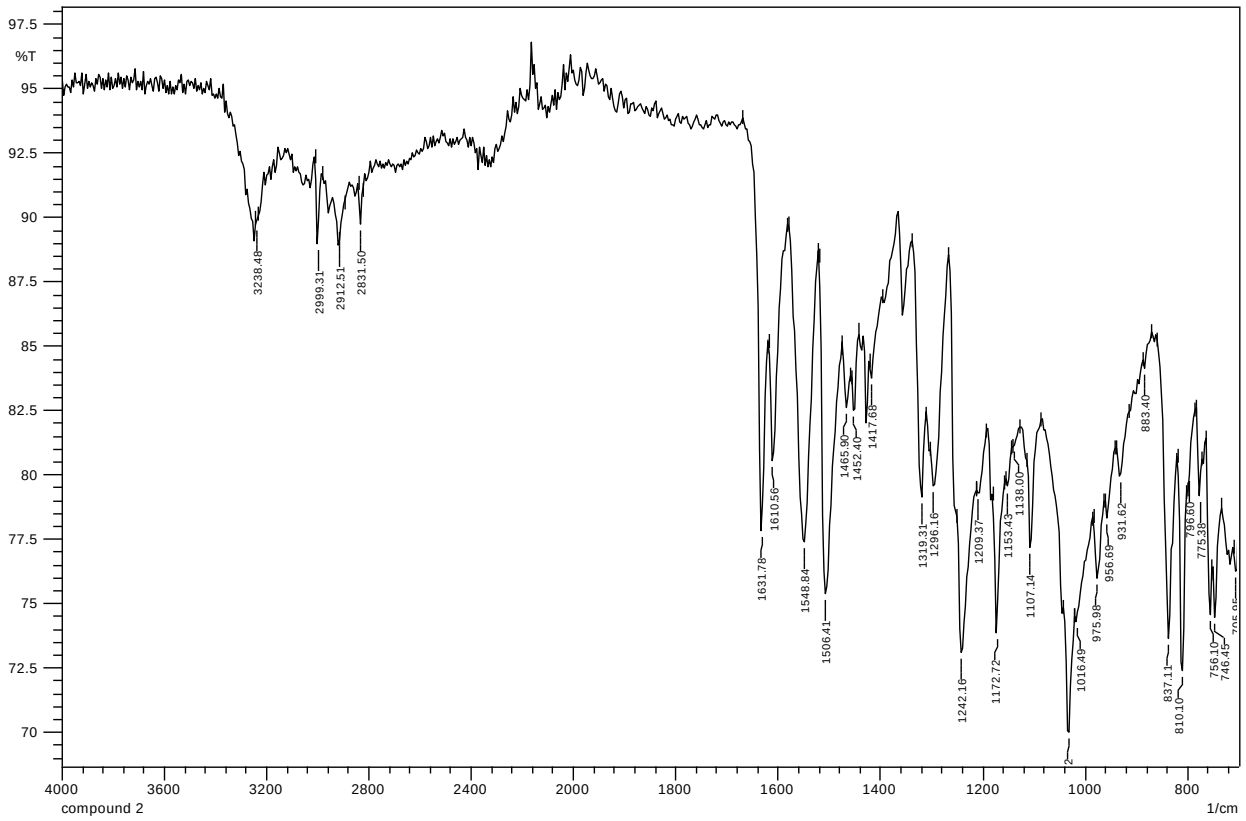
^{1}H NMR:



^{13}C NMR:



FTIR:



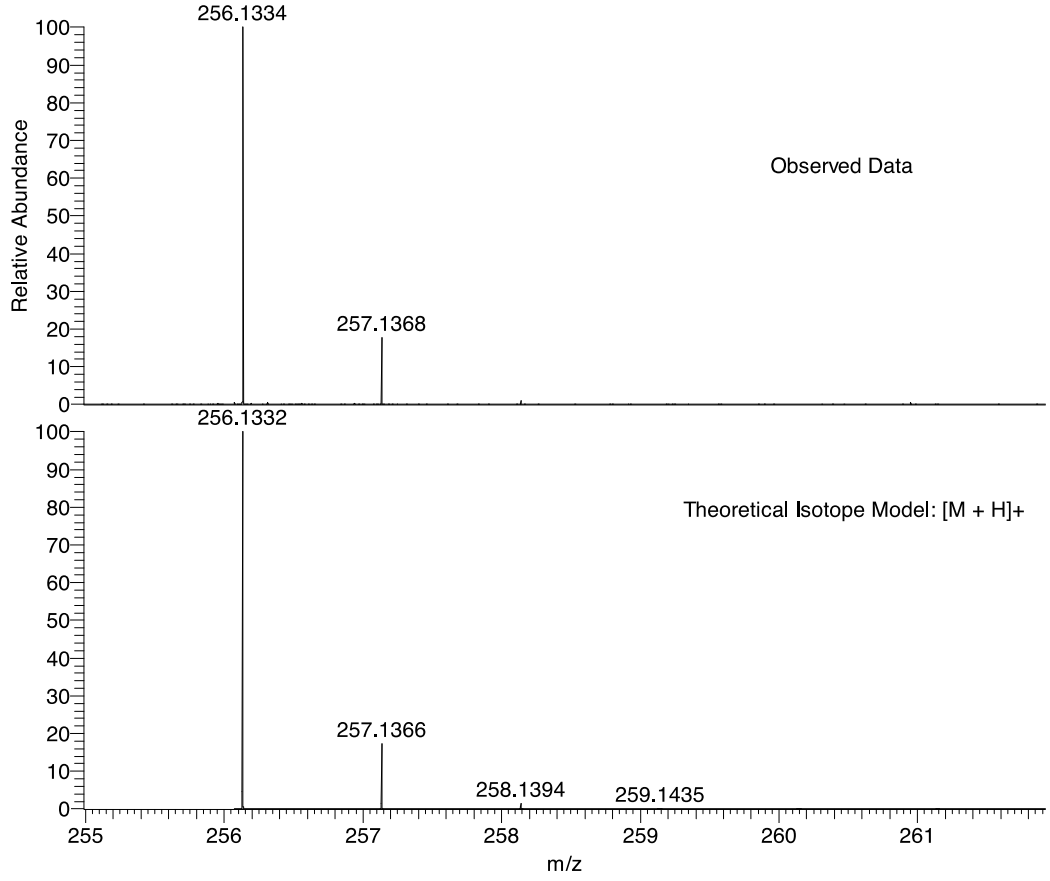
HRMS:

DM95-2 MW=255?
(MeOH)/MeOH + NH4OAc

EPSRC National Centre Swansea
LTQ Orbitrap XL

Donna MacMillan
29/10/2012 21:36:51

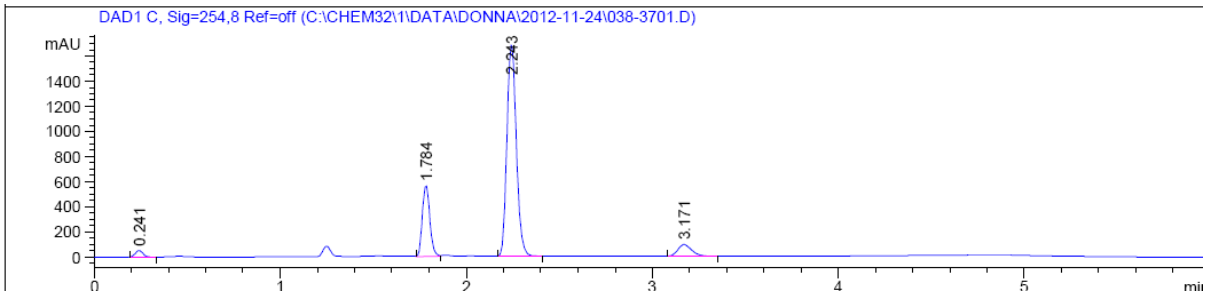
SM: 7G



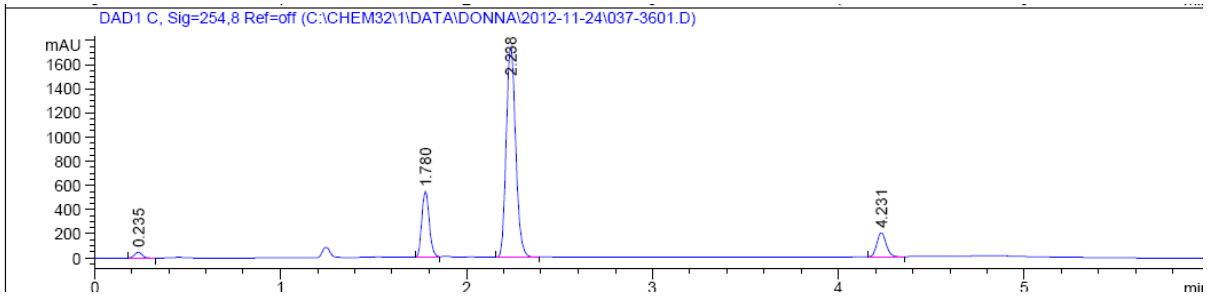
NL:
3.68E6
STRWAT013-OJ-HNESP#29-44 RT: 0.88-1.29 AV: 15 T: FTMS + p NSI Full ms [120.00-2000.00]

NL:
1.95E4
$C_{16}H_{17}NO_2$ H:
$C_{16}H_{18}N_1O_2$
p (gss, s /p:40) Chrg 1
R: 100000 Res .Pwr . @FWHM

HPLC assay:



Dibenzyl ether standard

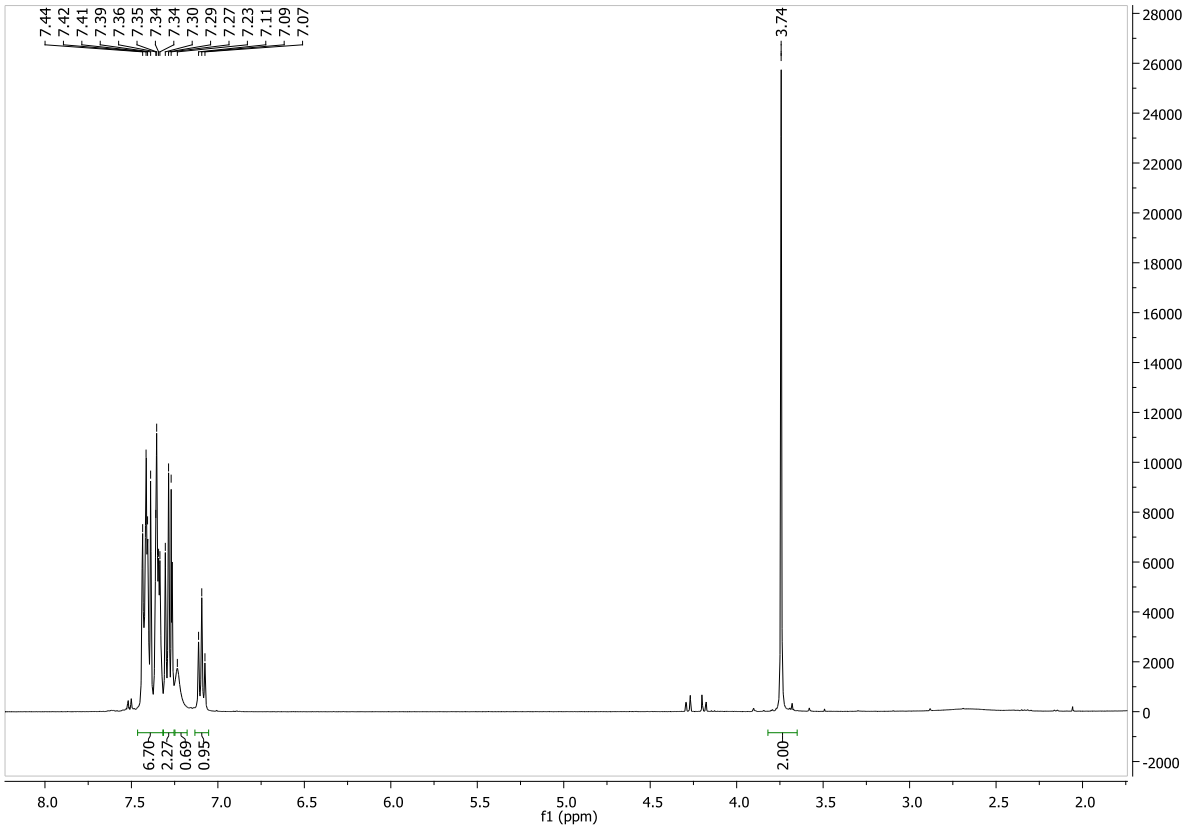


Bromobenzene standard

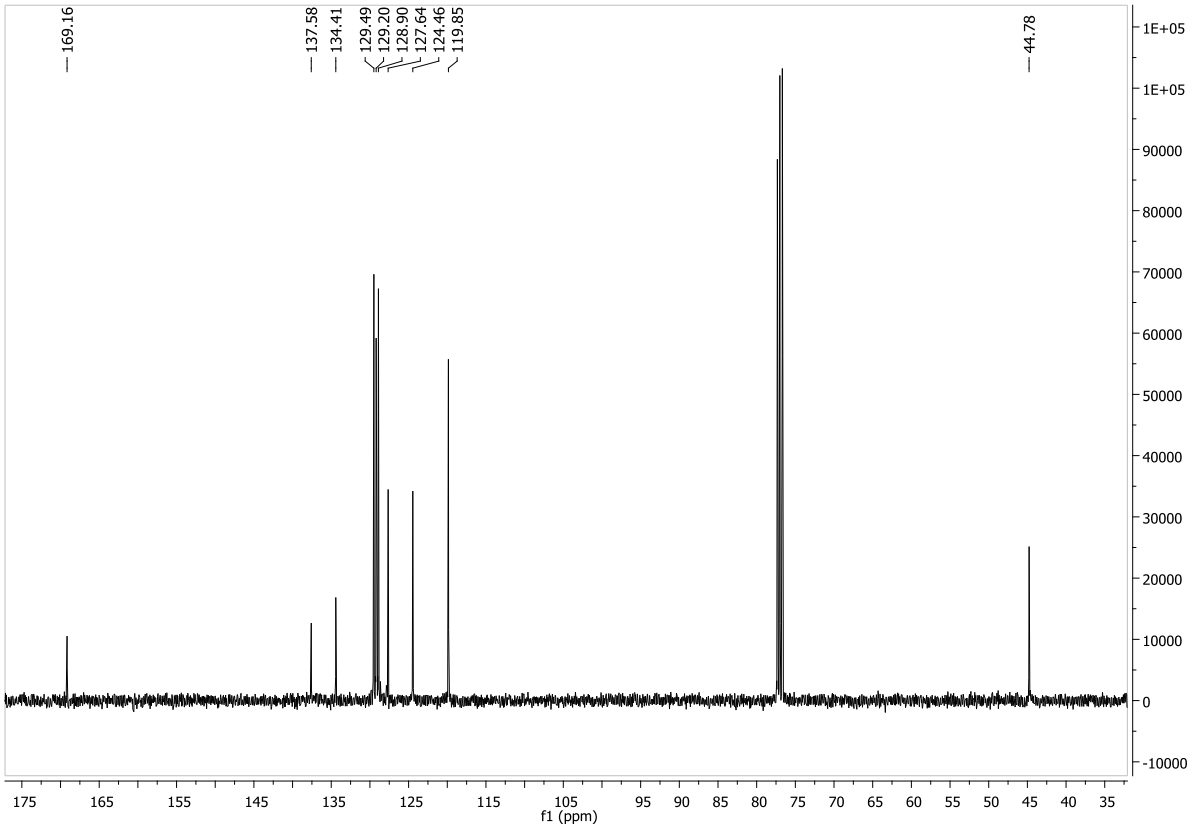
Substrate	R_t (min)
Toluic acid	1.78
p-Methoxybenzylamine	0.24
Compound 2: *N*-(4-Methoxybenzyl)-4-methylbenzamide	2.24
Dibenzyl ether (standard)	4.23
Bromobenzene (standard)	3.17

Compound 3: *N*,2-Diphenylacetamide

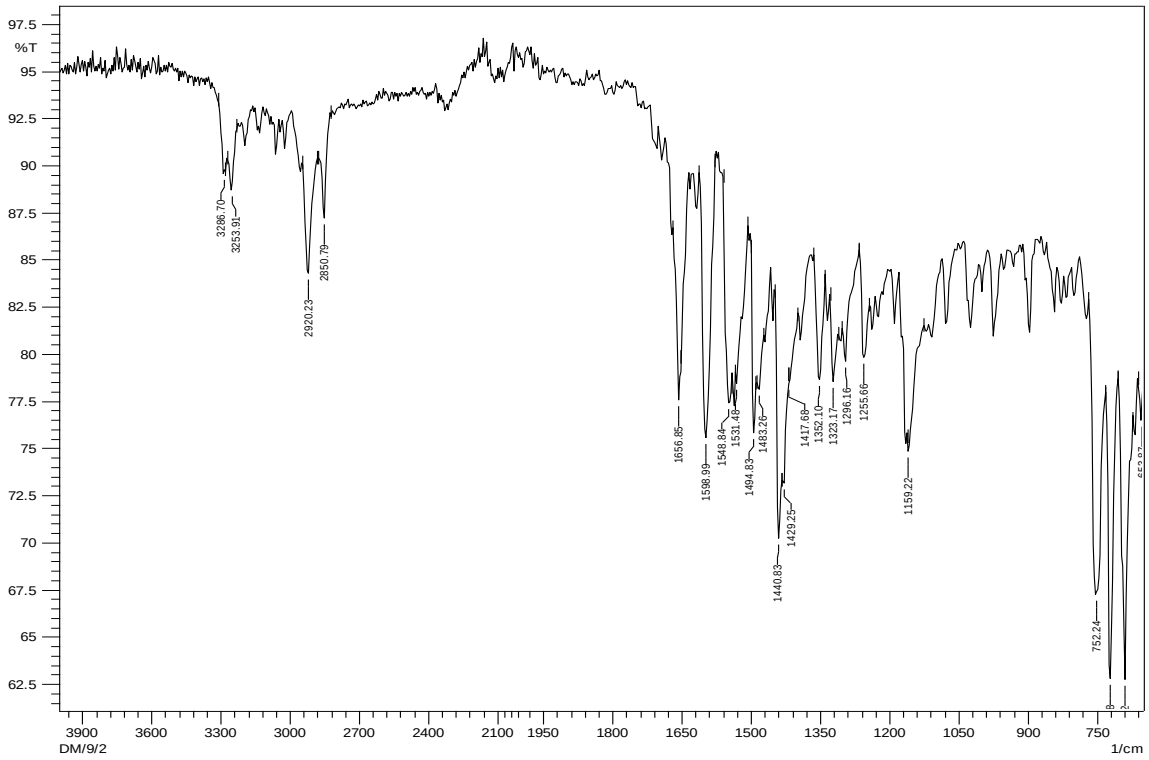
^{1}H NMR:



^{13}C NMR:



FTIR:

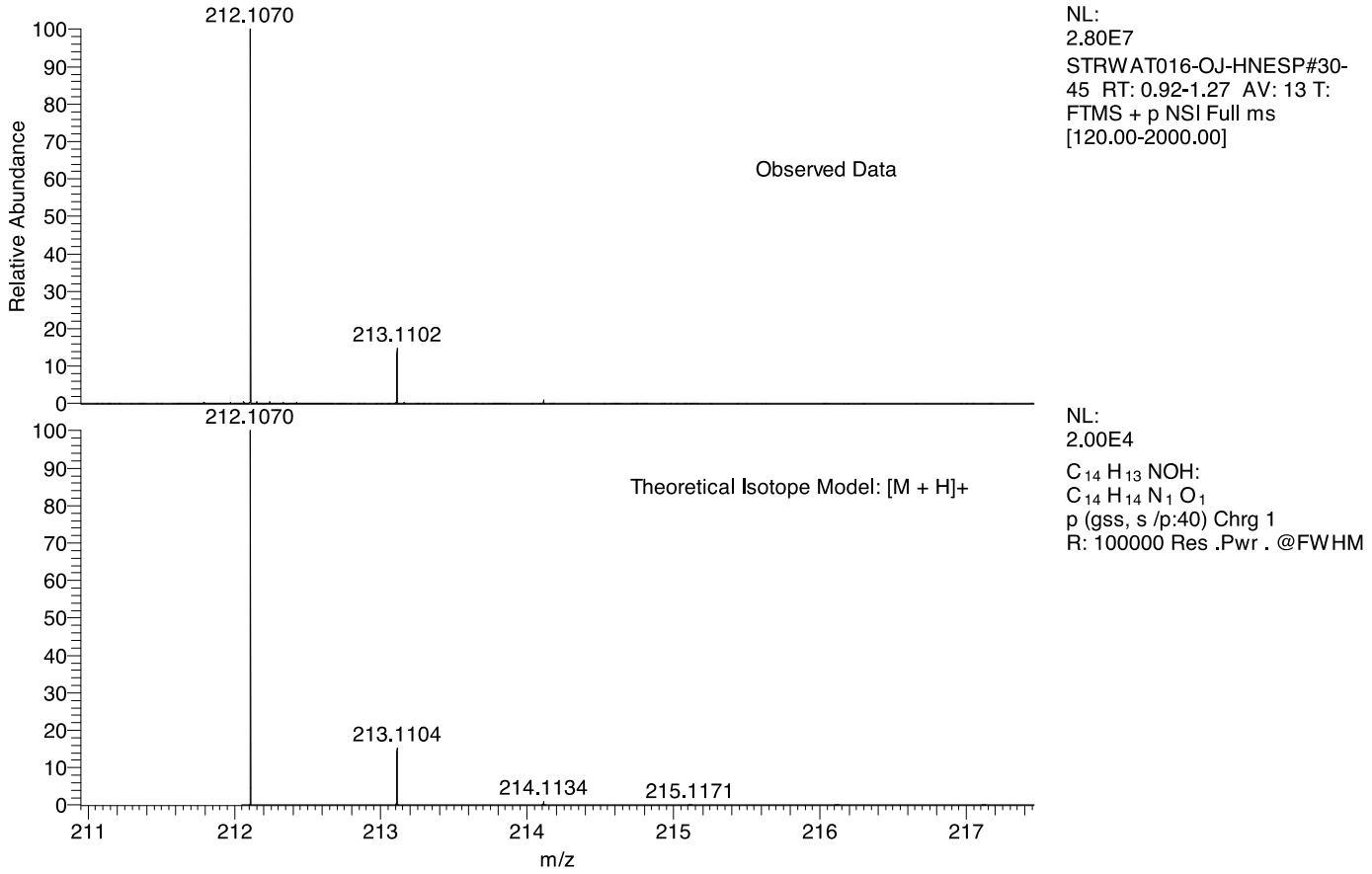


HRMS:

