Electronic Supplementary Material (ESI) for Green Chemistry

Development of a Solvent Selection Guide for Aldehyde-based Direct Reductive Amination Processes

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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 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 77.36 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 Macherey-Nagel C_{18} 5 μM 4.6 x 50 mm column using MeCN/H_2O as 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

v) Conversions were obtained using an internal standard (iodobenzene or bromobenzene).

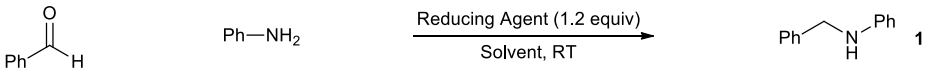
2. Experimental Procedures

2.1 Representative Reactions

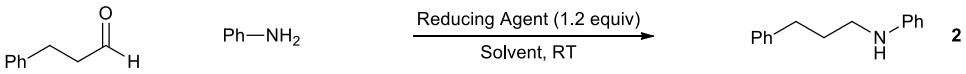
Reducing Agents	Solvent Selection	
$NaBH_3CN$	*tert*-Butyl methyl ether (TBME)	*N*,*N*-Dimethylformamide (DMF)
$NaBH(OAc)_3$	Cyclopentyl methyl ether (CPME)	Ethyl acetate (EtOAc)
pic-BH_3	Dichloromethane (CH_2Cl_2)	*iso*-Propyl alcohol (IPA)
	1,2-Dichloroethane (DCE)	2-Methyl tetrahydrofuran (2-MeTHF)
	Dimethylcarbonate (DMC)	Tetrahydrofuran (THF)

Representative Reactions

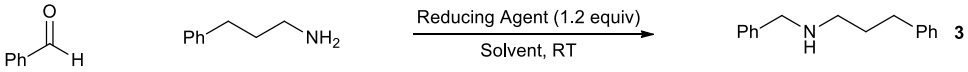
Reaction 1: Aryl Aldehyde - Acyclic Primary Aryl Amine



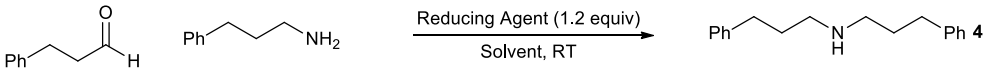
Reaction 2: Alkyl Aldehyde - Acyclic Primary Aryl Amine



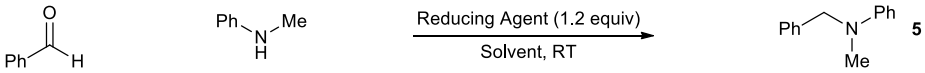
Reaction 3: Aryl Aldehyde - Acyclic Primary Alkyl Amine



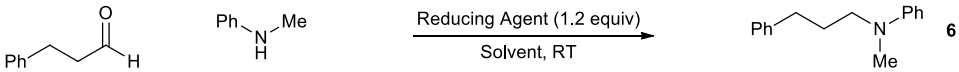
Reaction 4: Alkyl Acid - Acyclic Primary Alkyl Amine



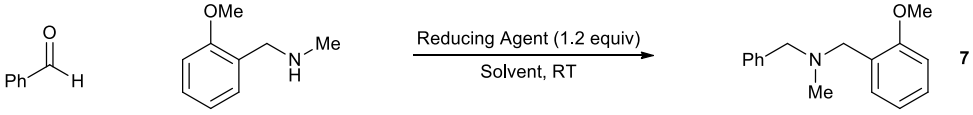
Reaction 5: Aryl Aldehyde - Acyclic Secondary Aryl Amine



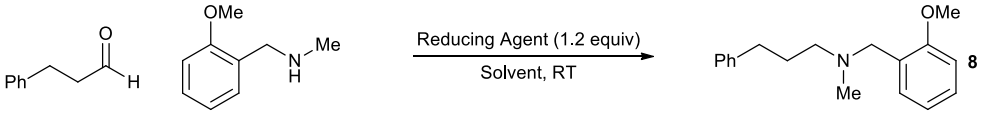
Reaction 6: Alkyl Aldehyde - Acyclic Secondary Aryl Amine



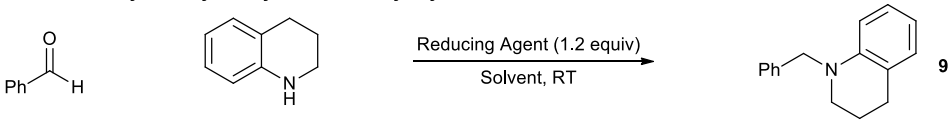
Reaction 7: Aryl Aldehyde - Acyclic Secondary Alkyl Amine



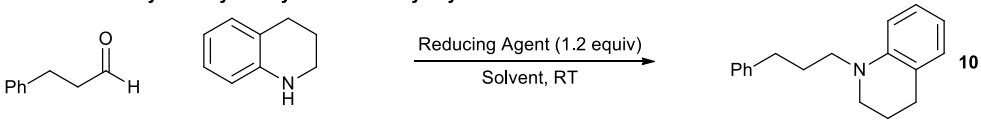
Reaction 8: Alkyl Aldehyde - Acyclic Secondary Alkyl Amine



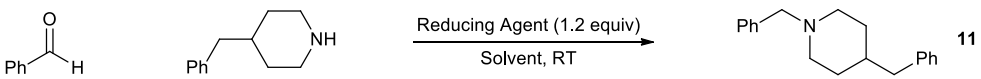
Reaction 9: Aryl Aldehyde - Cyclic Secondary Aryl Amine



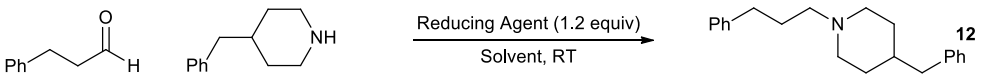
Reaction 10: Alkyl Aldehyde - Cyclic Secondary Aryl Amine



Reaction 11: Aryl Aldehyde - Cyclic Secondary Alkyl Amine



Reaction 12: Alkyl Aldehyde - Cyclic Secondary Aryl Amine



2.2 General Experimental Procedure for Representative Reactions and Substrate Application

A solution of aldehyde (1 equiv, 0.2 mmol), internal standard, and reducing agent (1.2 equiv, 0.24 mmol) in the appropriate solvent (1 mL, 0.2 M) at room temperature was treated with an amine (1.1 equiv, 0.22 mmol). The reaction was then monitored by HPLC with analyses at 0 h (approx. 5 min), 1 h, 2 h, 4 h, 6 h, 8 h, and 24 h by removal of an aliquot (10 µL) which was diluted to 1 mL in MeOH before injection. In the case of reactions using $NaBH_3CN$, several drops of AcOH were added prior to addition of the amine.

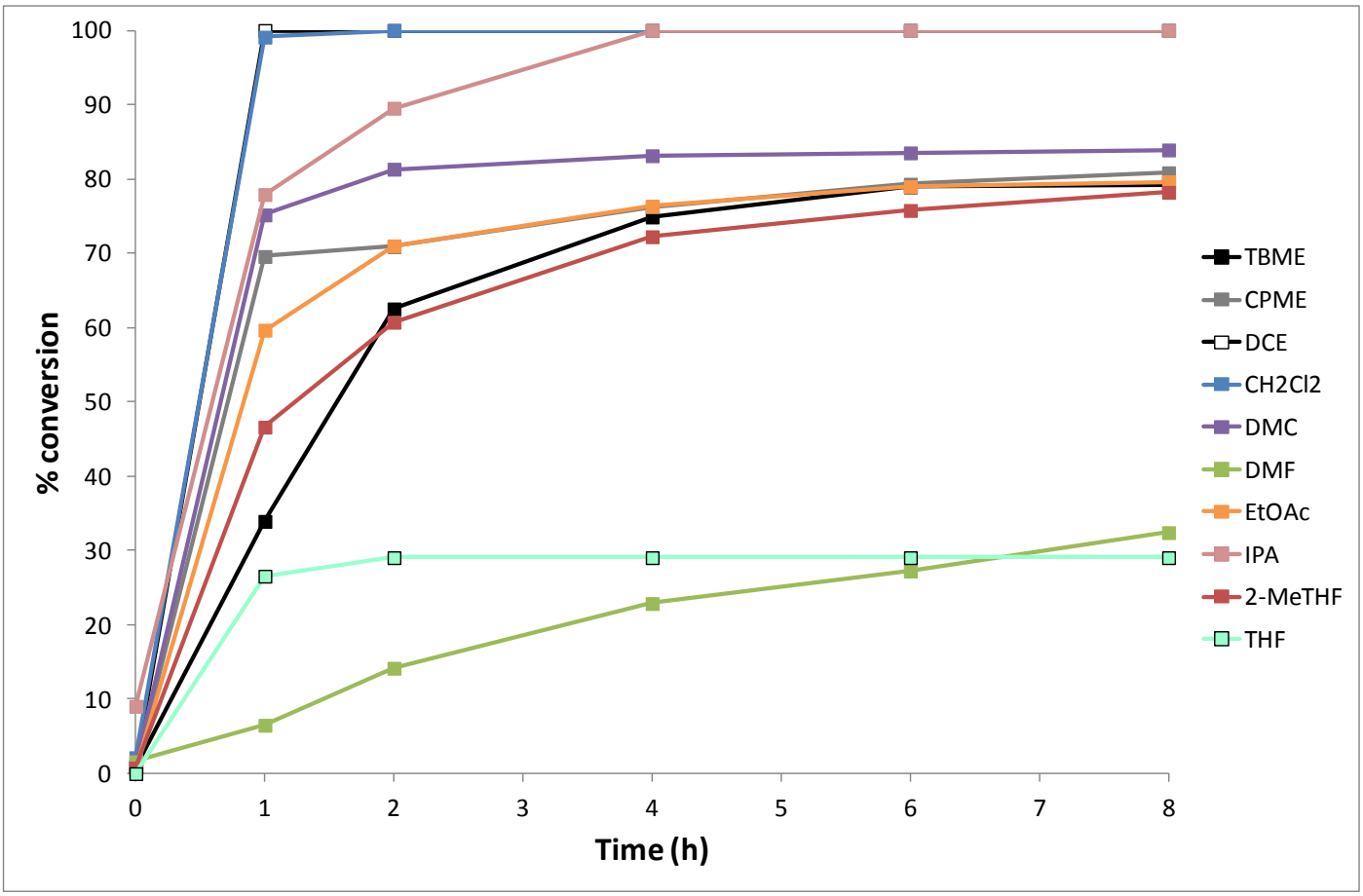
2.3 General Experimental Procedure for Gram-scale Reactions

To a solution of the aldehyde (1 equiv, 20 mmol) in EtOAc (40 mL) was added the amine (1.1 equiv, 22 mmol) followed by $NaBH(OAc)_3$ (1.2 equiv, 24 mmol) and the mixture was stirred at room temperature for 6 h. The reaction mixture was quenched with a saturated aqueous $NaHCO_3$ solution (20 mL). The organic layer was separated and the aqueous layer was extracted with ethyl acetate (3 × 20 mL). The combined organic layers were dried (Na_2SO_4) and concentrated under reduced pressure to a residue, which was purified by flash column chromatography to afford the product.

3. Experimental Data

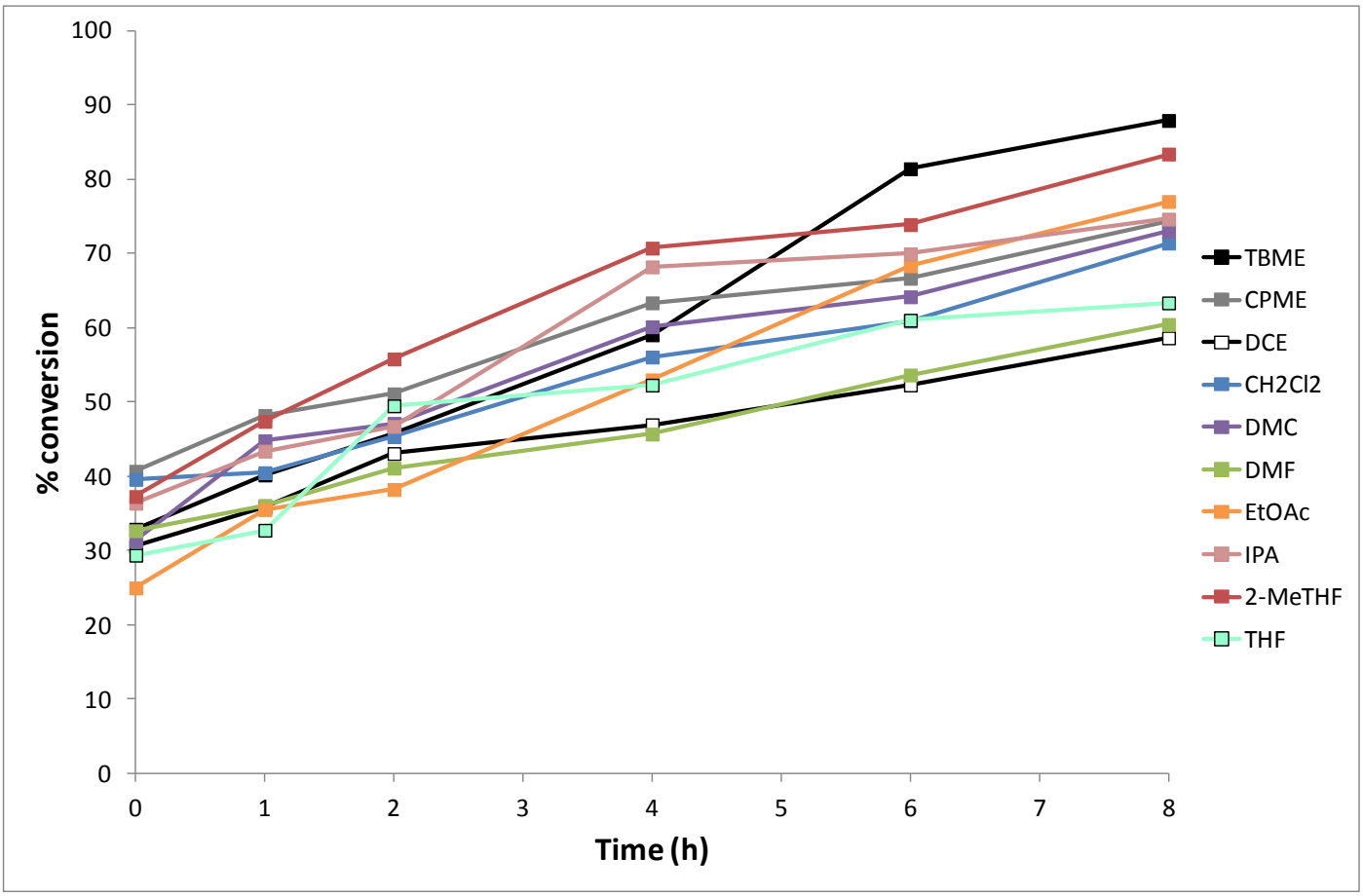
3.1 Conversion vs. Time Data for Reactions 1-12 Using Specific Reducing Agents in the Range of Solvents

Reaction 1: Sodium Triacetoxyborohydride



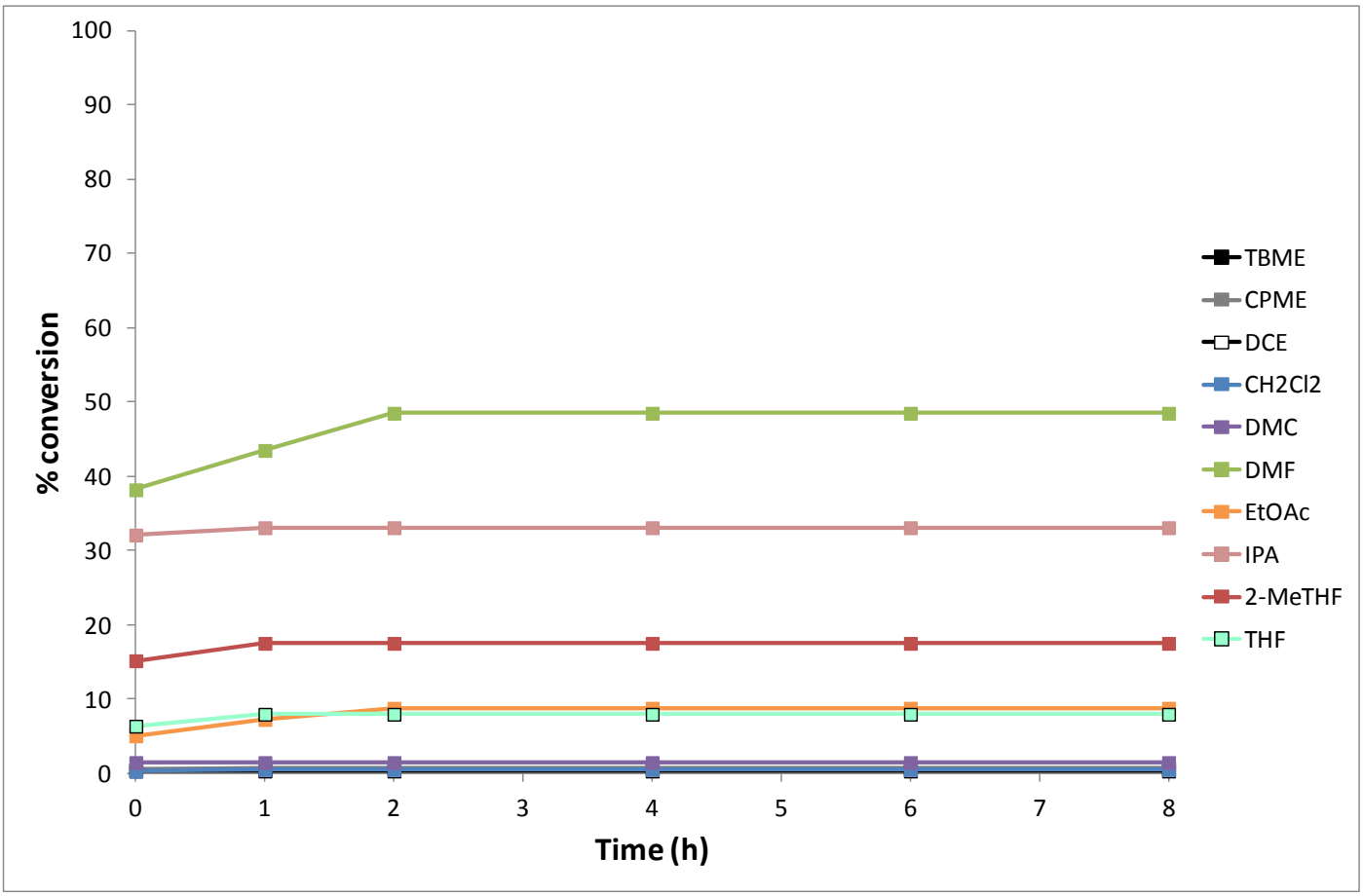
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	0.8	0.5	0.9	2.1	0.9	1.6	0.4	9.1	0.7	0.0
1	33.9	69.6	100.0	99.1	75.2	6.5	59.7	77.9	46.6	26.6
2	62.5	70.9	100.0	100.0	81.3	14.2	71.0	89.5	60.7	29.1
4	74.9	76.3	100.0	100.0	83.1	22.9	76.4	100.0	72.2	29.1
6	78.9	79.3	100.0	100.0	83.5	27.3	79.0	100.0	75.8	29.1
8	79.3	80.8	100.0	100.0	83.9	32.4	79.6	100.0	78.2	29.1
24	84.5	85.6	100.0	100.0	85.3	39.3	79.8	100.0	79.6	29.1

Reaction 1: Picoline-borane Complex



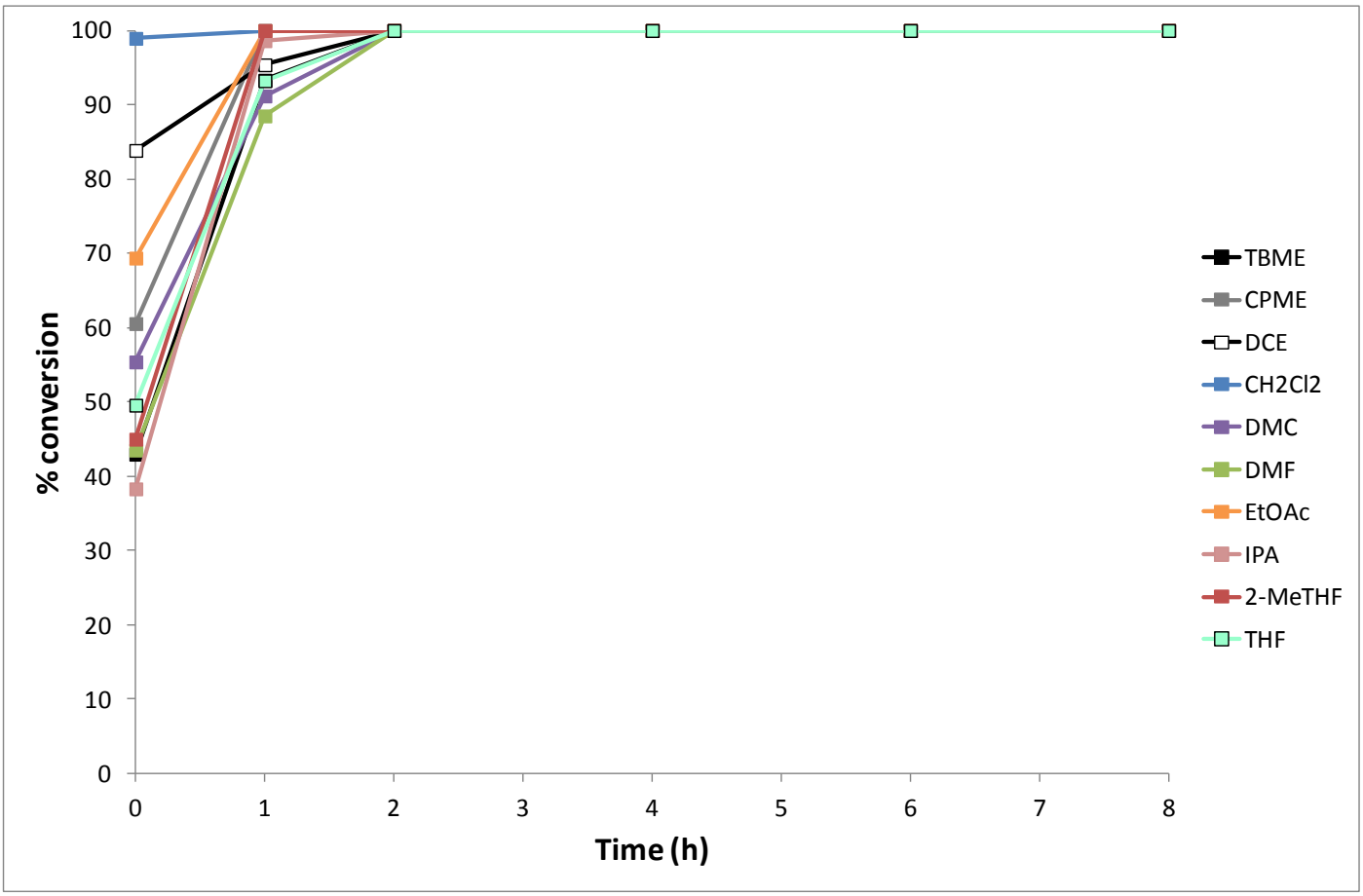
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	32.9	40.7	30.6	39.6	31.3	32.7	25.0	36.4	37.3	29.4
1	40.2	48.2	35.9	40.5	44.8	36.1	35.5	43.4	47.4	32.8
2	45.7	51.1	43.1	45.4	47.1	41.1	38.3	46.7	55.8	49.5
4	59.1	63.4	47.0	56.1	60.1	45.7	53.0	68.2	70.7	52.3
6	81.4	66.7	52.3	60.9	64.2	53.6	68.3	70.0	73.9	61.0
8	87.9	74.2	58.6	71.4	73.0	60.4	77.0	74.6	83.4	63.4
24	89.7	80.2	65.0	71.4	79.2	77.1	83.8	74.6	83.4	63.4

Reaction 1: Sodium Cyanoborohydride



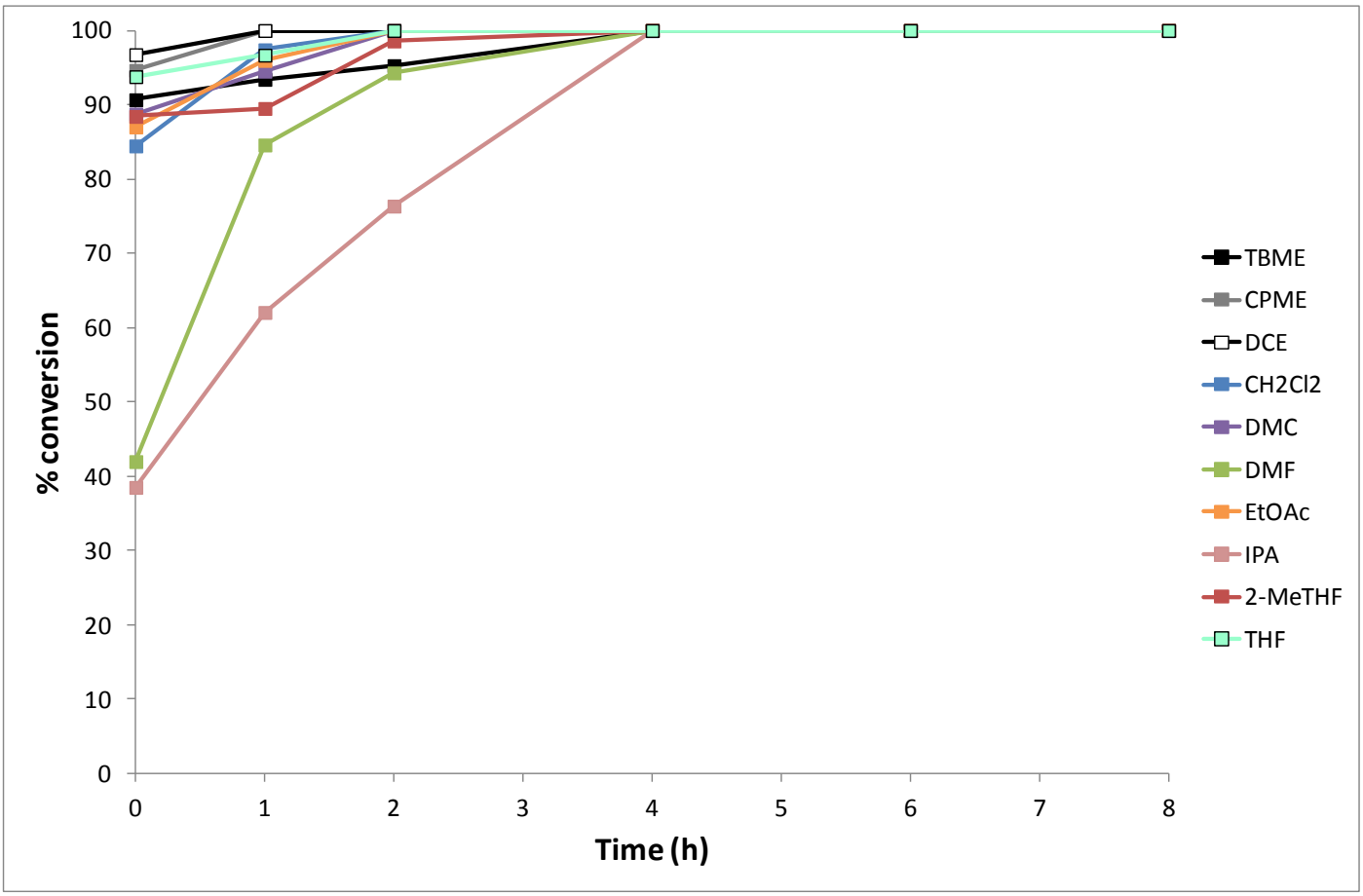
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	0.5	0.5	0.4	0.3	1.5	38.2	5.1	32.1	15.2	6.4
1	0.5	0.7	0.4	0.6	1.5	43.5	7.3	33.1	17.5	8.0
2	0.5	0.7	0.4	0.6	1.5	48.5	8.8	33.1	17.5	8.0
4	0.5	0.7	0.4	0.6	1.5	48.5	8.8	33.1	17.5	8.0
6	0.5	0.7	0.4	0.6	1.5	48.5	8.8	33.1	17.5	8.0
8	0.5	0.7	0.4	0.6	1.5	48.5	8.8	33.1	17.5	8.0
24	0.5	0.7	0.4	0.6	1.5	48.5	8.8	33.1	17.5	8.0

Reaction 2: Sodium Triacetoxyborohydride



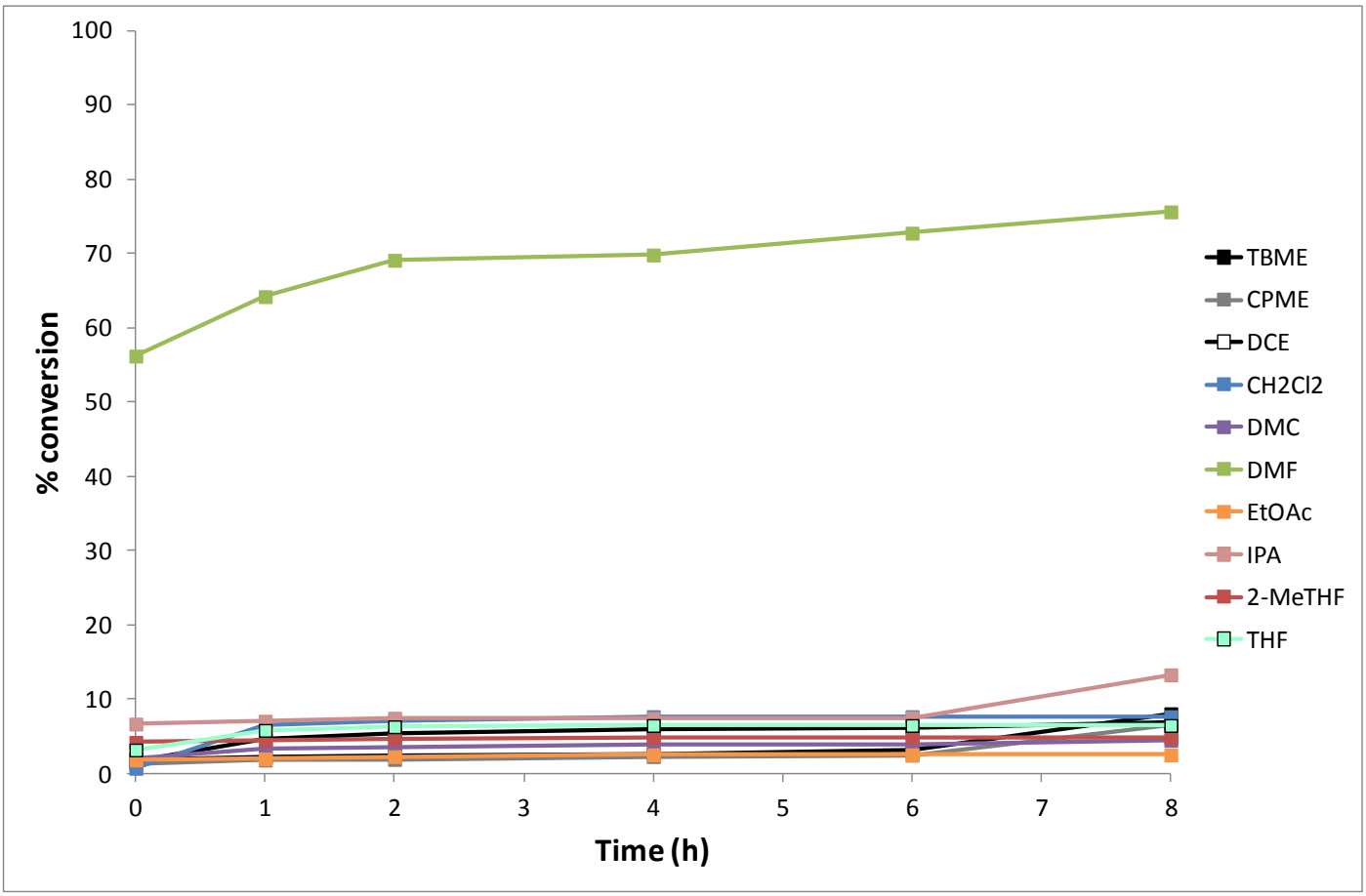
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	43.0	60.6	83.9	98.9	55.4	43.5	69.4	38.3	45.0	49.6
1	93.3	100.0	95.4	100.0	91.2	88.5	100.0	98.6	100.0	93.2
2	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	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	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Reaction 2: Picoline-borane Complex



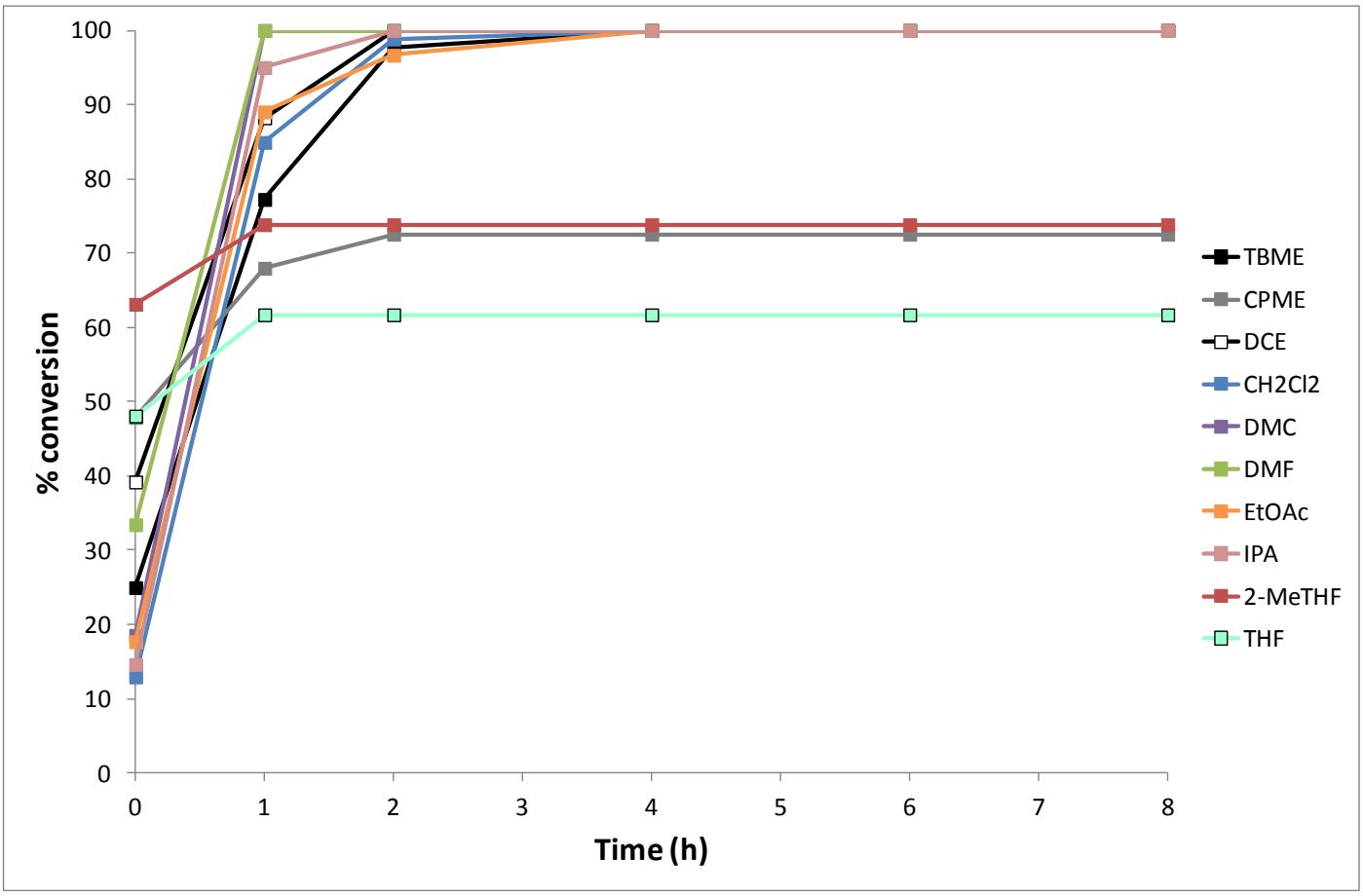
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	90.7	94.6	96.8	84.5	88.8	42.0	87.0	38.5	88.4	93.8
1	93.4	100.0	100.0	97.4	94.5	84.6	96.0	62.1	89.5	96.7
2	95.3	100.0	100.0	100.0	100.0	94.3	100.0	76.4	98.6	100.0
4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	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	100.0	100.0

Reaction 2: Sodium Cyanoborohydride



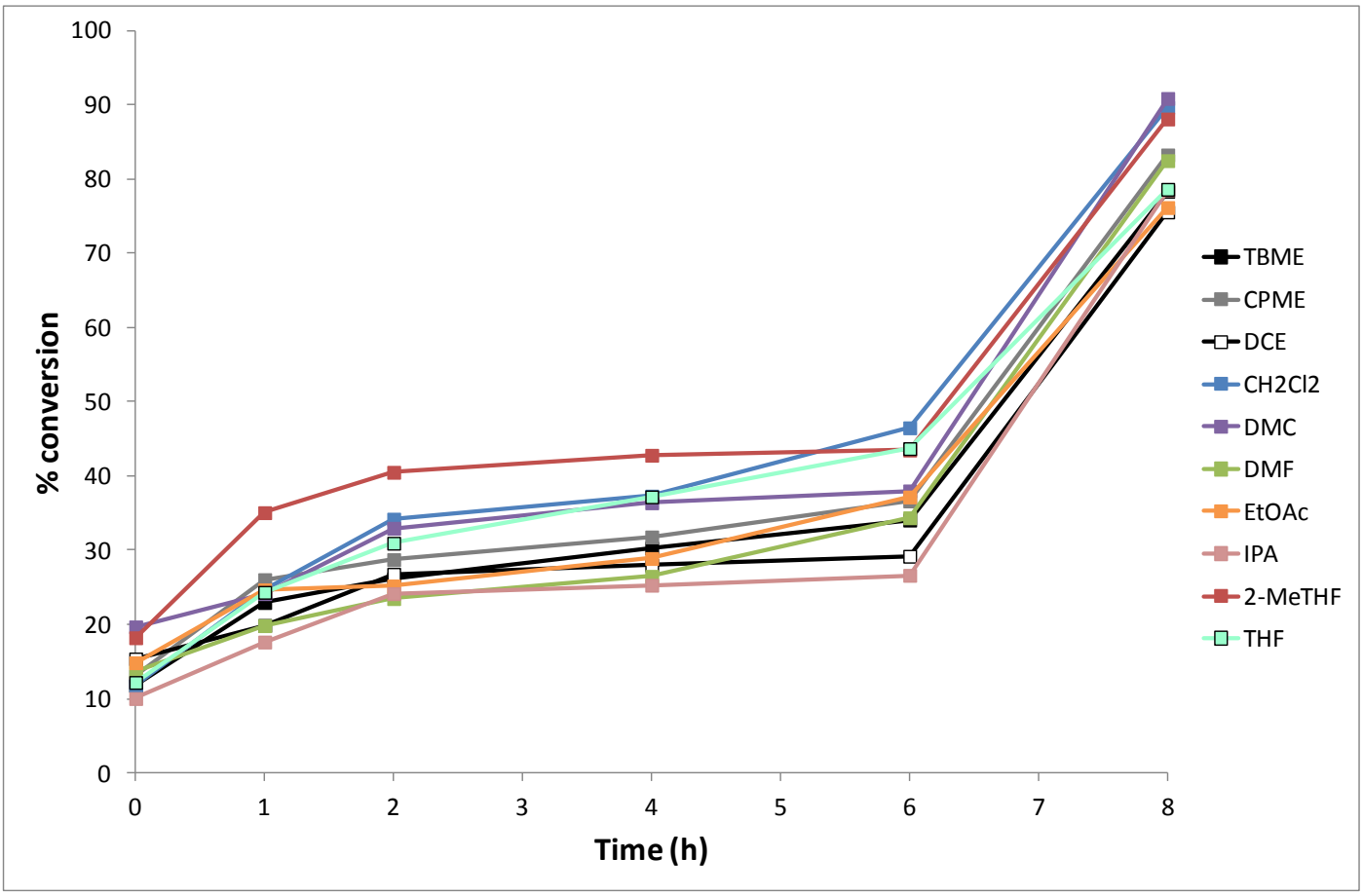
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	1.8	1.3	1.7	0.7	2.1	56.2	1.9	6.7	4.2	3.2
1	2.2	1.8	4.6	6.5	3.3	64.2	2.0	7.1	4.5	5.8
2	2.5	1.9	5.3	7.1	3.6	69.1	2.3	7.5	4.7	6.3
4	2.7	2.3	5.9	7.7	3.9	69.8	2.5	7.5	4.9	6.5
6	3.1	2.5	6.2	7.7	4.0	72.7	2.5	7.5	4.9	6.5
8	8.1	6.4	6.8	7.7	4.5	75.6	2.5	13.3	4.9	6.5
24	12.6	8.5	6.8	7.7	5.5	100.0	2.5	13.3	4.9	6.5

Reaction 3: Sodium Triacetoxyborohydride



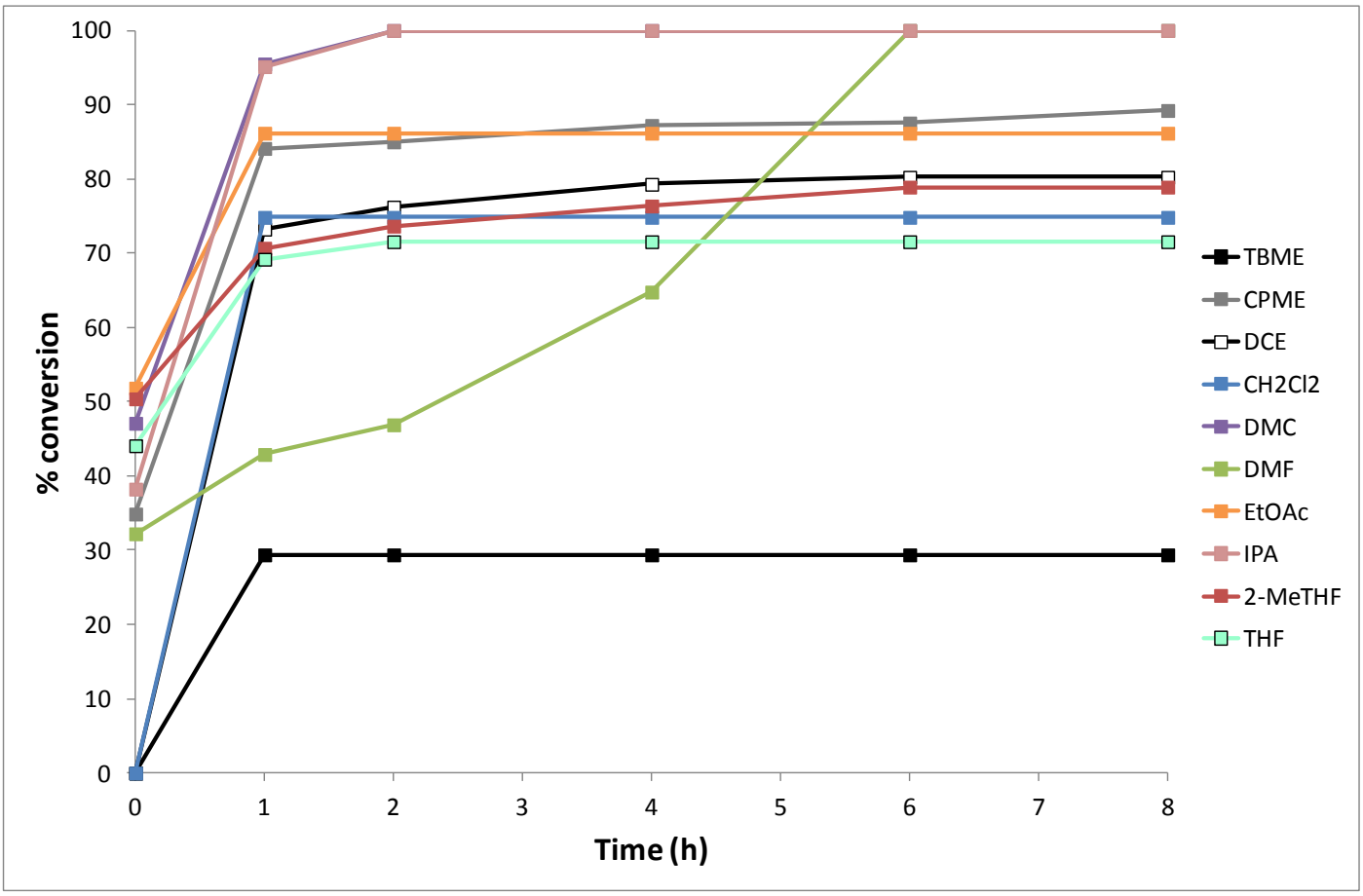
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	25.0	47.9	39.2	12.9	18.6	33.4	17.7	14.6	63.1	48.1
1	77.3	68.0	88.2	84.9	100.0	100.0	89.0	95.0	73.9	61.7
2	97.8	72.6	100.0	98.8	100.0	100.0	96.7	100.0	73.9	61.7
4	100.0	72.6	100.0	100.0	100.0	100.0	100.0	100.0	73.9	61.7
6	100.0	72.6	100.0	100.0	100.0	100.0	100.0	100.0	73.9	61.7
8	100.0	72.6	100.0	100.0	100.0	100.0	100.0	100.0	73.9	61.7
24	100.0	72.6	100.0	100.0	100.0	100.0	100.0	100.0	73.9	61.7

Reaction 3: Picoline-borane Complex



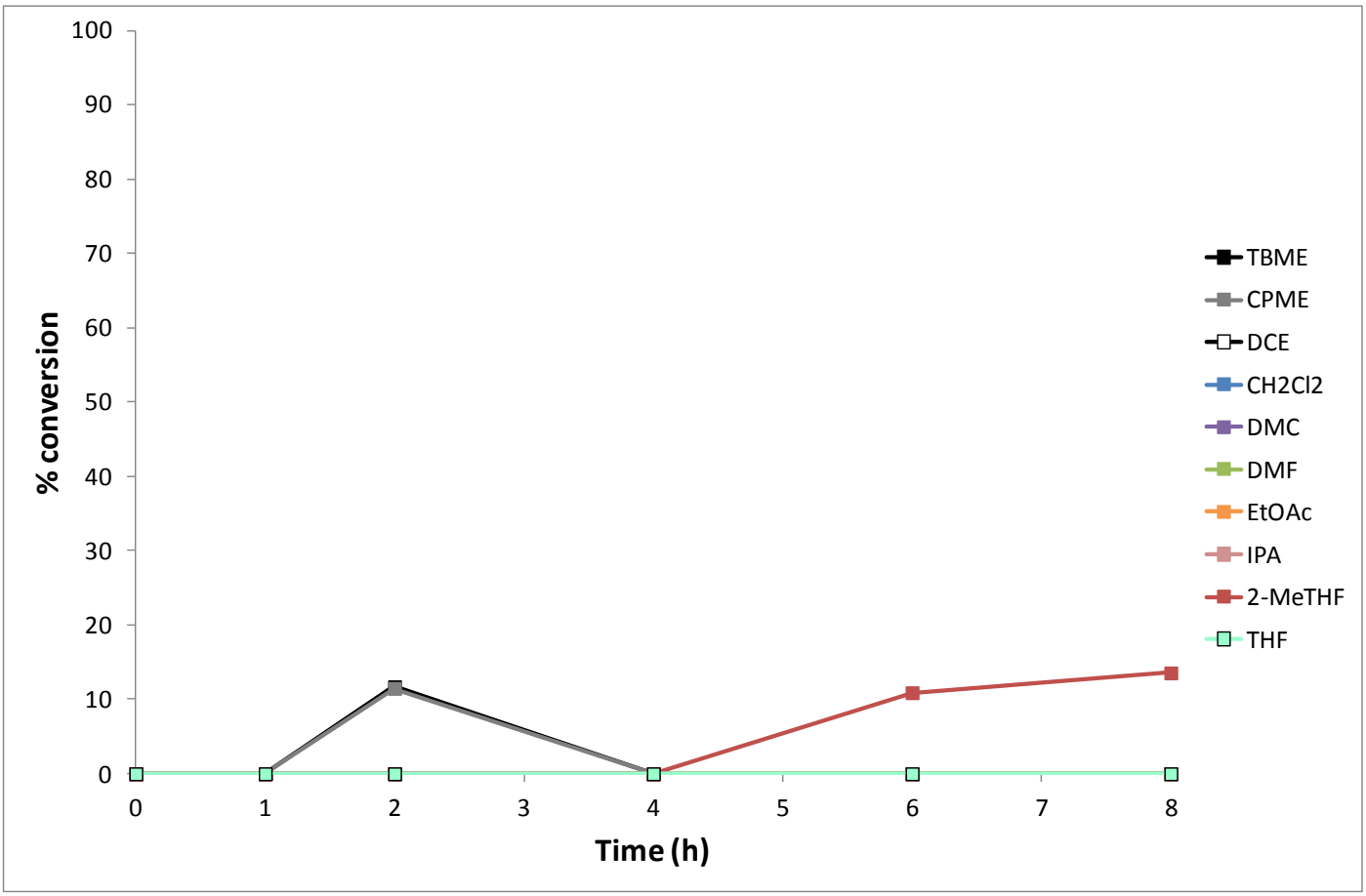
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	11.8	13.1	15.4	11.8	19.7	13.6	14.9	10.0	18.2	12.2
1	23.0	26.1	19.9	24.6	24.2	19.9	24.7	17.7	35.1	24.3
2	26.2	28.7	26.8	34.2	33.0	23.5	25.2	24.2	40.5	31.0
4	30.3	31.8	28.0	37.3	36.4	26.5	28.9	25.3	42.8	37.2
6	34.1	36.6	29.2	46.5	38.0	34.4	37.2	26.6	43.5	43.7
8	78.3	83.2	75.6	89.7	90.8	82.5	76.2	78.5	88.1	78.6
24	78.3	83.2	75.6	89.7	93.2	53.5	76.2	78.5	88.1	78.6

Reaction 3: Sodium Cyanoborohydride



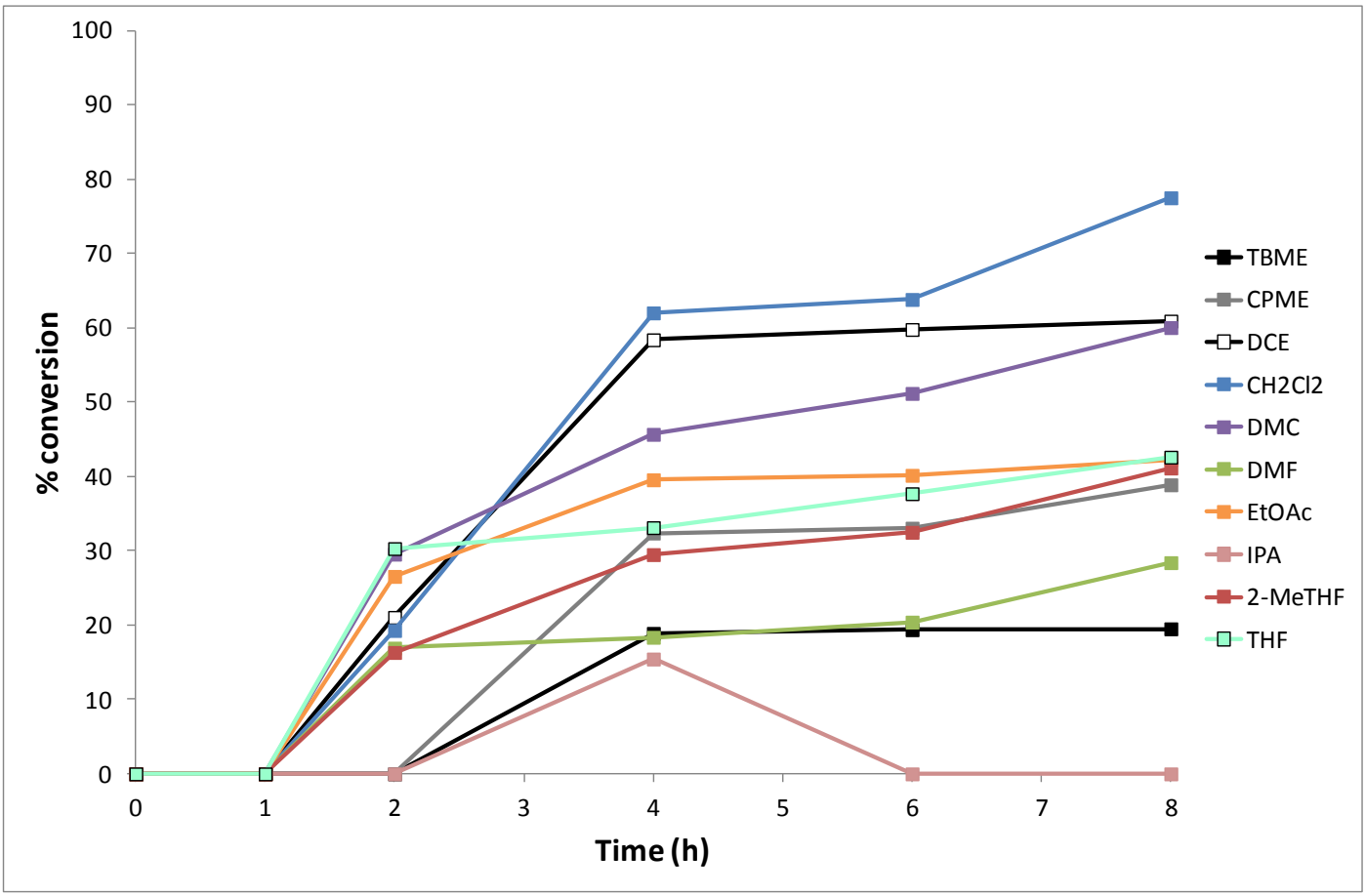
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	0.0	34.9	0.0	0.0	47.1	32.2	51.8	38.2	50.4	44.1
1	29.4	84.1	73.2	74.8	95.5	42.9	86.2	95.1	70.7	69.2
2	29.4	85.0	76.2	74.8	100.0	46.9	86.2	100.0	73.7	71.6
4	29.4	87.2	79.3	74.8	100.0	64.8	86.2	100.0	76.4	71.6
6	29.4	87.5	80.2	74.8	100.0	100.0	86.2	100.0	78.9	71.6
8	29.4	89.2	80.2	74.8	100.0	100.0	86.2	100.0	78.9	71.6
24	29.4	100.0	80.2	74.8	100.0	100.0	86.2	100.0	78.9	71.6

Reaction 4: Sodium Triacetoxyborohydride



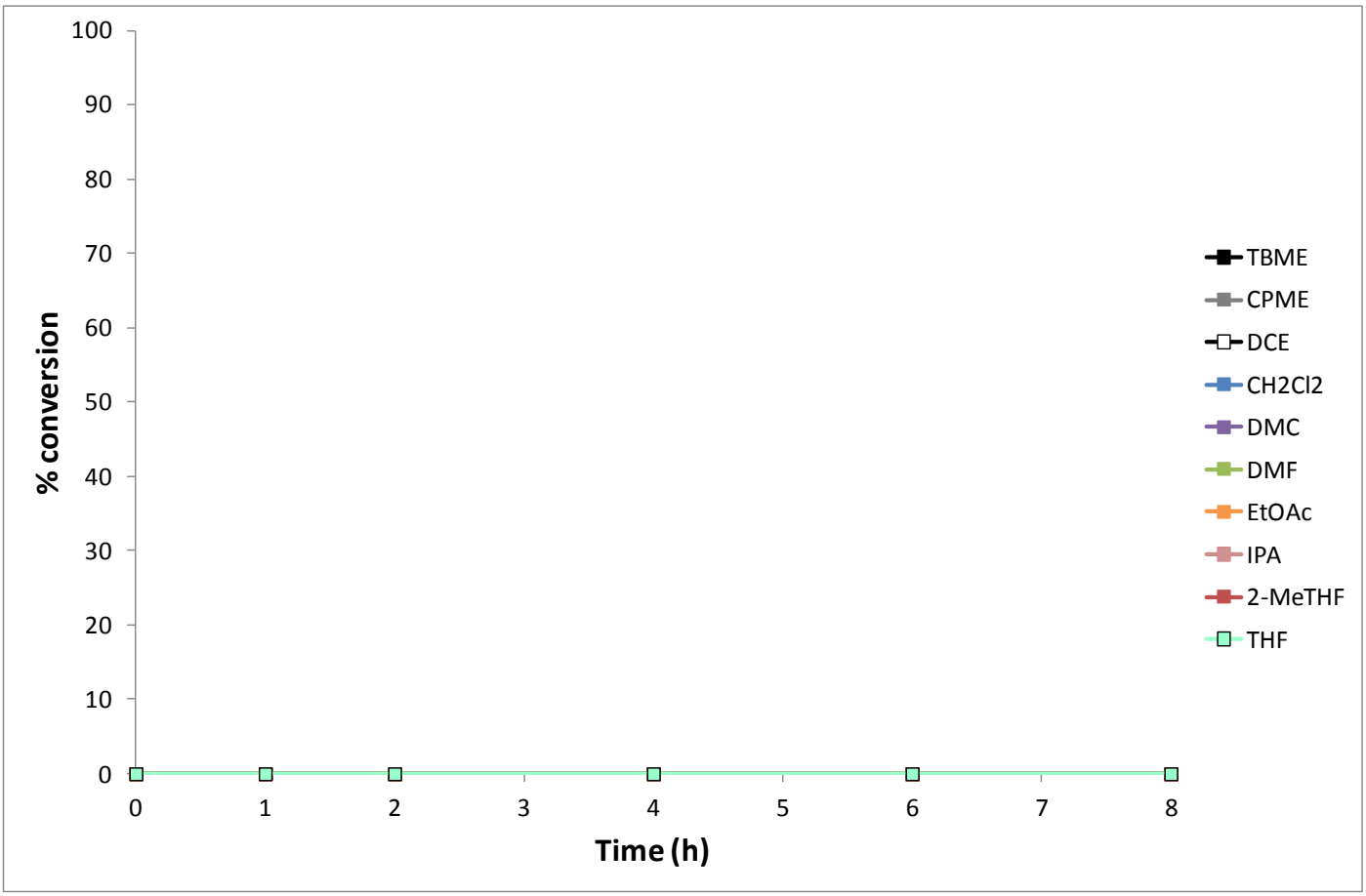
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	11.7	11.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.9	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.6	0.0
24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.6	0.0