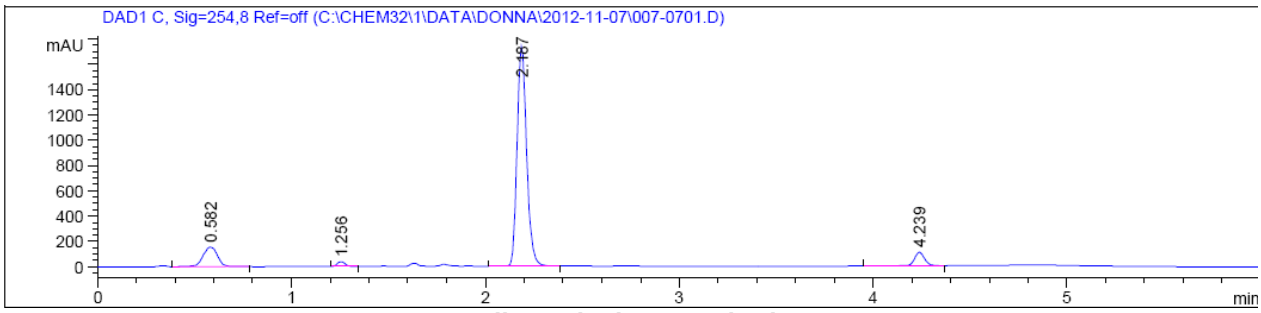
DM92 MW=212?
(MeOH)/MeOH + NH4OAc

EPSRC National Centre Swansea
LTQ Orbitrap XL

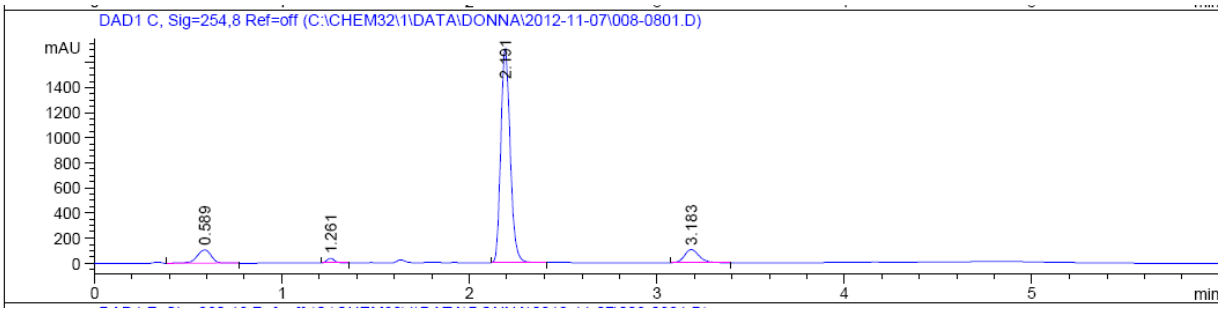
Donna MacMillan
29/10/2012 21:47:11



HPLC assay:



Dibenzyl ether standard

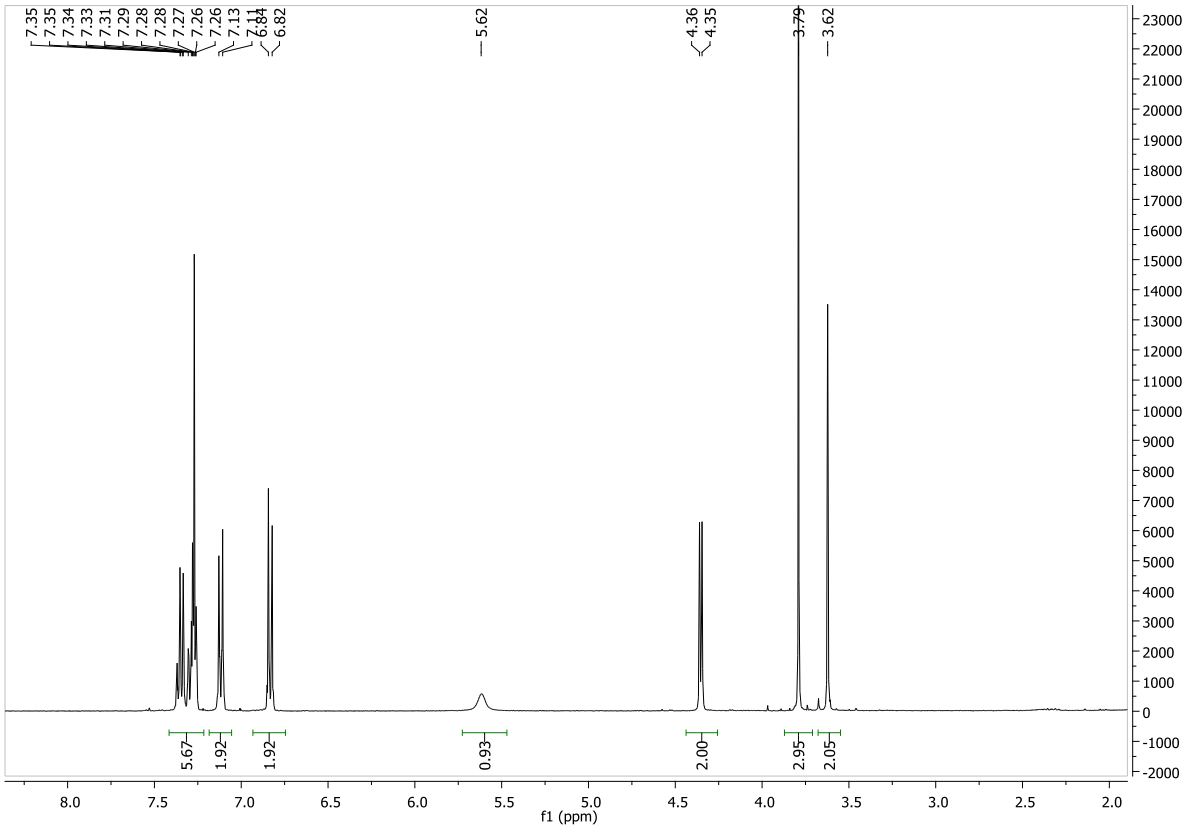


Bromobenzene standard

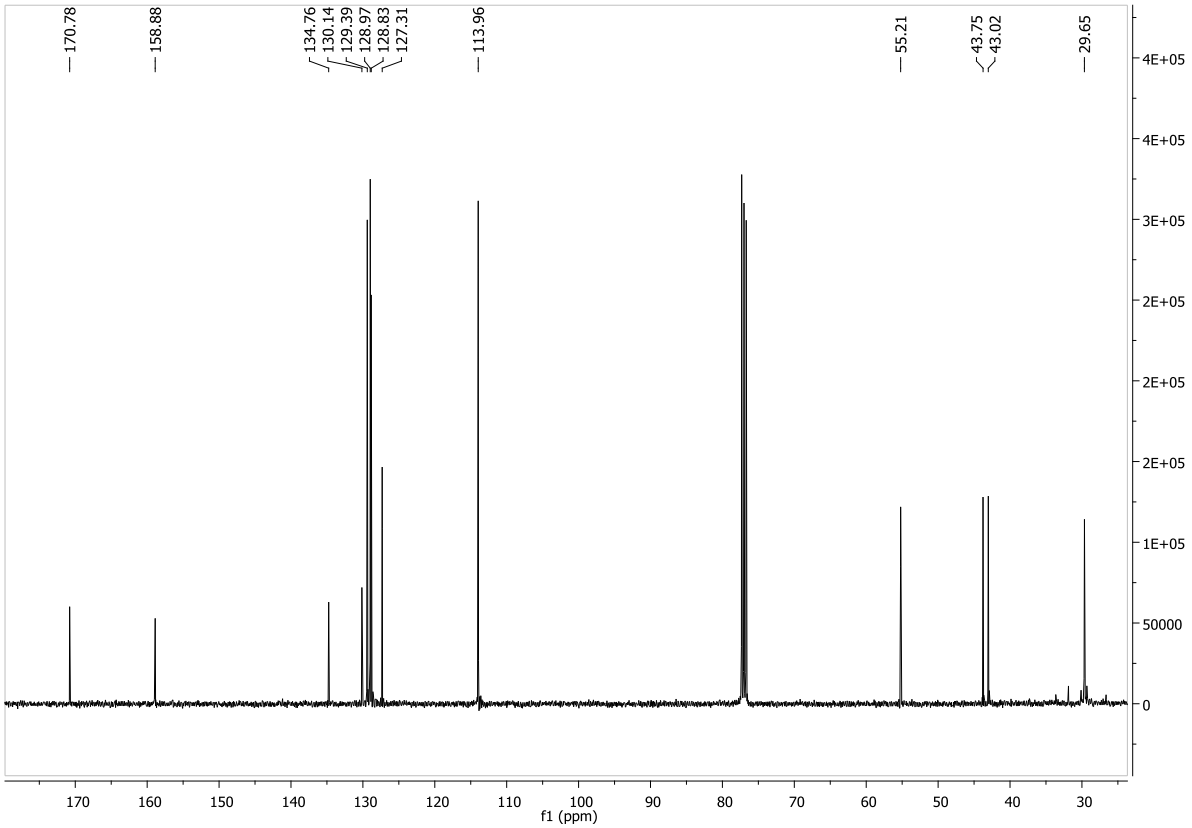
Substrate	R_t (min)
Phenylacetic acid	1.26
Aniline	0.58
Compound 3: *N*,2-Diphenylacetamide	2.19
Dibenzyl ether (standard)	4.24
Bromobenzene (standard)	3.18

Compound 4: *N*-(4-Methoxybenzyl)-2-phenylacetamide

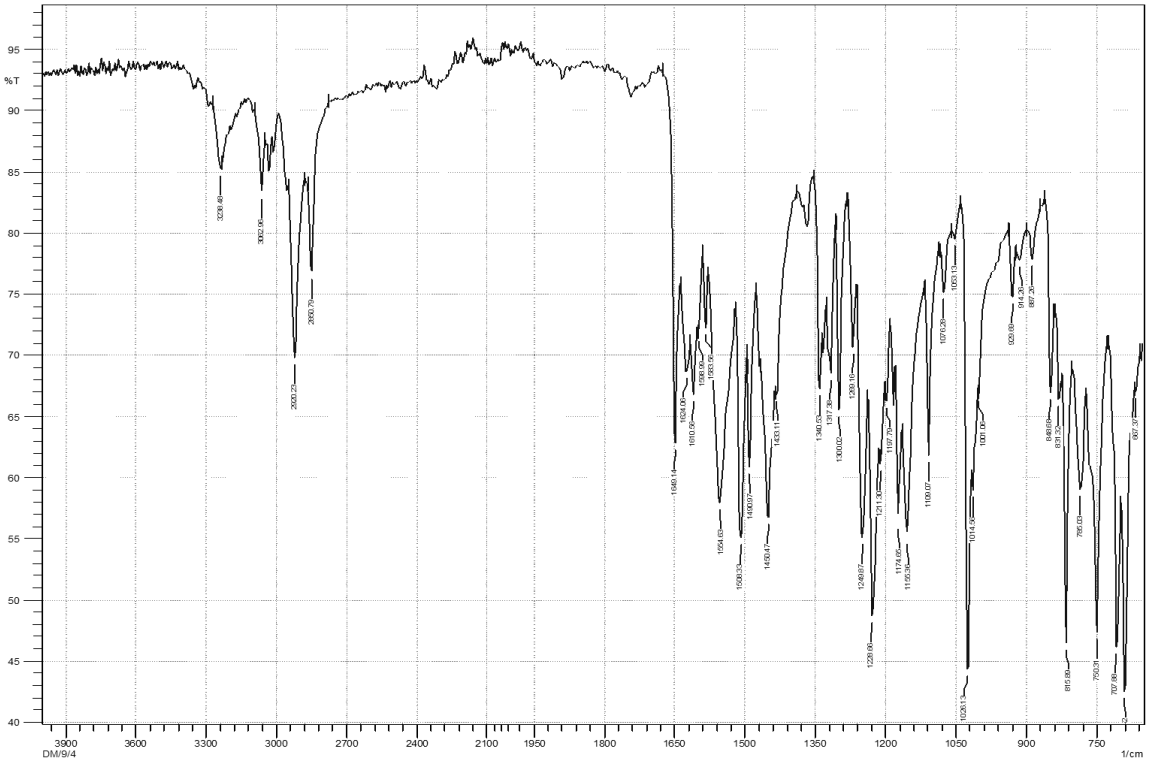
^{1}H NMR:



^{13}C NMR:



FTIR:



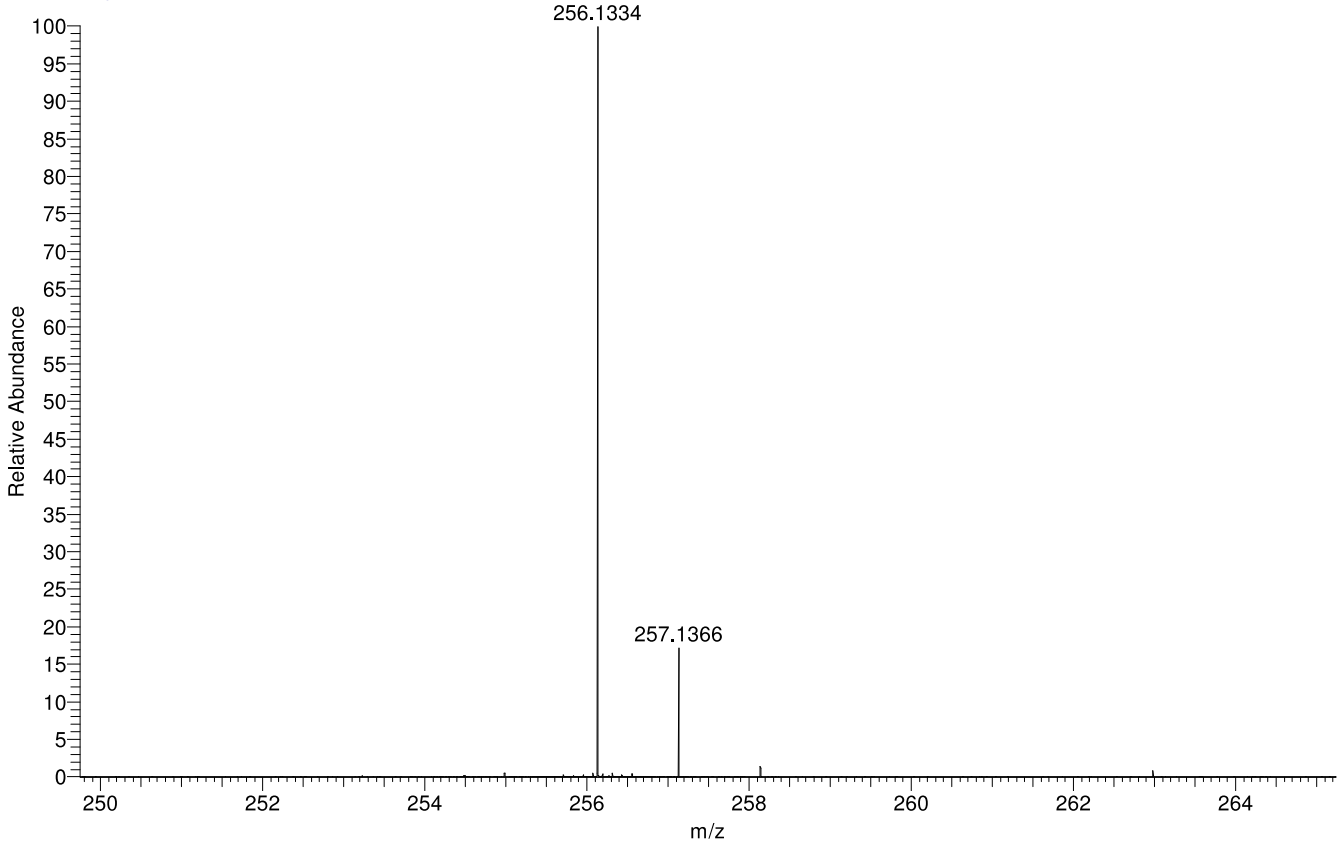
HRMS:

DM94 MW=255?
(MeOH)/MeOH + NH4OAc

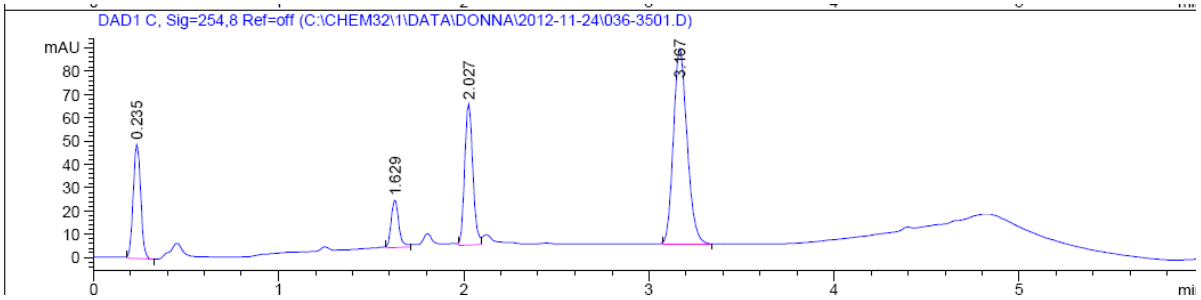
EPSRC National Centre Swansea
LTQ Orbitrap XL

Donna MacMillan
29/10/2012 20:59:02

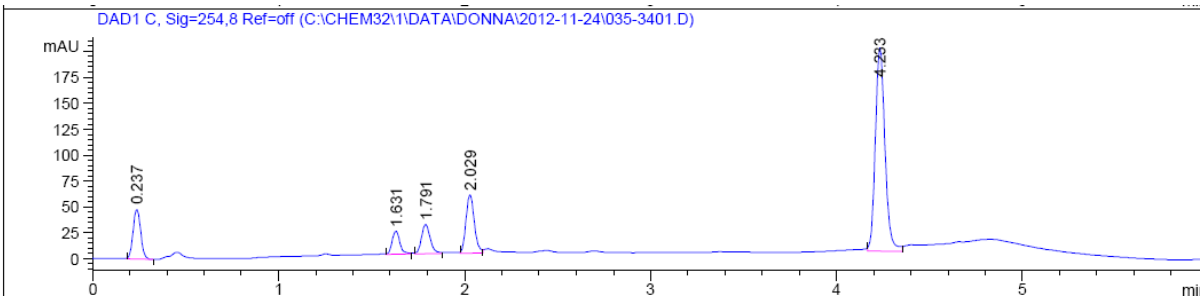
STRWAT002-OJ-HNESP #30-46 RT: 0.80-1.25 AV: 17 SM: 7G NL: 2.90E7
T: FTMS + p NSI Full ms [120.00-2000.00]



HPLC assay:



Dibenzyl ether standard

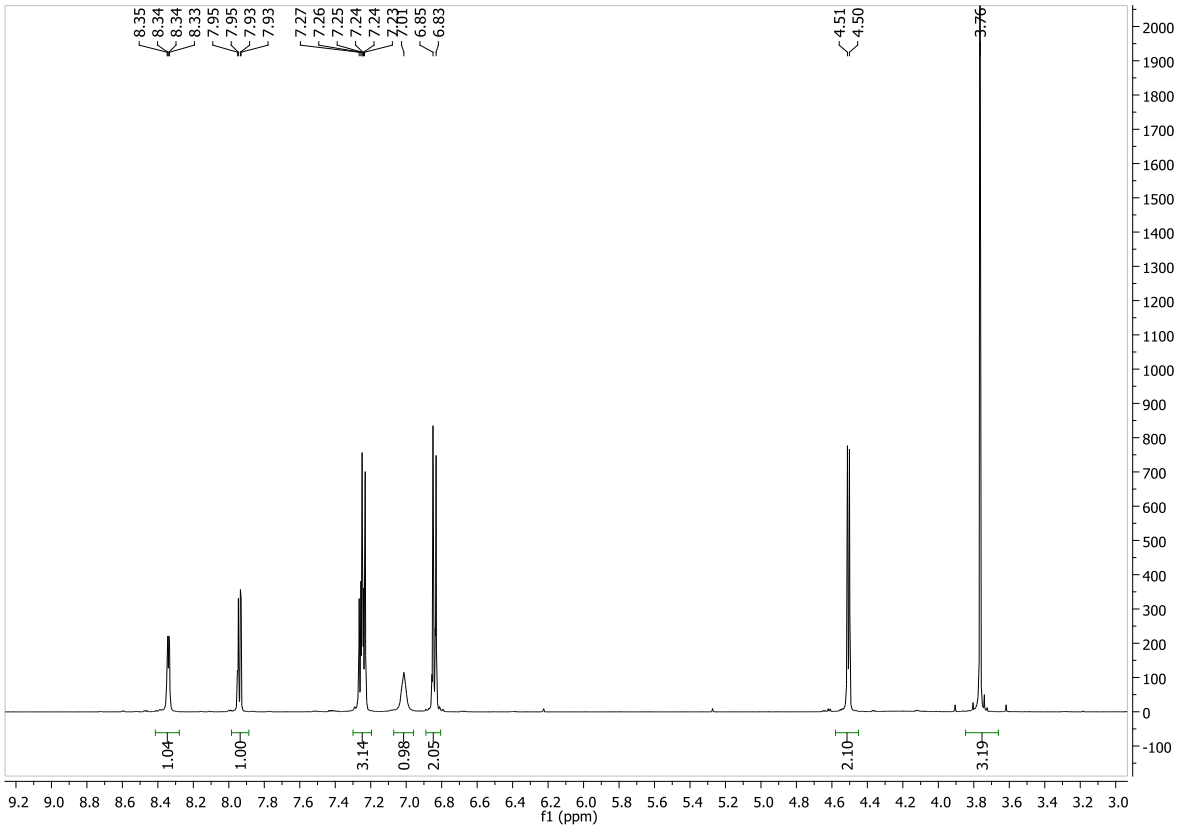


Bromobenzene standard

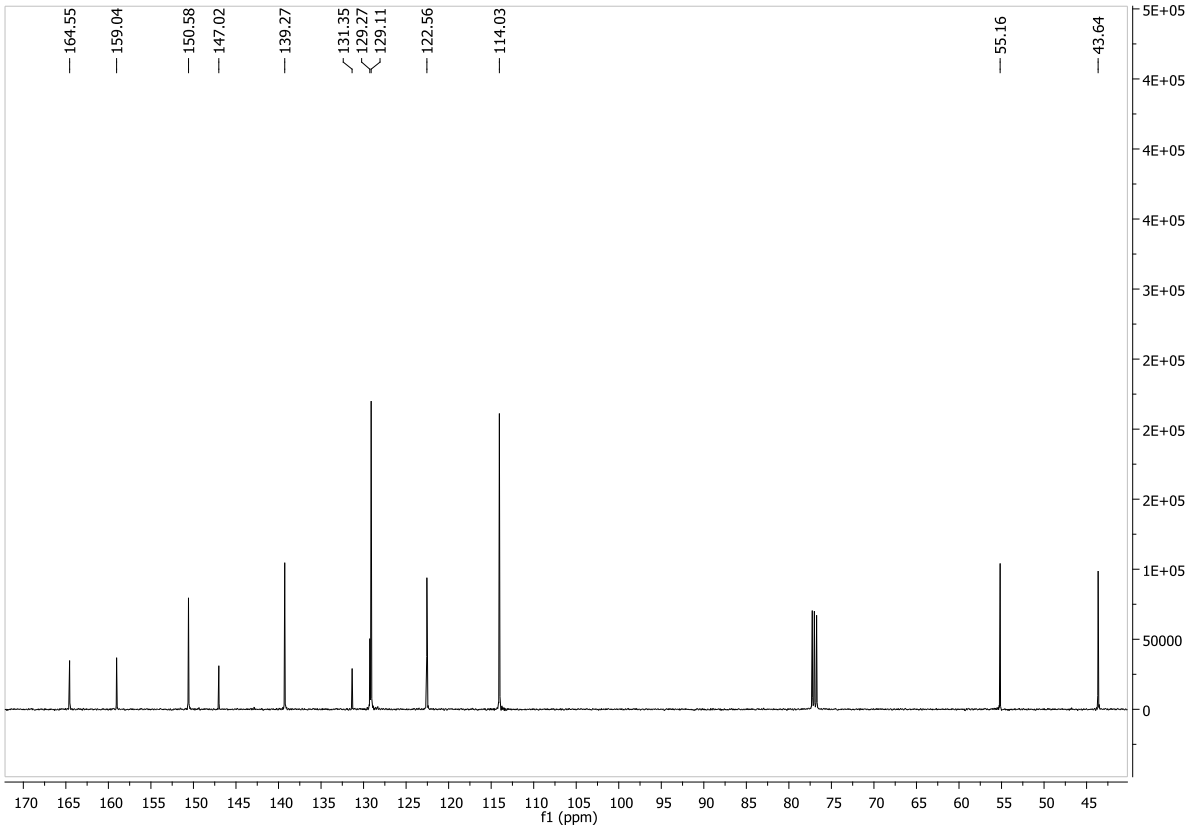
Substrate	R_t (min)
Phenylacetic acid	1.63
p-Methoxybenzylamine	0.24
Compound 4: *N*-(4-Methoxybenzyl)-2-phenylacetamide	2.03
Dibenzyl ether (standard)	4.23
Bromobenzene (standard)	3.17