Reaction 4: Picoline-borane Complex



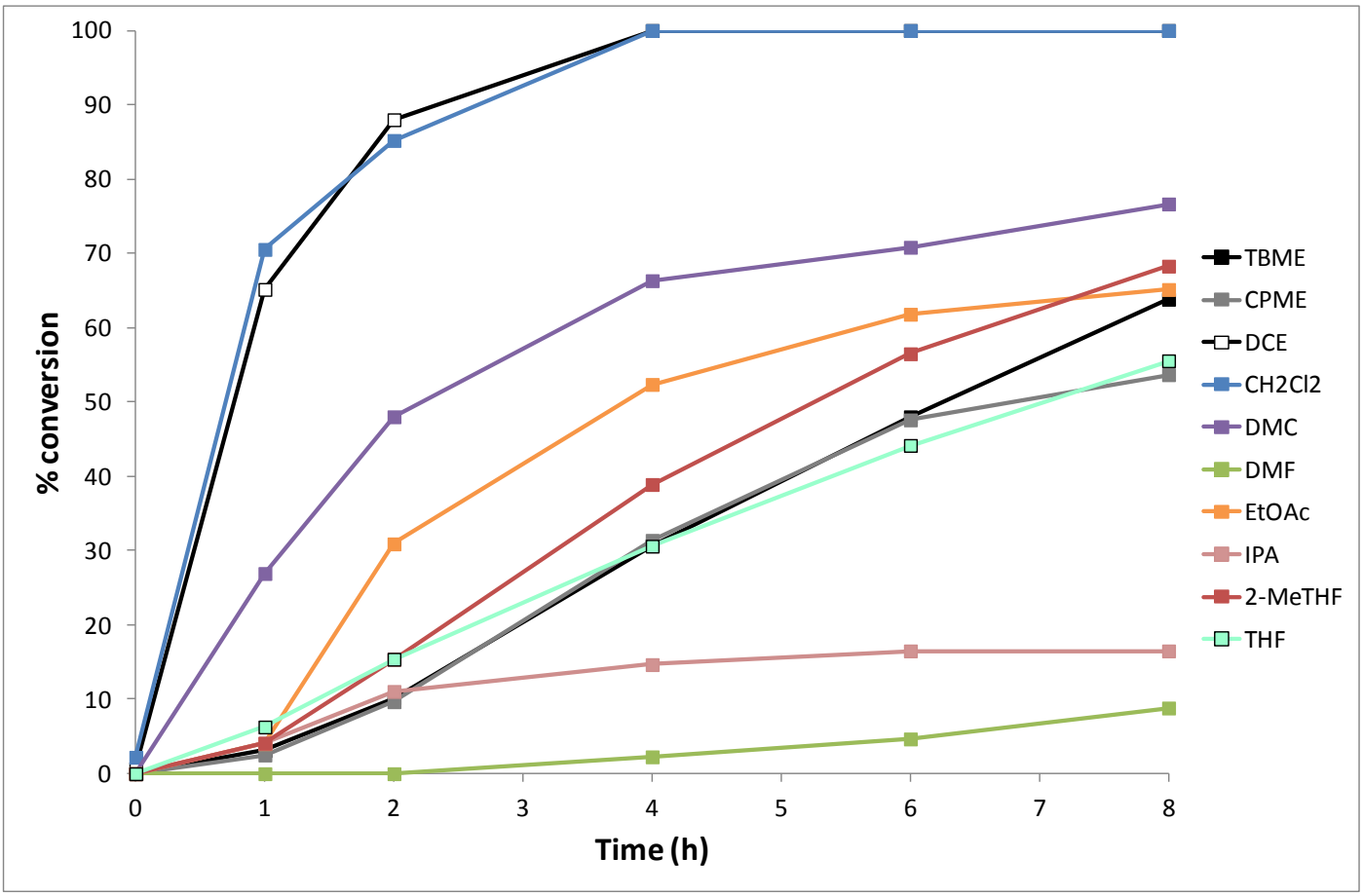
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	21.1	19.3	29.6	16.9	26.6	0.0	16.3	30.3
4	18.9	32.4	58.4	62.0	45.7	18.4	39.6	15.5	29.5	33.1
6	19.4	33.1	59.8	63.8	51.2	20.4	40.2	0.0	32.5	37.7
8	19.5	38.9	60.9	77.5	60.0	28.4	42.3	0.0	41.1	42.6
24	19.5	38.9	60.9	77.5	60.0	28.4	42.3	0.0	41.1	42.6

Reaction 4: Sodium Cyanoborohydride



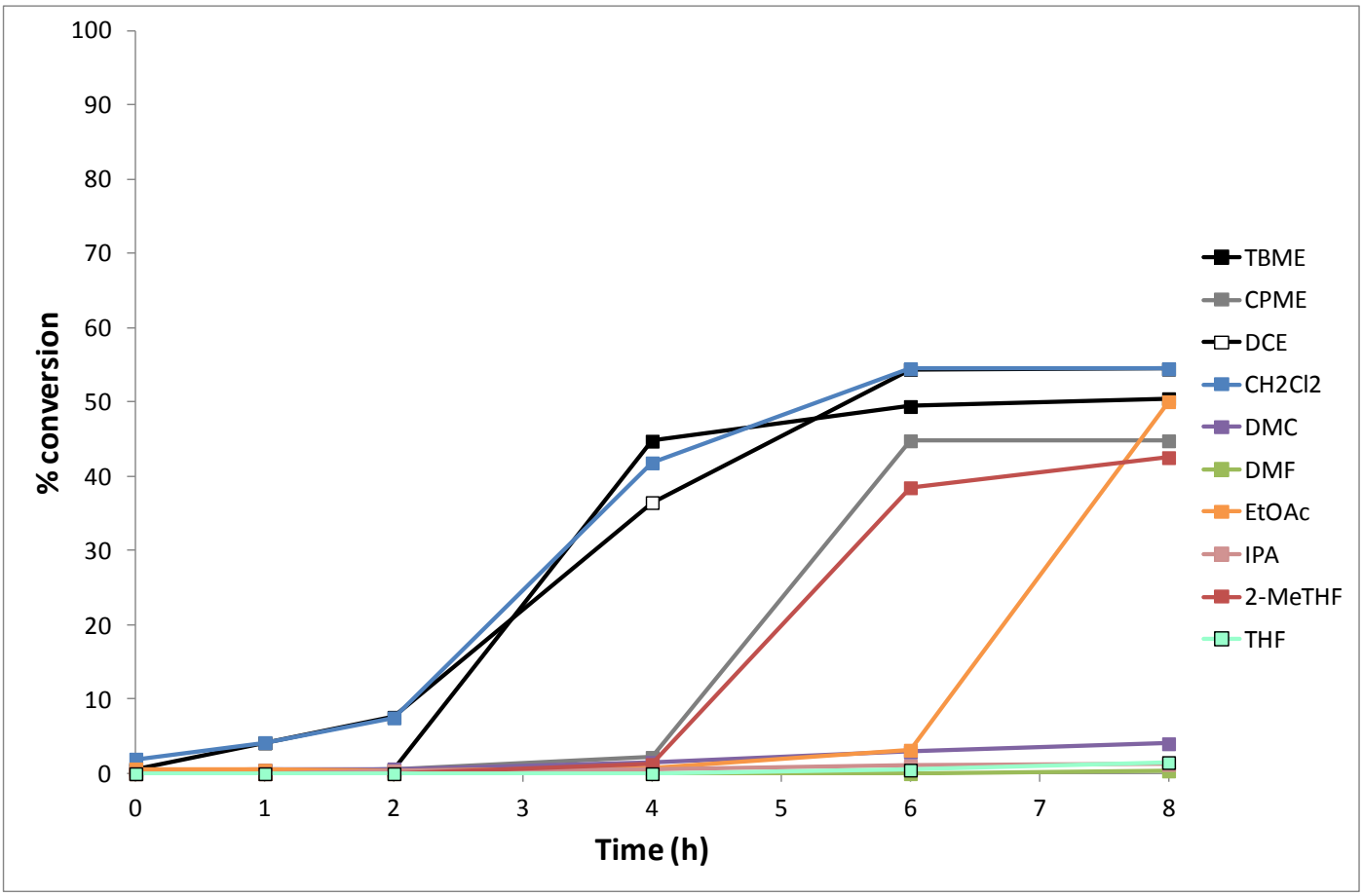
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Reaction 5: Sodium Triacetoxyborohydride



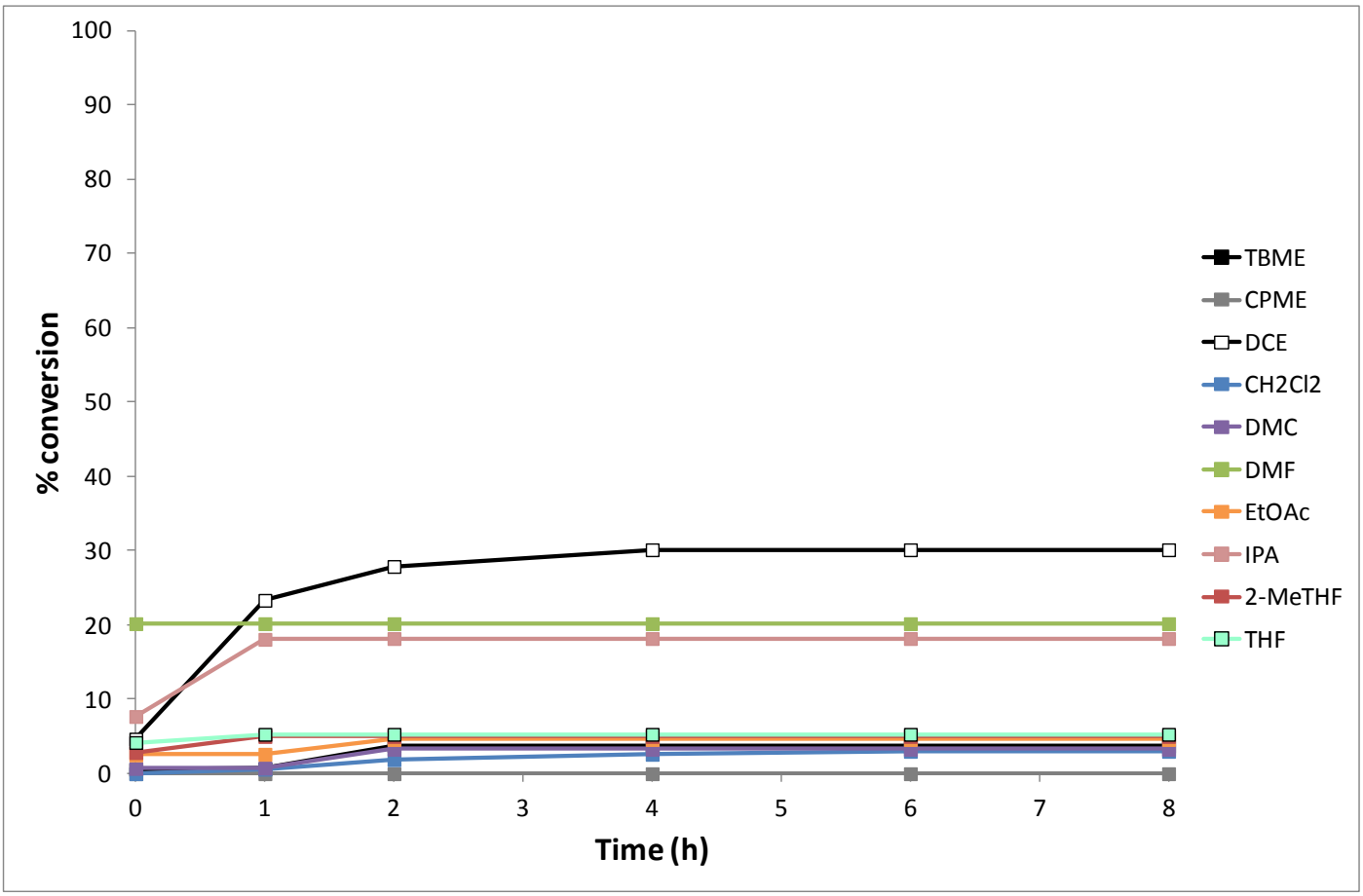
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	0.0	0.0	0.7	2.2	0.0	0.0	0.0	0.0	0.0	0.0
1	3.1	2.5	65.2	70.5	26.9	0.0	4.0	4.1	4.1	6.3
2	10.2	9.7	88.0	85.2	48.0	0.0	30.9	11.1	15.4	15.4
4	30.7	31.4	100.0	100.0	66.3	2.3	52.4	14.7	38.9	30.6
6	48.0	47.6	100.0	100.0	70.8	4.7	61.8	16.5	56.5	44.2
8	63.8	53.7	100.0	100.0	76.7	8.8	65.2	16.5	68.3	55.6
24	89.4	87.4	100.0	100.0	87.1	25.4	72.0	17.0	73.1	57.7

Reaction 5: Picoline-borane Complex



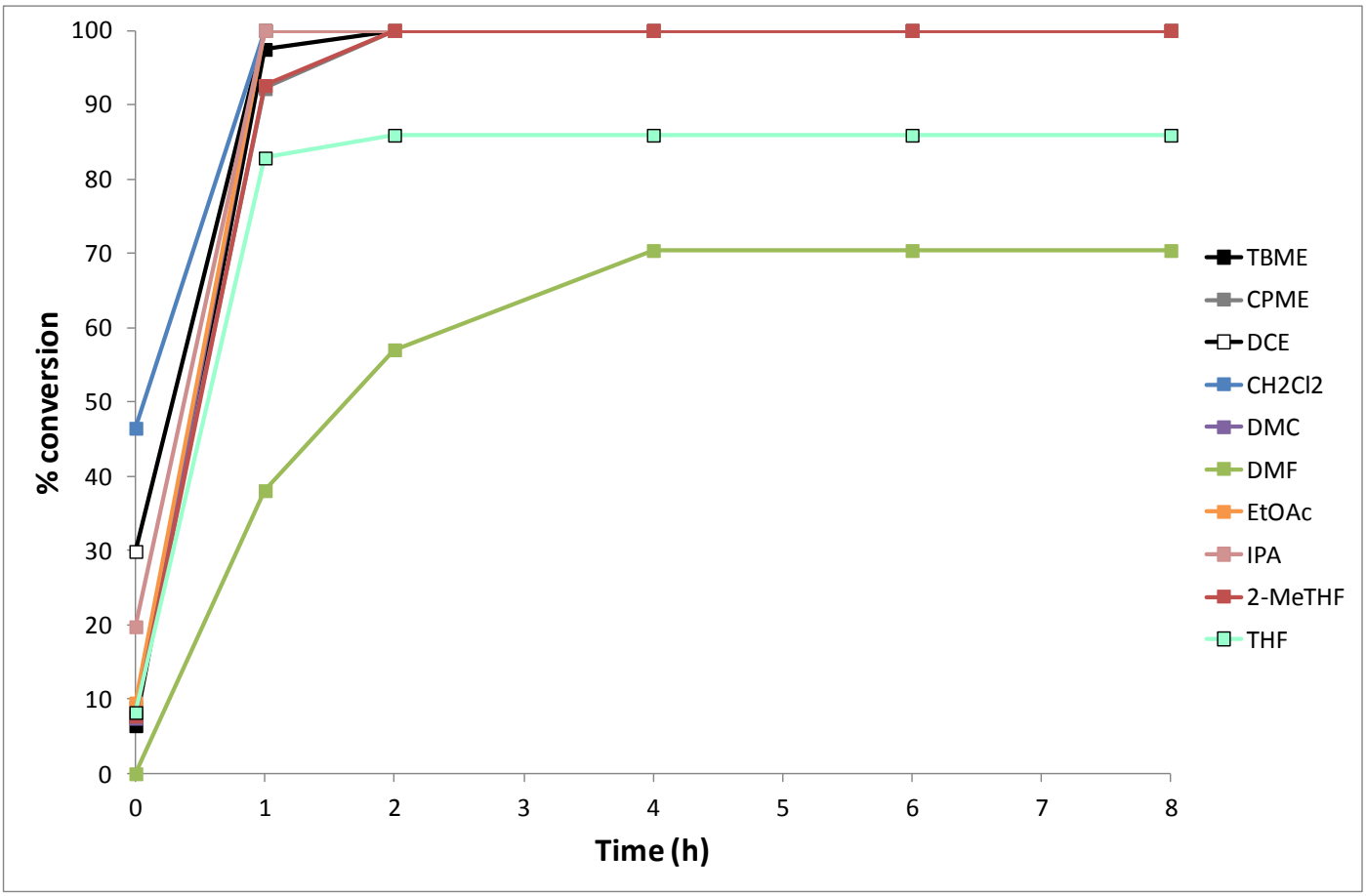
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	0.0	0.4	0.6	2.0	0.4	0.0	0.6	0.0	0.0	0.0
1	0.4	0.0	4.1	4.2	0.5	0.0	0.5	0.0	0.0	0.0
2	0.5	0.6	7.6	7.5	0.7	0.0	0.4	0.4	0.0	0.0
4	44.7	2.2	36.5	41.8	1.5	0.0	0.7	0.6	1.2	0.0
6	49.4	44.8	54.4	54.5	2.9	0.0	3.2	1.0	38.5	0.5
8	50.5	44.8	54.4	54.5	4.0	0.4	50.1	1.2	42.5	1.5
24	50.5	44.8	54.4	54.5	47.8	8.6	52.3	6.1	42.5	48.9

Reaction 5: Sodium Cyanoborohydride



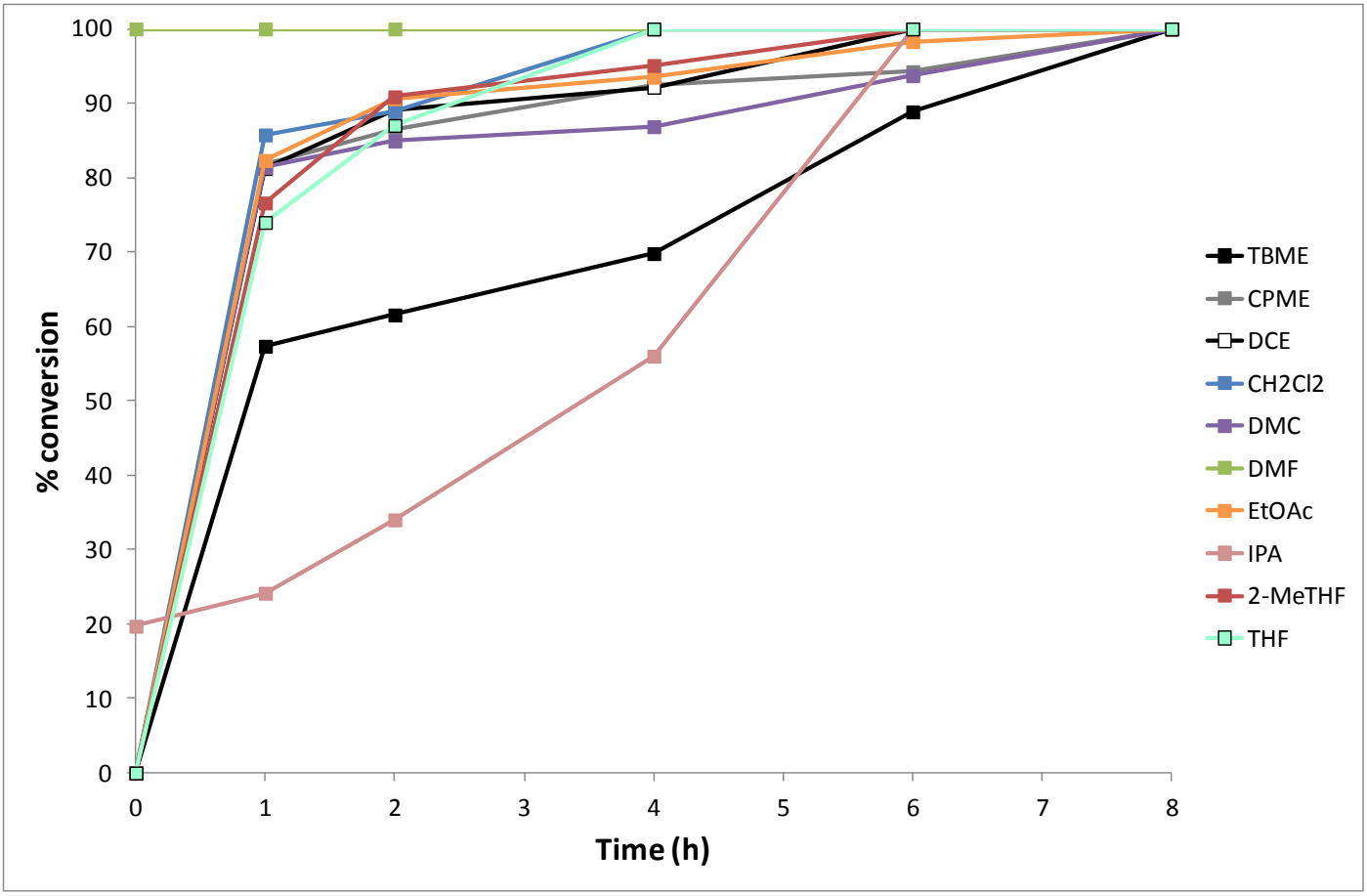
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	0.6	0.0	4.7	0.0	0.7	20.2	2.5	7.7	2.8	4.2
1	0.7	0.0	23.3	0.6	0.8	20.2	2.6	18.1	5.0	5.3
2	3.7	0.0	27.9	1.9	3.3	20.2	4.6	18.2	5.0	5.3
4	3.7	0.0	30.1	2.6	3.3	20.2	4.6	18.2	5.0	5.3
6	3.7	0.0	30.1	3.0	3.3	20.2	4.6	18.2	5.0	5.3
8	3.7	0.0	30.1	3.0	3.3	20.2	4.6	18.2	5.0	5.3
24	3.7	0.0	30.1	3.0	3.3	20.2	4.6	18.2	5.0	5.3

Reaction 6: Sodium Triacetoxyborohydride



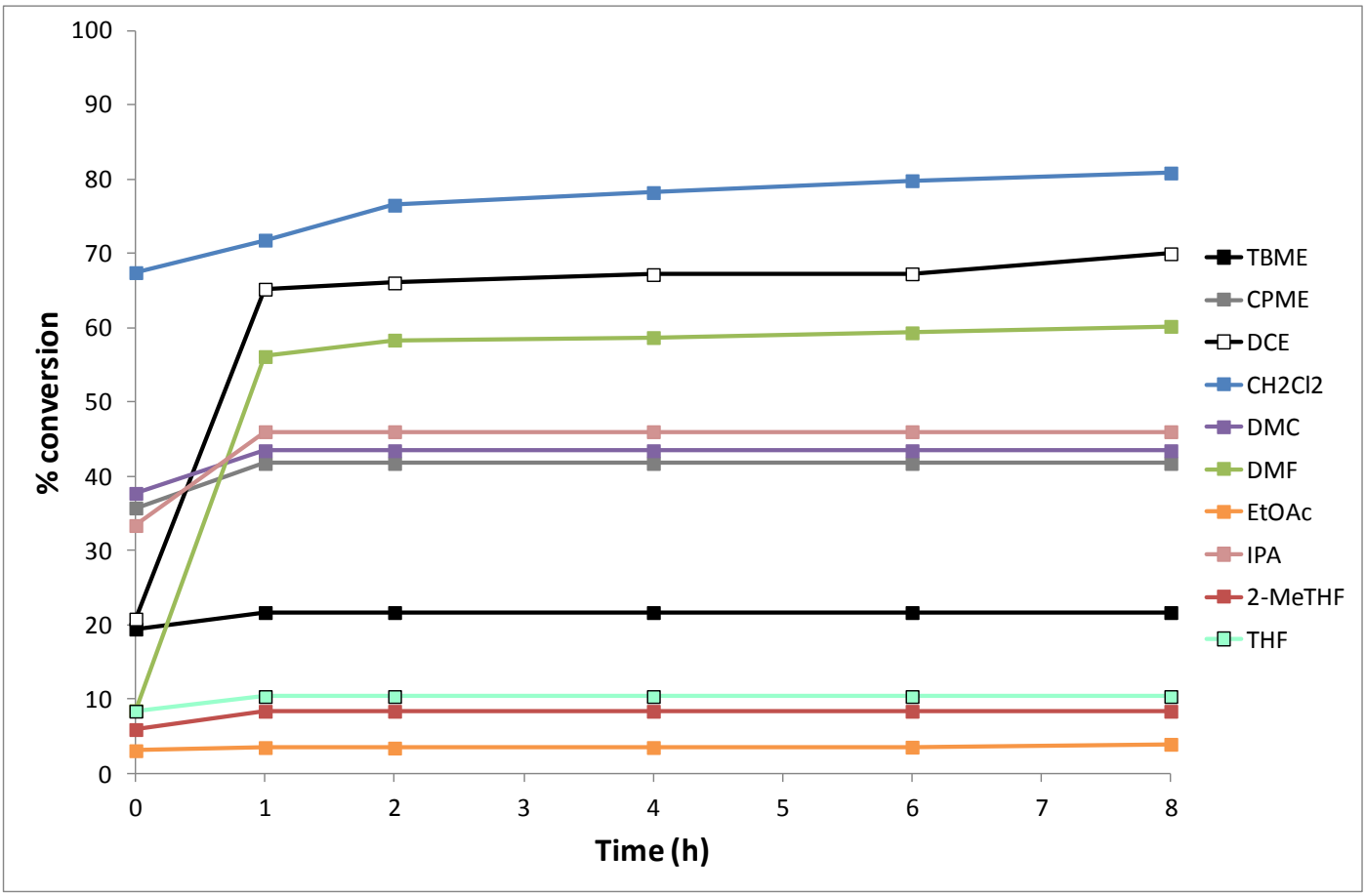
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	6.5	9.0	29.9	46.5	7.5	0.0	9.5	19.8	7.7	8.2
1	97.5	92.2	100.0	100.0	100.0	38.1	100.0	100.0	92.6	82.8
2	100.0	100.0	100.0	100.0	100.0	57.0	100.0	100.0	100.0	85.9
4	100.0	100.0	100.0	100.0	100.0	70.4	100.0	100.0	100.0	85.9
6	100.0	100.0	100.0	100.0	100.0	70.4	100.0	100.0	100.0	85.9
8	100.0	100.0	100.0	100.0	100.0	70.4	100.0	100.0	100.0	85.9
24	100.0	100.0	100.0	100.0	100.0	70.4	100.0	100.0	100.0	85.9

Reaction 6: Picoline-borane Complex



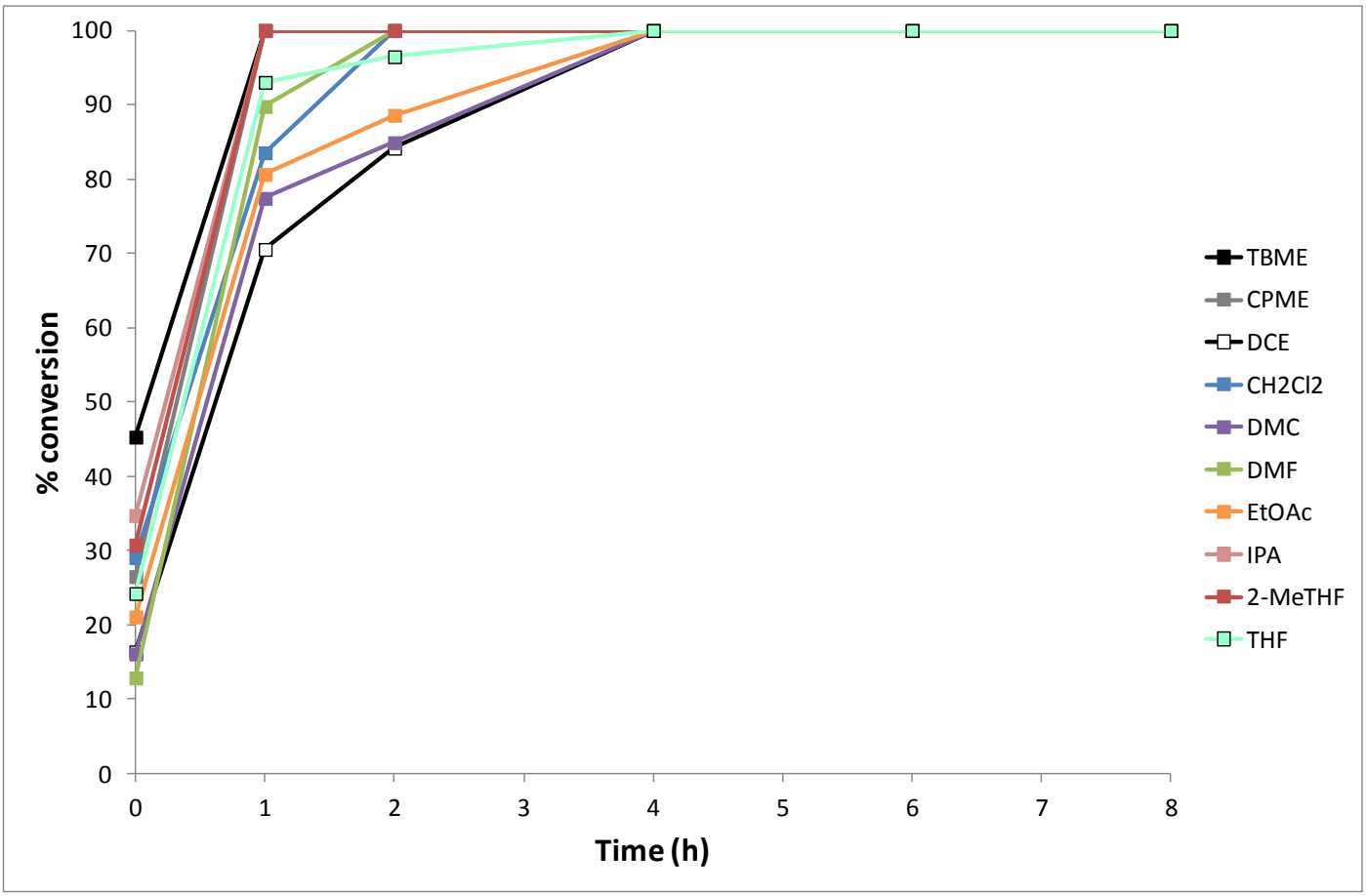
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	19.7	0.0	0.0
1	57.3	81.9	81.2	85.8	81.4	100.0	82.3	24.2	76.6	74.0
2	61.6	86.5	89.1	88.9	84.9	100.0	90.6	34.0	90.9	87.0
4	69.8	92.5	92.2	100.0	86.9	100.0	93.5	56.0	95.1	100.0
6	88.9	94.3	100.0	100.0	93.7	100.0	98.3	100.0	100.0	100.0
8	100.0	100.0	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	100.0	100.0

Reaction 6: Sodium Cyanoborohydride



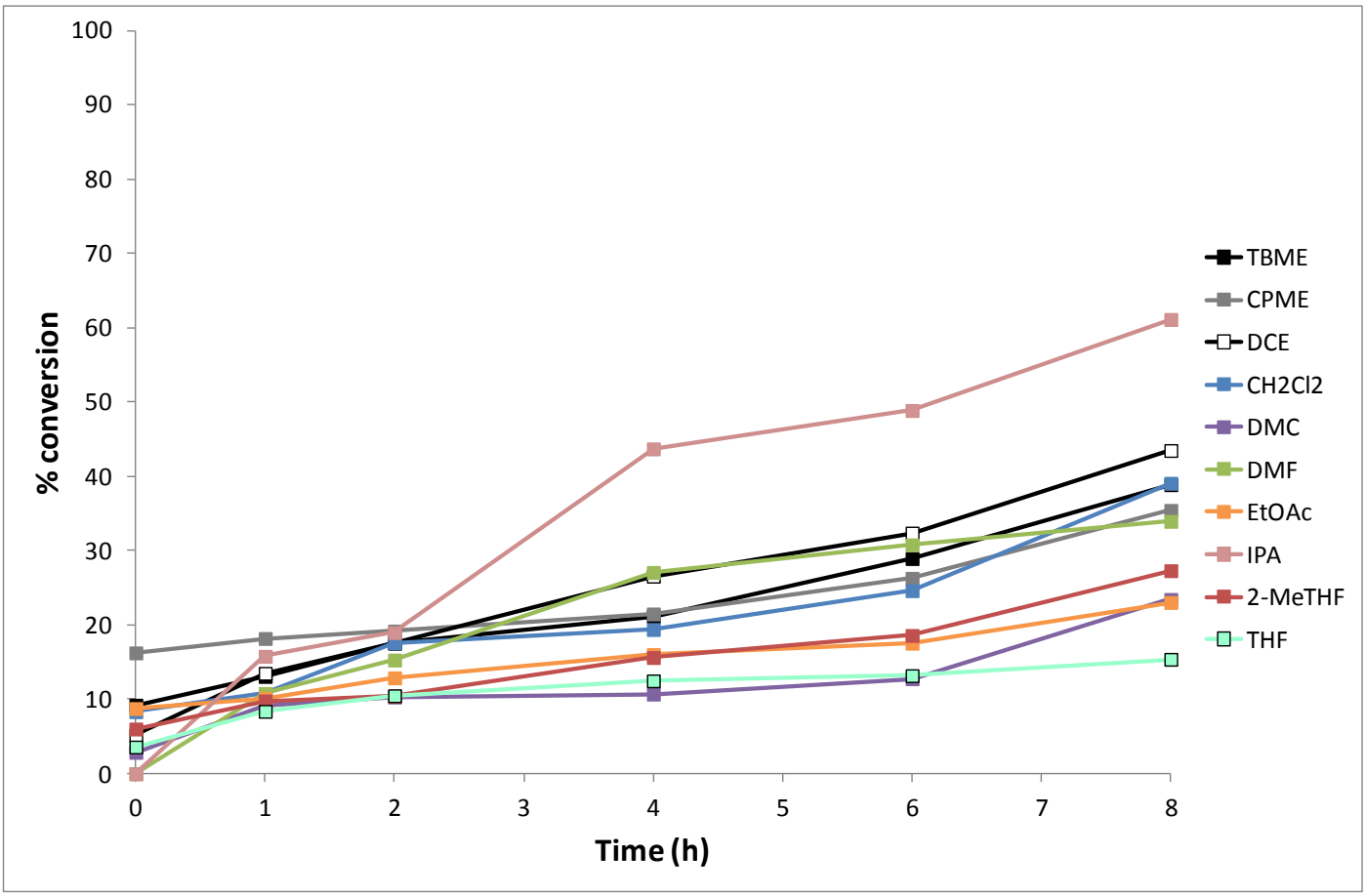
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	19.5	35.8	20.8	67.4	37.7	8.5	3.1	33.4	5.9	8.4
1	21.7	41.7	65.2	71.8	43.5	56.1	3.5	46.0	8.4	10.4
2	21.7	41.7	66.0	76.5	43.5	58.3	3.5	46.0	8.4	10.4
4	21.7	41.7	67.2	78.2	43.5	58.7	3.5	46.0	8.4	10.4
6	21.7	41.7	67.3	79.8	43.5	59.3	3.6	46.0	8.4	10.4
8	21.7	41.7	70.0	80.8	43.5	60.2	4.0	46.0	8.4	10.4
24	21.7	41.7	73.2	82.5	43.5	93.6	31.0	46.0	8.4	10.4

Reaction 7: Sodium Triacetoxyborohydride



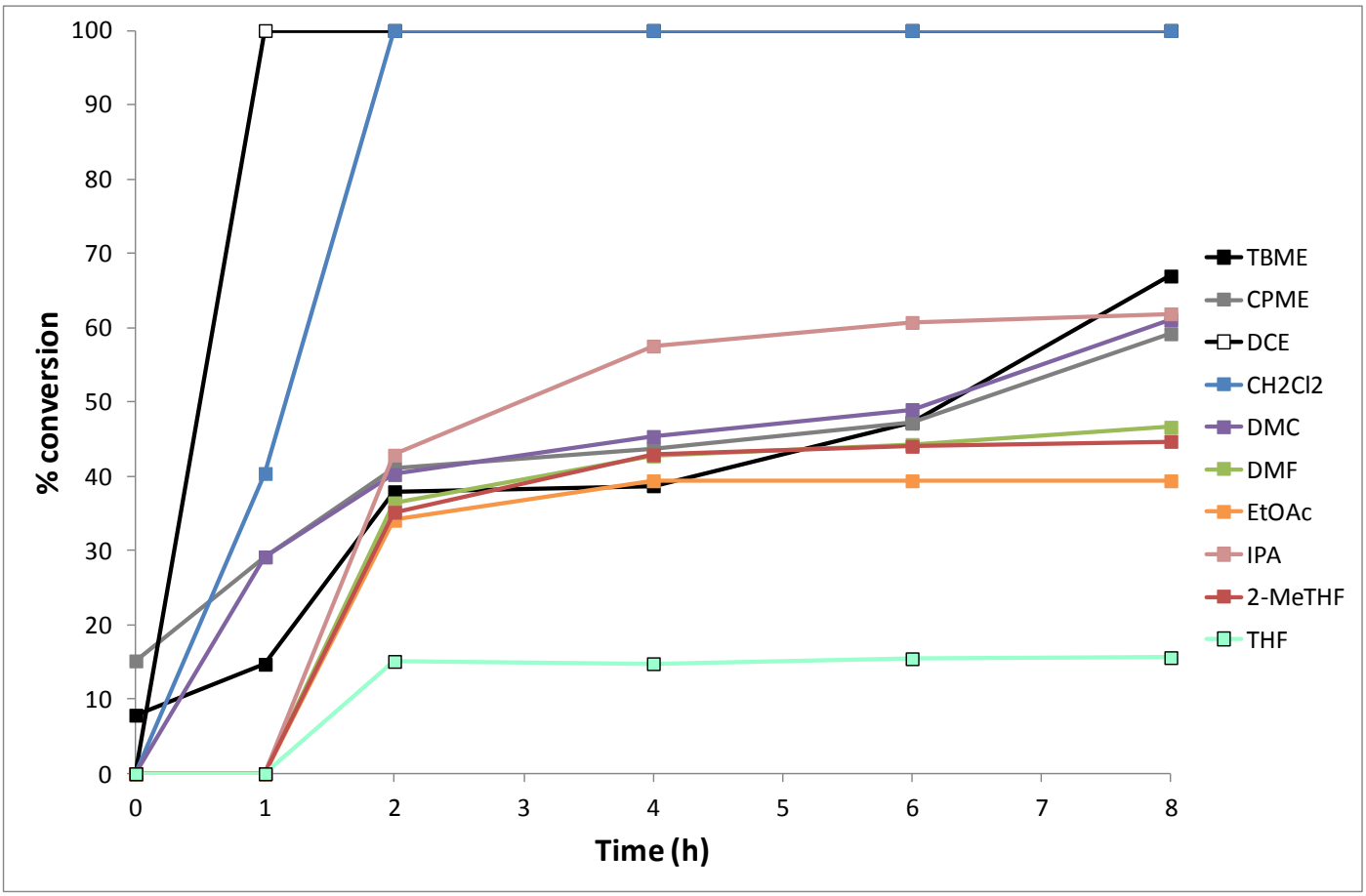
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	45.3	26.5	16.4	29.1	16.1	12.9	21.1	34.7	30.8	24.2
1	100.0	100.0	70.5	83.5	77.4	89.8	80.6	100.0	100.0	93.0
2	100.0	100.0	84.2	100.0	84.9	100.0	88.6	100.0	100.0	96.5
4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	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	100.0	100.0

Reaction 7: Picoline-borane Complex



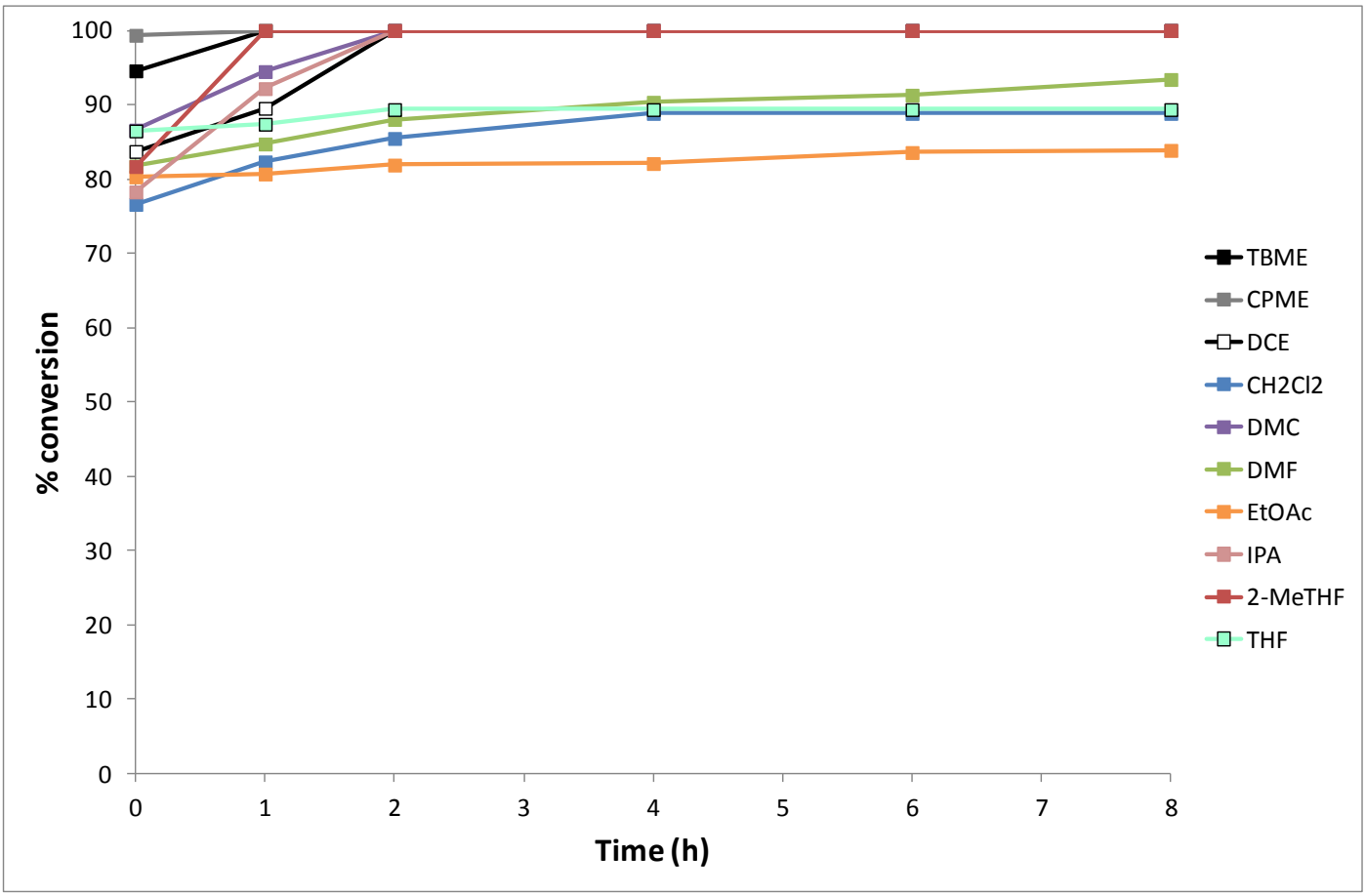
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	9.2	16.3	5.2	8.3	2.9	0.0	8.8	0.0	6.0	3.6
1	13.1	18.2	13.5	10.8	9.1	10.8	10.1	15.8	9.8	8.4
2	17.6	19.2	17.6	17.6	10.3	15.3	12.9	19.0	10.4	10.5
4	21.2	21.5	26.6	19.4	10.7	27.1	16.0	43.7	15.6	15.3
6	29.0	26.3	32.4	24.6	12.8	30.8	17.6	48.9	18.6	15.3
8	38.9	35.4	43.5	39.1	23.5	34.0	23.0	61.1	27.3	15.3
24	59.3	55.4	58.0	60.8	41.7	66.5	46.2	74.0	65.8	27.9

Reaction 7: Sodium Cyanoborohydride



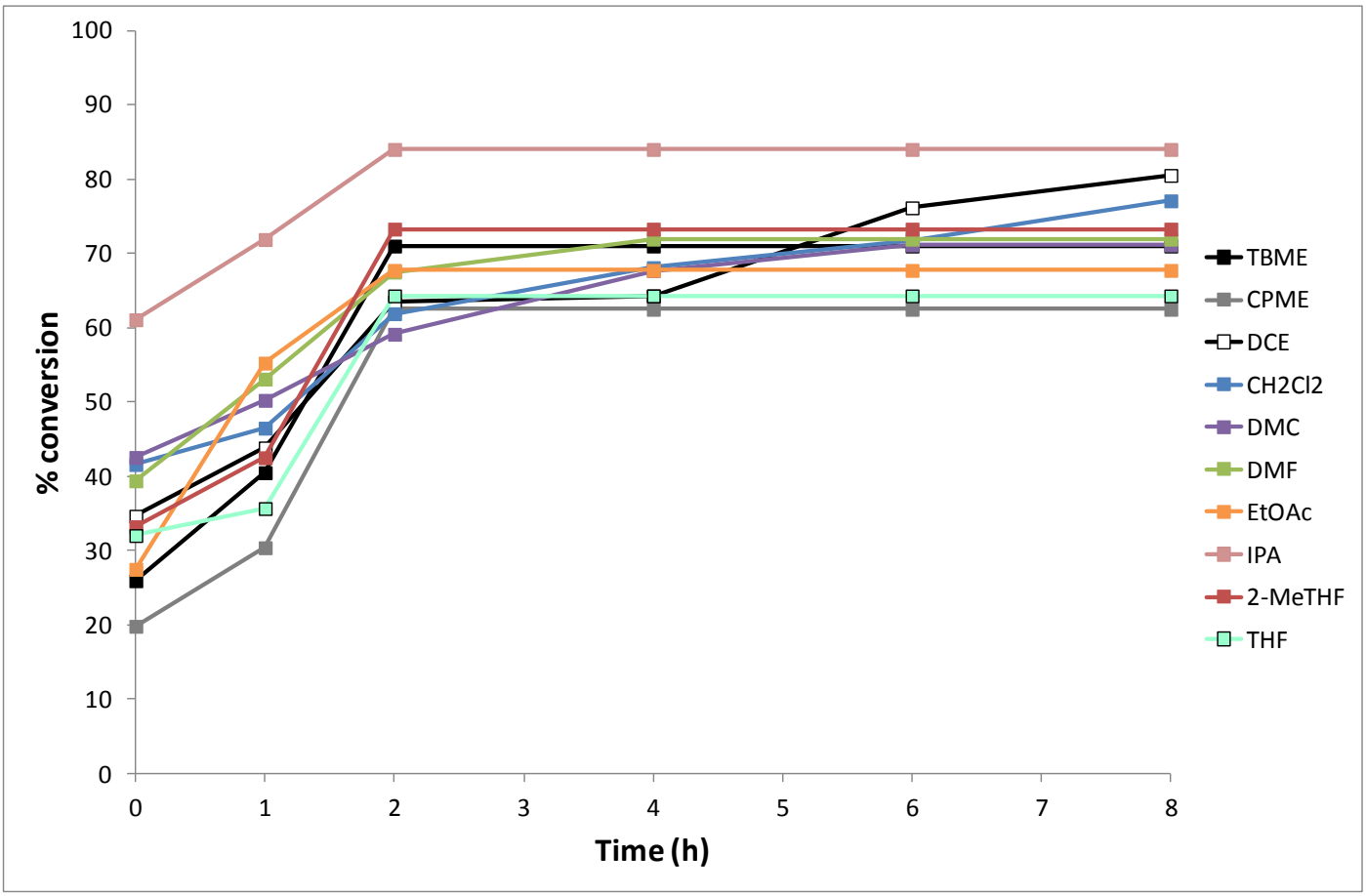
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	7.9	15.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	14.7	29.2	100.0	40.4	29.2	0.0	0.0	0.0	0.0	0.0
2	37.9	41.1	100.0	100.0	40.3	36.5	34.1	42.9	35.2	15.1
4	38.7	43.8	100.0	100.0	45.4	42.7	39.4	57.5	42.9	14.8
6	47.3	47.2	100.0	100.0	49.0	44.3	39.7	60.7	44.1	15.5
8	67.0	59.2	100.0	100.0	61.1	46.6	25.9	61.9	44.7	15.6
24	82.0	59.2	100.0	100.0	100.0	46.6	37.8	68.1	44.7	22.2

Reaction 8: Sodium Triacetoxyborohydride



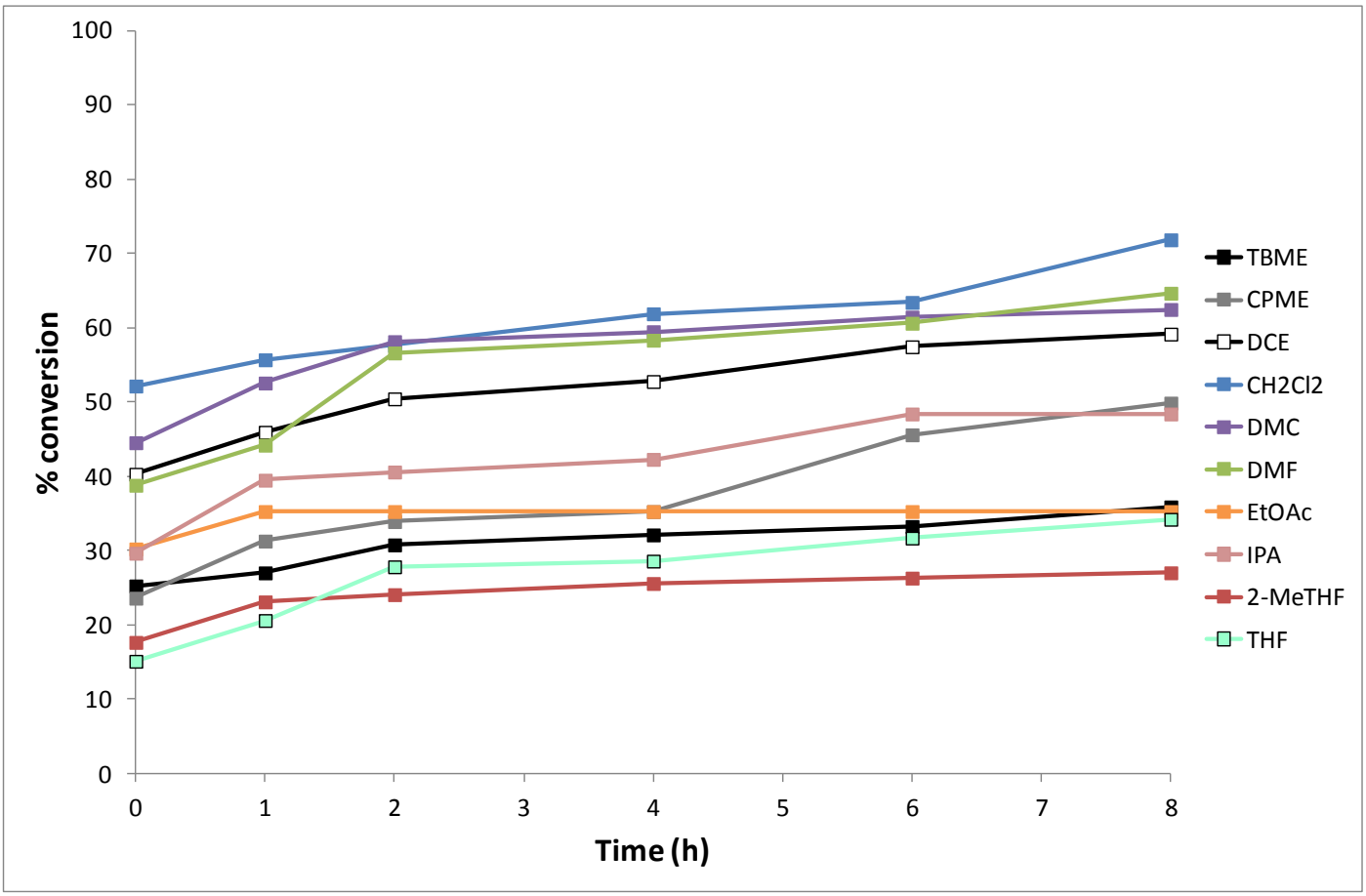
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	94.6	99.4	83.7	76.6	86.6	81.8	80.3	78.3	81.7	86.5
1	100.0	100.0	89.5	82.3	94.5	84.7	80.7	92.2	100.0	87.4
2	100.0	100.0	100.0	85.5	100.0	88.0	81.9	100.0	100.0	89.4
4	100.0	100.0	100.0	88.8	100.0	90.4	82.1	100.0	100.0	89.4
6	100.0	100.0	100.0	88.8	100.0	91.3	83.6	100.0	100.0	89.4
8	100.0	100.0	100.0	88.8	100.0	93.4	83.9	100.0	100.0	89.4
24	100.0	100.0	100.0	88.8	100.0	100.0	93.7	100.0	100.0	89.4

Reaction 8: Picoline-borane Complex



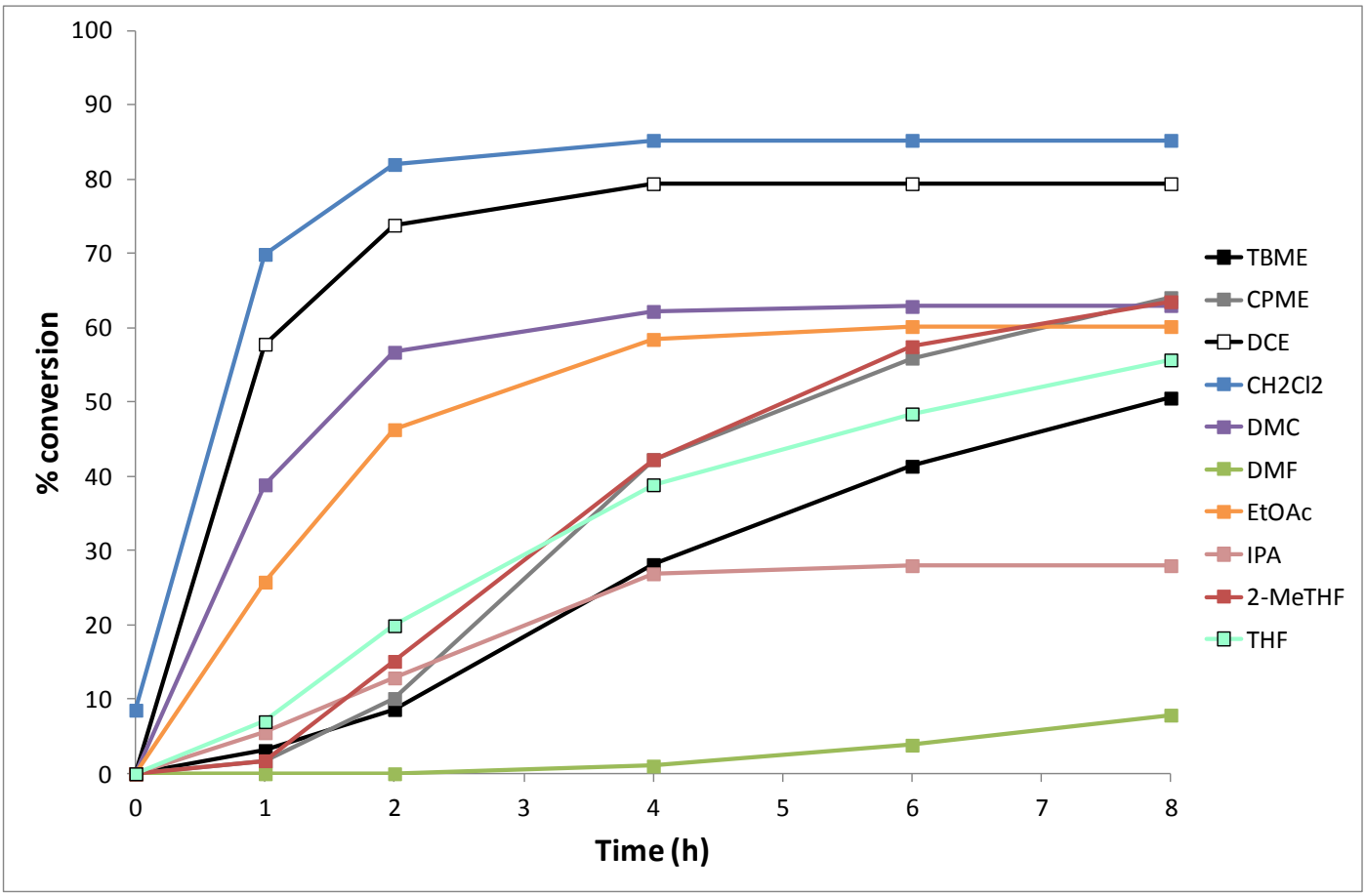
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	26.0	19.8	34.7	41.6	42.6	39.4	27.5	61.1	33.2	32.0
1	40.5	30.4	43.8	46.5	50.2	53.1	55.3	71.9	42.5	35.7
2	71.0	62.5	63.5	61.9	59.1	67.5	67.7	84.0	73.3	64.3
4	71.0	62.5	64.3	68.1	67.7	71.9	67.7	84.0	73.3	64.3
6	71.0	62.5	76.1	71.6	71.2	71.9	67.7	84.0	73.3	64.3
8	71.0	62.5	80.5	77.1	71.2	71.9	67.7	84.0	73.3	64.3
24	71.0	62.5	81.4	82.4	71.2	71.9	67.7	84.0	73.3	64.3

Reaction 8: Sodium Cyanoborohydride



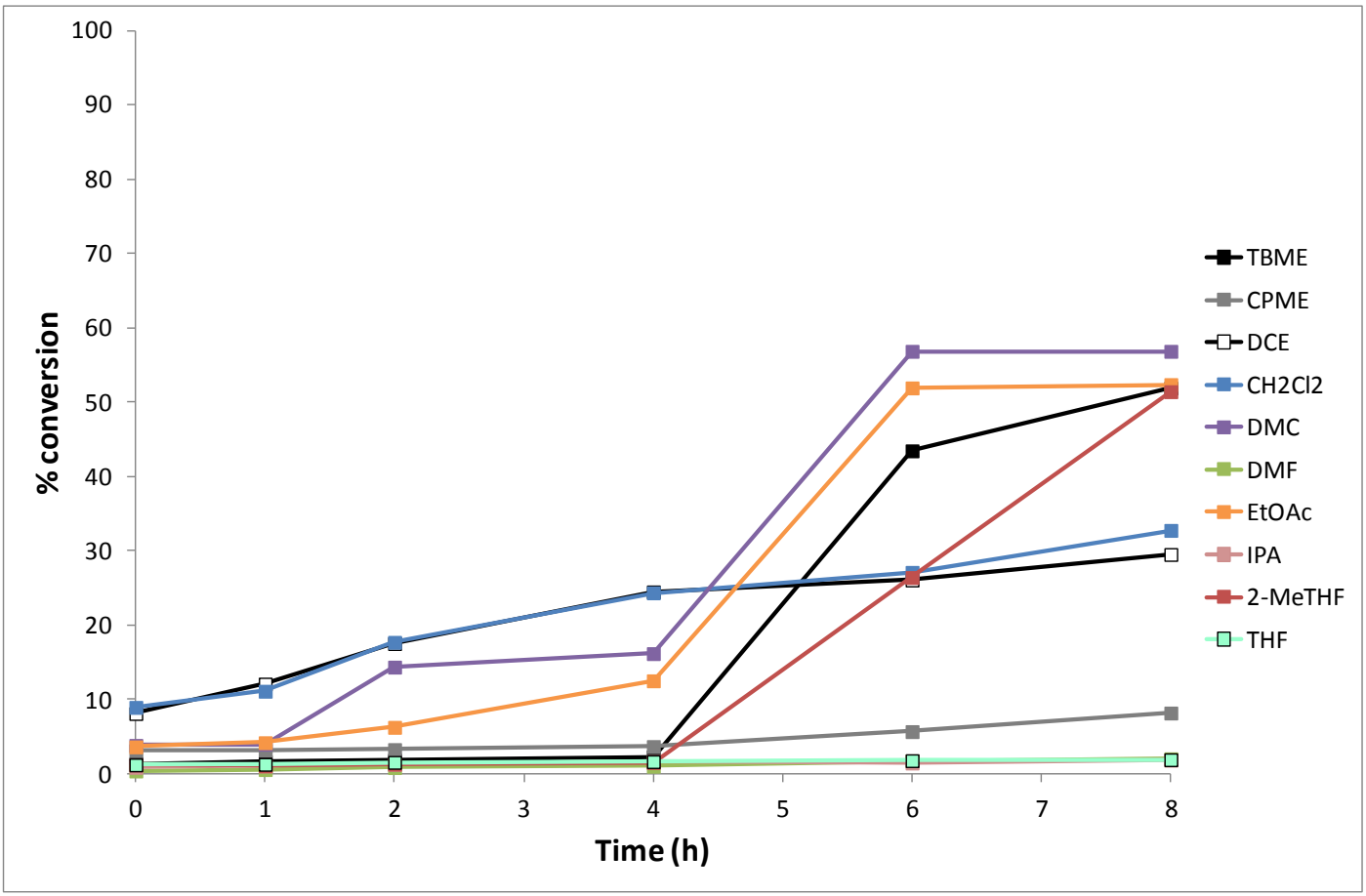
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	25.3	23.6	40.3	52.2	44.5	38.8	30.2	29.7	17.7	15.1
1	27.0	31.3	46.0	55.7	52.6	44.2	35.3	39.5	23.1	20.6
2	30.8	33.9	50.4	57.6	58.1	56.6	35.3	40.6	24.1	27.8
4	32.1	35.3	52.8	61.9	59.5	58.3	35.3	42.3	25.6	28.6
6	33.3	45.6	57.4	63.4	61.4	60.6	35.3	48.4	26.3	31.7
8	35.9	49.9	59.2	71.8	62.5	64.7	35.3	48.4	27.0	34.2
24	35.9	51.2	59.2	72.4	62.5	64.7	35.3	48.4	27.0	34.7