Compound 5: 2-Chloro-*N*-(2-Methoxybenzyl)nicotinamide

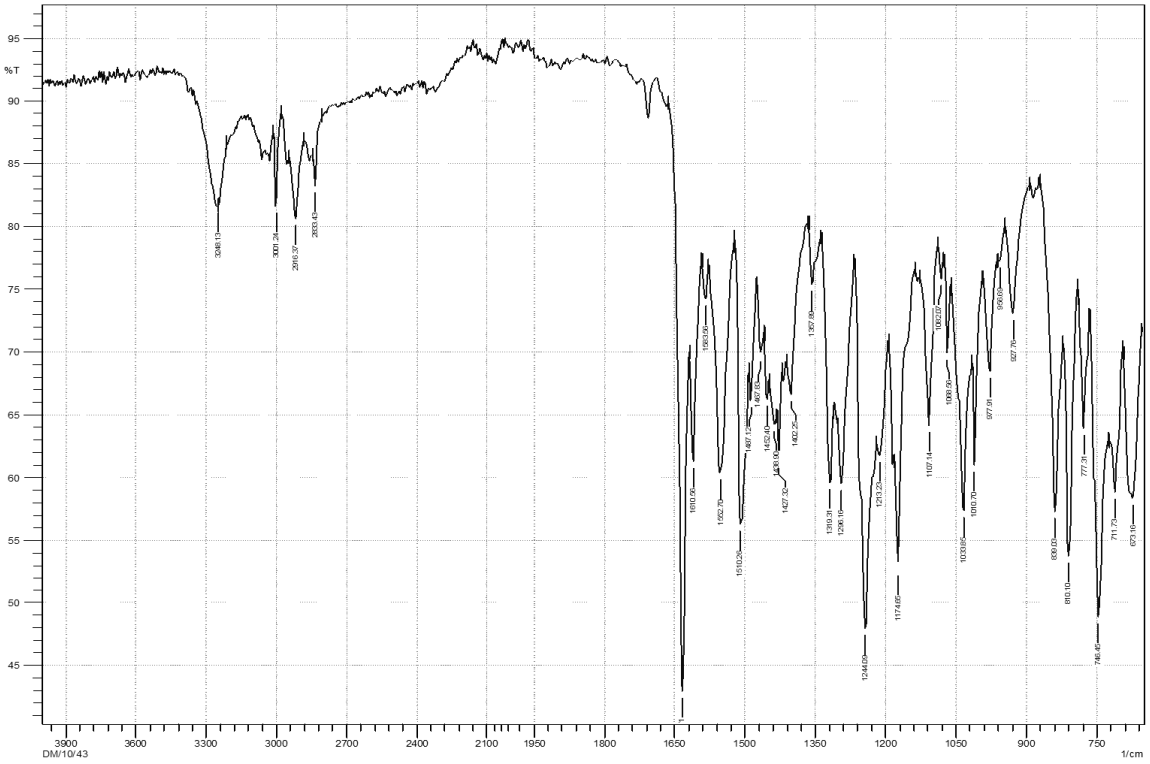
^{1}H NMR:



^{13}C NMR:



FTIR:



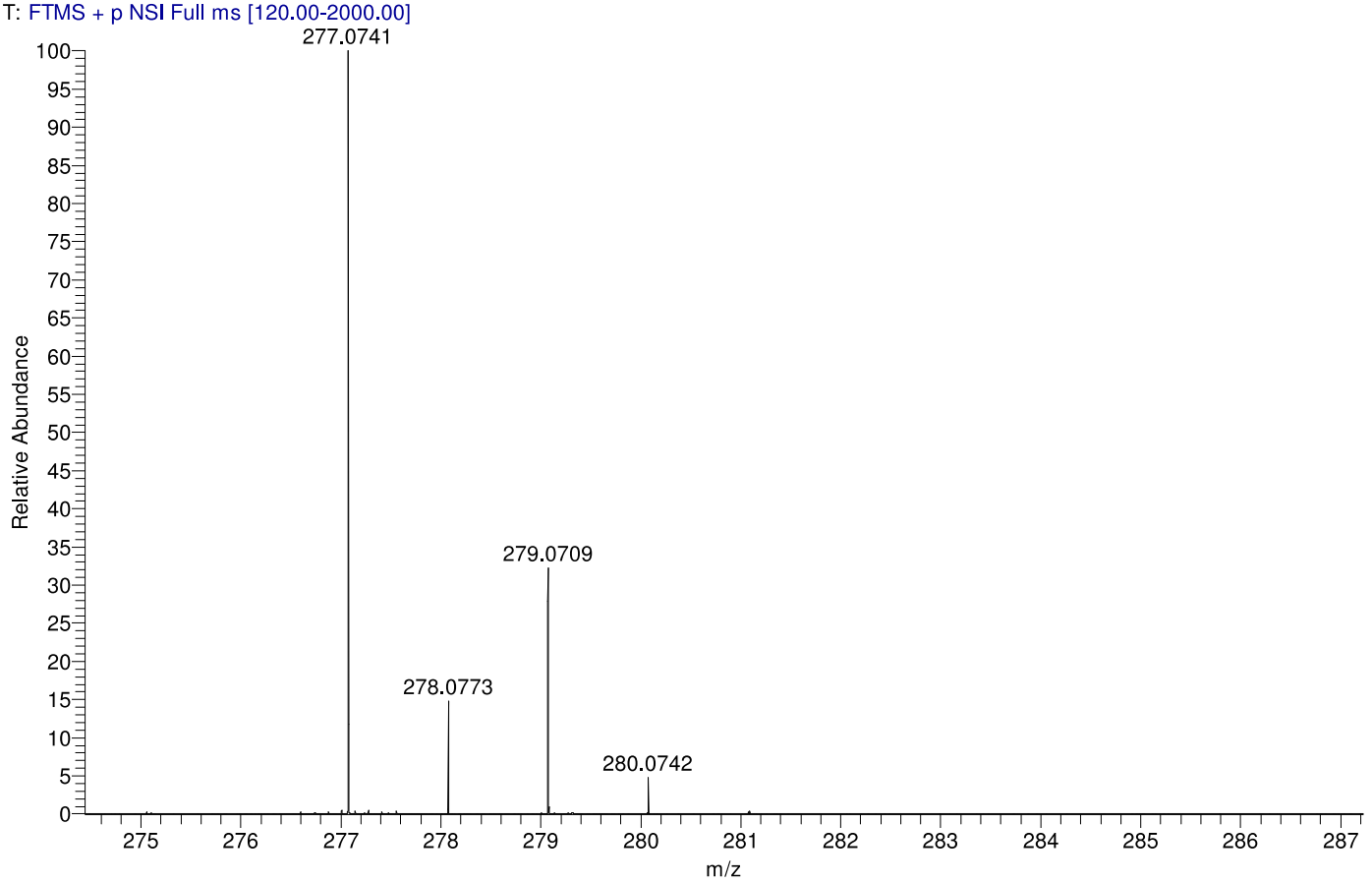
HRMS:

DM1043 MW=276?
(MeOH)/MeOH + NH4OAc

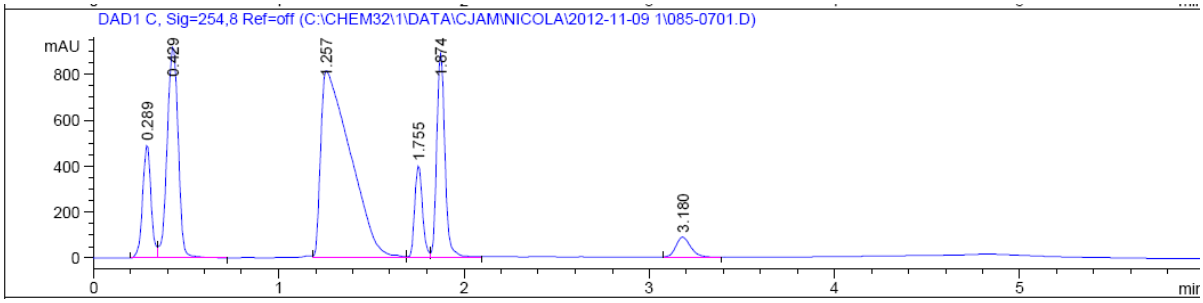
EPSRC National Centre Swansea
LTQ Orbitrap XL

Donna MacMillan
29/10/2012 21:19:41

STRWAT008-OJ-HNESP #29-46 RT: 0.74-1.22 AV: 18 SM: 7G NL: 4.34E7
T: FTMS + p NSI Full ms [120.00-2000.00]



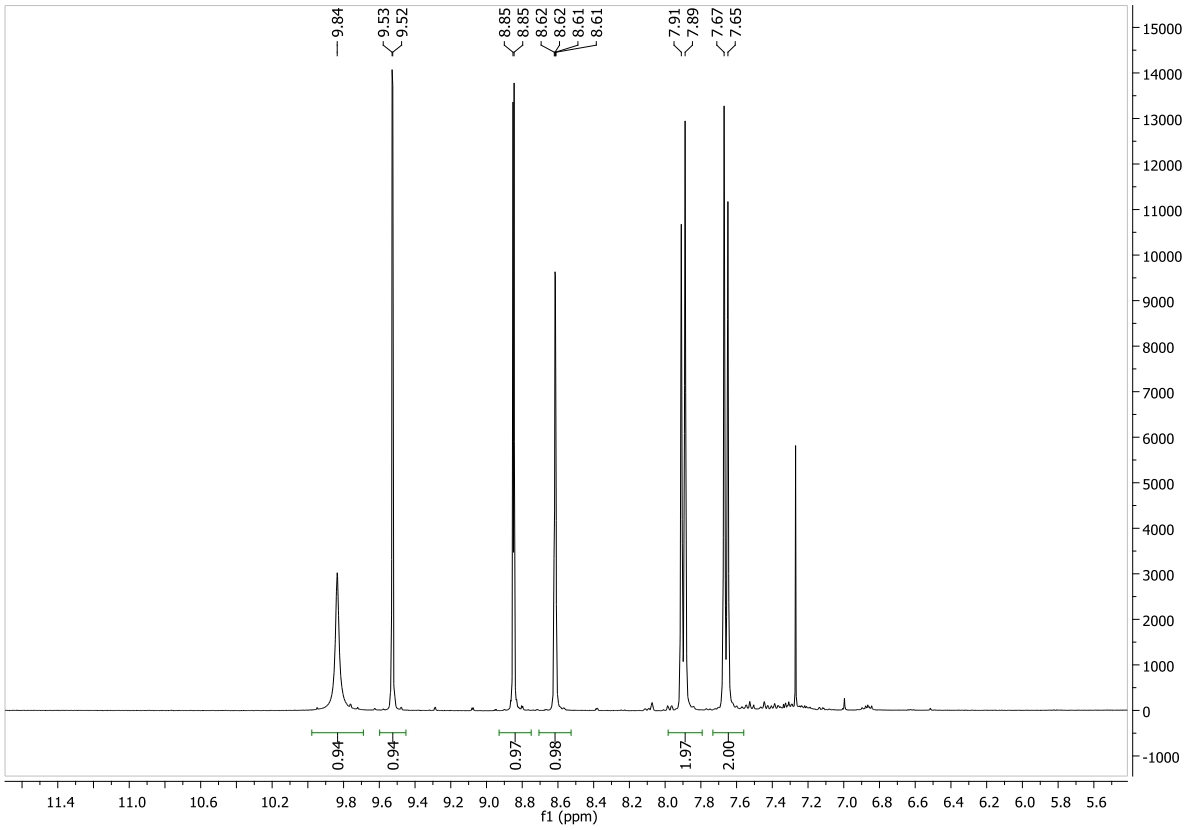
HPLC assay:



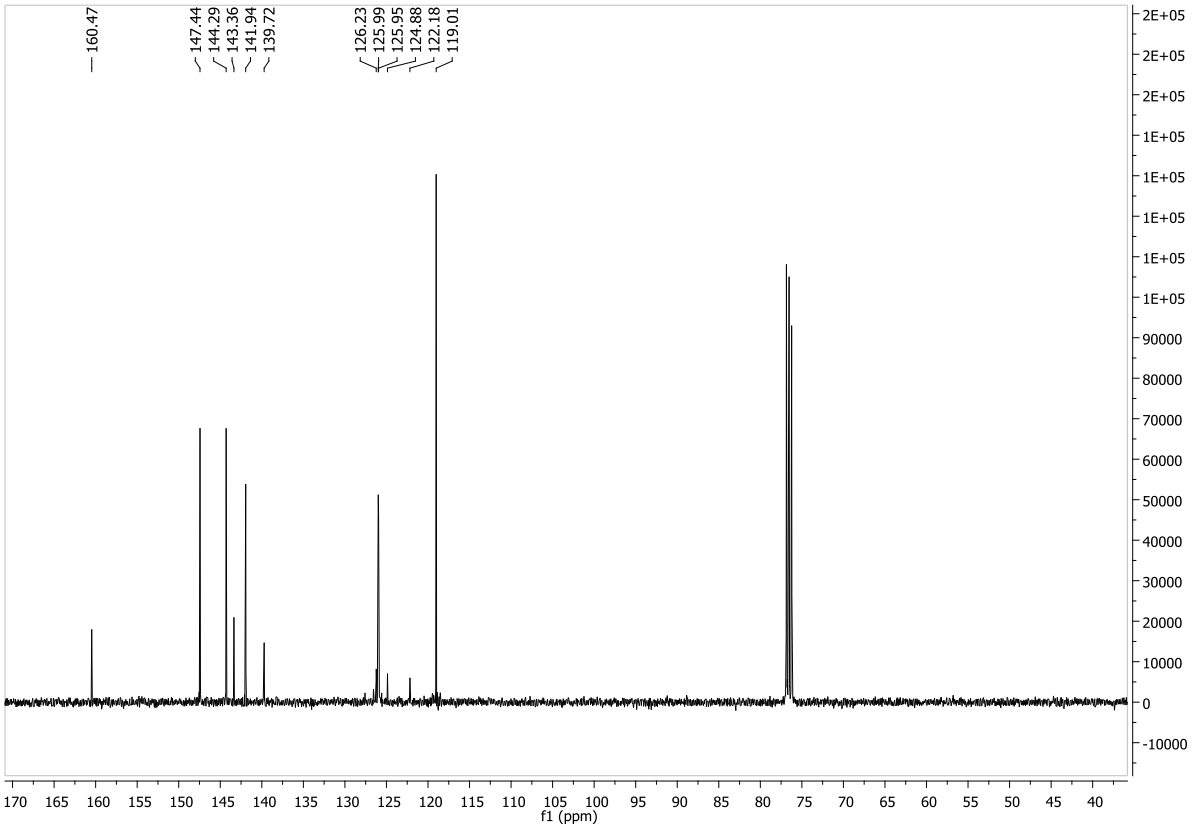
Substrate	R_t (min)
2-Chloronicotinic acid	1.26
2-Methoxybenzylamine	0.4, 1.87
Compound 5: 2-Chloro-*N*-(2-Methoxybenzyl)nicotinamide	1.76
Bromobenzene (standard)	3.18

Compound 6: *N*-(4-(Trifluoromethyl)phenyl)pyrazine-2-carboxamide

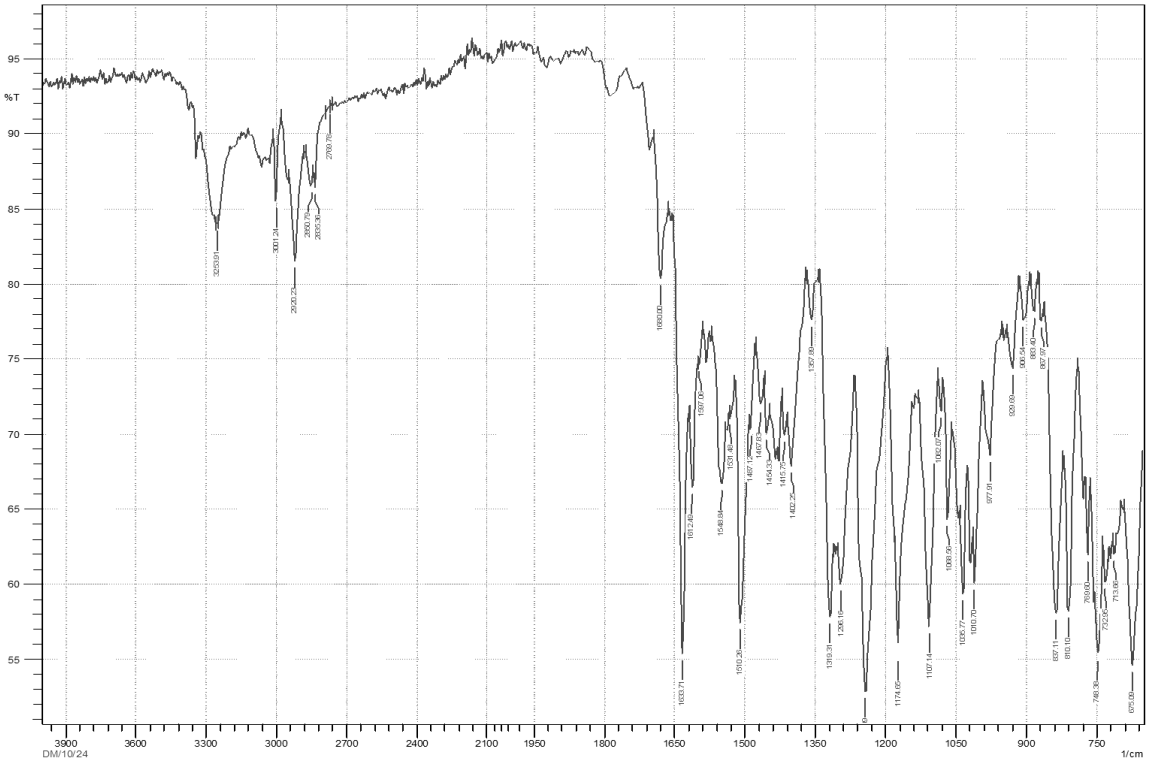
^{1}H NMR:



^{13}C NMR:

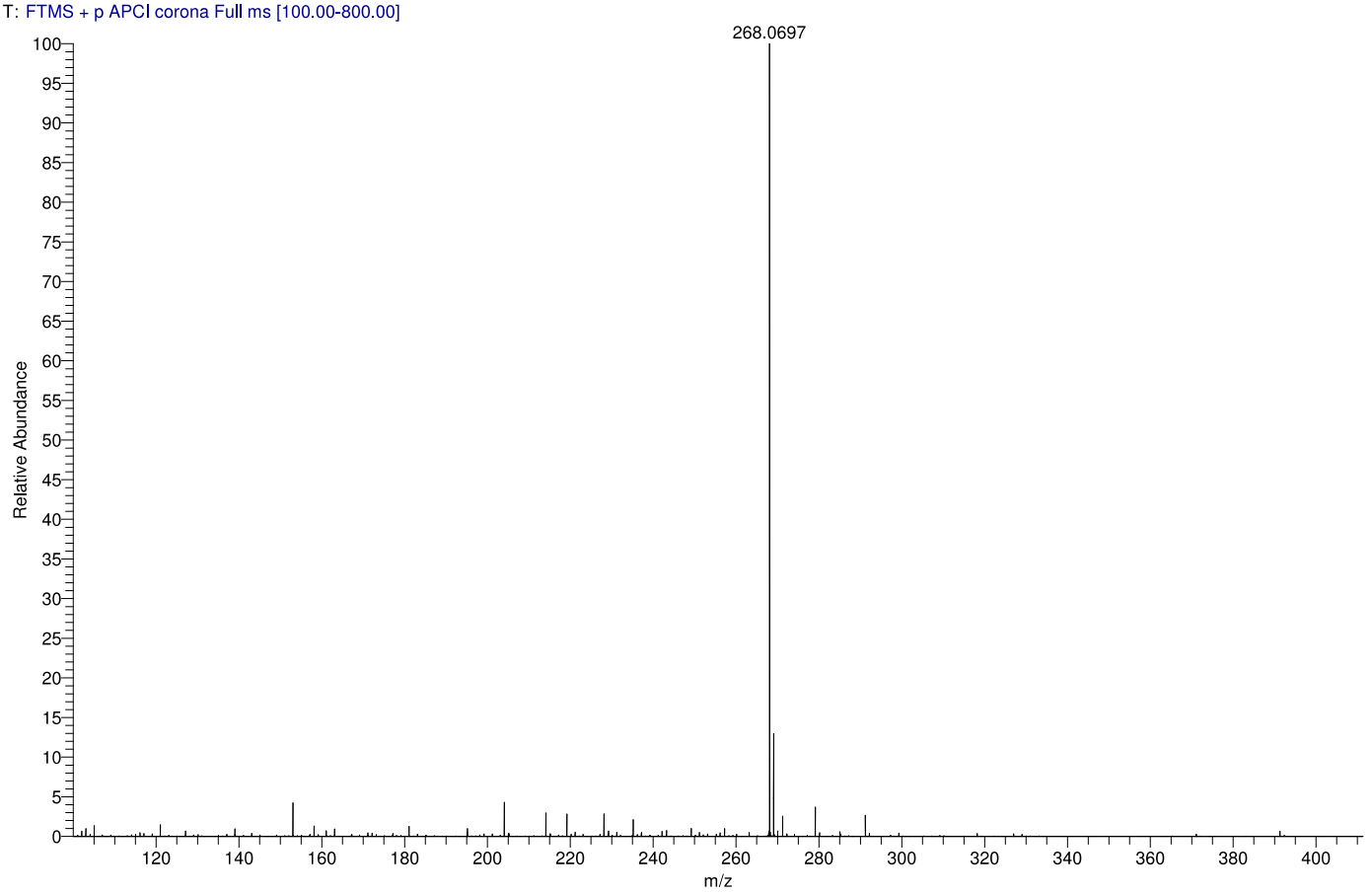


FTIR:

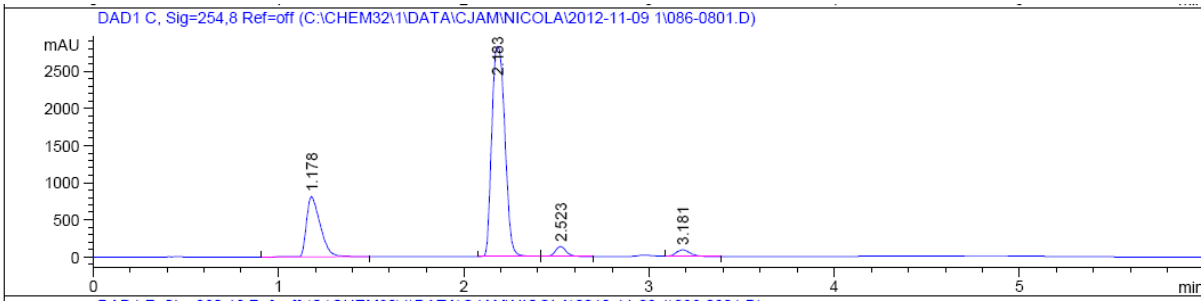


HRMS:

DM1024 MW=267? | EPSRC National Centre Swansea | MacMillan
ASAP(MeOH) | LTQ Orbitrap XL | 09/11/2012 08:41:05
STRWAT007-PG-HASP #16-19 RT: 0.47-0.55 AV: 4 SM: 7G NL: 8.01E6
T: FTMS + p APCI corona Full ms [100.00-800.00]