Reaction 9: Sodium Triacetoxyborohydride



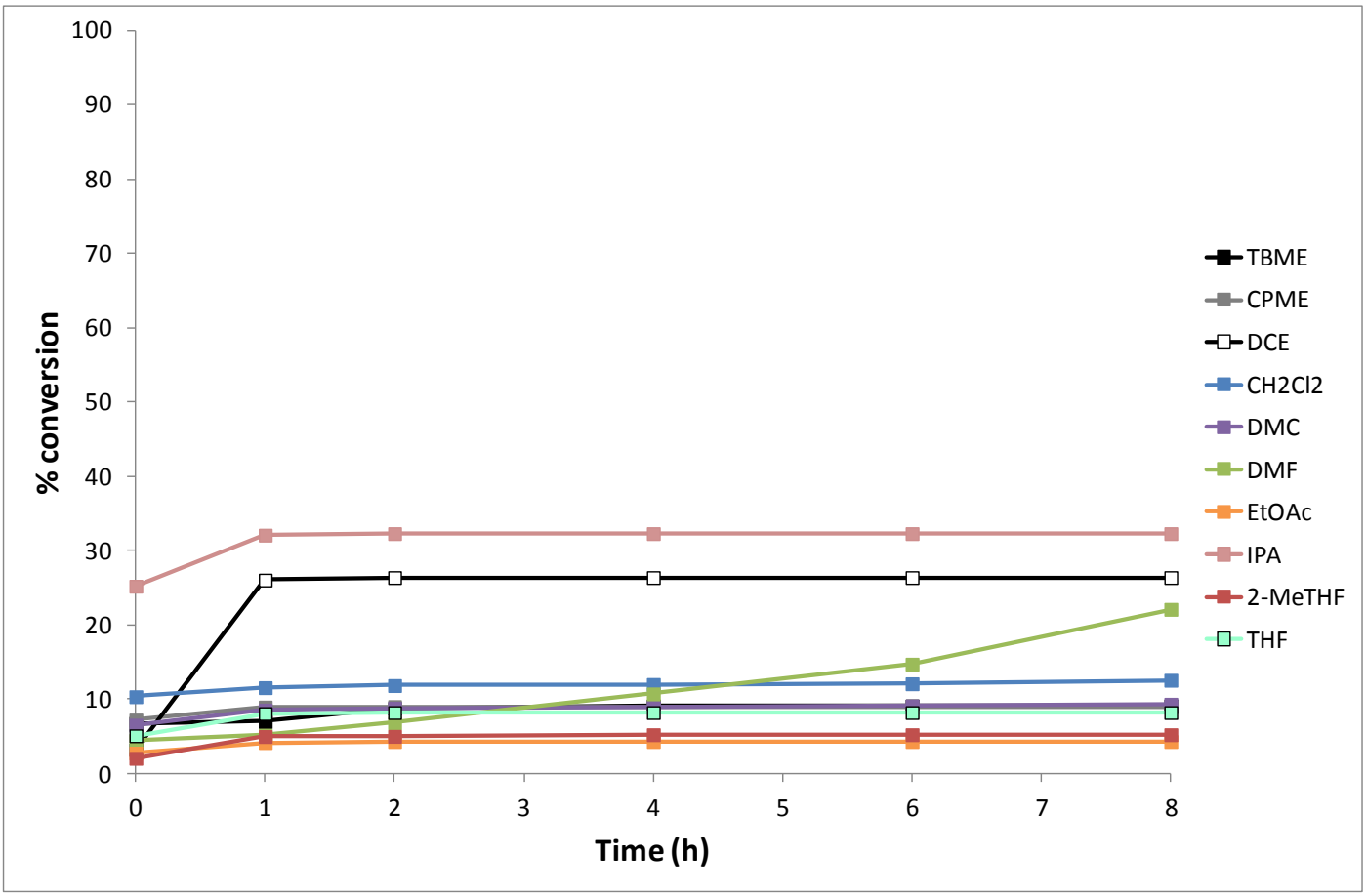
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	0.0	0.0	0.0	8.6	0.0	0.0	0.0	0.0	0.0	0.0
1	3.1	1.7	57.8	69.9	38.9	0.0	25.8	5.5	1.7	7.0
2	8.6	10.1	73.8	82.0	56.7	0.0	46.3	12.9	15.1	19.9
4	28.1	42.3	79.4	85.2	62.2	1.0	58.4	26.9	42.3	38.9
6	41.4	55.9	79.4	85.2	62.9	3.8	60.2	28.0	57.5	48.4
8	50.5	64.1	79.4	85.2	63.0	7.9	60.2	28.0	63.5	55.7
24	73.8	81.4	79.4	85.2	63.7	32.5	60.2	28.0	76.6	69.1

Reaction 9: Picoline-borane Complex



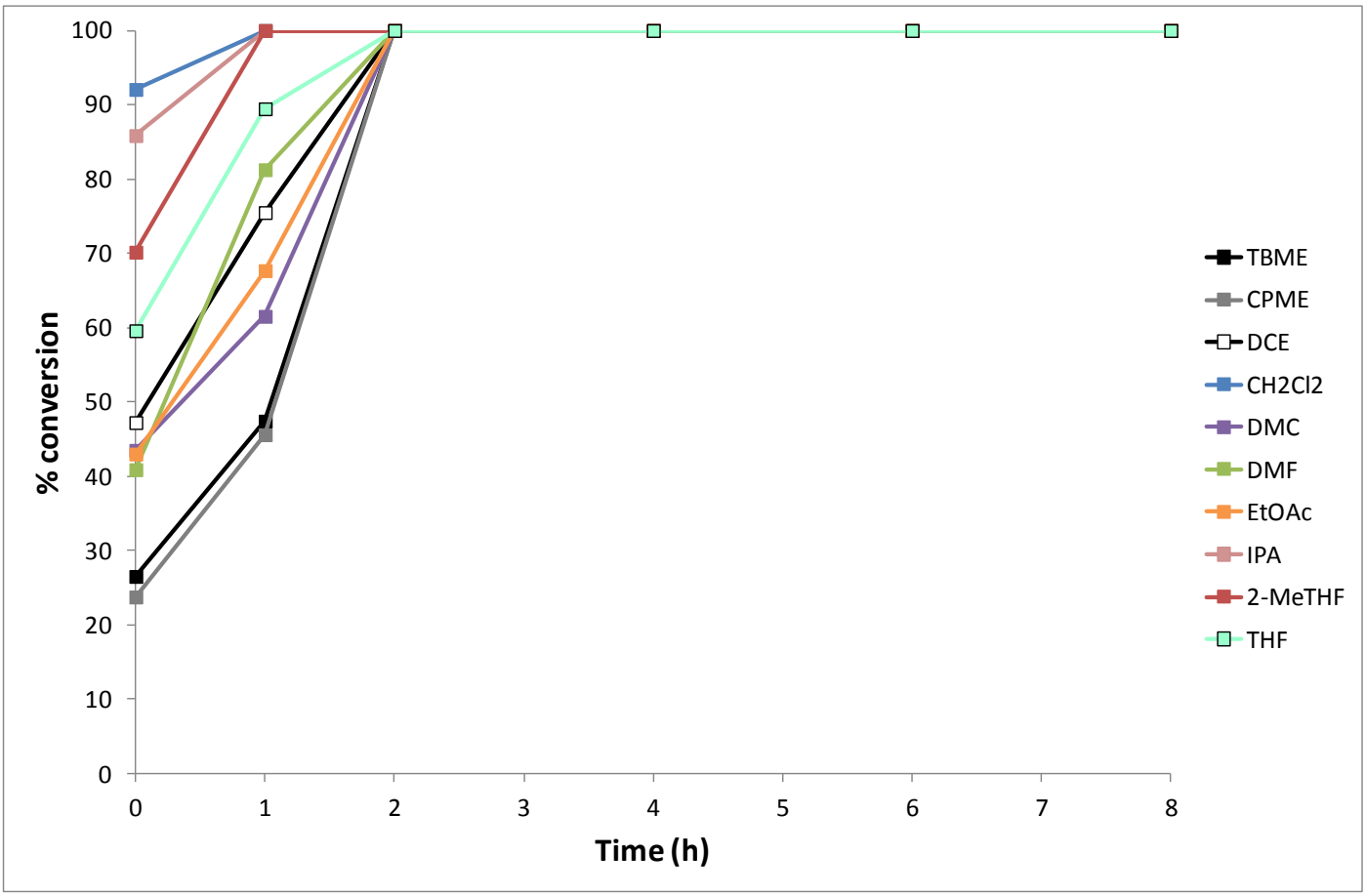
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	1.4	3.1	8.1	9.0	3.8	0.4	3.6	0.9	1.2	1.2
1	1.7	3.2	12.1	11.1	4.0	0.6	4.2	1.1	1.1	1.3
2	1.9	3.3	17.5	17.7	14.4	0.9	6.3	1.3	1.3	1.6
4	2.3	3.7	24.5	24.4	16.2	1.0	12.5	1.7	1.5	1.7
6	43.5	5.7	26.1	27.1	56.9	1.8	51.9	1.5	26.4	1.8
8	51.9	8.2	29.5	32.8	56.9	2.0	52.4	1.9	51.4	1.9
24	51.9	51.3	61.4	69.7	56.9	59.4	52.4	71.4	51.4	52.6

Reaction 9: Sodium Cyanoborohydride



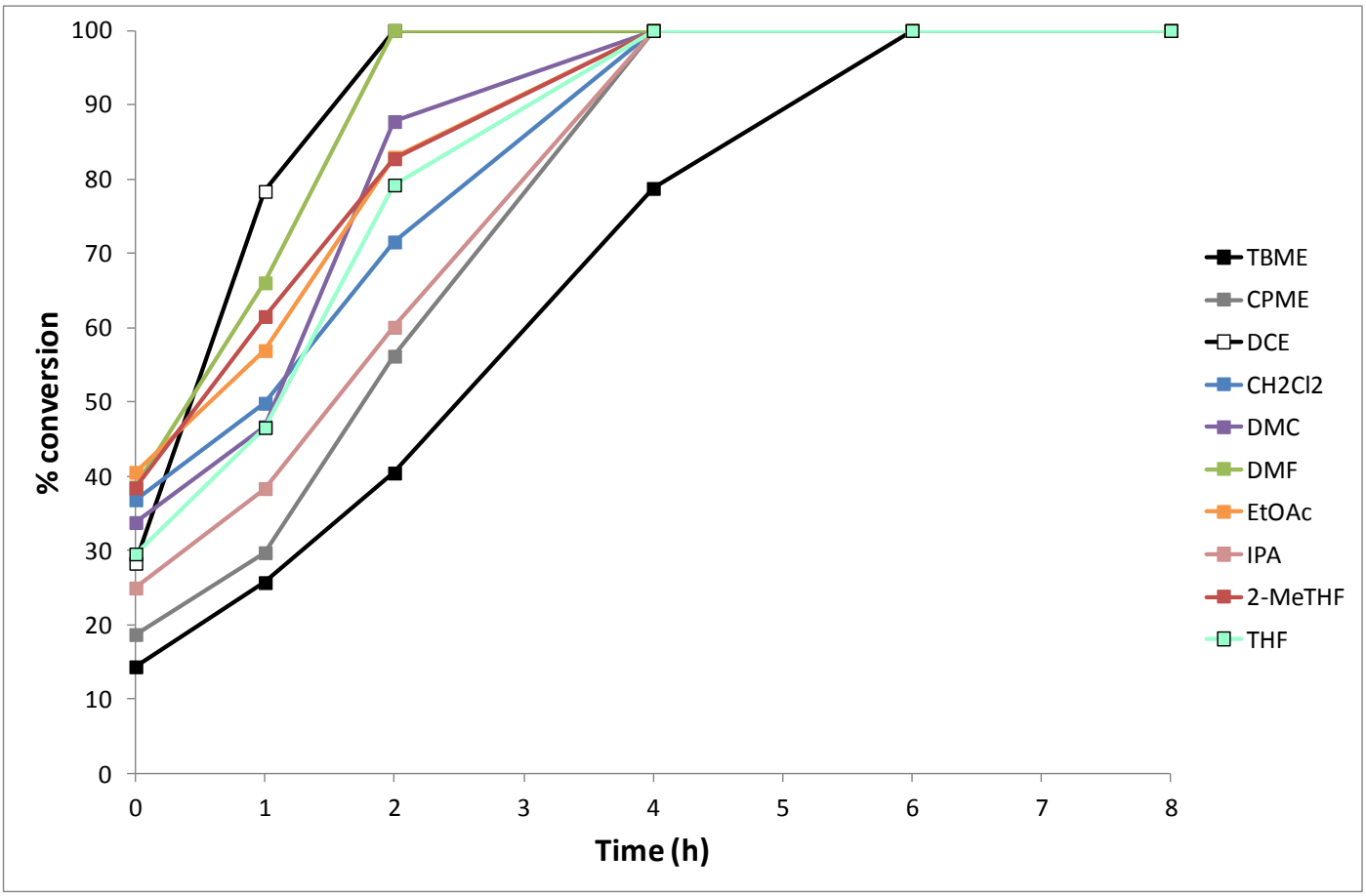
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	6.8	7.2	3.2	10.4	6.5	4.5	2.8	25.2	2.1	5.1
1	7.0	9.0	26.1	11.6	8.6	5.2	4.2	32.1	5.0	8.1
2	8.8	9.0	26.4	11.9	8.8	6.8	4.3	32.3	5.0	8.2
4	9.1	9.0	26.4	12.0	8.9	10.7	4.3	32.3	5.3	8.2
6	9.1	9.0	26.4	12.1	9.1	14.7	4.3	32.3	5.3	8.2
8	9.1	9.0	26.4	12.6	9.4	22.1	4.3	32.3	5.3	8.2
24	9.1	9.0	26.4	12.6	9.4	22.1	4.3	32.3	5.3	8.2

Reaction 10: Sodium Triacetoxyborohydride



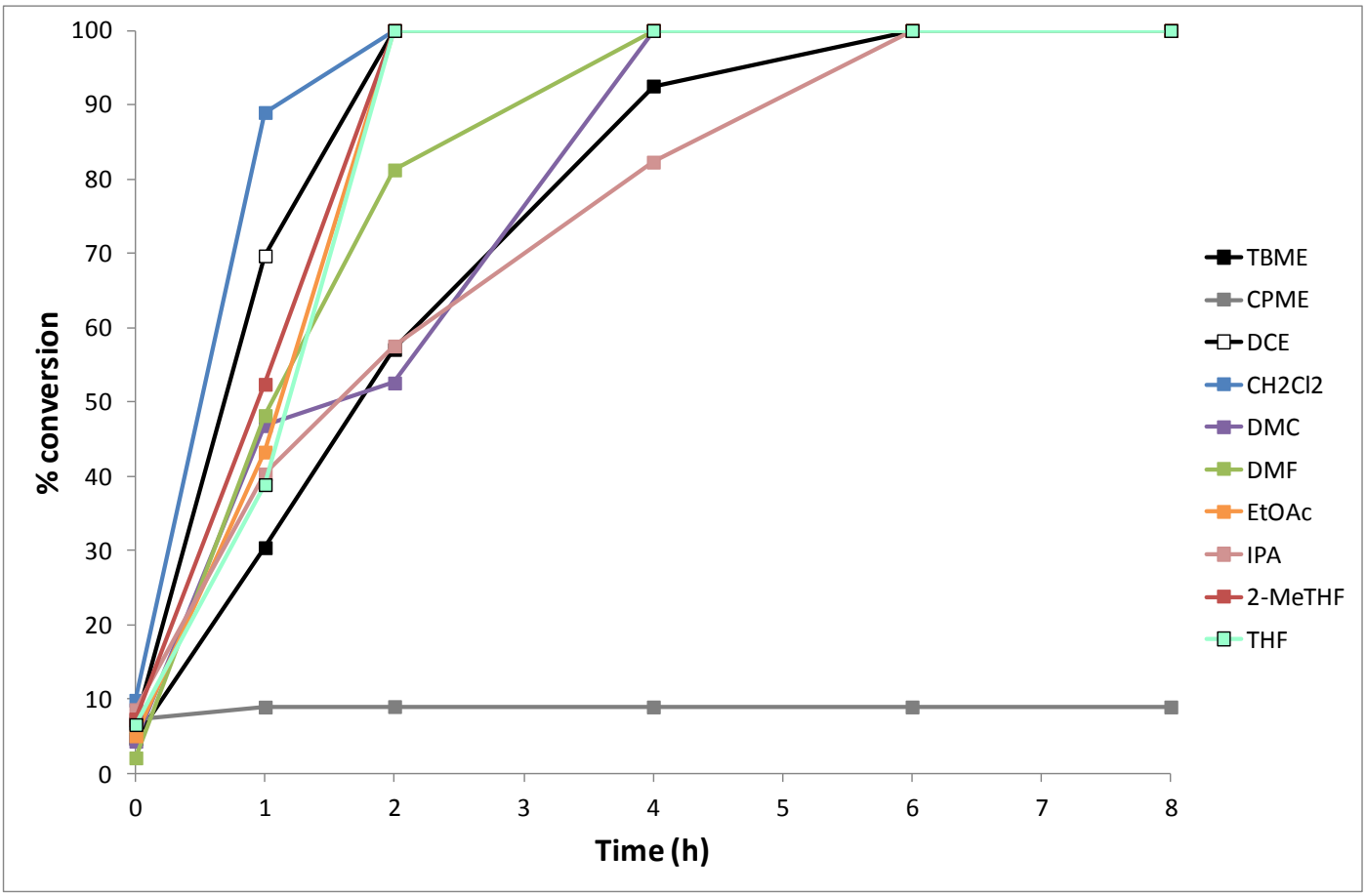
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	26.6	23.8	47.3	92.1	43.5	40.9	43.0	85.9	70.2	59.6
1	47.4	45.6	75.5	100.0	61.5	81.3	67.7	100.0	100.0	89.5
2	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	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	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Reaction 10: Picoline-borane Complex



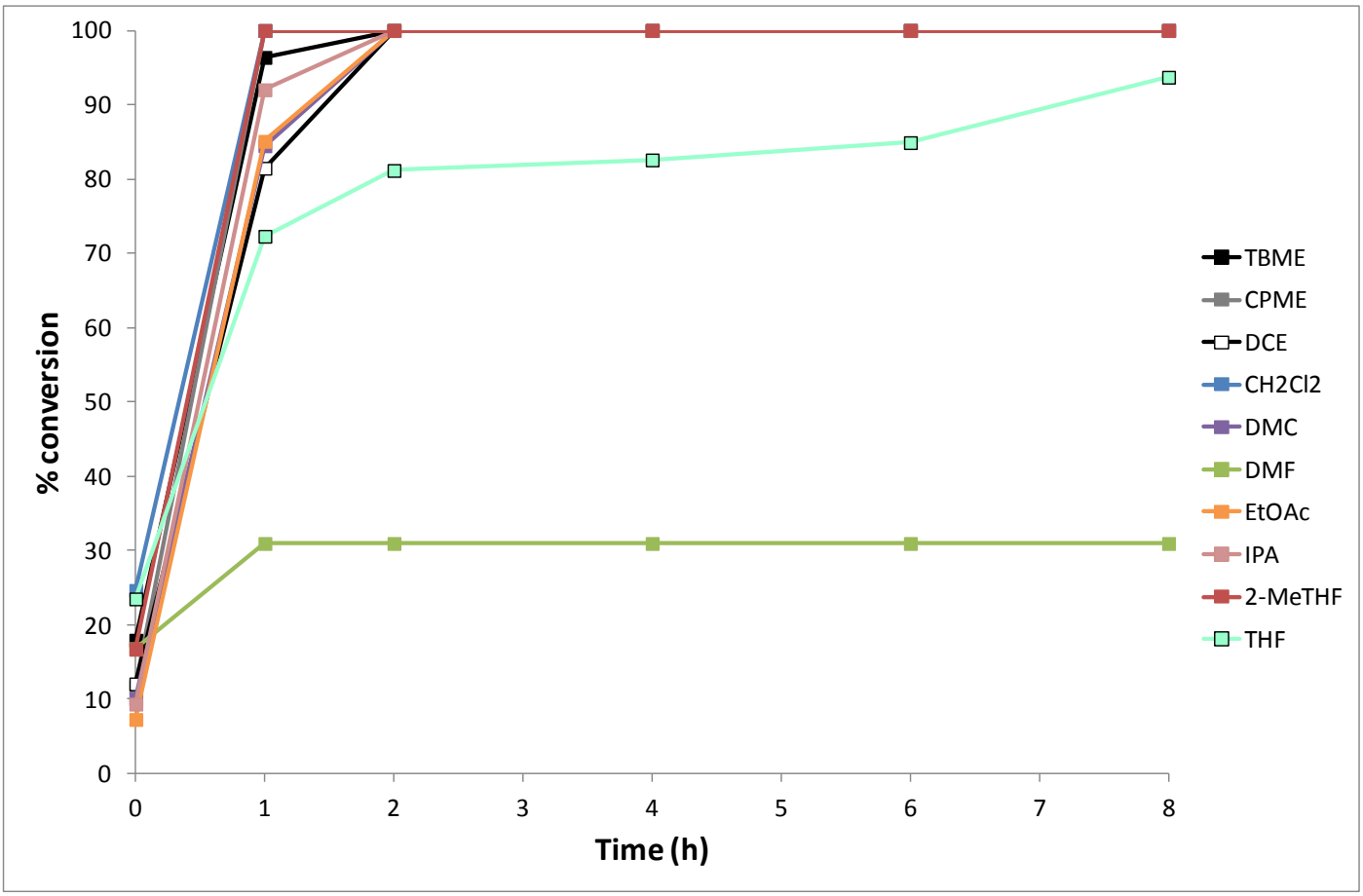
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	14.4	18.7	28.3	36.9	33.8	38.6	40.6	25.0	38.5	29.6
1	25.7	29.7	78.4	49.8	46.7	66.0	56.9	38.4	61.5	46.6
2	40.5	56.2	100.0	71.6	87.8	100.0	83.0	60.1	82.8	79.2
4	78.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
8	100.0	100.0	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	100.0	100.0

Reaction 10: Sodium Cyanoborohydride



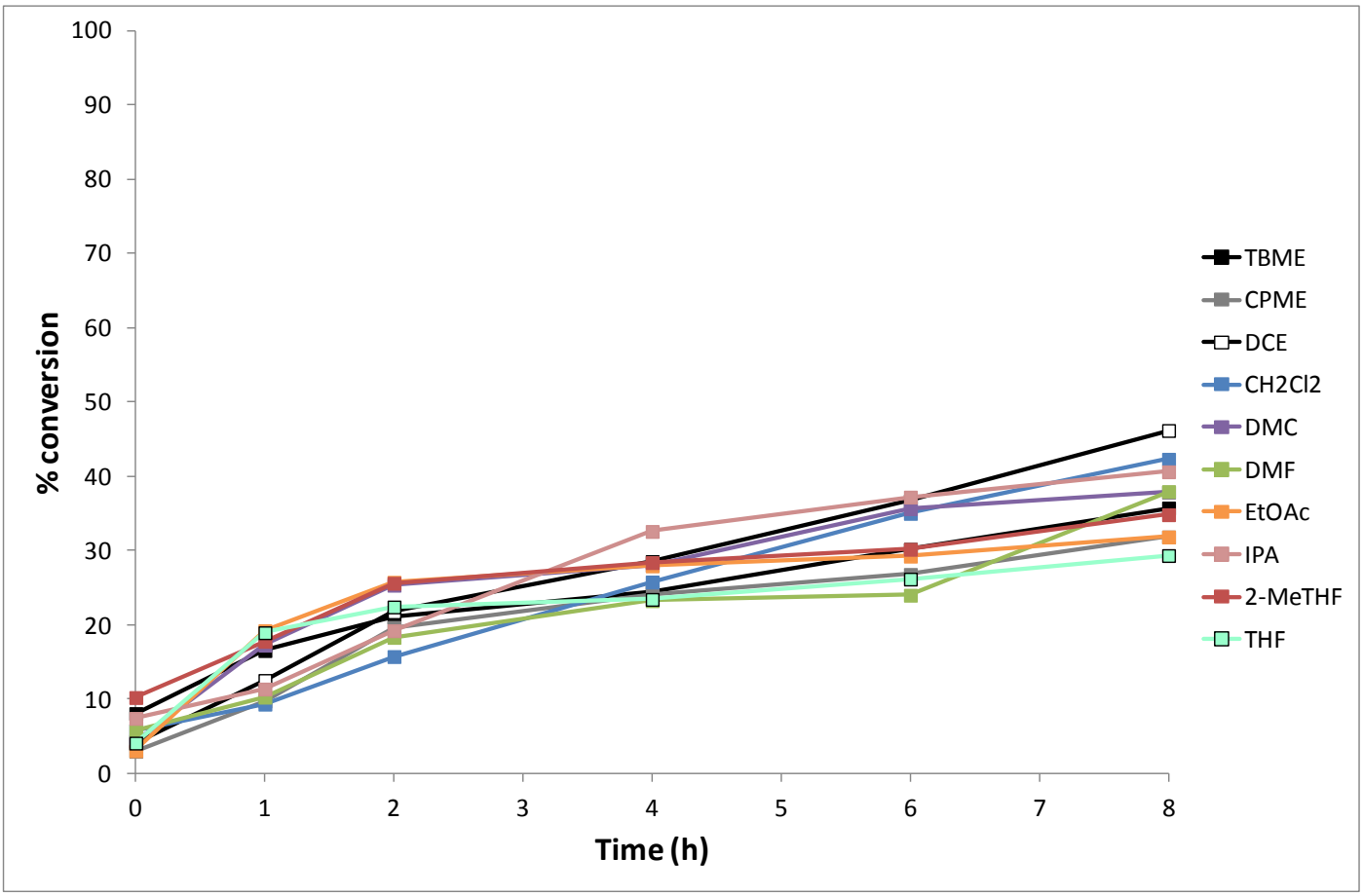
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	4.8	5.8	6.8	9.9	4.4	2.1	5.1	8.6	7.4	6.6
1	30.4	35.0	69.7	89.0	46.8	48.2	43.3	40.3	52.4	38.9
2	57.1	62.3	100.0	100.0	52.6	81.2	100.0	57.6	100.0	100.0
4	92.5	73.0	100.0	100.0	100.0	100.0	100.0	82.3	100.0	100.0
6	100.0	90.7	100.0	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	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Reaction 11: Sodium Triacetoxyborohydride



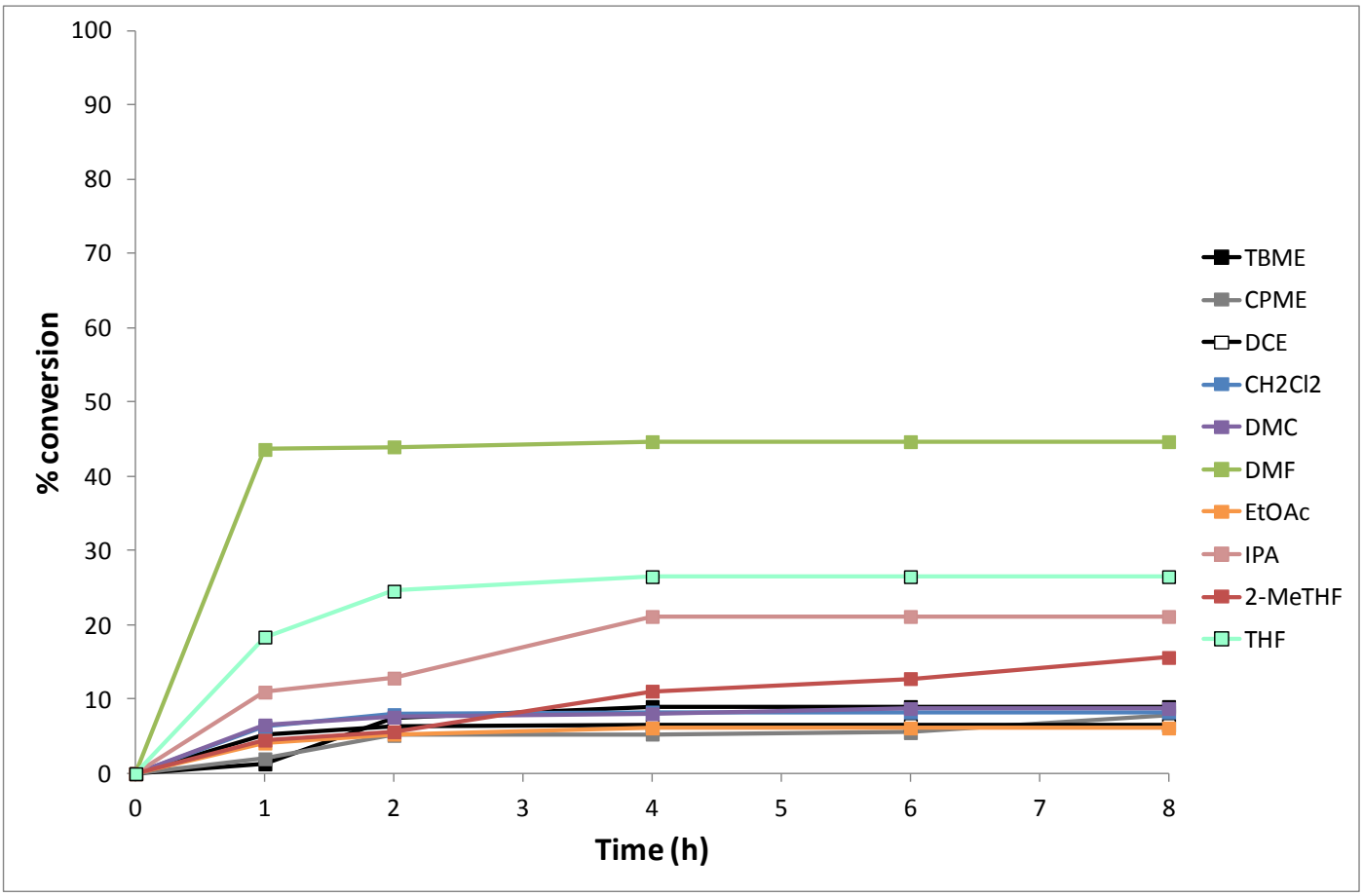
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	18.0	11.7	12.1	24.7	10.1	16.8	7.3	9.4	16.7	23.5
1	96.4	100.0	81.5	100.0	84.5	31.0	85.1	92.0	100.0	72.3
2	100.0	100.0	100.0	100.0	100.0	31.0	100.0	100.0	100.0	81.2
4	100.0	100.0	100.0	100.0	100.0	31.0	100.0	100.0	100.0	82.6
6	100.0	100.0	100.0	100.0	100.0	31.0	100.0	100.0	100.0	84.9
8	100.0	100.0	100.0	100.0	100.0	31.0	100.0	100.0	100.0	93.7
24	100.0	100.0	100.0	100.0	100.0	31.0	100.0	100.0	100.0	100.0

Reaction 11: Picoline-borane Complex



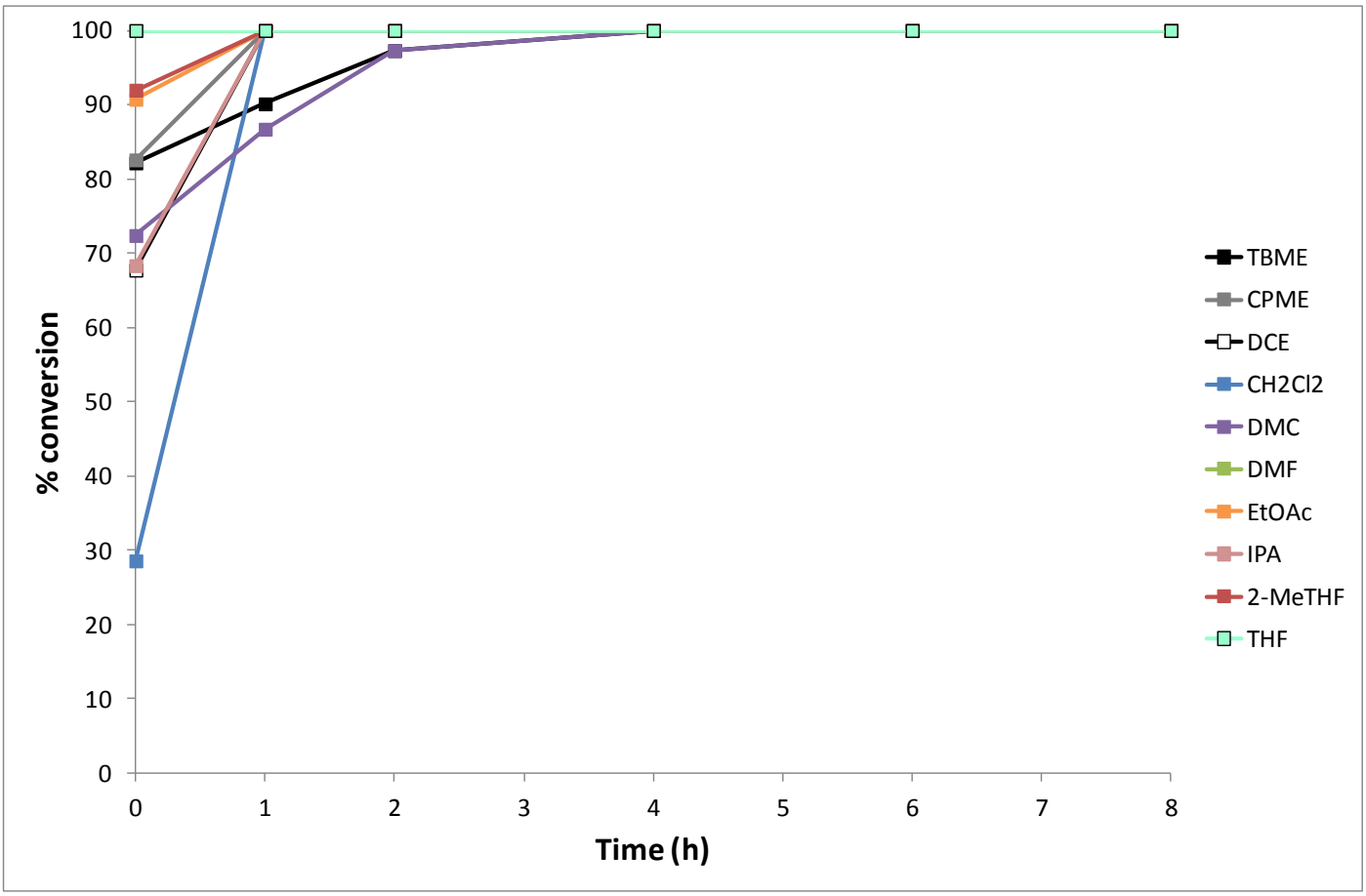
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	8.1	3.0	4.0	5.8	4.4	5.7	3.1	7.4	10.3	4.1
1	16.6	9.8	12.5	9.4	17.3	10.3	19.2	11.4	17.8	19.0
2	21.0	19.7	21.8	15.8	25.4	18.3	25.8	19.2	25.6	22.4
4	24.5	24.1	28.5	25.8	28.1	23.3	28.0	32.6	28.4	23.5
6	30.2	26.8	36.7	35.0	35.7	24.0	29.3	37.2	30.2	26.2
8	35.8	31.9	46.2	42.3	37.9	38.0	31.9	40.6	34.9	29.4
24	40.8	38.4	61.1	63.5	44.7	63.9	45.3	40.6	43.2	36.9

Reaction 11: Sodium Cyanoborohydride



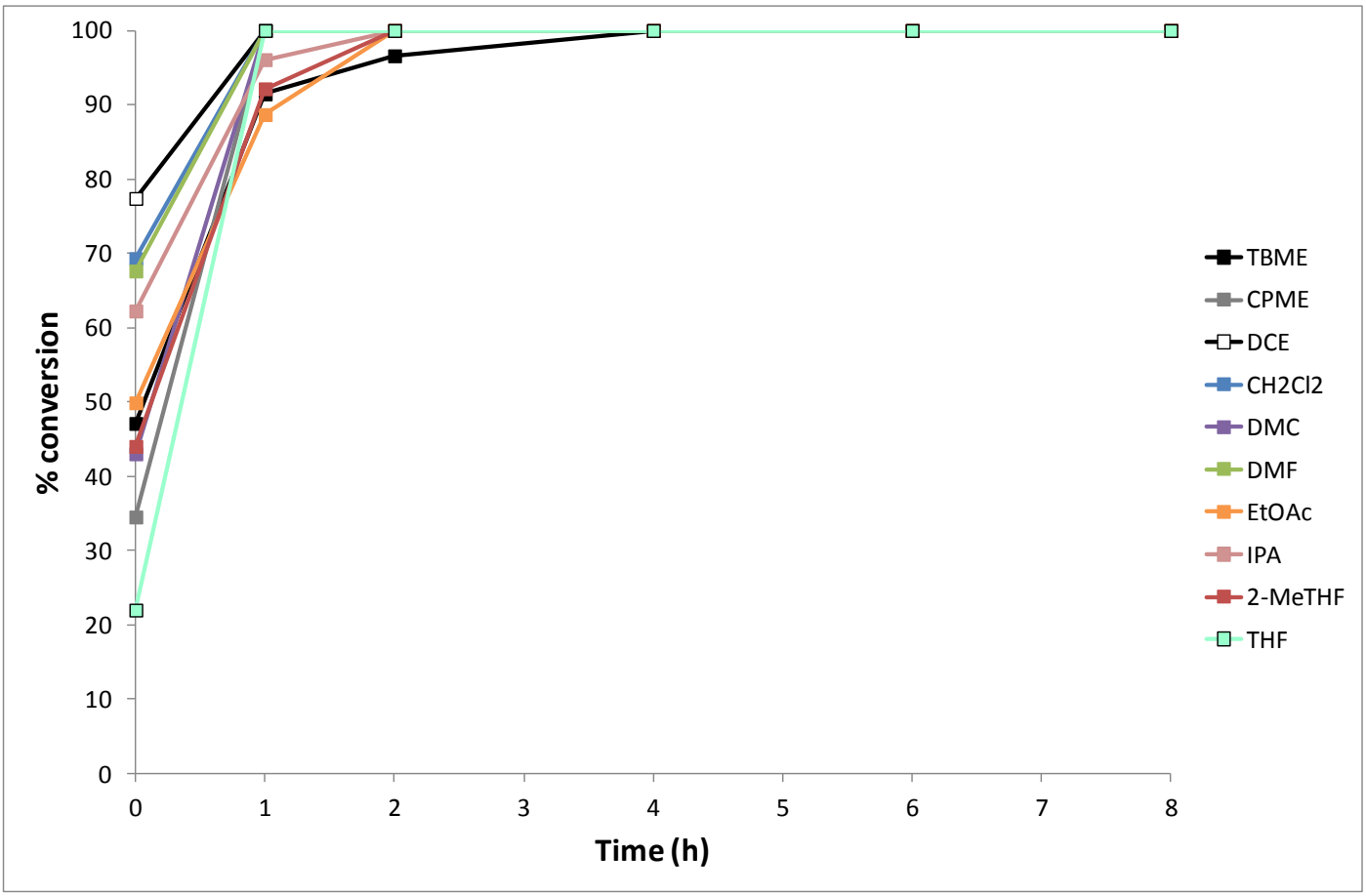
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	1.3	2.0	5.2	6.3	6.6	43.6	4.1	11.0	4.5	18.4
2	7.5	5.2	6.3	8.0	7.6	44.0	5.3	12.9	5.6	24.6
4	9.0	5.3	6.5	8.3	8.1	44.7	6.2	21.2	11.1	26.5
6	9.0	5.5	6.5	8.3	8.8	44.7	6.2	21.2	12.8	26.5
8	9.0	7.9	6.5	8.3	8.8	44.7	6.2	21.2	15.6	26.5
24	9.0	10.5	6.5	8.3	8.8	44.7	6.2	21.2	40.5	26.5

Reaction 12: Sodium Triacetoxyborohydride



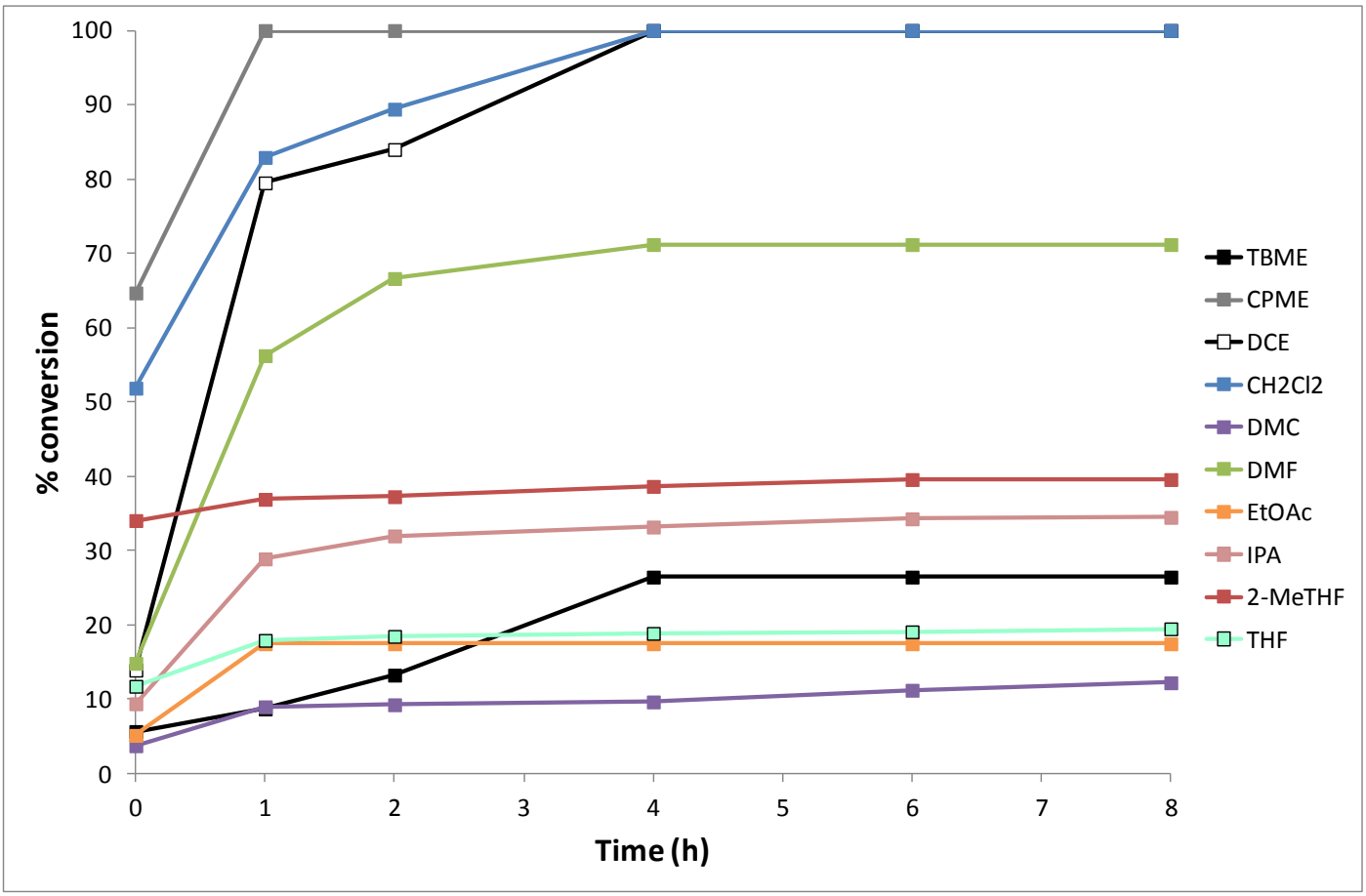
Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	82.2	82.6	67.7	28.6	72.4	100.0	90.7	68.3	92.0	100.0
1	90.1	100.0	100.0	100.0	86.7	100.0	100.0	100.0	100.0	100.0
2	97.3	100.0	100.0	100.0	97.3	100.0	100.0	100.0	100.0	100.0
4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
6	100.0	100.0	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	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Reaction 12: Picoline-borane Complex



Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	47.1	34.5	77.4	69.3	43.0	67.6	49.9	62.3	44.0	22.0
1	91.5	100.0	100.0	100.0	100.0	100.0	88.7	96.1	92.2	100.0
2	96.6	100.0	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	100.0	100.0
6	100.0	100.0	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	100.0	100.0
24	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

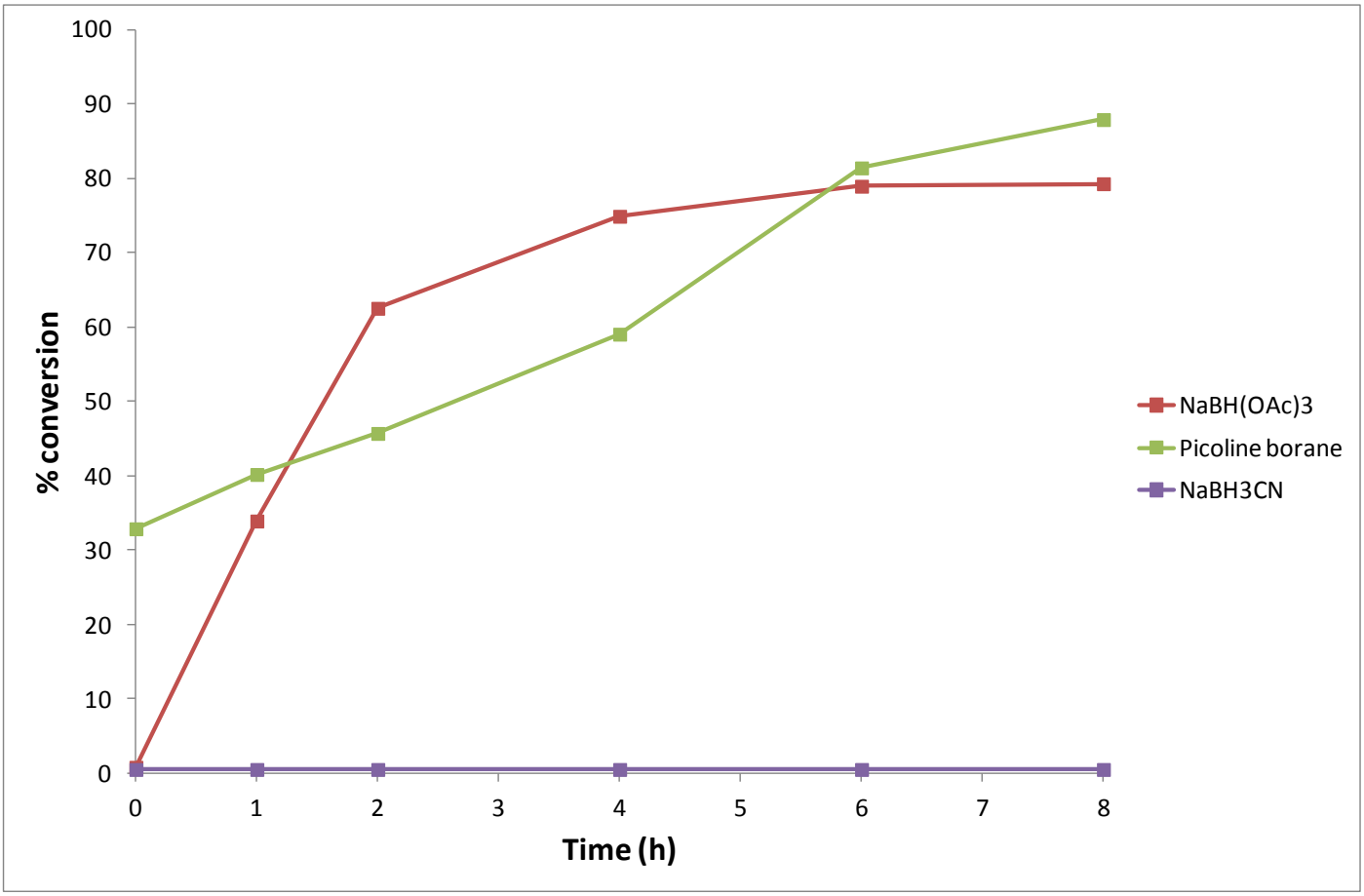
Reaction 12: Sodium Cyanoborohydride



Time (h) / Solvent	TBME	CPME	DCE	CH_2Cl_2	DMC	DMF	EtOAc	IPA	2-MeTHF	THF
0	5.7	64.7	13.9	51.9	3.8	14.9	5.2	9.4	34.1	11.8
1	8.7	100.0	79.5	82.9	9.0	56.3	17.5	28.9	36.9	17.9
2	13.3	100.0	84.0	89.4	9.3	66.6	17.5	32.0	37.3	18.5
4	26.5	100.0	100.0	100.0	9.7	71.2	17.5	33.2	38.7	18.9
6	26.5	100.0	100.0	100.0	11.2	71.2	17.5	34.3	39.6	19.1
8	26.5	100.0	100.0	100.0	12.2	71.2	17.5	34.5	39.6	19.5
24	26.5	100.0	100.0	100.0	12.7	71.2	17.5	37.1	39.6	20.4

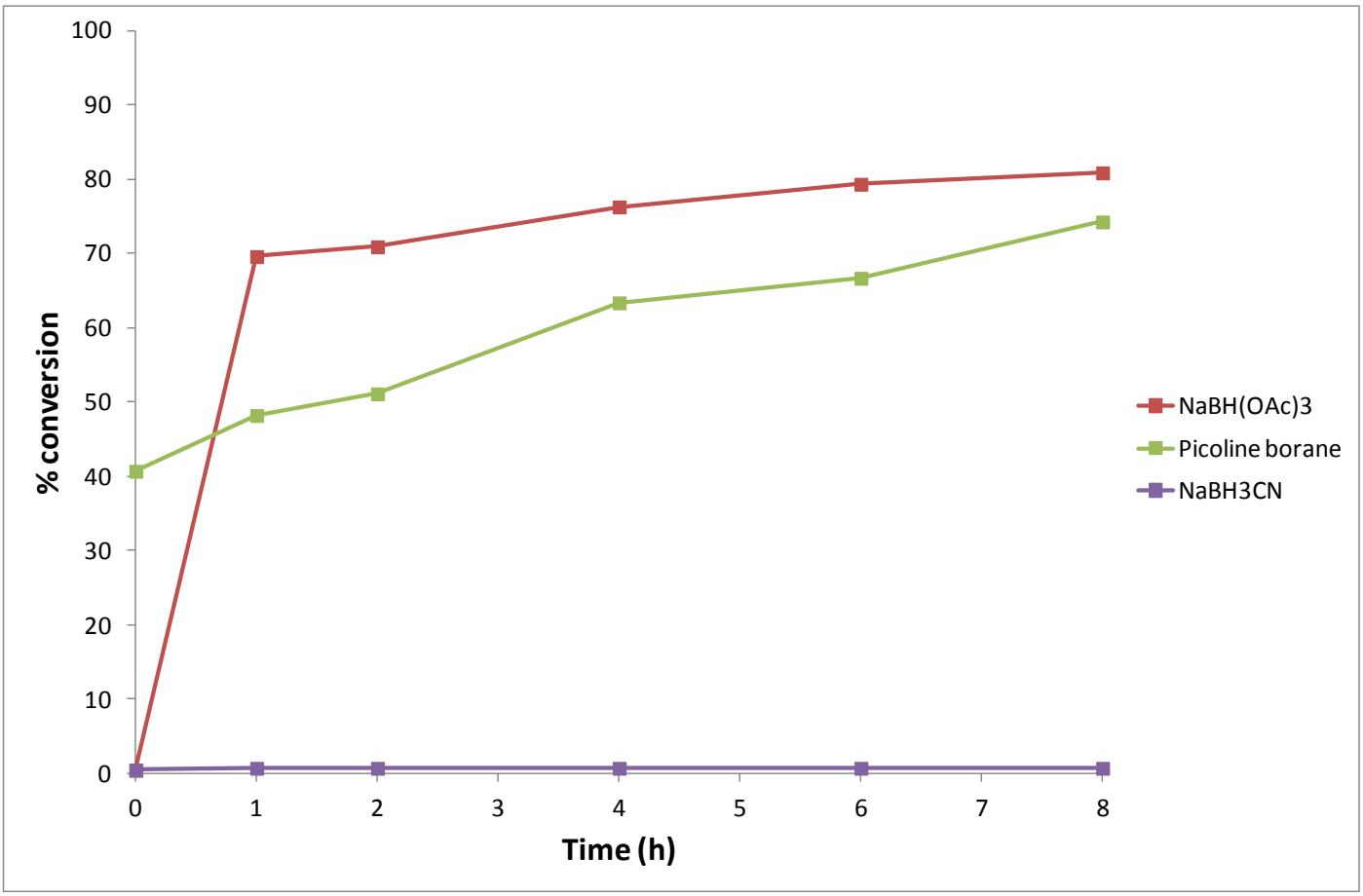
3.2 Conversion vs. Time Data for Reactions 1-12 Using the Range of Reducing Agents in a Specific Solvent

Reaction 1: TBME



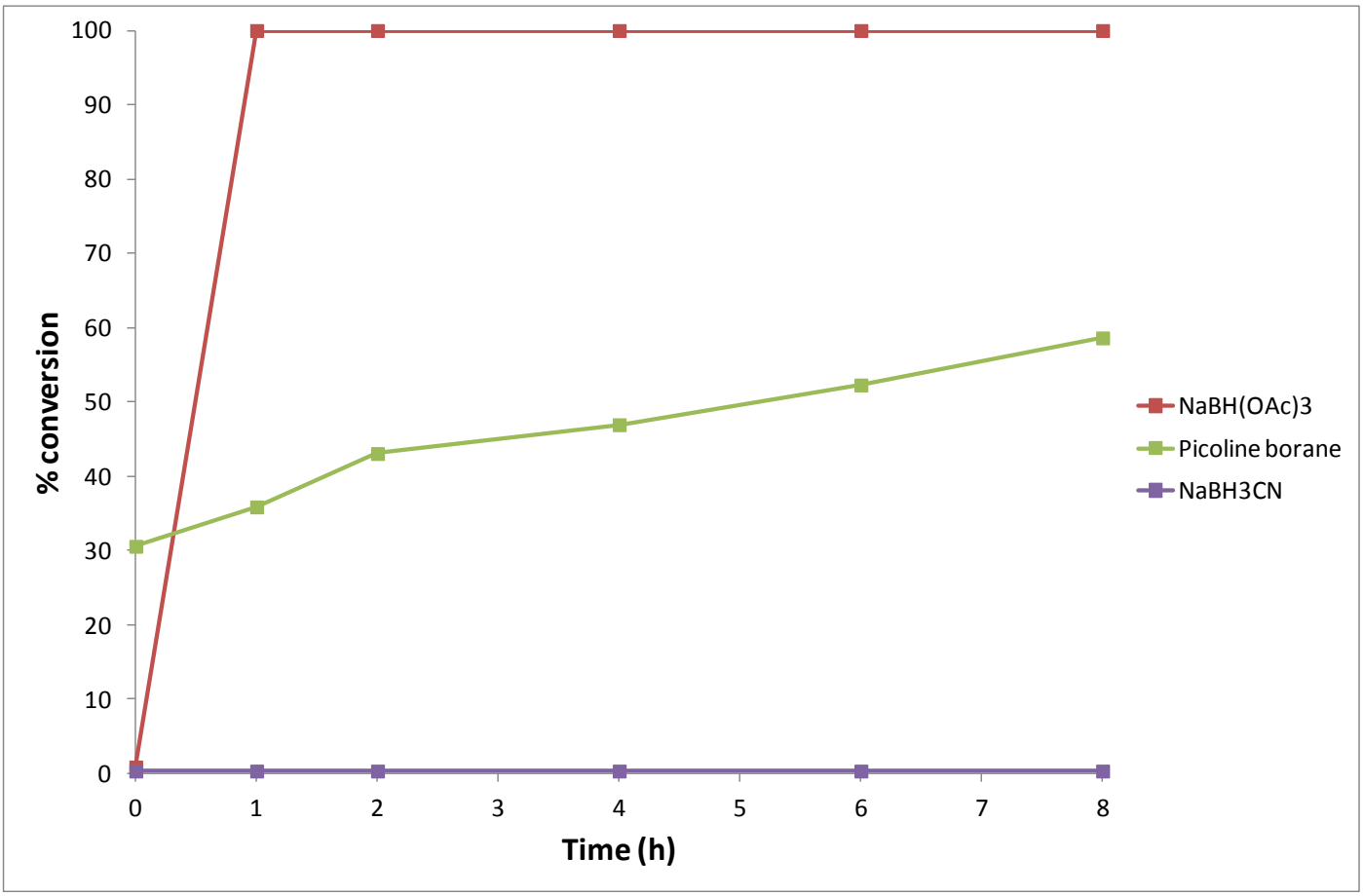
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.8	32.9	0.5
1	33.9	40.2	0.5
2	62.5	45.7	0.5
4	74.9	59.1	0.5
6	78.9	81.4	0.5
8	79.3	87.9	0.5
24	84.5	89.7	0.5

Reaction 1: CPME



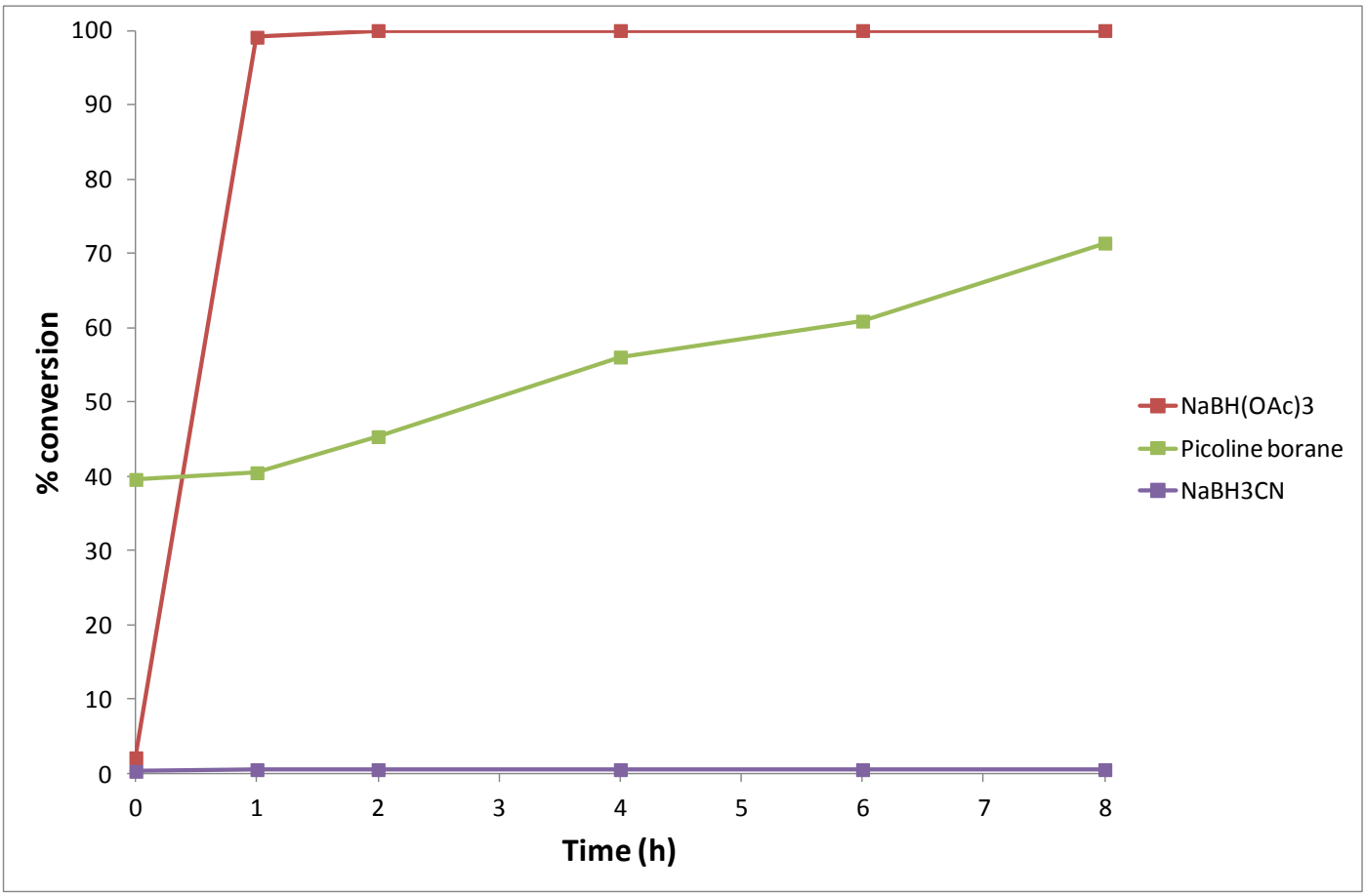
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.5	40.7	0.5
1	69.6	48.2	0.7
2	70.9	51.1	0.7
4	76.3	63.4	0.7
6	79.3	66.7	0.7
8	80.8	74.2	0.7
24	85.6	80.2	0.7