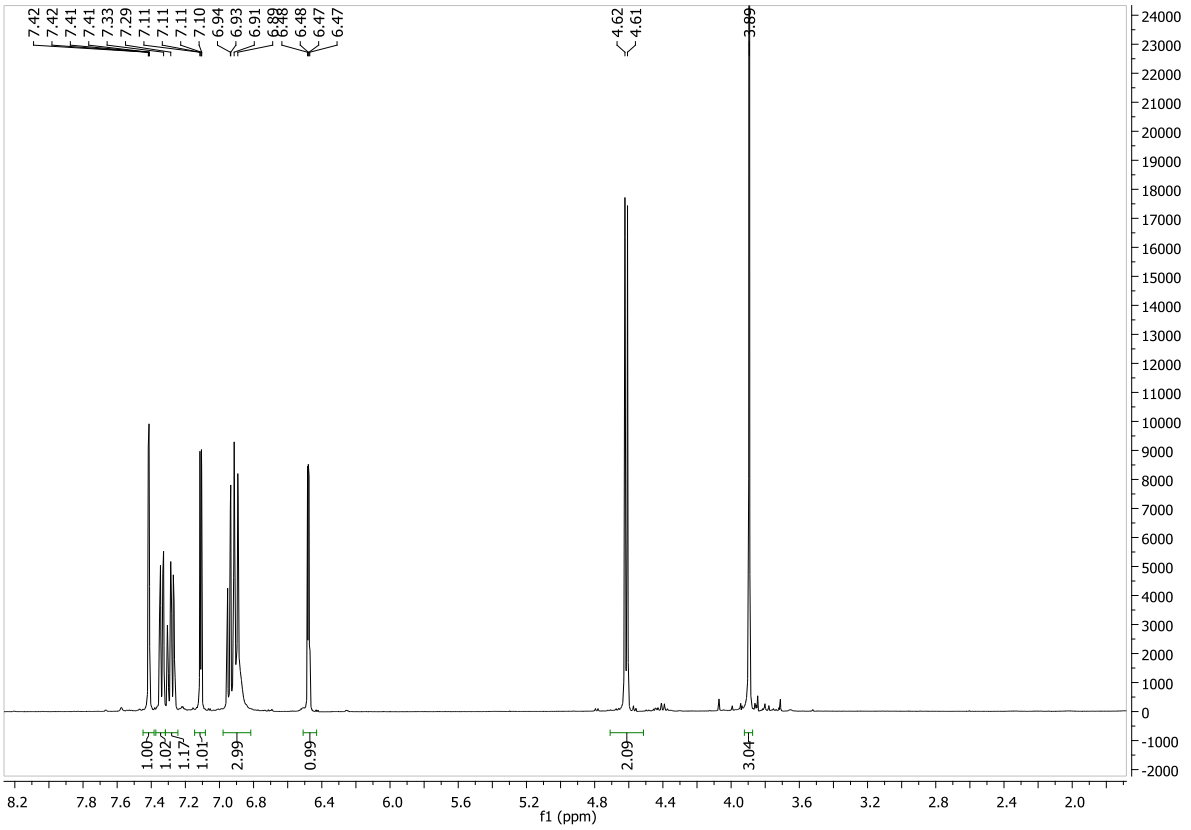
HPLC assay:



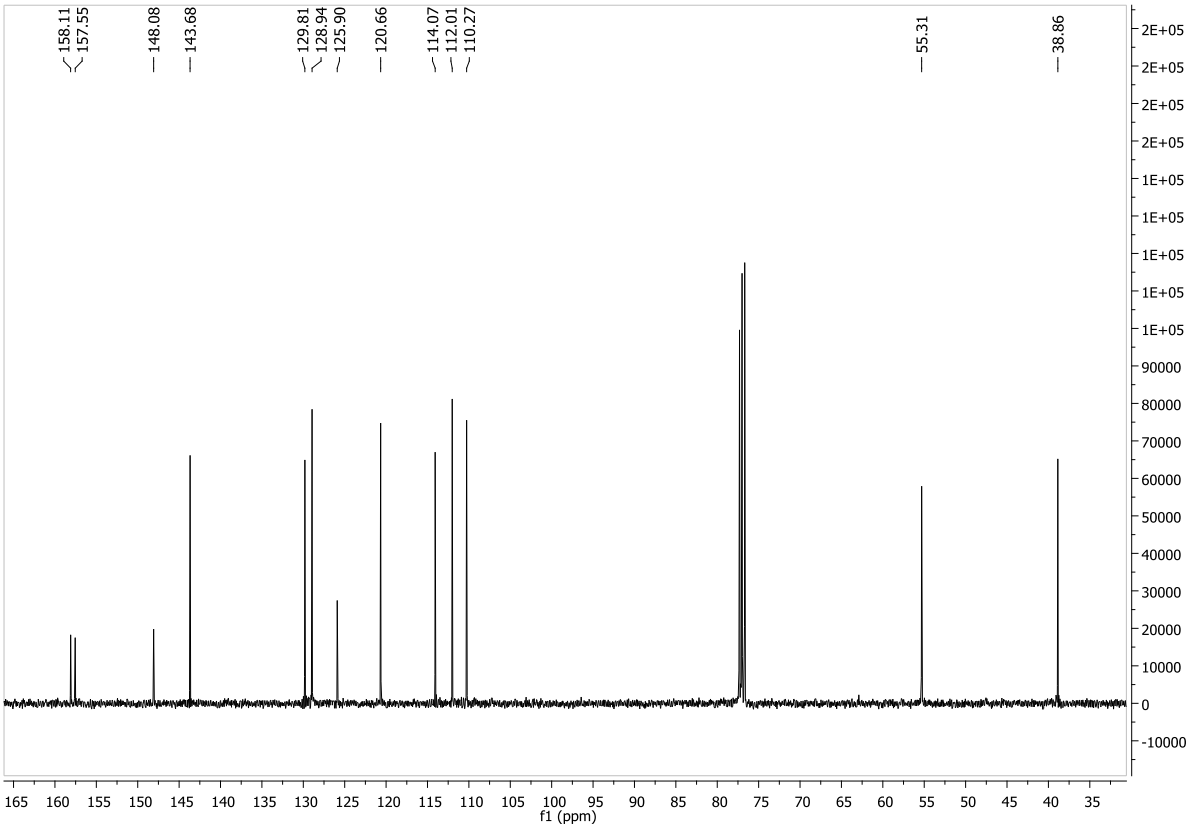
Component	R_t (min)
4-Trifluoromethyl aniline	2.18
2-Pyrazine carboxylic acid	1.18
Compound 6: *N*-(4-(Trifluoromethyl)phenyl)pyrazine-2-carboxamide	2.52
Bromobenzene (standard)	3.18

Compound 7: *N*-(2-Methoxybenzyl)furan-3-carboxamide

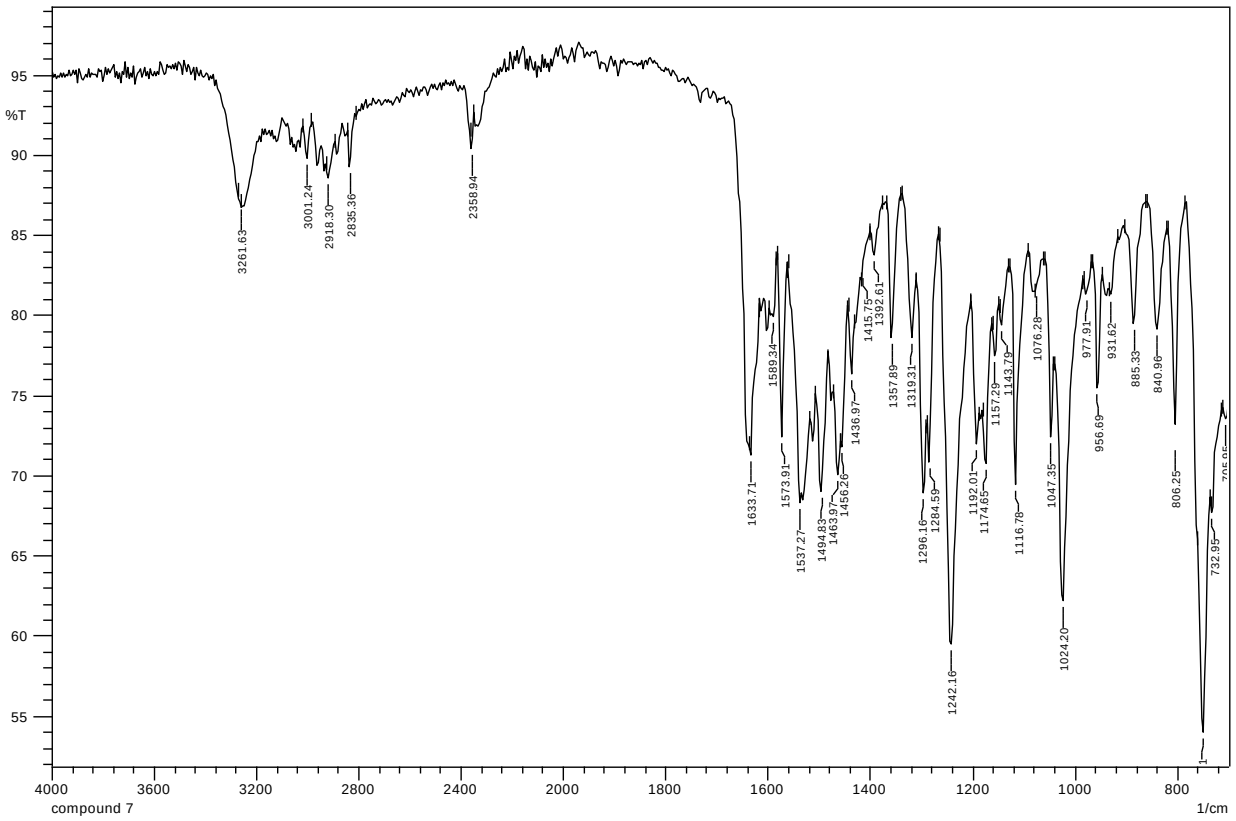
^{1}H NMR:



^{13}C NMR:



FTIR:



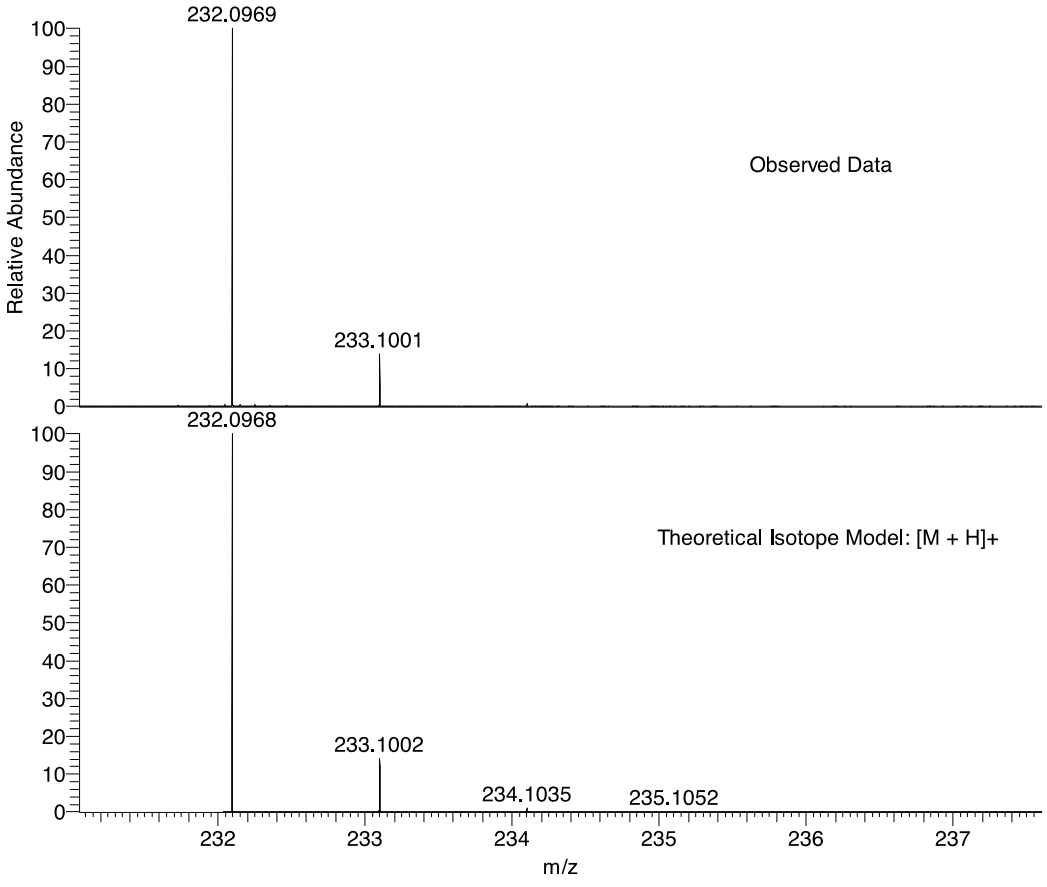
HRMS:

DM1027 MW=231?
(MeOH)/MeOH + NH4OAc

EPSRC National Centre Swansea
LTQ Orbitrap XL

Donna MacMillan
29/10/2012 21:26:34

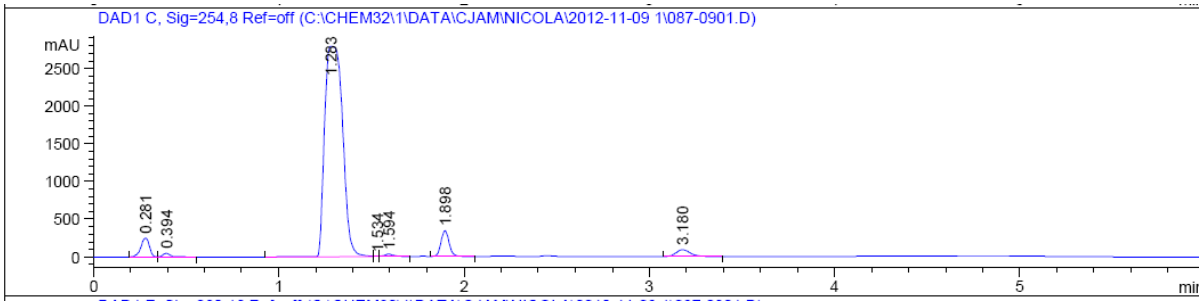
SM: 7G



NL:
4.93E7
STRWAT015-OJ-HNESP#27-51 RT: 0.72-1.28 AV: 22 T: FTMS + p NSI Full ms [120.00-2000.00]

NL:
2.01E4
$C_{13}H_{13}NO_3H$:
$C_{13}H_{14}N_1O_3$
p (gss, s /p:40) Chrg 1
R: 100000 Res .Pwr . @FWHM

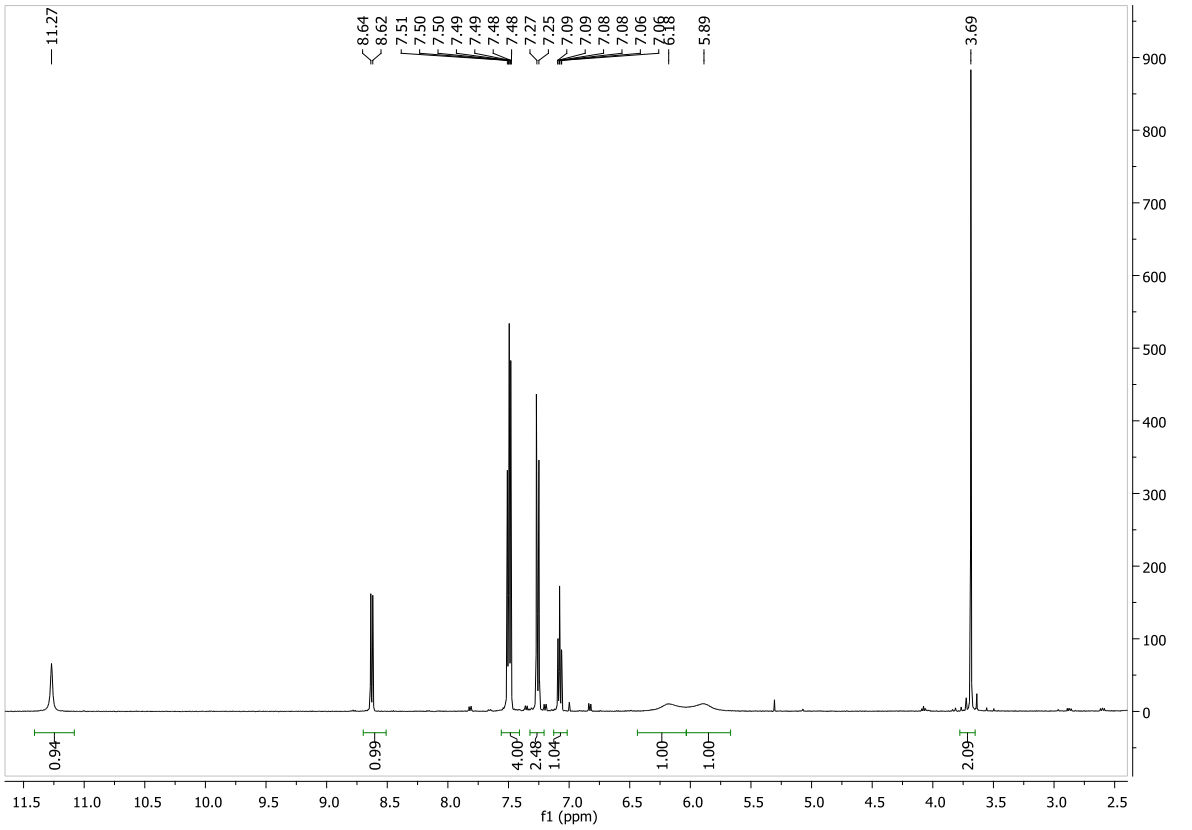
HPLC assay:



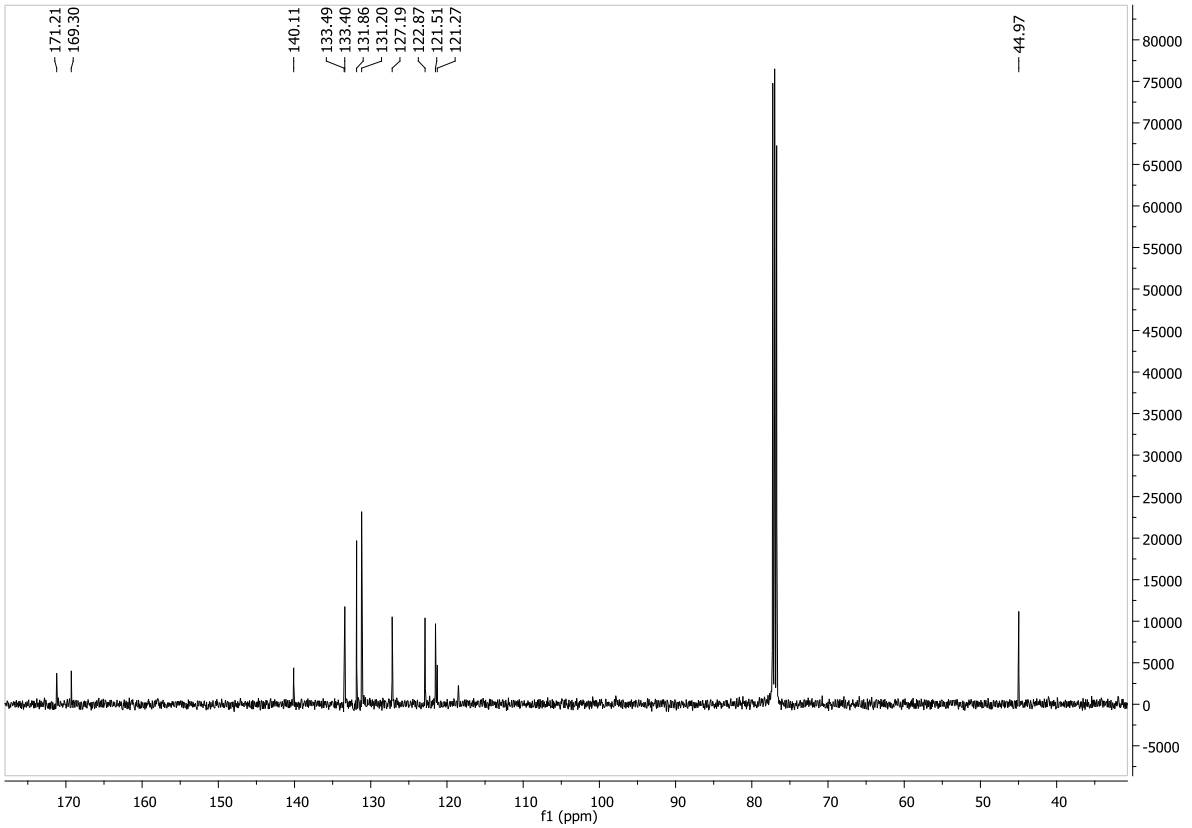
Component	R_t (min)
2-Furoic acid	1.28
2-Methoxybenzylamine	0.4, 1.87
Compound 7: *N*-(2-Methoxybenzyl)furan-3-carboxamide	1.90
Bromobenzene (standard)	3.18

Compound 8: 2-(2-(4-Bromophenyl)acetamido)benzamide

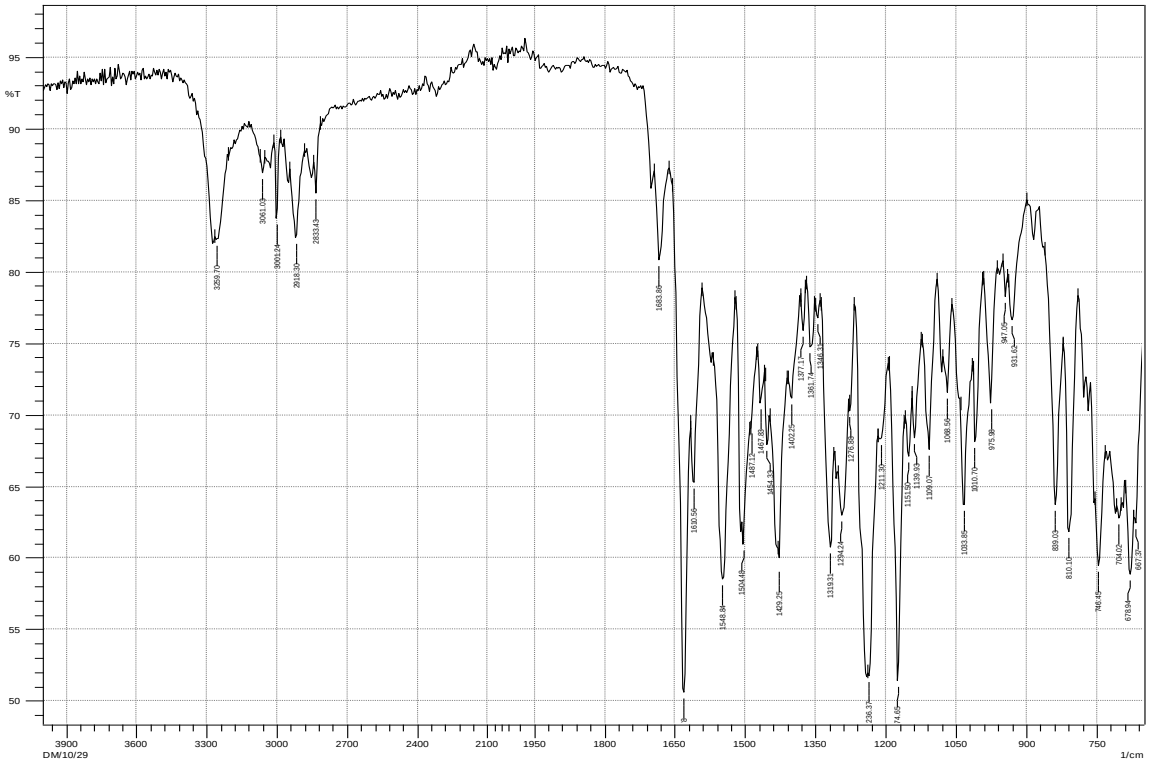
^{1}H NMR:



^{13}C NMR:



FTIR:



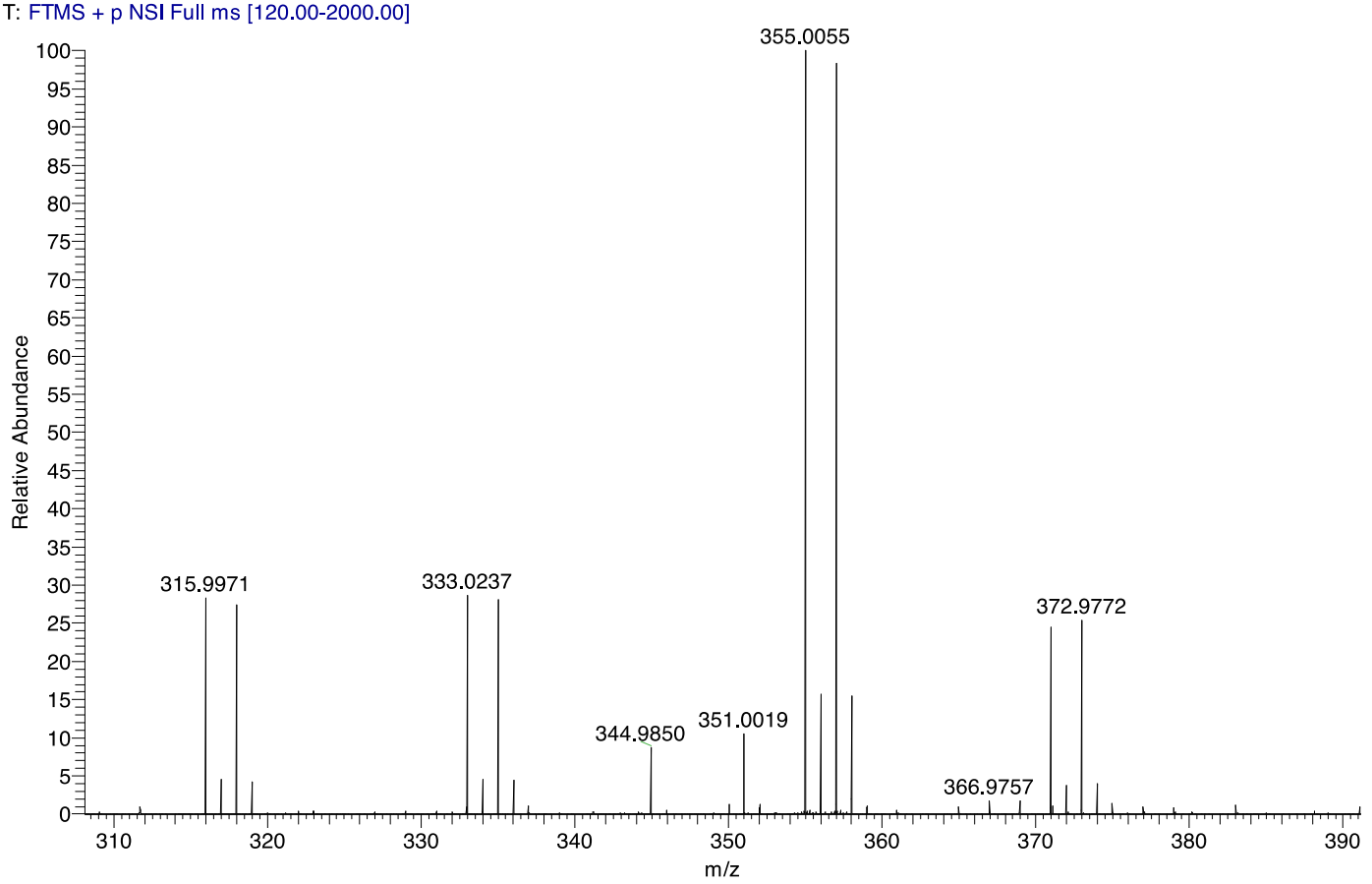
HRMS:

DM1029 MW=332?
(MeOH)/MeOH + NH4OAc

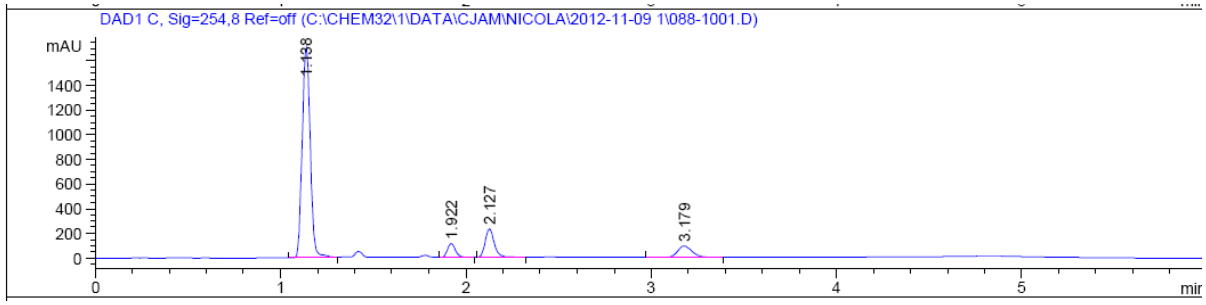
EPSRC National Centre Swansea
LTQ Orbitrap XL

Donna MacMillan
29/10/2012 21:43:44

STRWAT010-OJ-HNESP #28-45 RT: 0.84-1.30 AV: 17 SM: 7G NL: 1.02E7
T: FTMS + p NSI Full ms [120.00-2000.00]



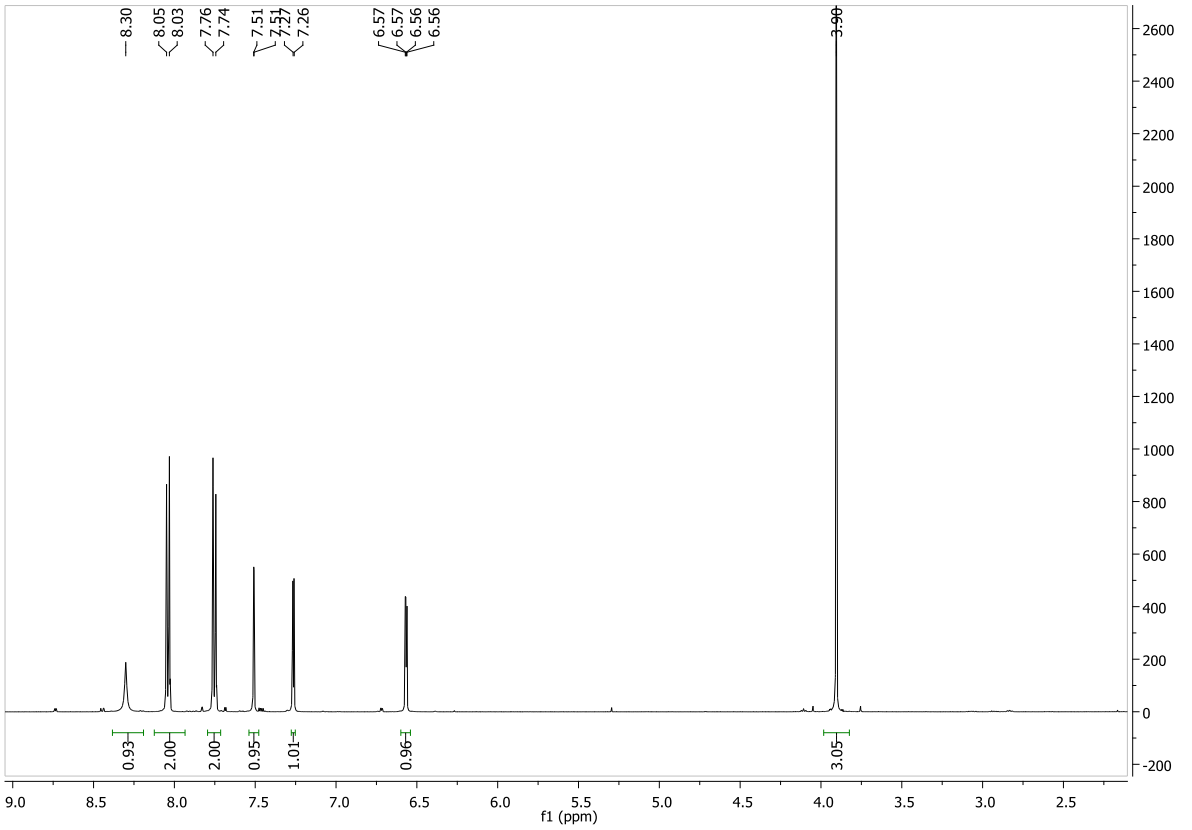
HPLC assay:



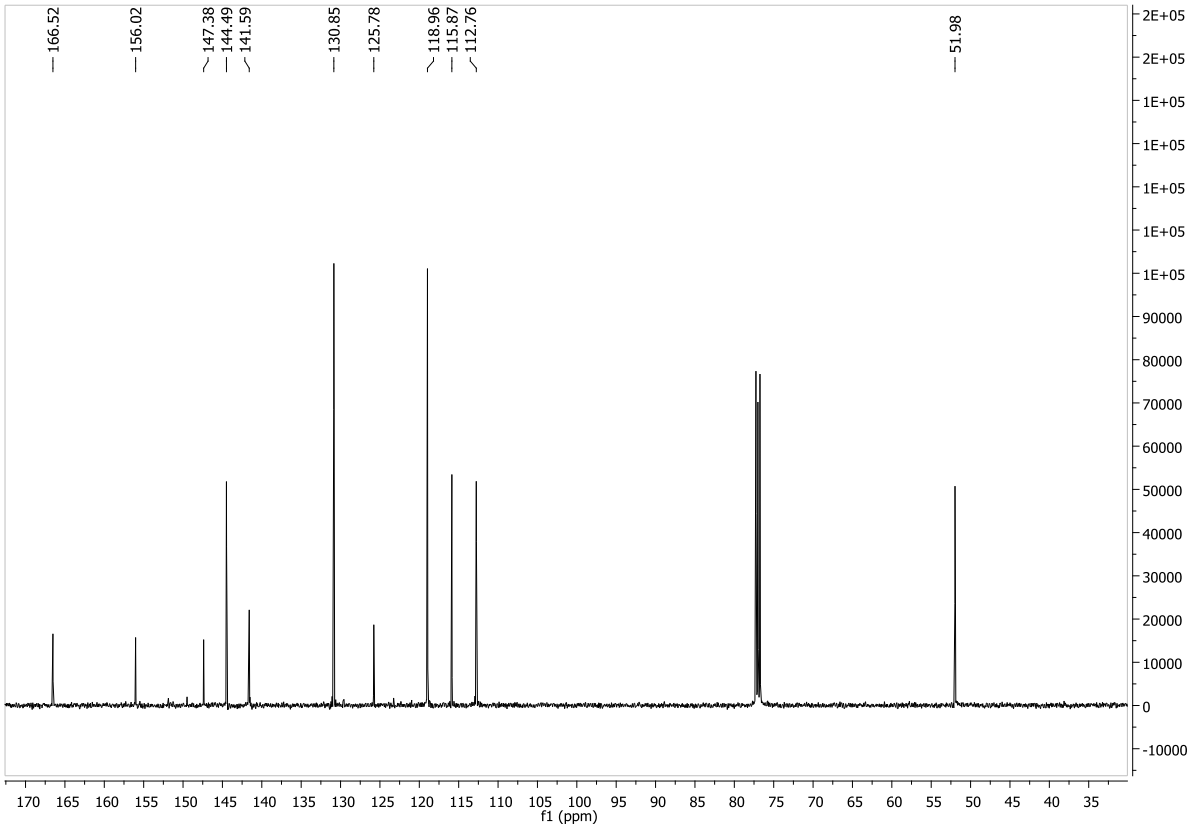
Component	R_t (min)
4-Bromophenyl acetic acid	1.92
2-Aminobenzamide	1.14
Compound 8: 2-(2-(4-Bromophenyl)acetamido)benzamide	2.13
Bromobenzene (standard)	3.18

Compound 9: Methyl 4-(furan-2-carboxamido)benzoate

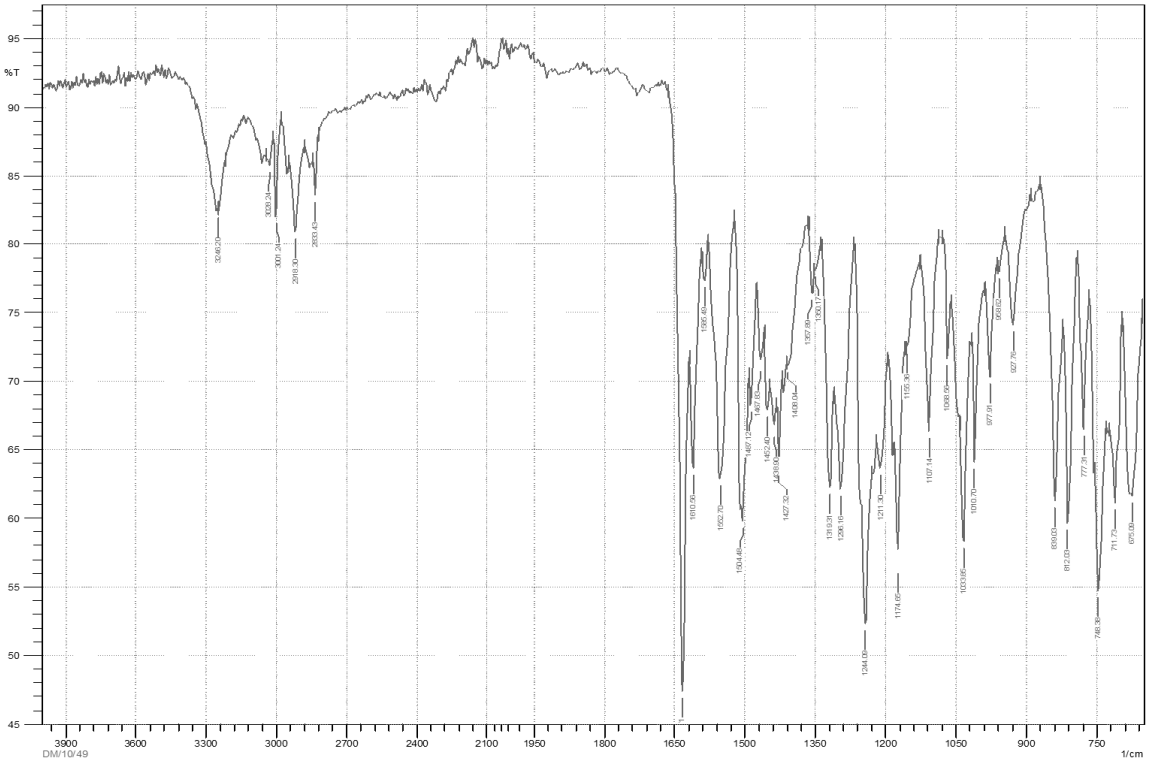
^{1}H NMR:



^{13}C NMR:



FTIR:

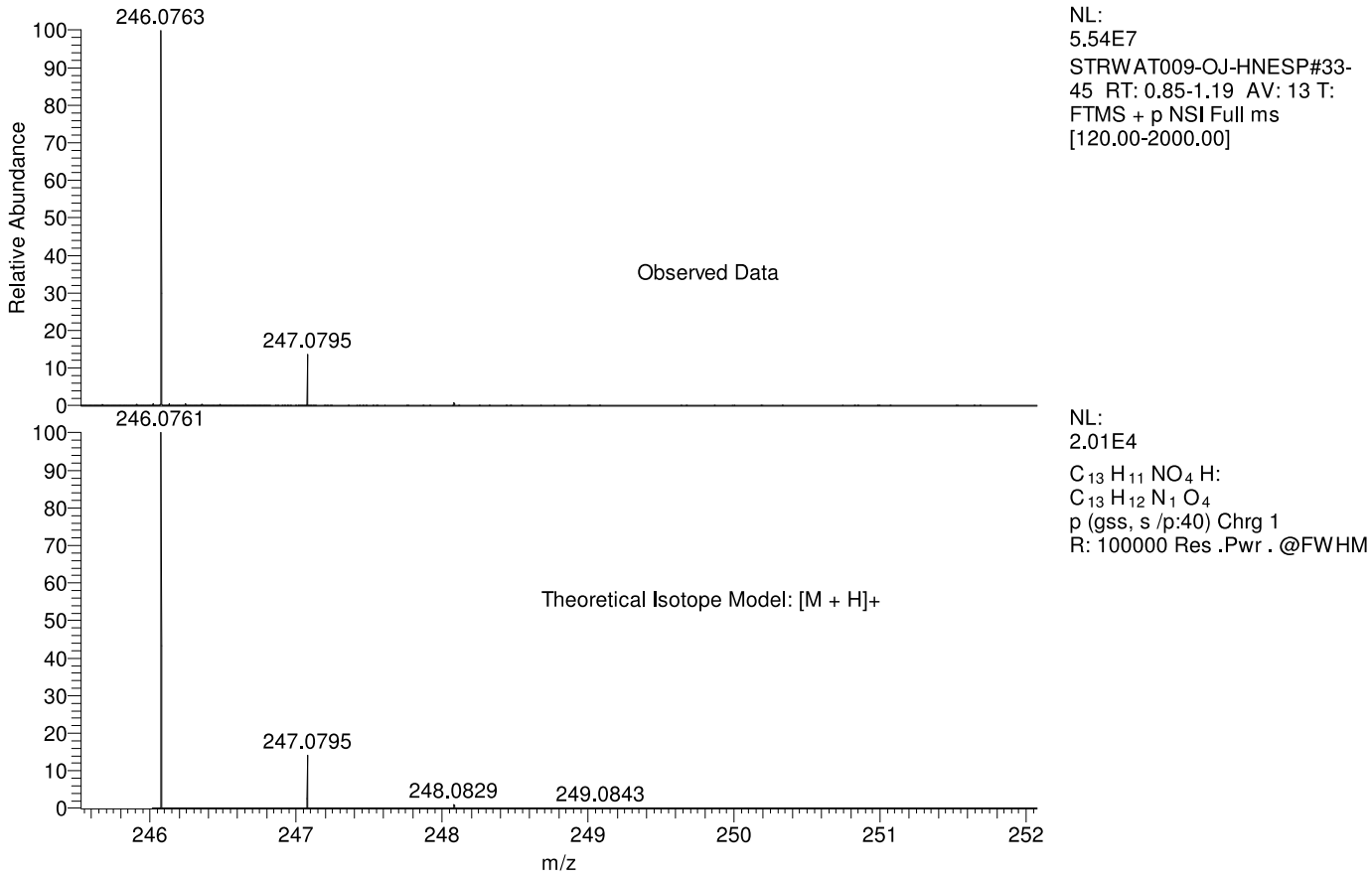


HRMS:

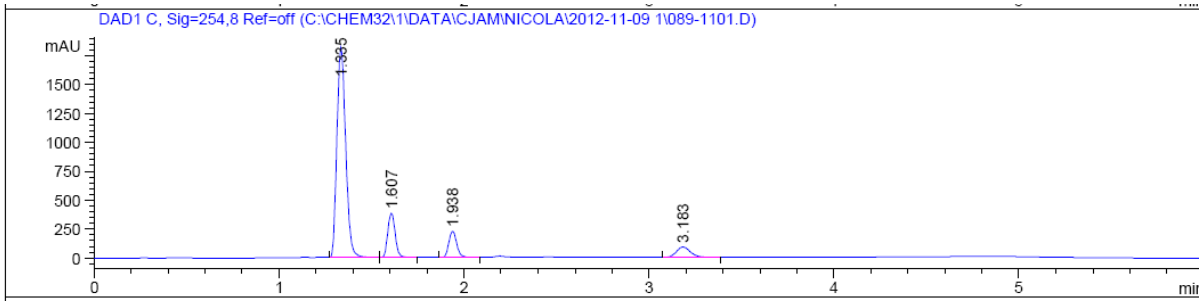
DM1049 MW=245?
(MeOH)/MeOH + NH4OAc

EPSRC National Centre Swansea
LTQ Orbitrap XL

Donna MacMillan
29/10/2012 21:23:07



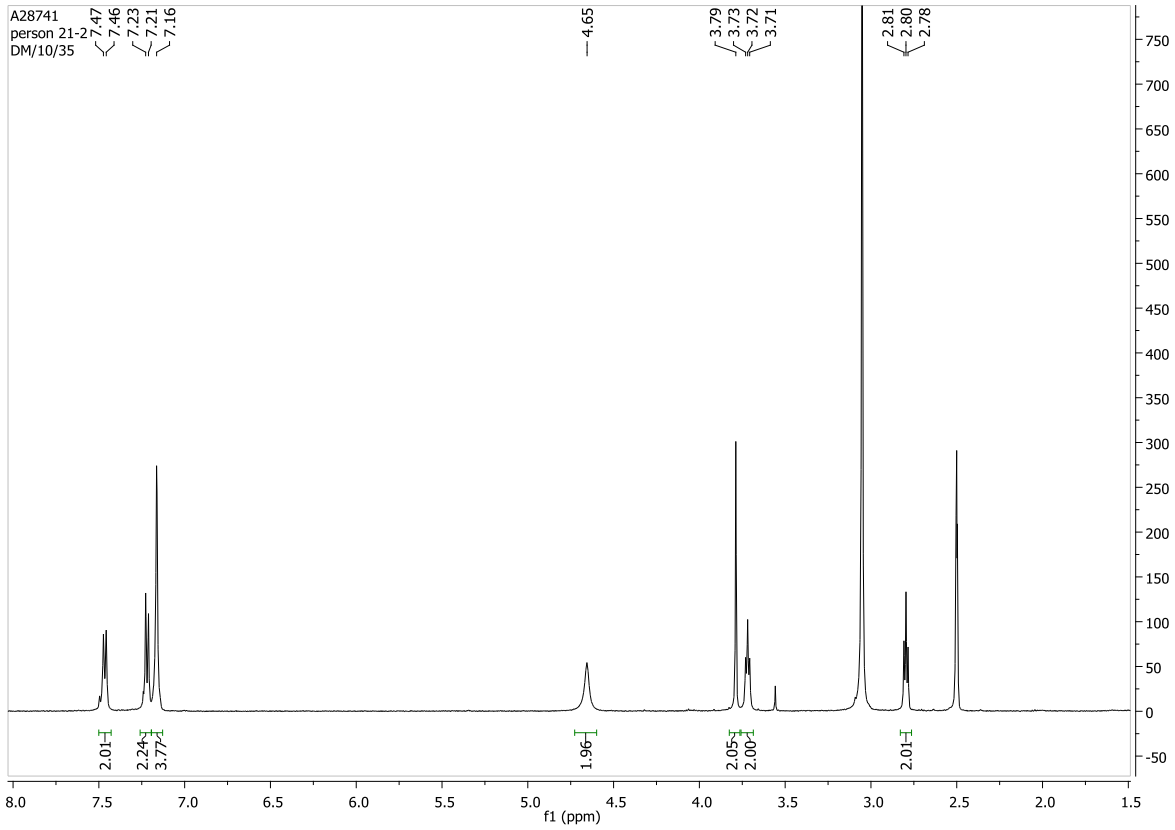
HPLC assay:



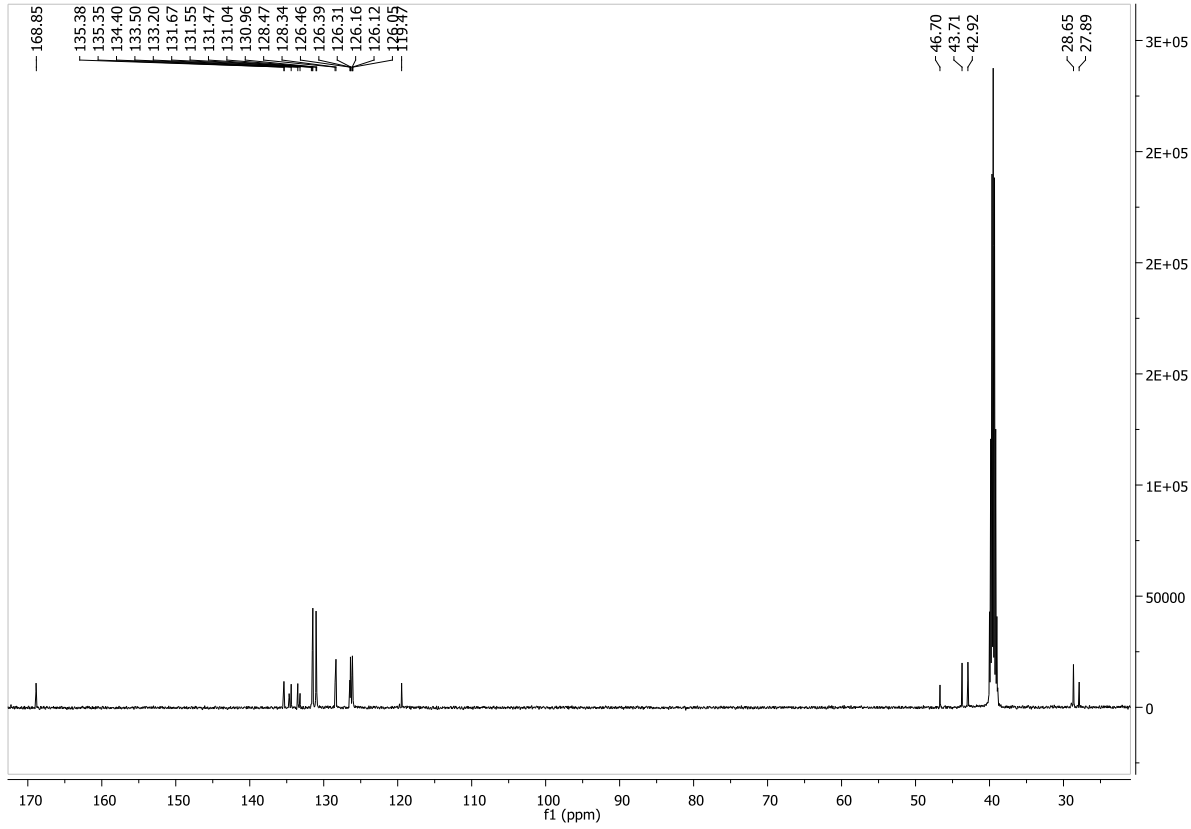
Component	R_t (min)
2-Furoic acid	1.34
Methyl 4-aminobenzoate	1.61
Compound 9: Methyl 4-(furan-2-carboxamido)benzoate	1.94
Bromobenzene (standard)	3.18

Compound 10: 2-(4-Bromophenyl)-1-(3,4-dihydroisoquinolin-2(1*H*)-yl)ethanone

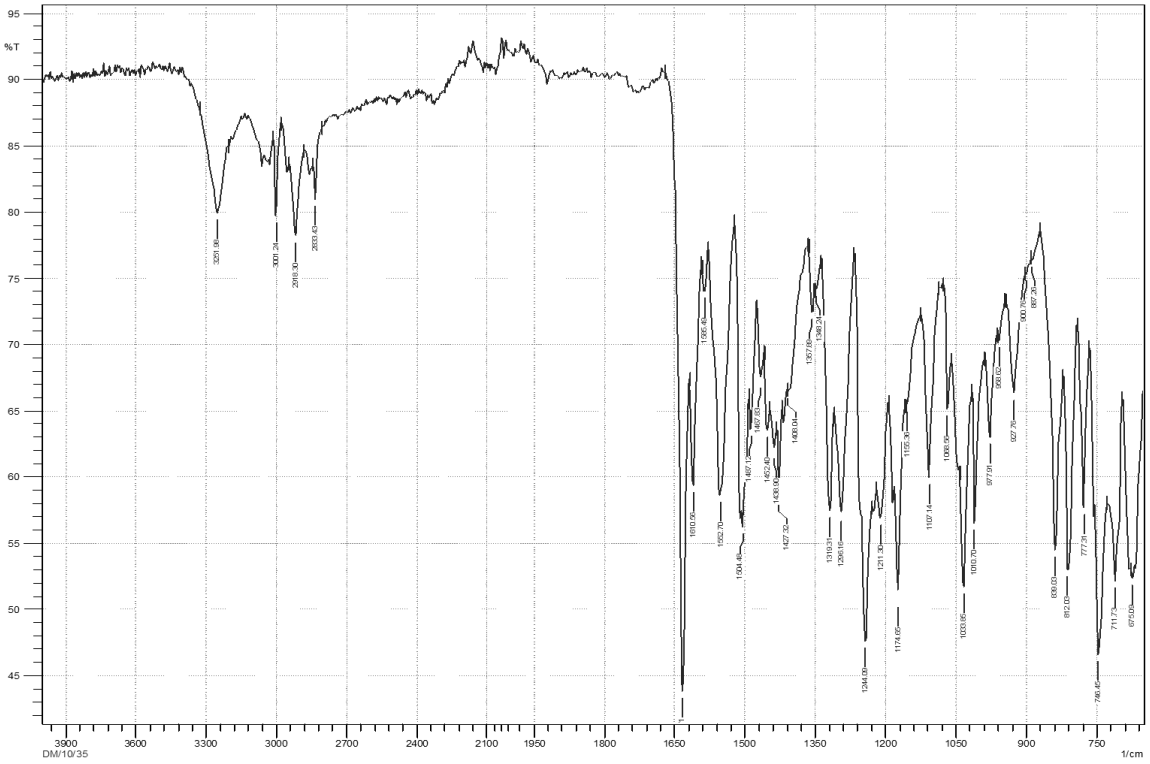
^{1}H NMR:



^{13}C NMR:



FTIR:



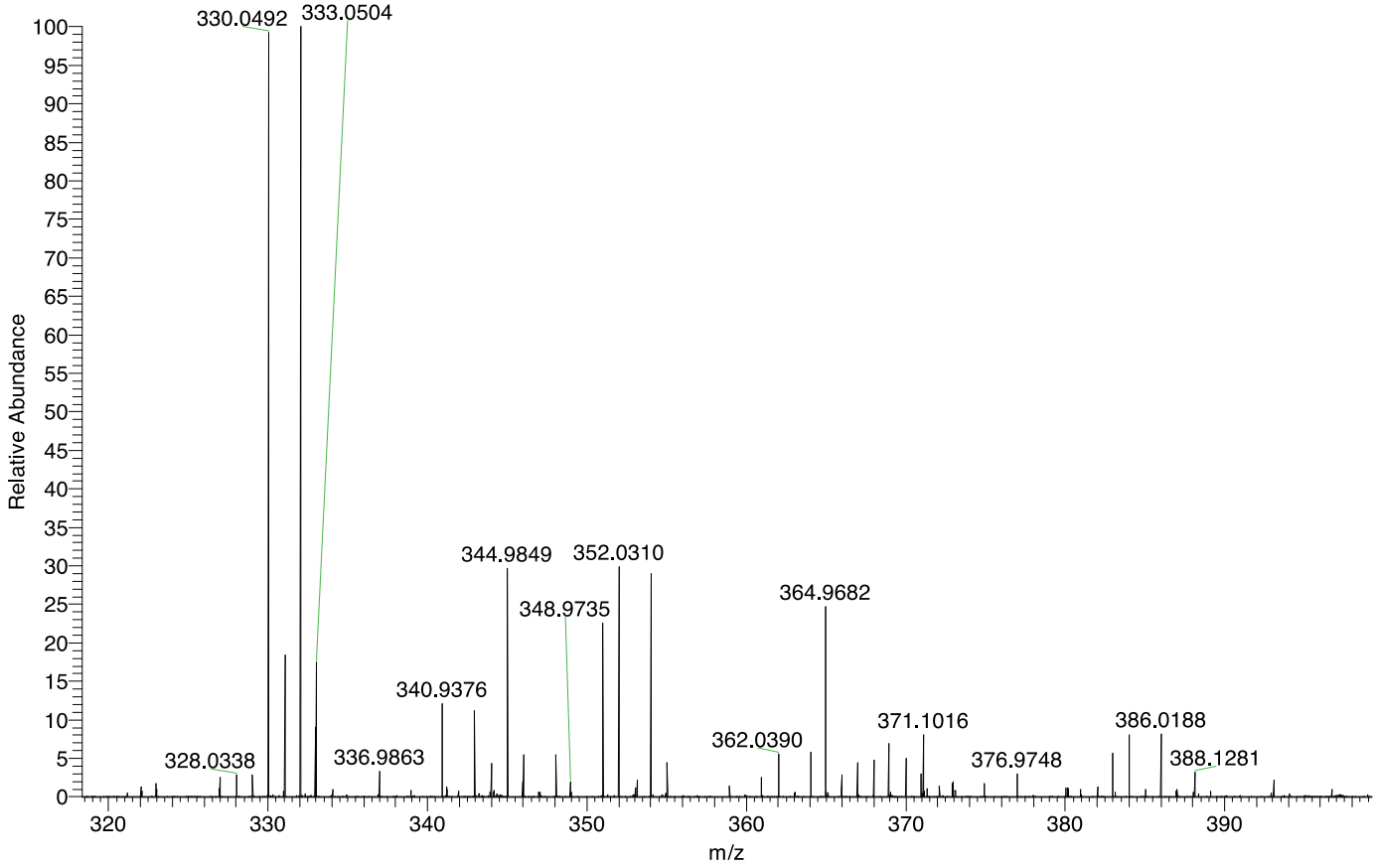
HRMS:

DM1035-2 MW=329?
(MeOH)/MeOH + NH4OAc

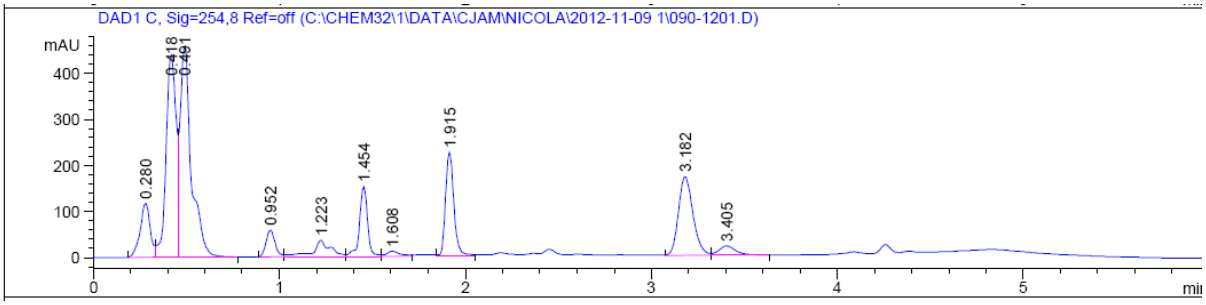
EPSRC National Centre Swansea
LTQ Orbitrap XL

Donna MacMillan
29/10/2012 21:33:27

STRWAT012-OJ-HNESP #31-43 RT: 0.96-1.27 AV: 12 SM: 7G NL: 1.84E6
T: FTMS + p NSI Full ms [120.00-2000.00]



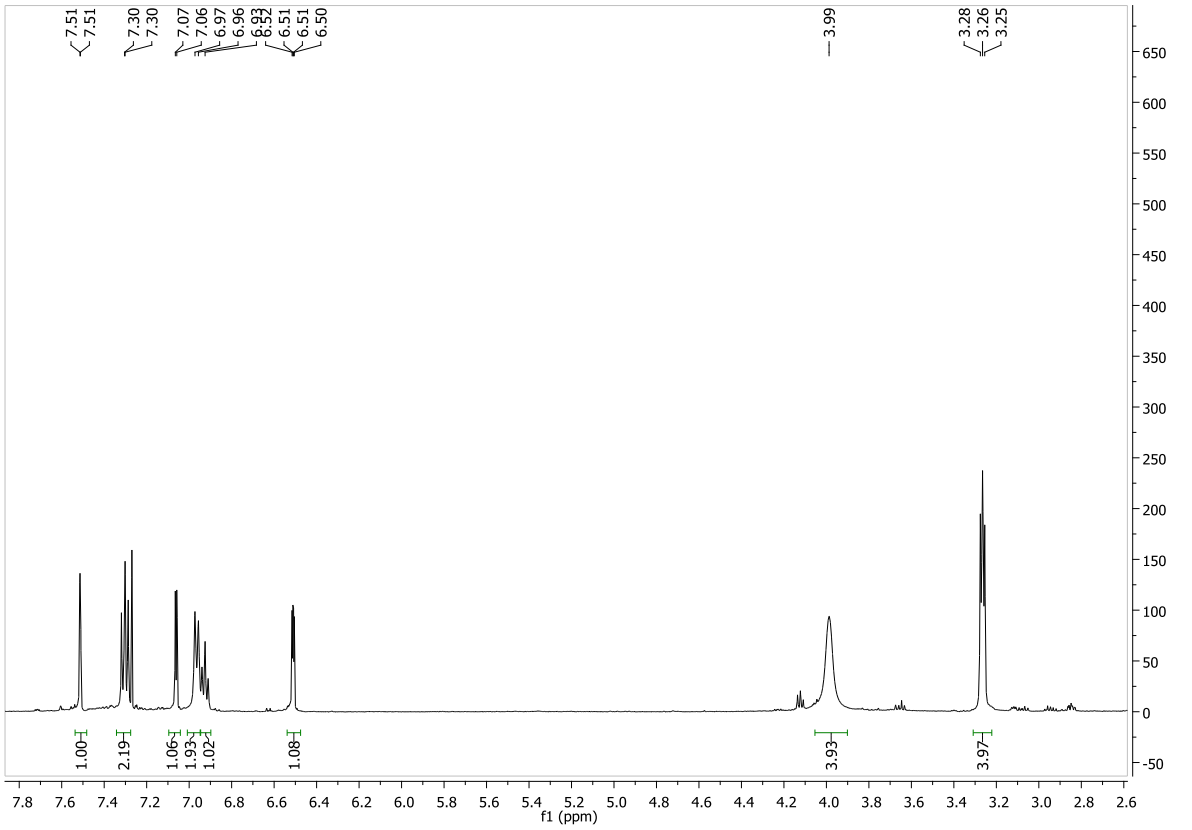
HPLC assay:



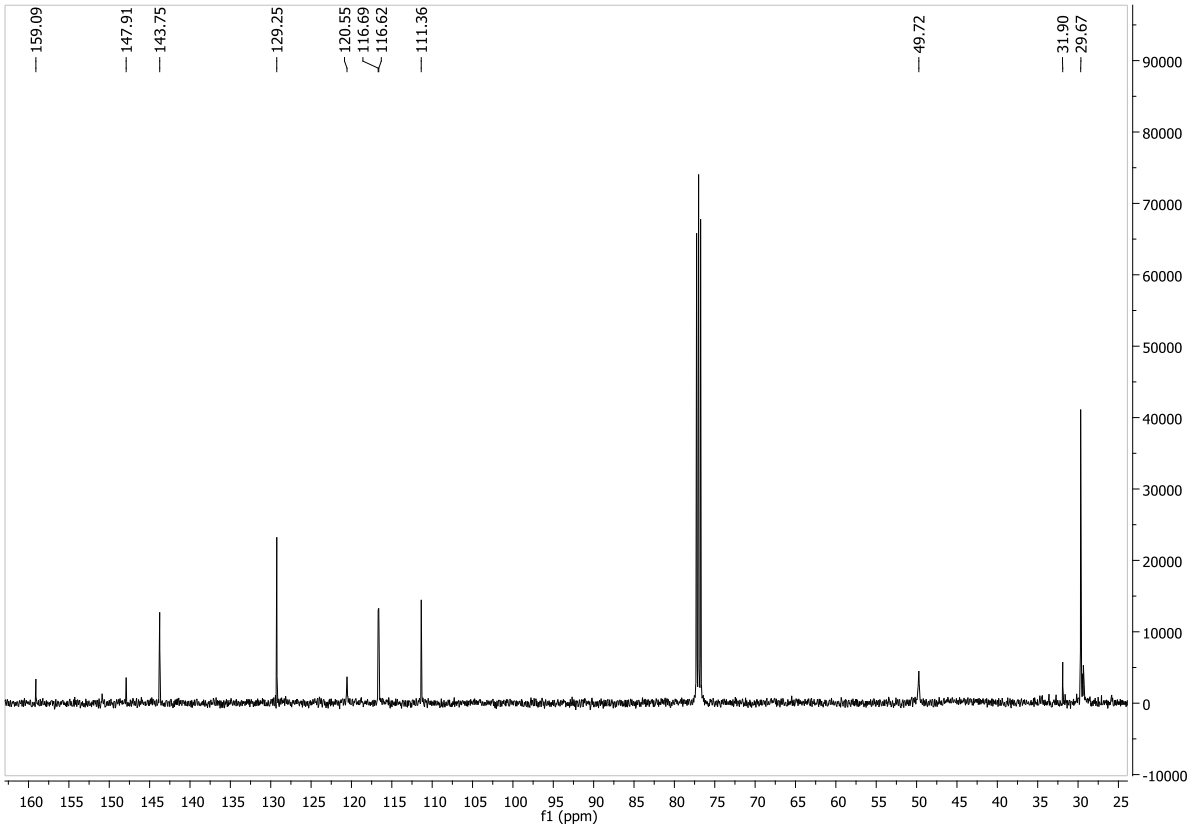
Component	R_t (min)
4-Bromo phenyl acetic acid	1.92
1,2,3,4-Tetrahydroisoquinoline	0.42, 0.95
Compound10: 2-(4-Bromophenyl)-1-(3,4-dihydroisoquinolin-2(1*H*)-yl)ethanone	3.41
Bromobenzene (standard)	3.18

Compound 11: Furan-3-yl(4-phenylpiperazin-1-yl)methanone

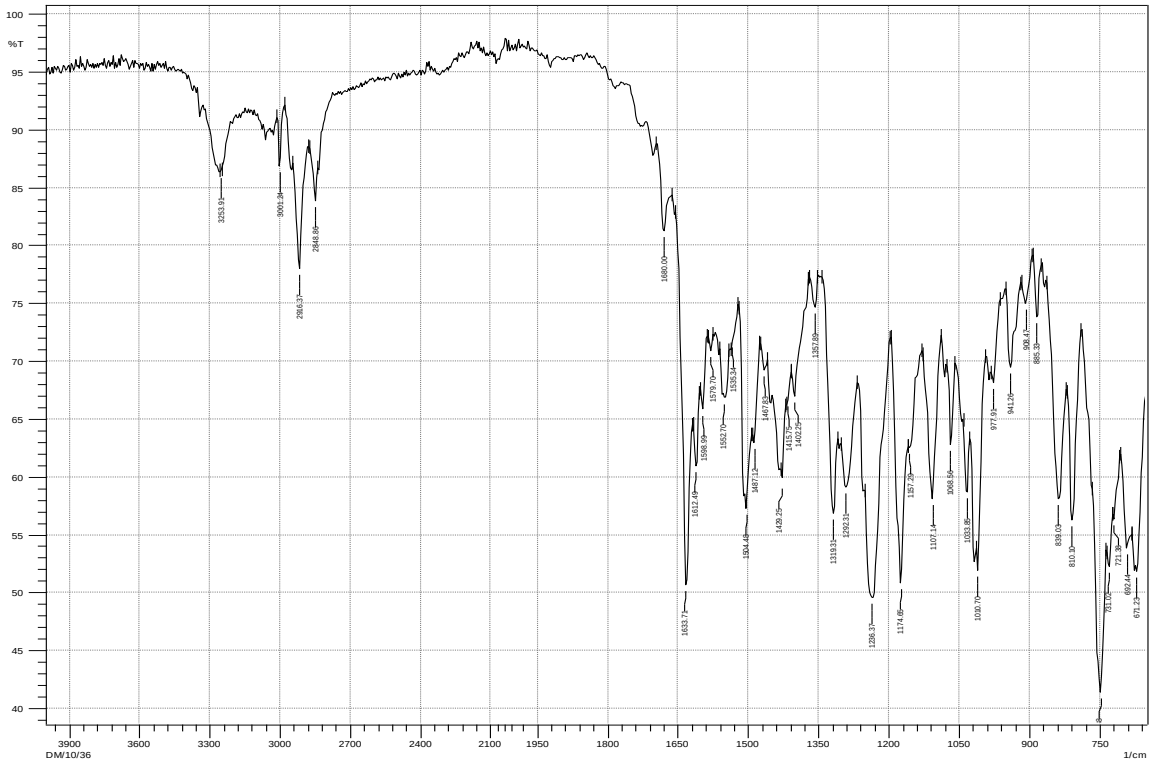
^{1}H NMR:



^{13}C NMR:



FTIR:



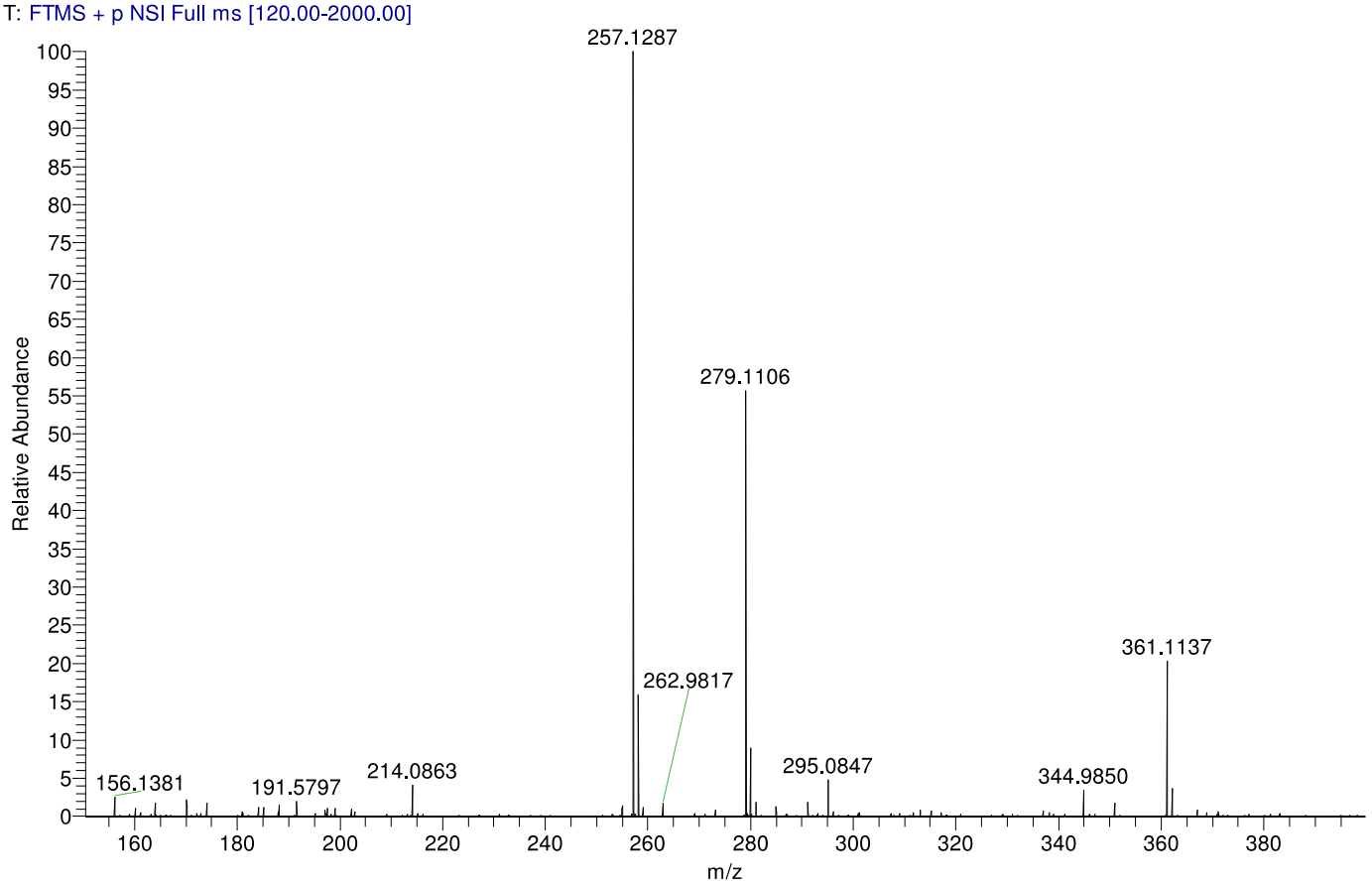
HRMS:

DM1036 MW=255?
(MeOH)/MeOH + NH4OAc

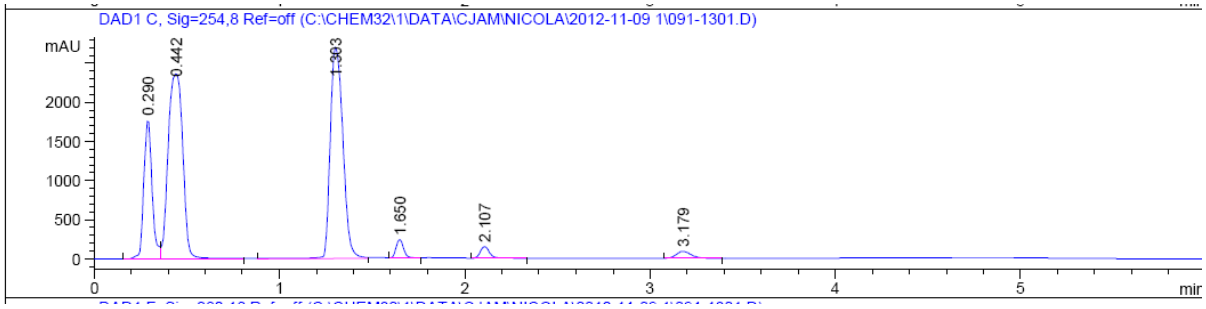
EPSRC National Centre Swansea
LTQ Orbitrap XL

Donna MacMillan
29/10/2012 21:09:22

STRWAT005-OJ-HNESP #29-47 RT: 0.74-1.25 AV: 19 SM: 7G NL: 1.91E7
T: FTMS + p NSI Full ms [120.00-2000.00]



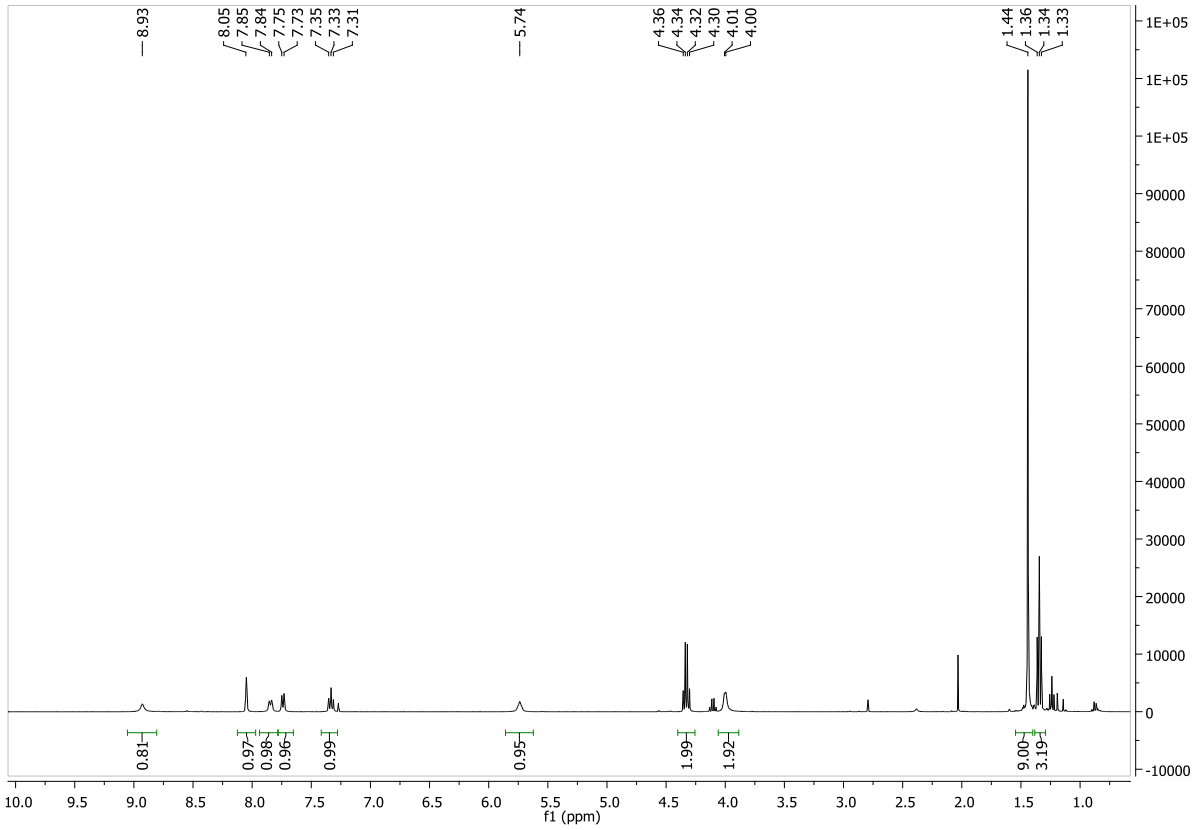
HPLC assay:



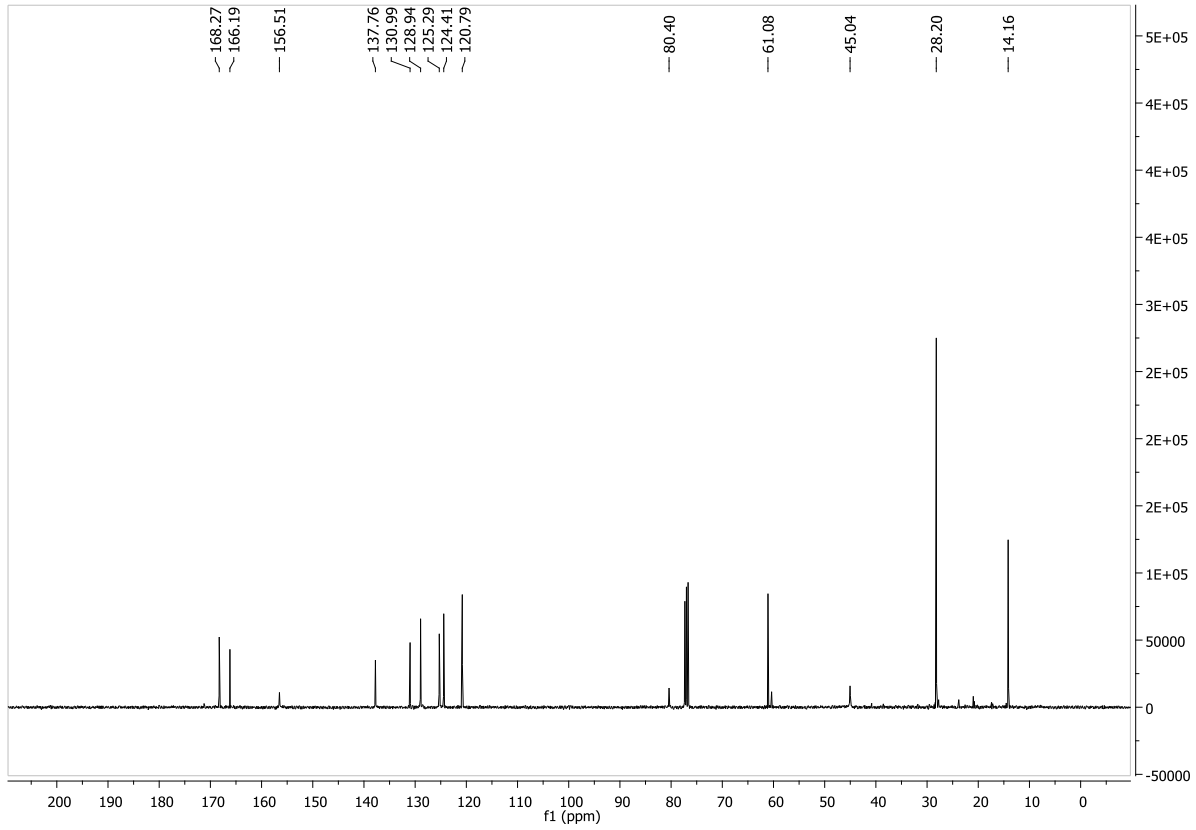
Component	R_t (min)
2-Furoic acid	1.30
1-Phenyl piperazine	0.30, 0.44, 1.65
Compound 11: Furan-3-yl(4-phenylpiperazin-1-yl)methanone	2.11
Bromobenzene (standard)	3.18

Compound 12: Ethyl 3-(2-((*tert*-butoxycarbonyl)amino)acetamido)benzoate

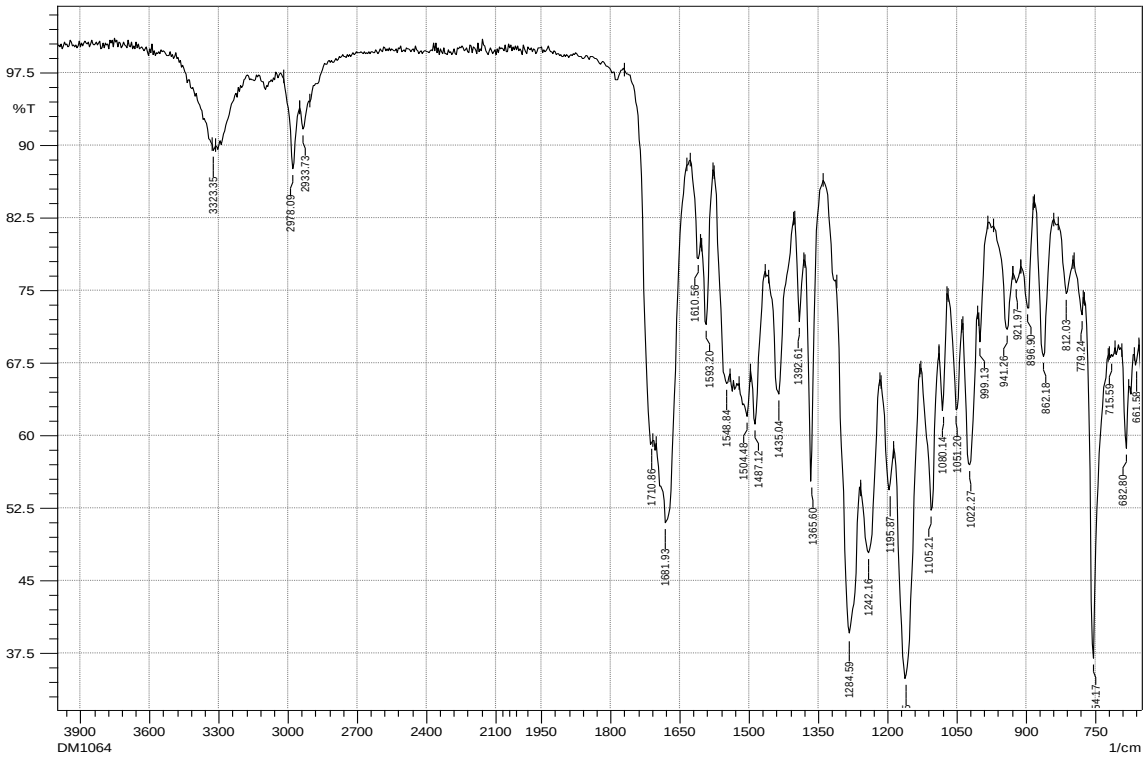
^{1}H NMR:



^{13}C NMR:



FTIR:



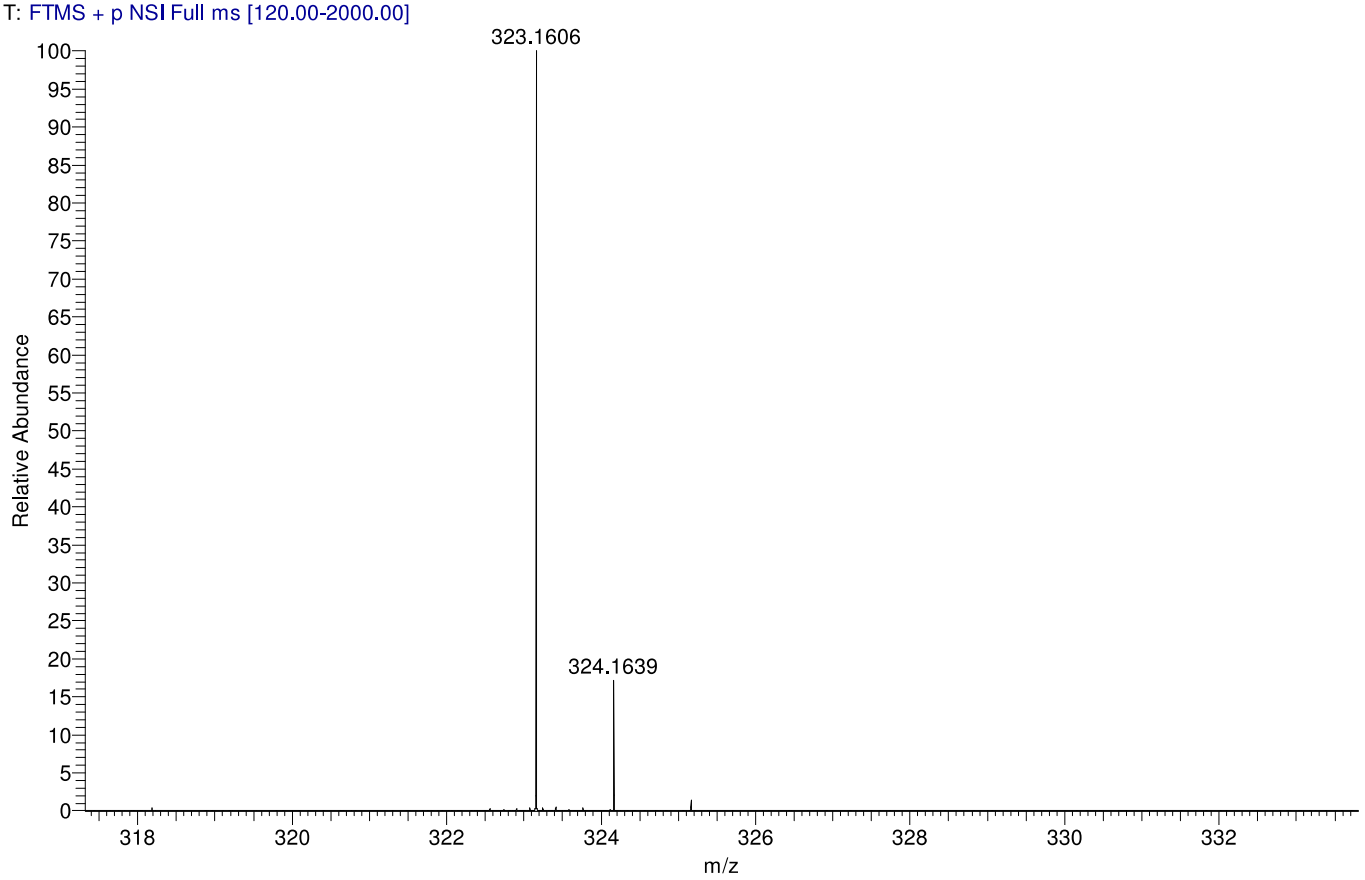
HRMS:

DM1064 MW=322?
(MeOH)/MeOH + NH4OAc

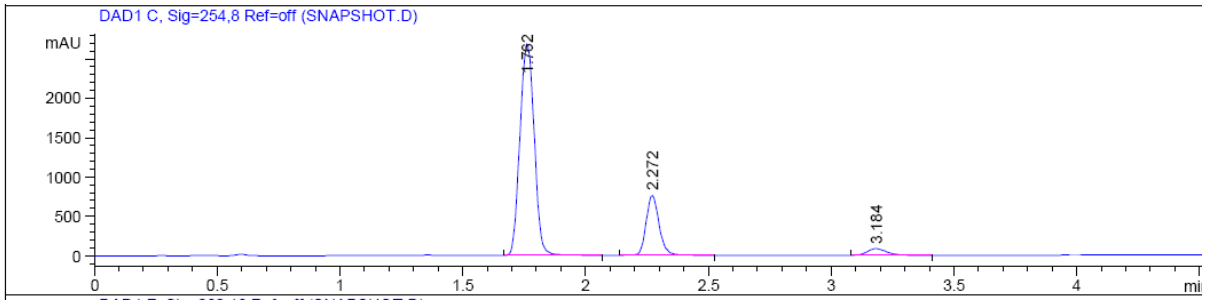
EPSRC National Centre Swansea
LTQ Orbitrap XL

Donna MacMillan
29/10/2012 21:02:27

STRWAT003-OJ-HNESP #34-49 RT: 0.86-1.28 AV: 16 SM: 7G NL: 5.13E7
T: FTMS + p NSI Full ms [120.00-2000.00]



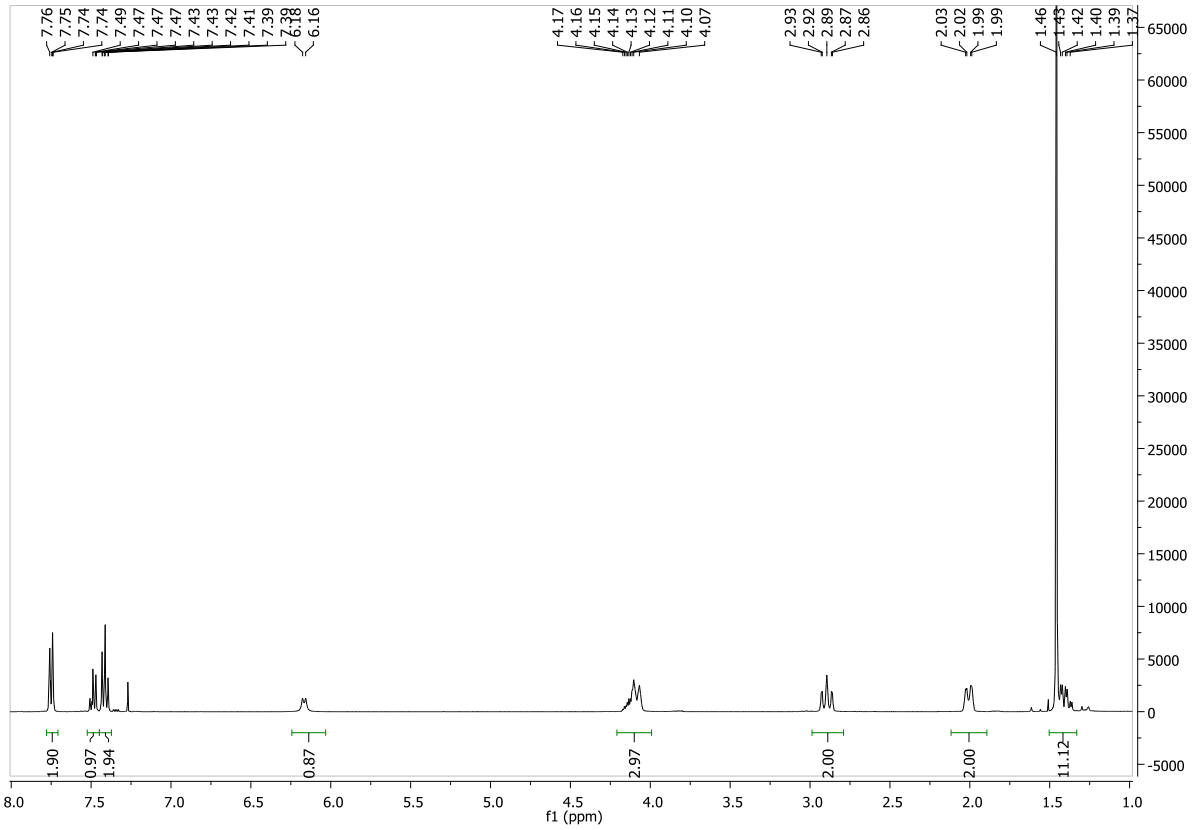
HPLC assay:



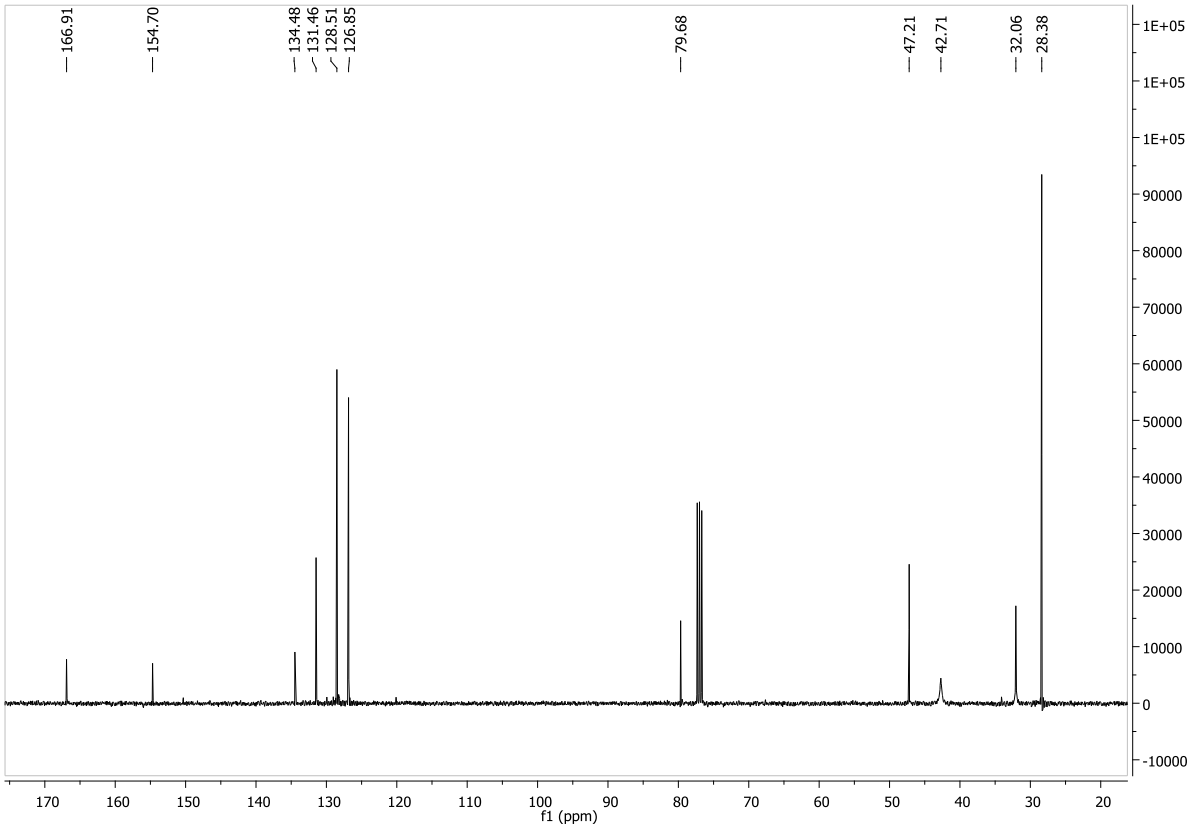
Component	R_t (min)
Ethyl 3-aminobenzoate	1.76
Compound 12: Ethyl 3-(2-((*tert*-butoxycarbonyl)amino)acetamido)benzoate	2.27
Bromobenzene (standard)	3.18