Reaction 1: DCE



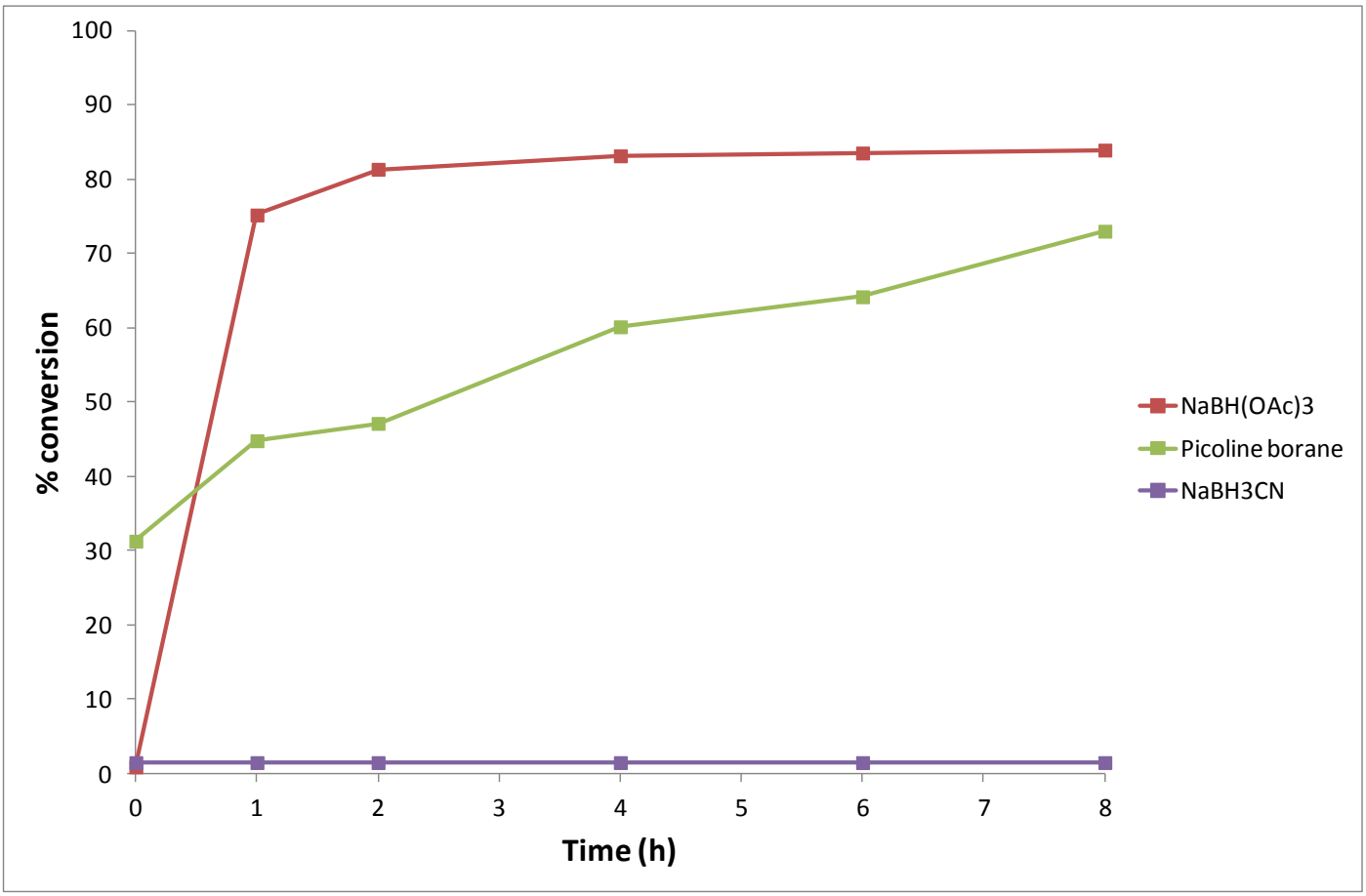
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.9	30.6	0.4
1	100.0	35.9	0.4
2	100.0	43.1	0.4
4	100.0	47.0	0.4
6	100.0	52.3	0.4
8	100.0	58.6	0.4
24	100.0	65.0	0.4

Reaction 1: CH_2Cl_2



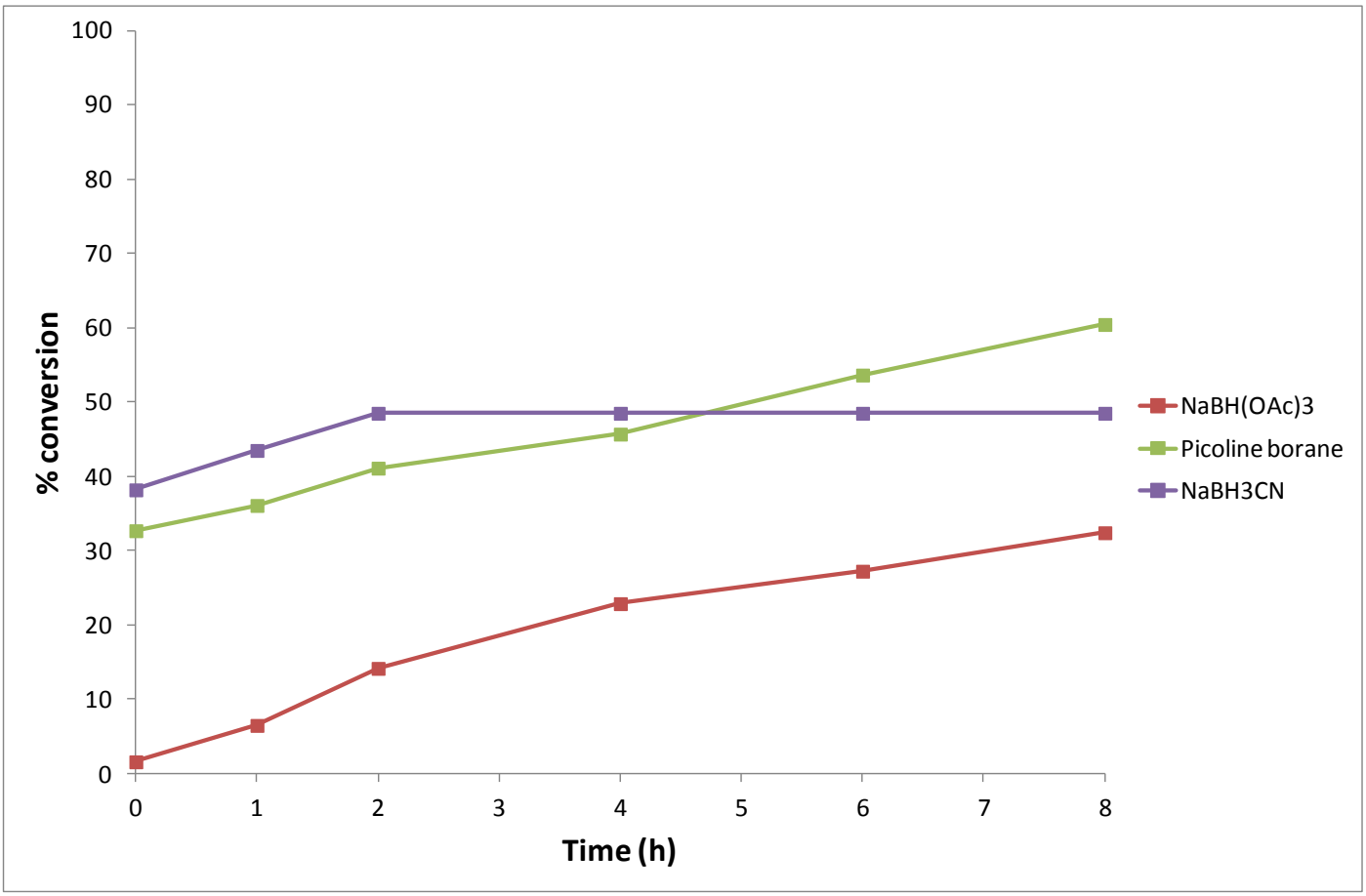
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	2.1	39.6	0.3
1	99.1	40.5	0.6
2	100.0	45.4	0.6
4	100.0	56.1	0.6
6	100.0	60.9	0.6
8	100.0	71.4	0.6
24	100.0	71.4	0.6

Reaction 1: DMC



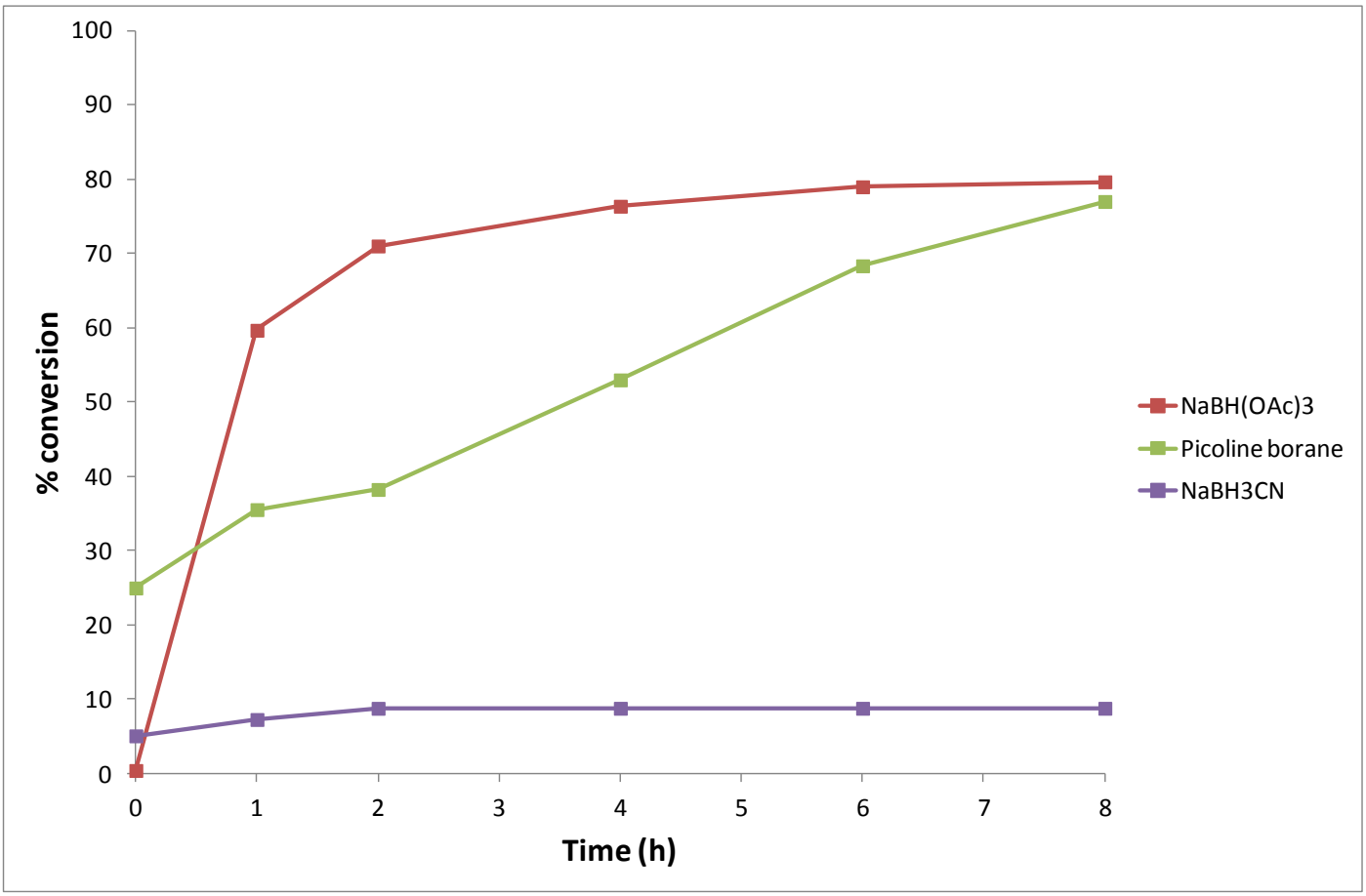
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.9	31.3	1.5
1	75.2	44.8	1.5
2	81.3	47.1	1.5
4	83.1	60.1	1.5
6	83.5	64.2	1.5
8	83.9	73.0	1.5
24	85.3	79.2	1.5

Reaction 1: DMF



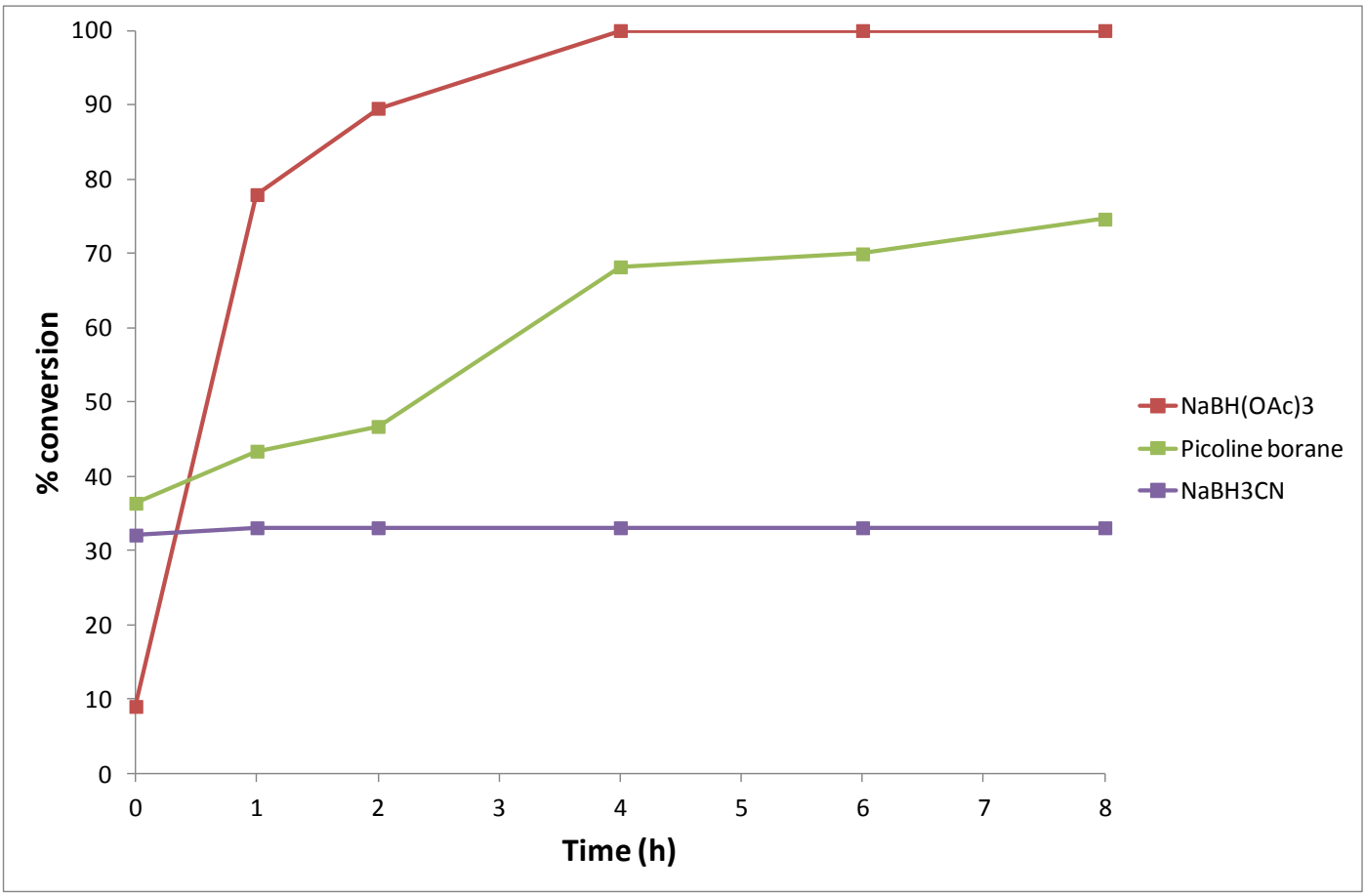
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	1.6	32.7	38.2
1	6.5	36.1	43.5
2	14.2	41.1	48.5
4	22.9	45.7	48.5
6	27.3	53.6	48.5
8	32.4	60.4	48.5
24	39.3	77.1	48.5

Reaction 1: EtOAc



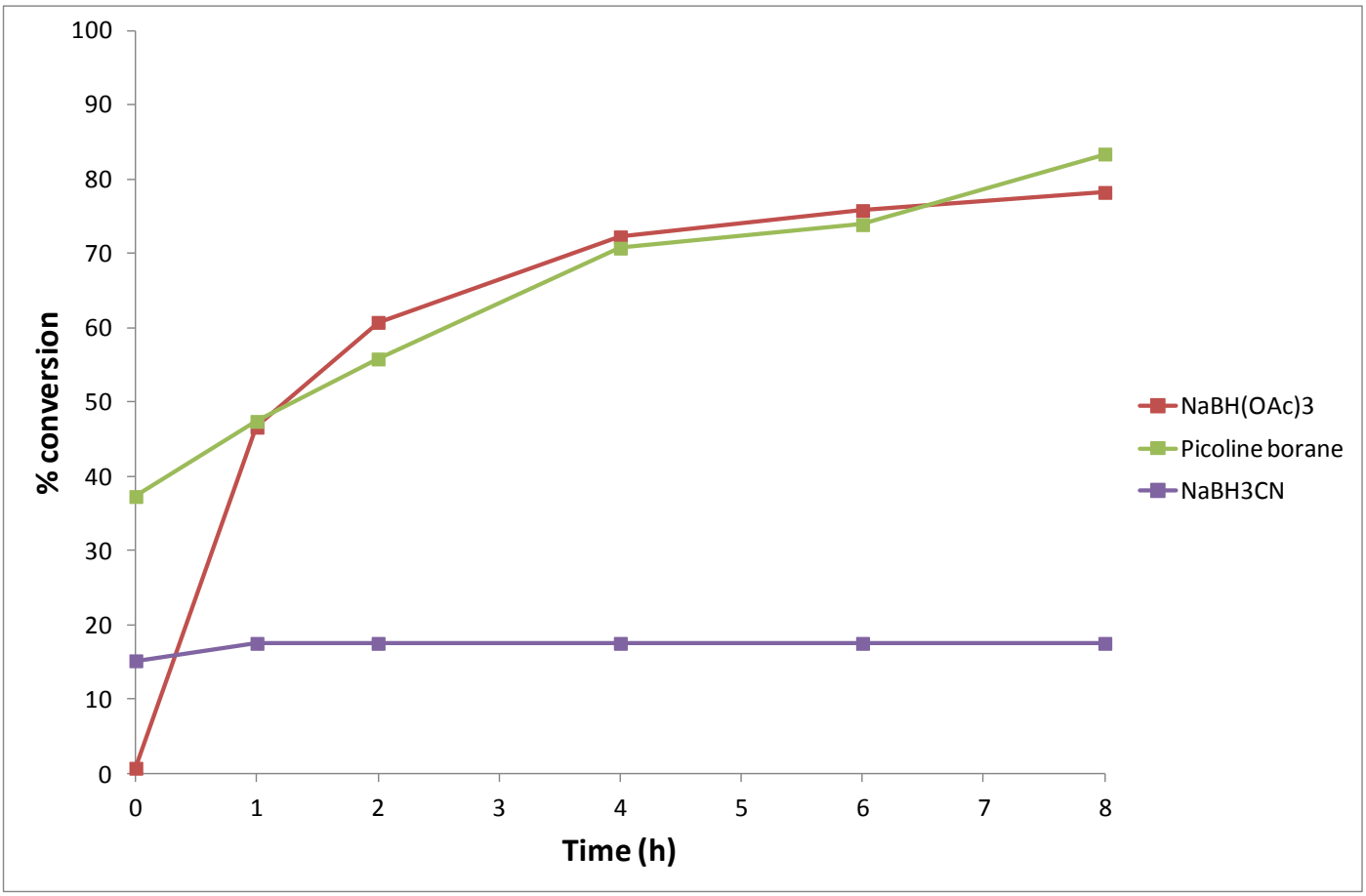
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.4	25.0	5.1
1	59.7	35.5	7.3
2	71.0	38.3	8.8
4	76.4	53.0	8.8
6	79.0	68.3	8.8
8	79.6	77.0	8.8
24	79.8	83.8	8.8

Reaction 1: IPA



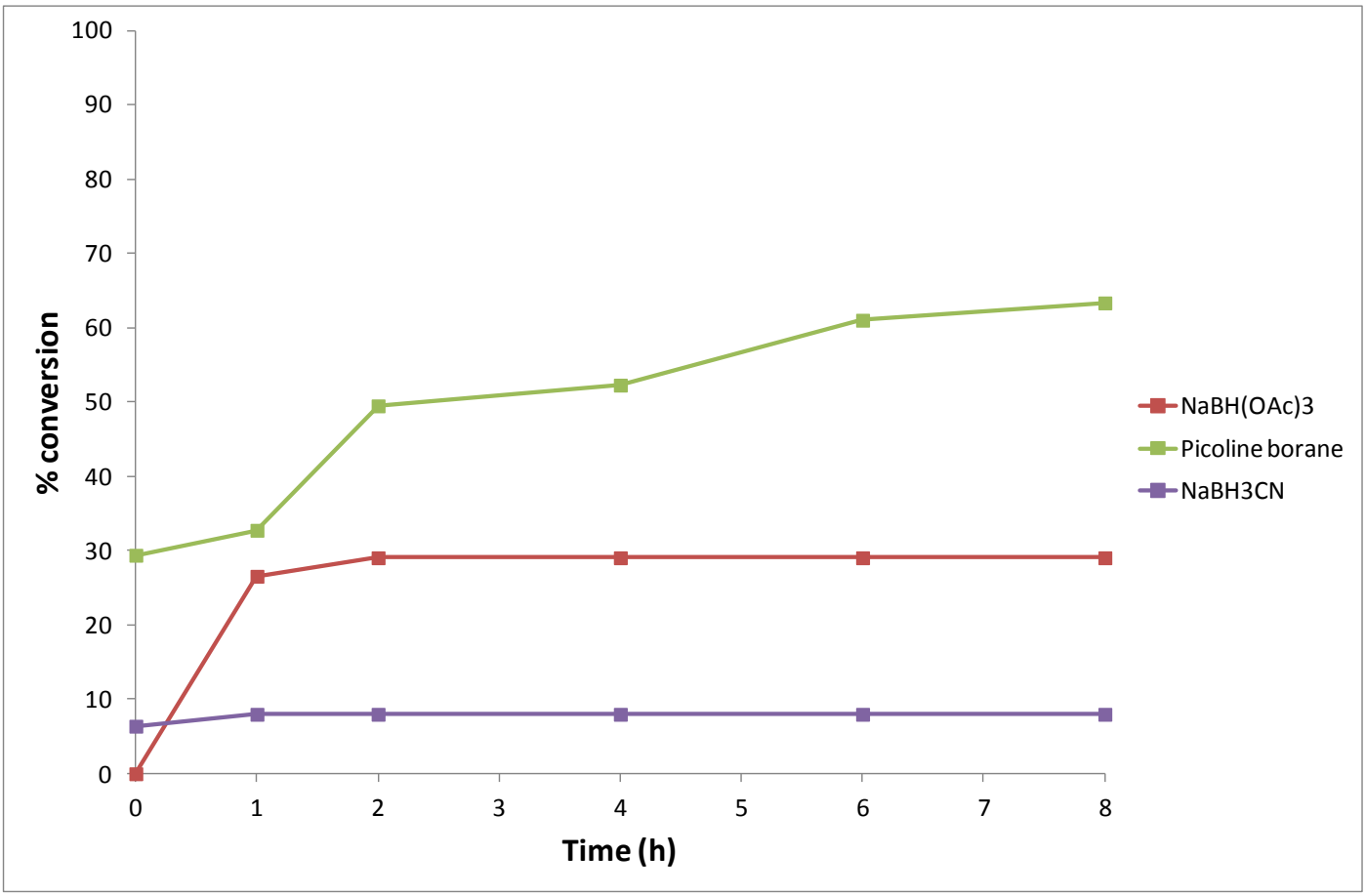
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	9.1	36.4	32.1
1	77.9	43.4	33.1
2	89.5	46.7	33.1
4	100.0	68.2	33.1
6	100.0	70.0	33.1
8	100.0	74.6	33.1
24	100.0	74.6	33.1

Reaction 1: 2-MeTHF



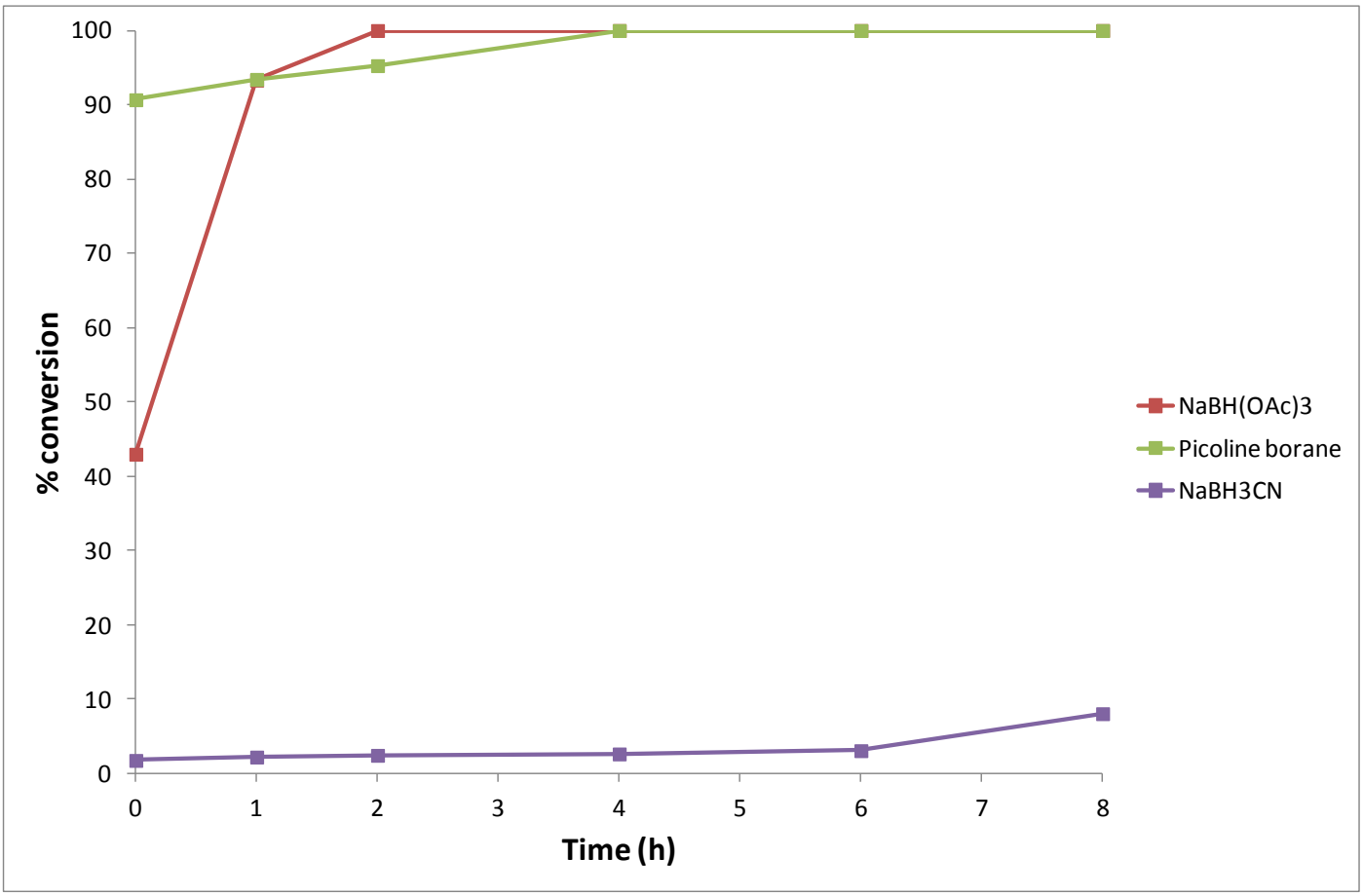
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.7	37.3	15.2
1	46.6	47.4	17.5
2	60.7	55.8	17.5
4	72.2	70.7	17.5
6	75.8	73.9	17.5
8	78.2	83.4	17.5
24	79.6	83.4	17.5

Reaction 1: THF



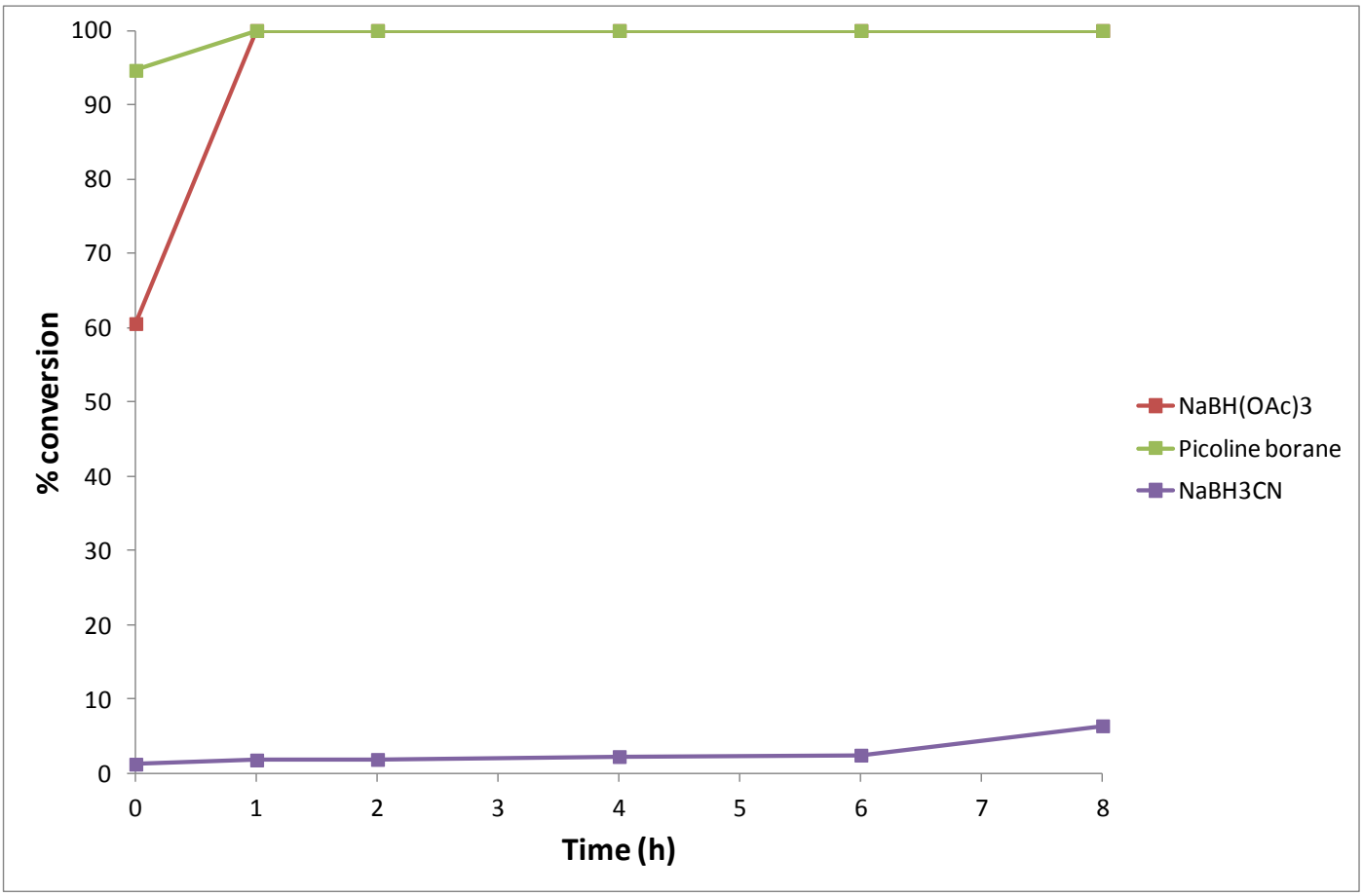
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	29.4	6.4
1	26.6	32.8	8.0
2	29.1	49.5	8.0
4	29.1	52.3	8.0
6	29.1	61.0	8.0
8	29.1	63.4	8.0
24	29.1	63.4	8.0