Compound 13: *tert*-Butyl 4-benzamidopiperidine-1-carboxylate

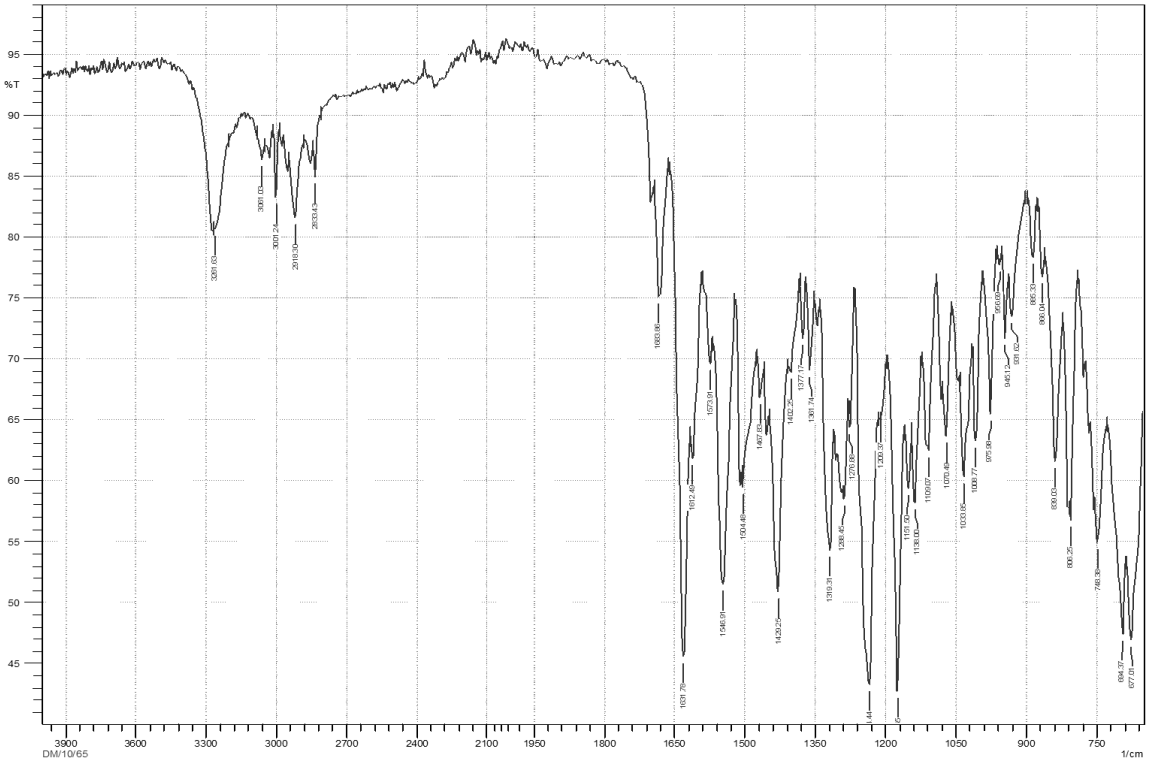
^{1}H NMR:



^{13}C NMR:



FTIR:



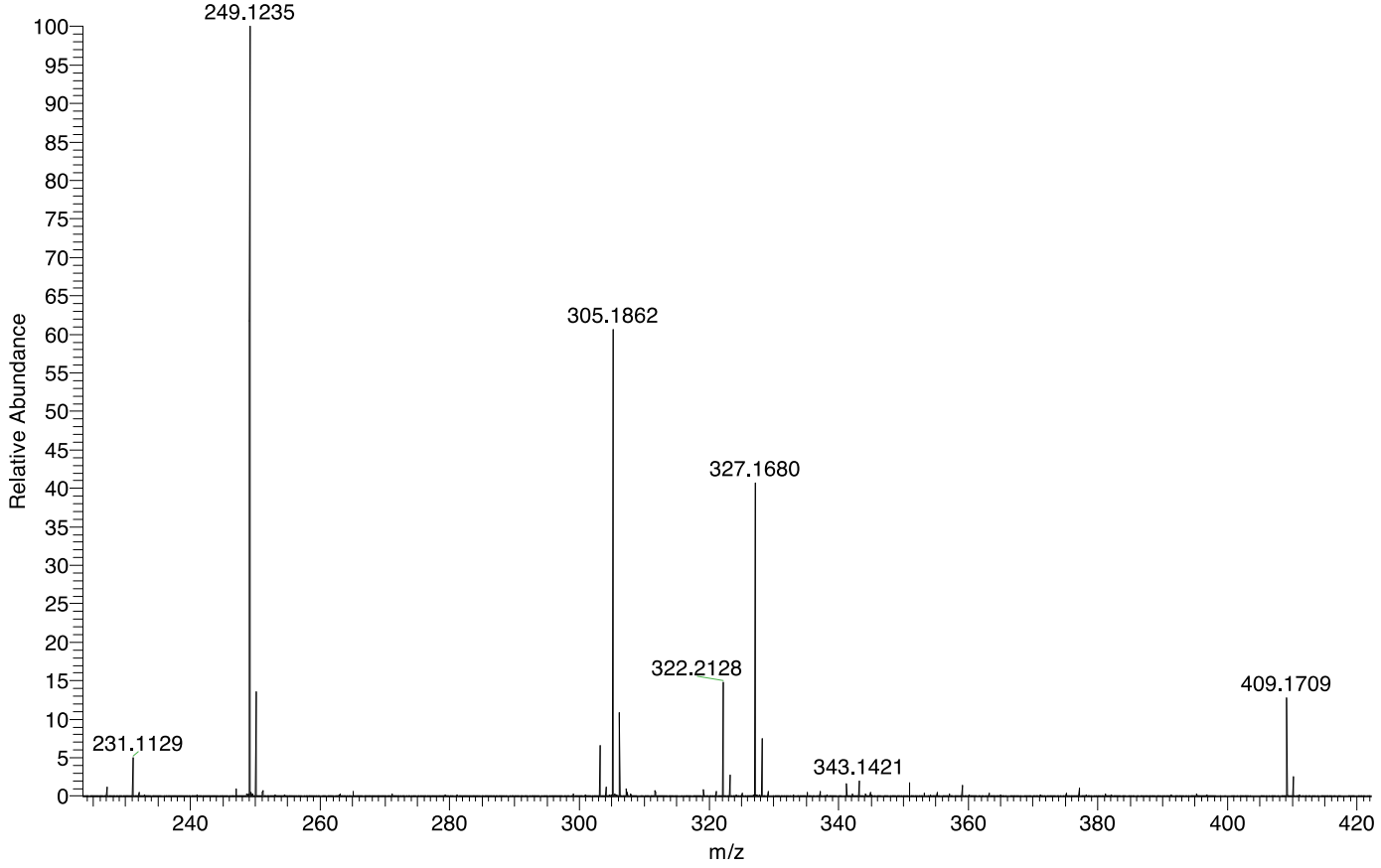
HRMS:

DM1065 MW=304?
(MeOH)/MeOH + NH4OAc

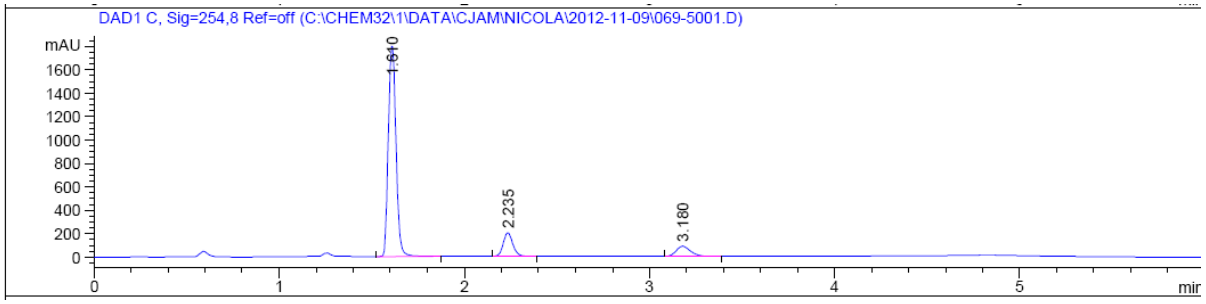
EPSRC National Centre Swansea
LTQ Orbitrap XL

Donna MacMillan
29/10/2012 21:30:00

STRWAT011-OJ-HNESP #88-108 RT: 1.93-2.48 AV: 21 SM: 7G NL: 7.28E7
T: FTMS + p NSI Full ms [200.00-4000.00]



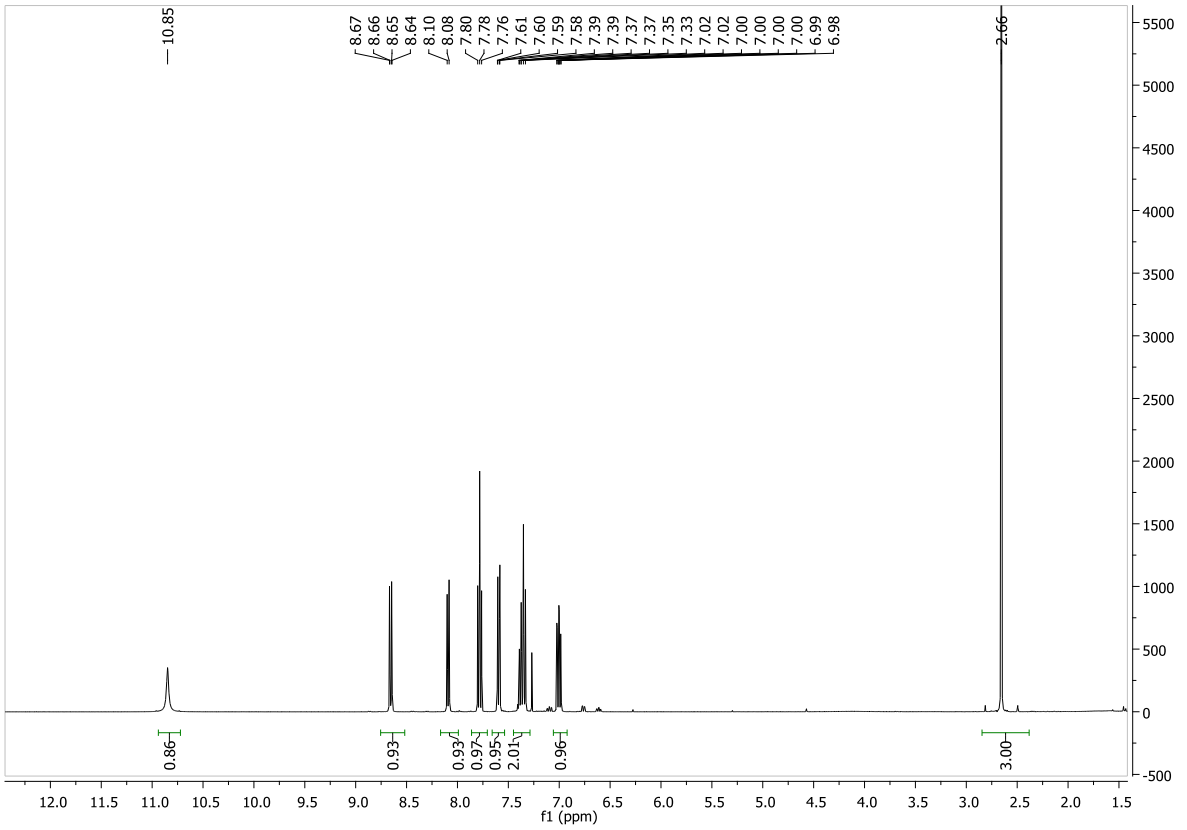
HPLC assay:



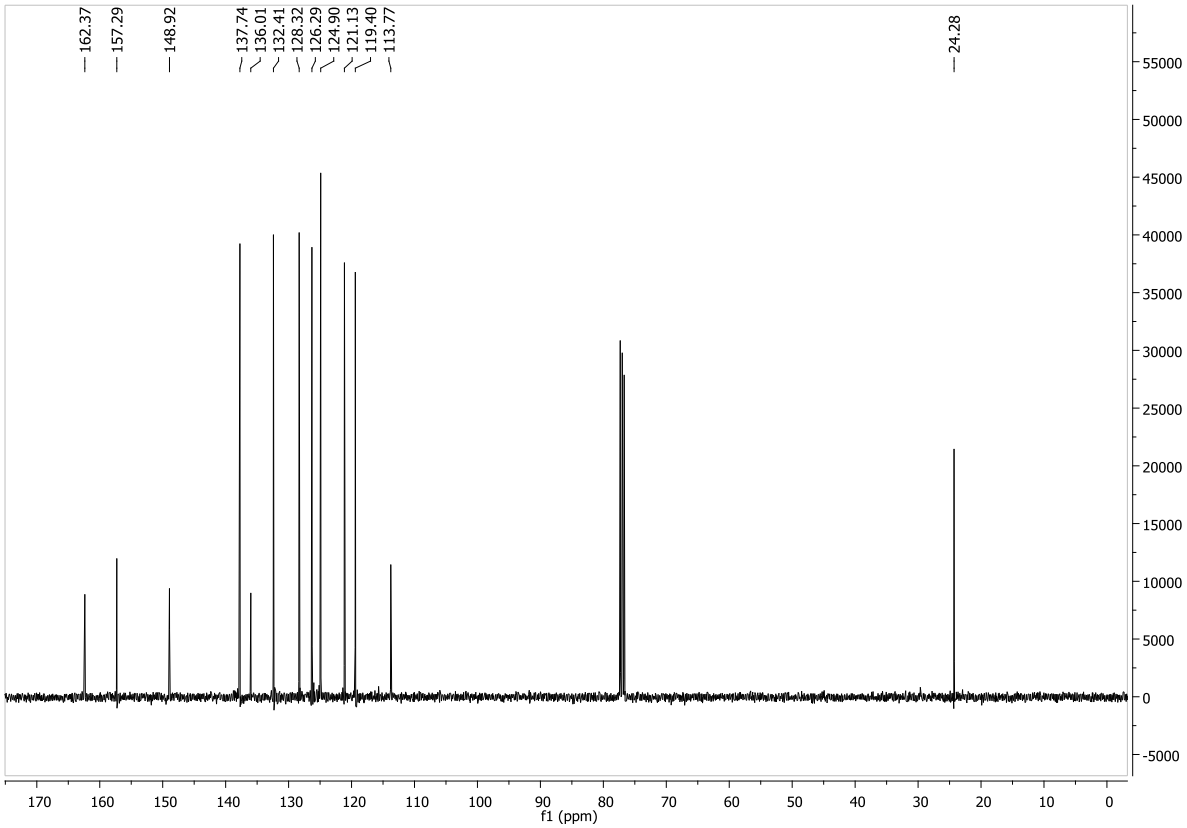
Component	R_t (min)
Benzoic acid	1.61
Compound 13: *tert*-Butyl 4-benzamidopiperidine-1-carboxylate	2.24
Bromobenzene (standard)	3.18

Compound 14: *N*-(2-Bromophenyl)-6-methylpicolinamide

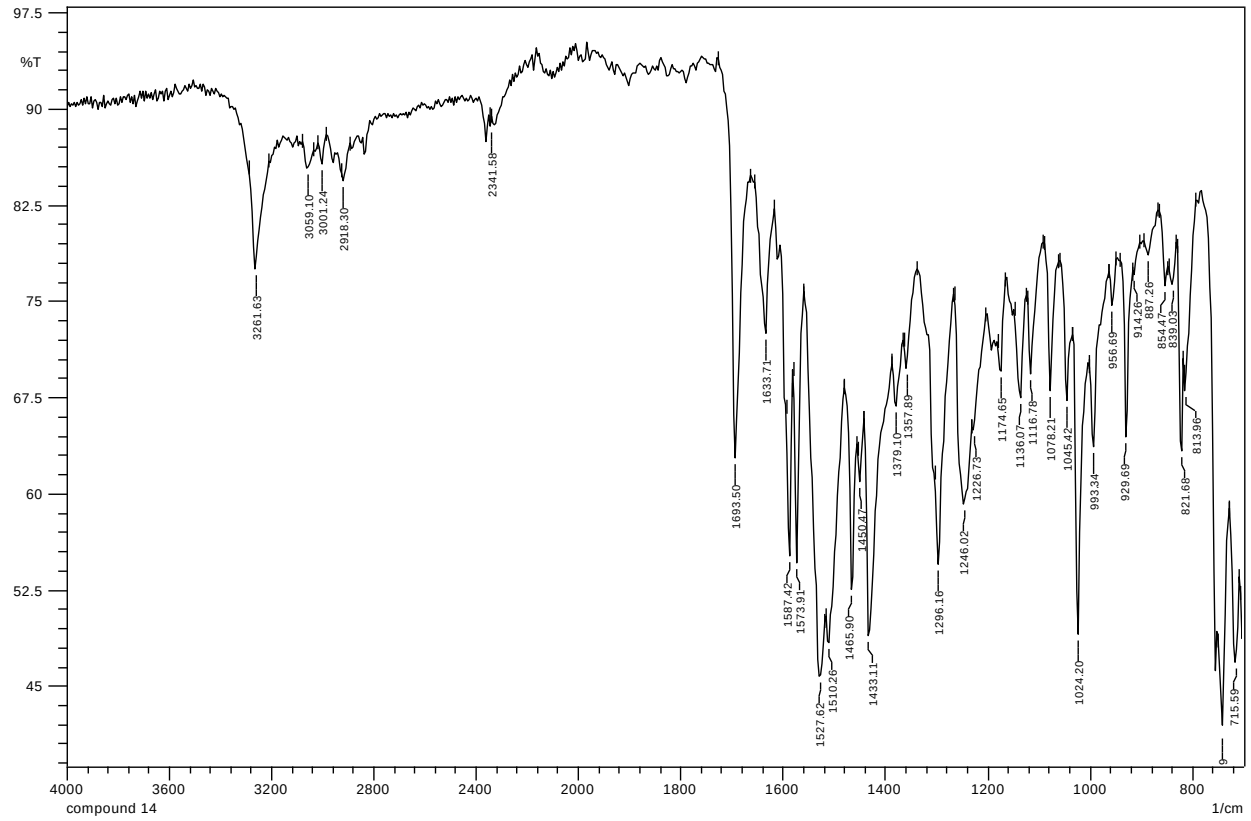
^{1}H NMR:



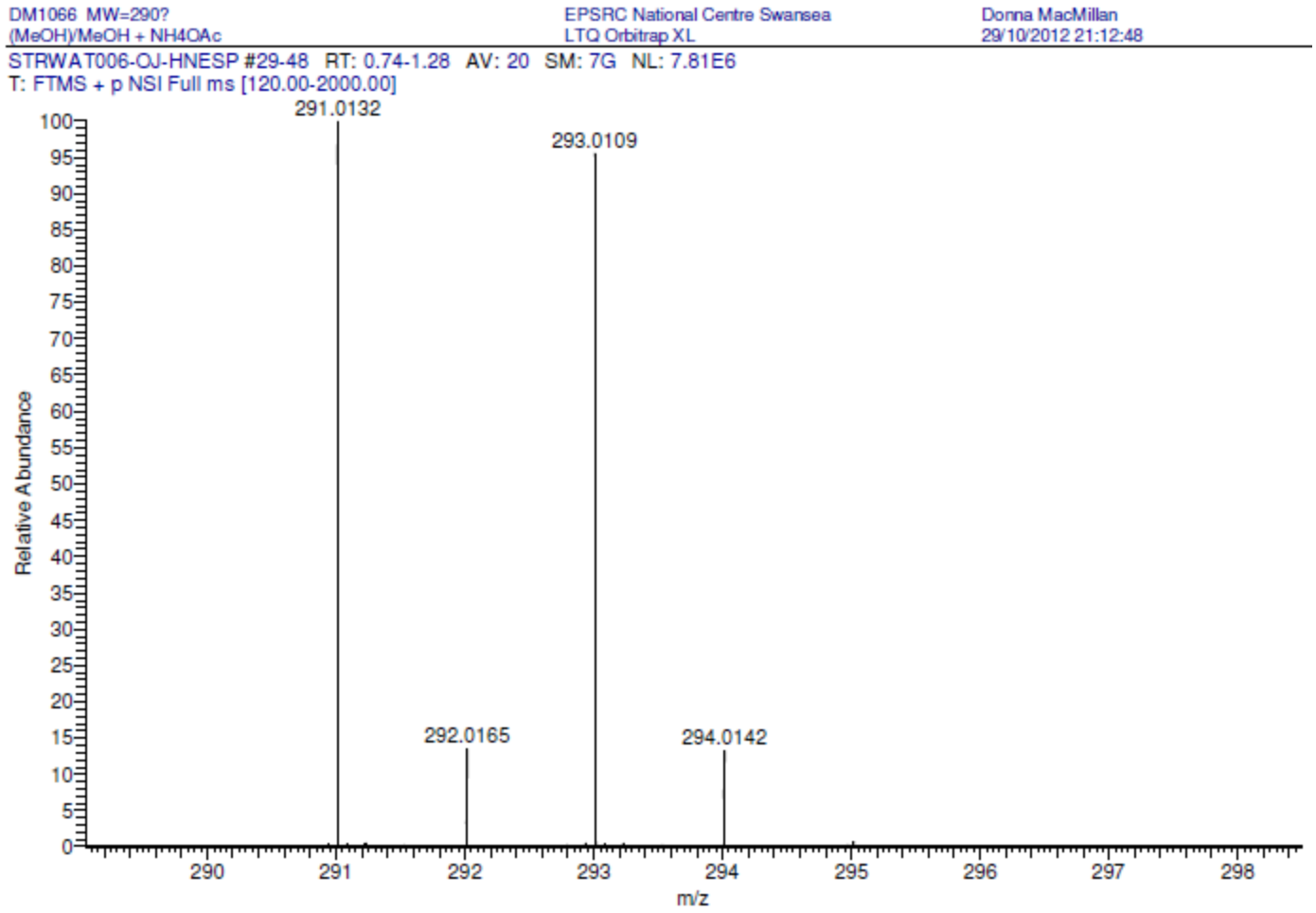
^{13}C NMR:



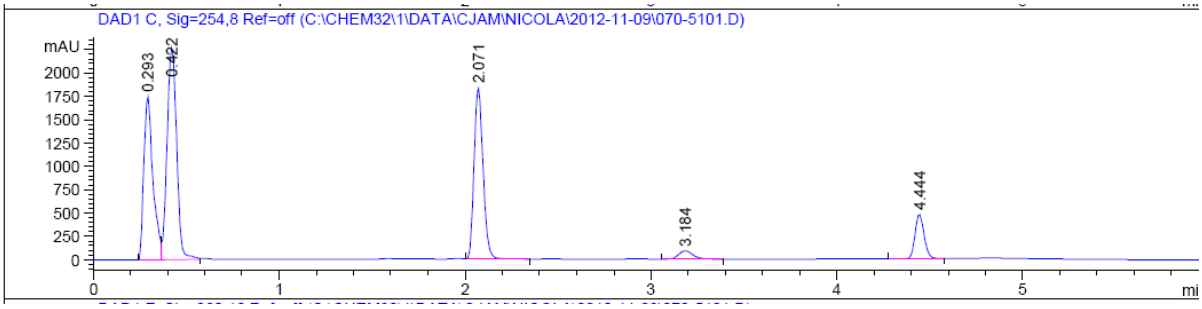
FTIR:


97.5
%T
90
82.5
75
67.5
60
52.5
45
3261.63
3059.10
3001.24
2918.30
2341.58
1693.50
1633.71
1587.42
1573.91
1527.62
1510.26
1465.90
1450.47
1433.11
1379.10
1357.89
1296.16
1246.02
1226.73
1174.65
1136.07
1116.78
1078.21
1045.42
1024.20
993.34
956.69
929.69
914.26
887.26
854.47
839.03
821.68
813.96
715.59
4000
3600
3200
2800
2400
2000
1800
1600
1400
1200
1000
800
compound 14
1/cm

HRMS:


DM1066 MW=290?
(MeOH)/MeOH + NH4OAc
EPSRC National Centre Swansea
LTQ Orbitrap XL
Donna MacMillan
29/10/2012 21:12:48
STRWAT006-OJ-HNESP #29-48 RT: 0.74-1.28 AV: 20 SM: 7G NL: 7.81E6
T: FTMS + p NSI Full ms [120.00-2000.00]
291.0132
293.0109
292.0165
294.0142
Relative Abundance
m/z

HPLC Assay:



Component	R_t (min)
2-Methyl picolinic acid	0.29, 0.42
2-Bromo aniline	2.07
Compound 14: *N*-(2-Bromophenyl)-6-methylpicolinamide	4.44
Bromobenzene (standard)	3.18

4. References

1. www.knime.org.