Reaction 2: TBME



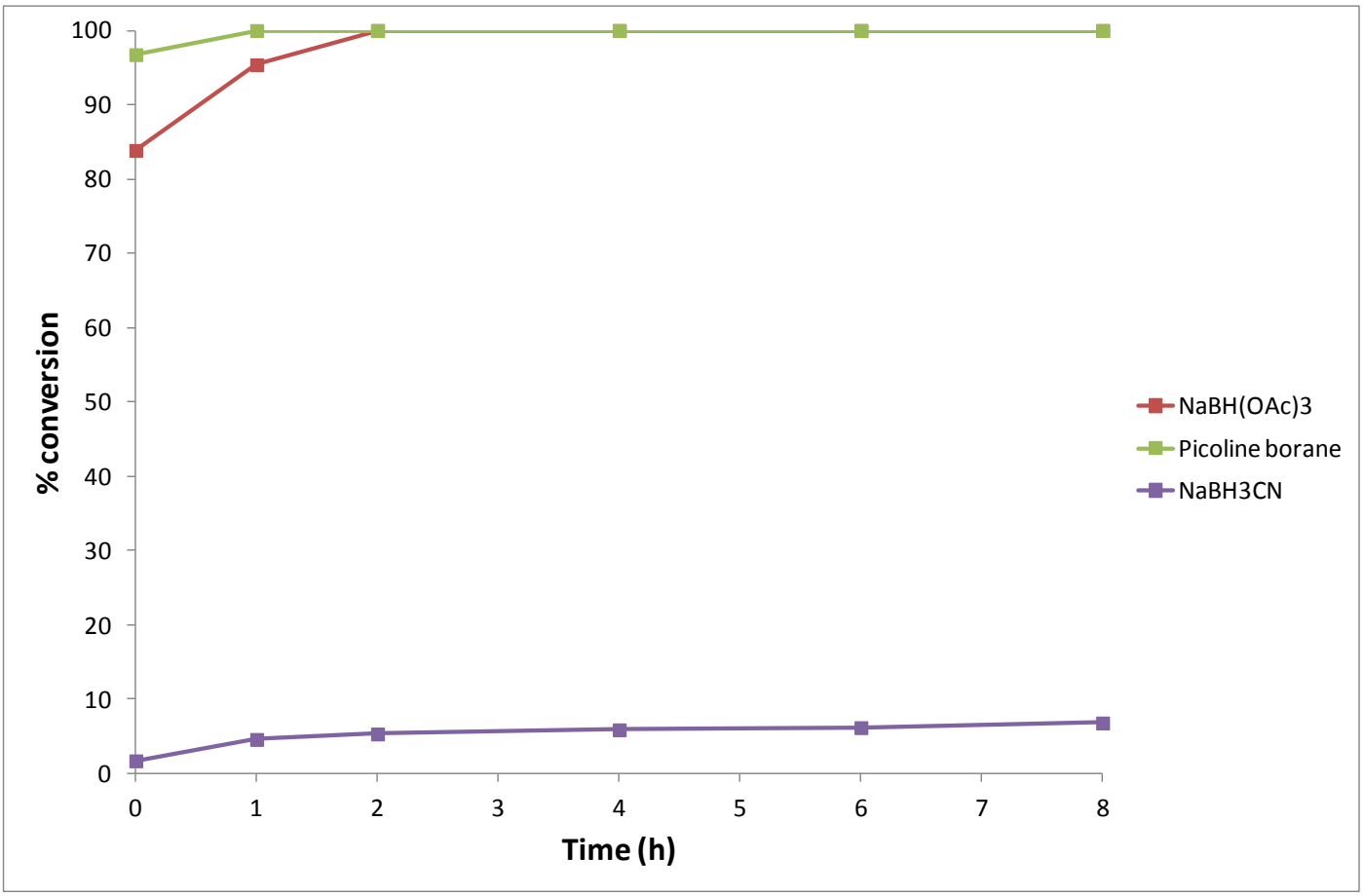
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	43.0	90.7	1.8
1	93.3	93.4	2.2
2	100.0	95.3	2.5
4	100.0	100.0	2.7
6	100.0	100.0	3.1
8	100.0	100.0	8.1
24	100.0	100.0	12.6

Reaction 2: CPME



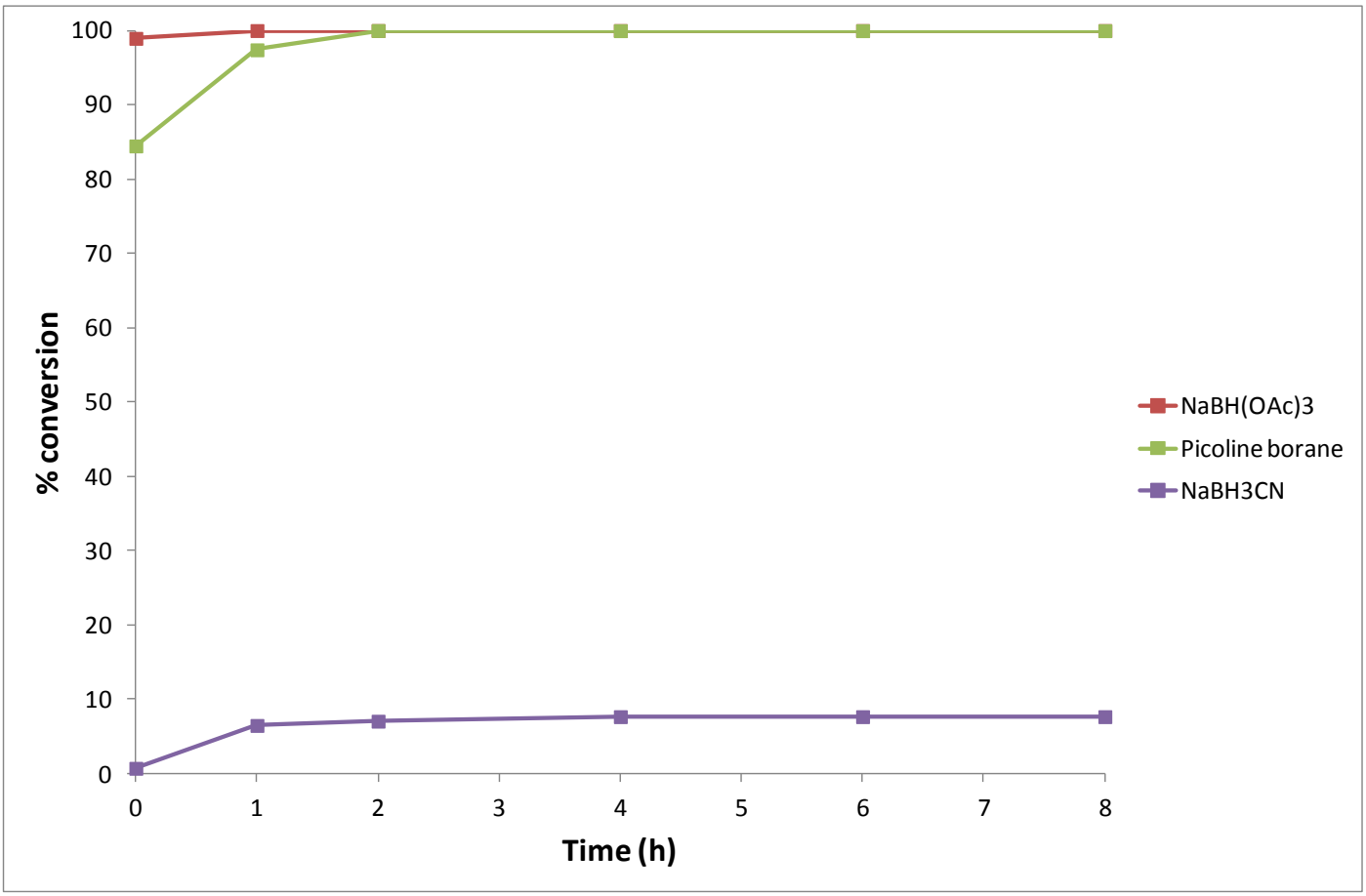
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	60.6	94.6	1.3
1	100.0	100.0	1.8
2	100.0	100.0	1.9
4	100.0	100.0	2.3
6	100.0	100.0	2.5
8	100.0	100.0	6.4
24	100.0	100.0	8.5

Reaction 2: DCE



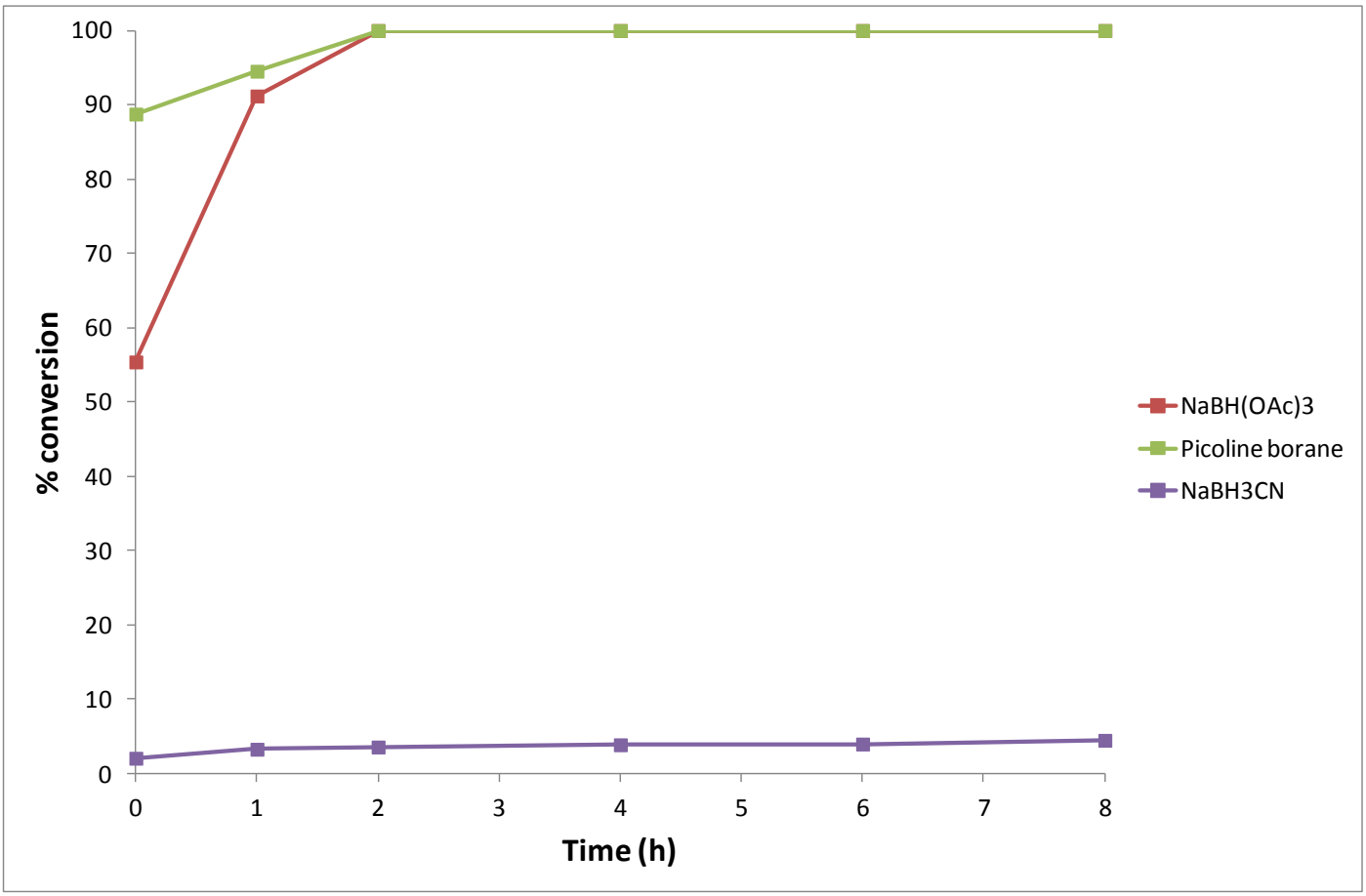
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	83.9	96.8	1.7
1	95.4	100.0	4.6
2	100.0	100.0	5.3
4	100.0	100.0	5.9
6	100.0	100.0	6.2
8	100.0	100.0	6.8
24	100.0	100.0	6.8

Reaction 2: CH_2Cl_2



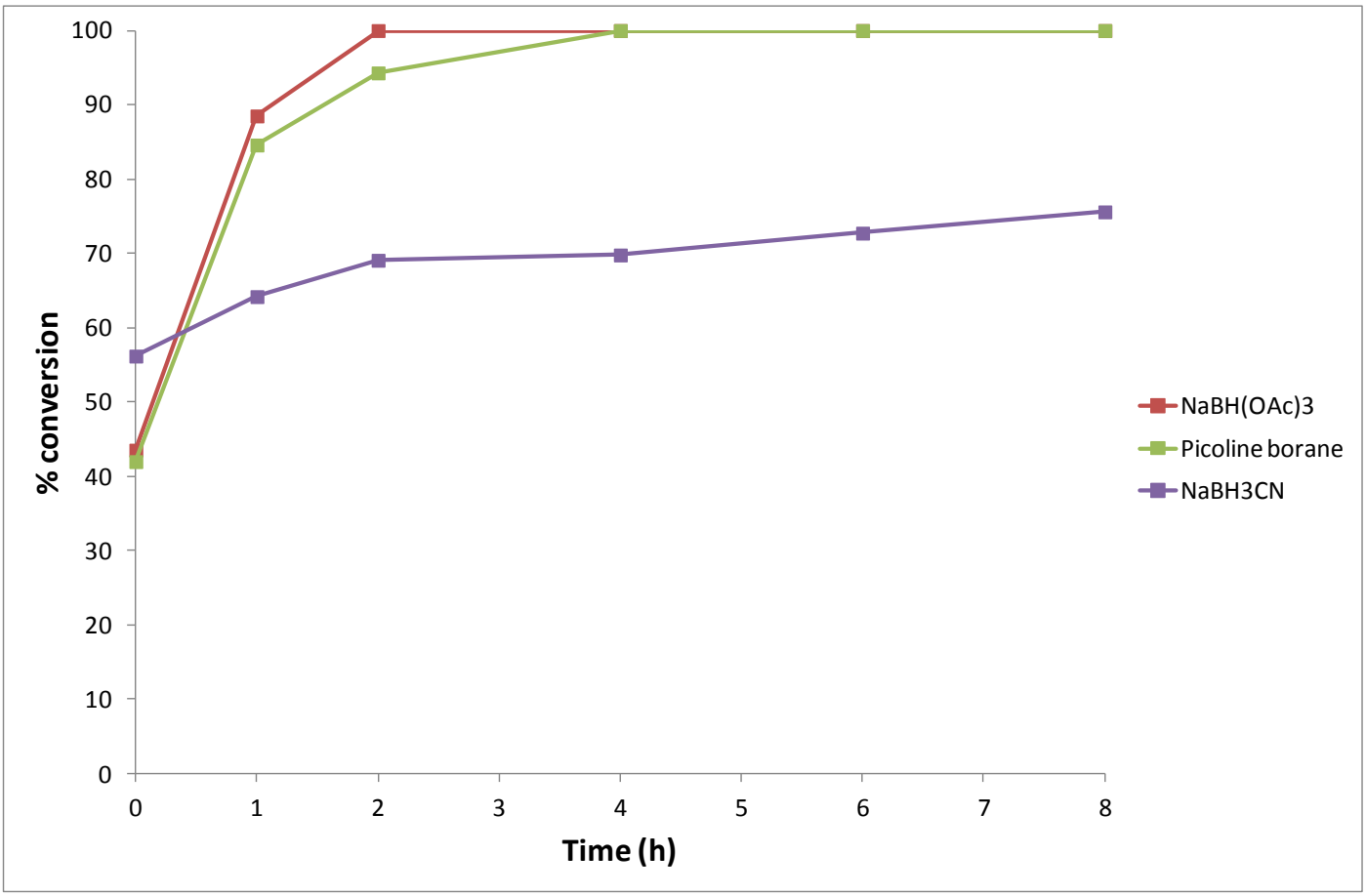
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	98.9	84.5	0.7
1	100.0	97.4	6.5
2	100.0	100.0	7.1
4	100.0	100.0	7.7
6	100.0	100.0	7.7
8	100.0	100.0	7.7
24	100.0	100.0	7.7

Reaction 2: DMC



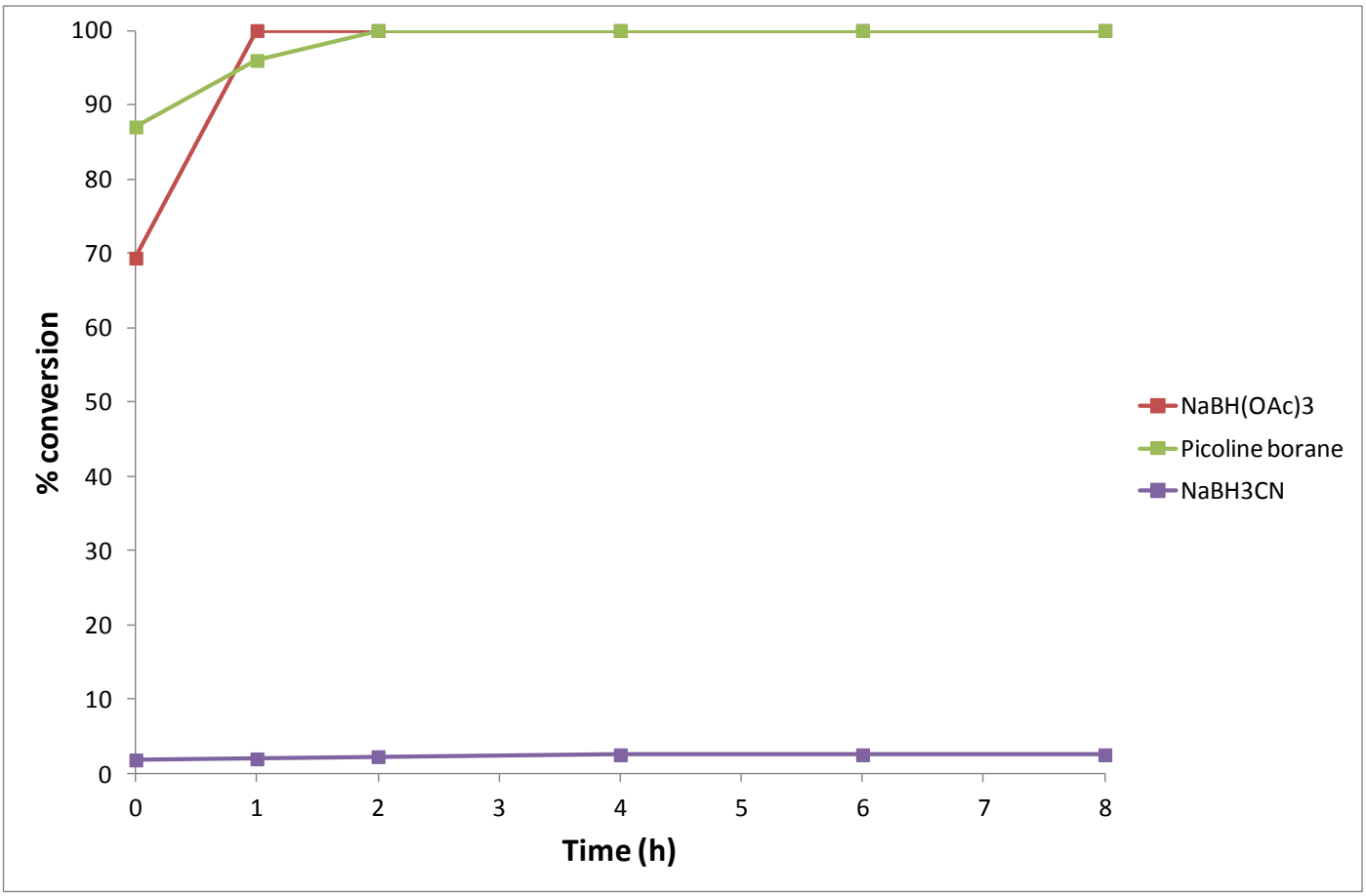
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	55.4	88.8	2.1
1	91.2	94.5	3.3
2	100.0	100.0	3.6
4	100.0	100.0	3.9
6	100.0	100.0	4.0
8	100.0	100.0	4.5
24	100.0	100.0	5.5

Reaction 2: DMF



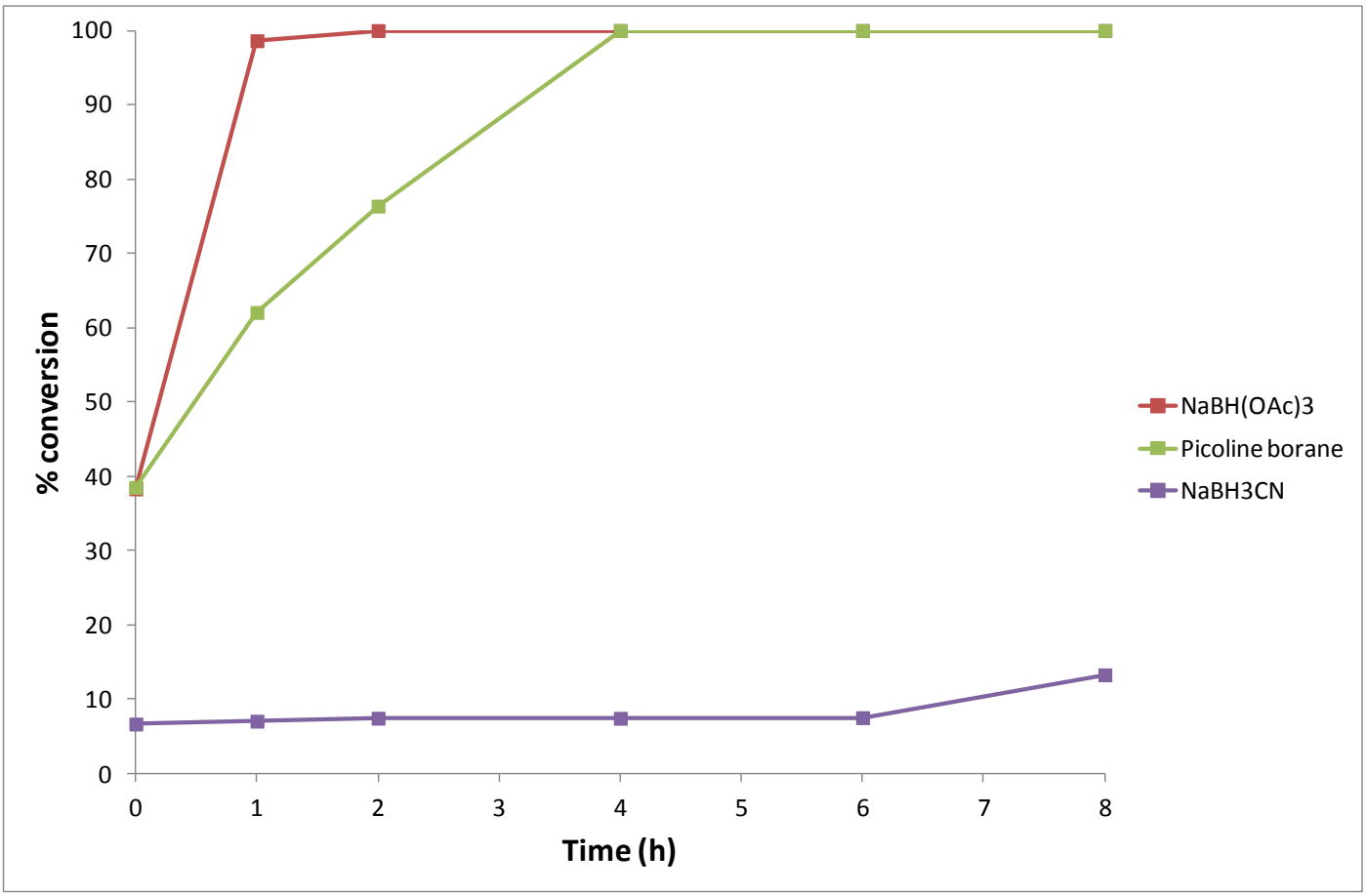
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	43.5	42.0	56.2
1	88.5	84.6	64.2
2	100.0	94.3	69.1
4	100.0	100.0	69.8
6	100.0	100.0	72.7
8	100.0	100.0	75.6
24	100.0	100.0	100.0

Reaction 2: EtOAc



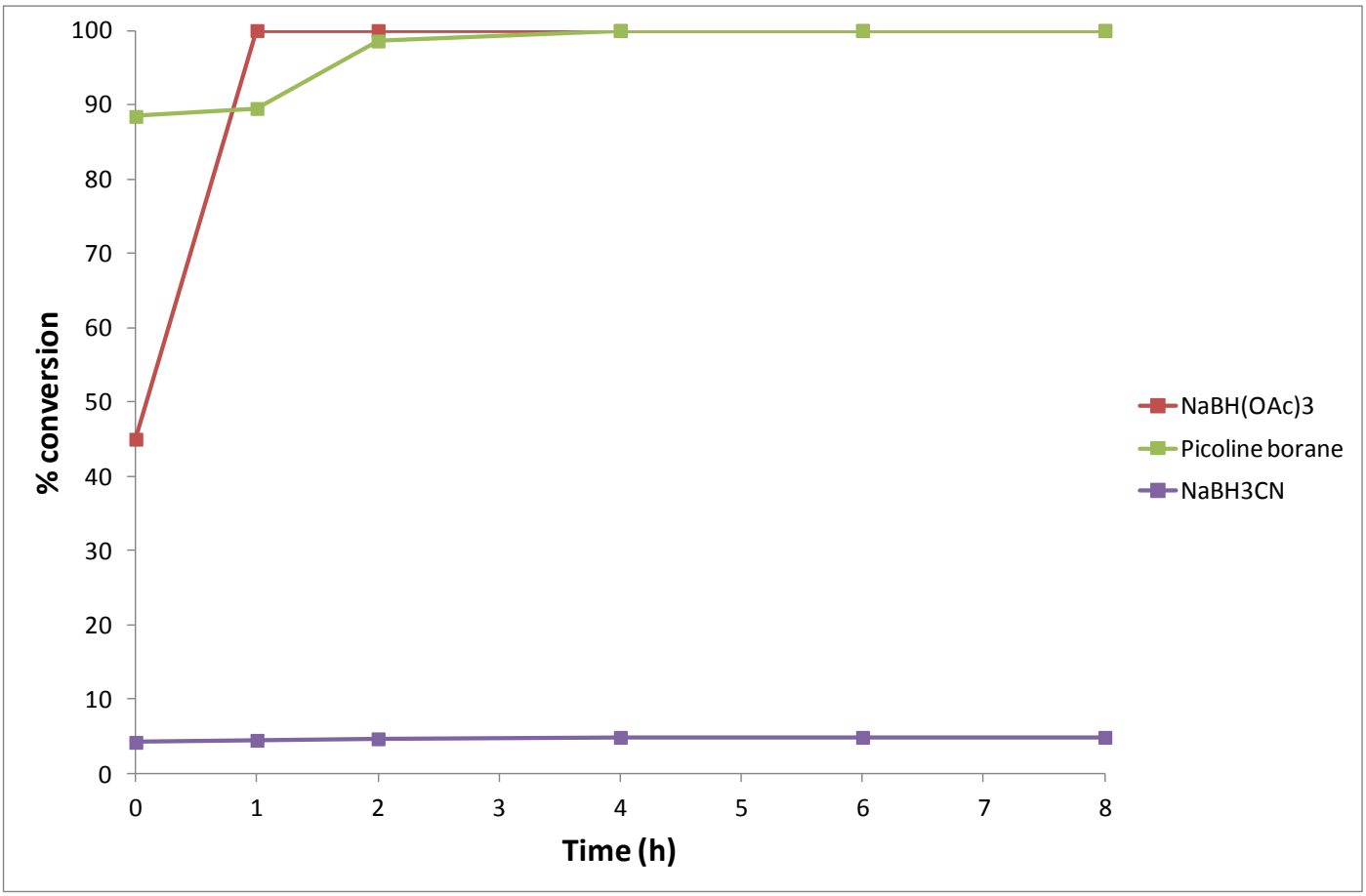
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	69.4	87.0	1.9
1	100.0	96.0	2.0
2	100.0	100.0	2.3
4	100.0	100.0	2.5
6	100.0	100.0	2.5
8	100.0	100.0	2.5
24	100.0	100.0	2.5

Reaction 2: IPA



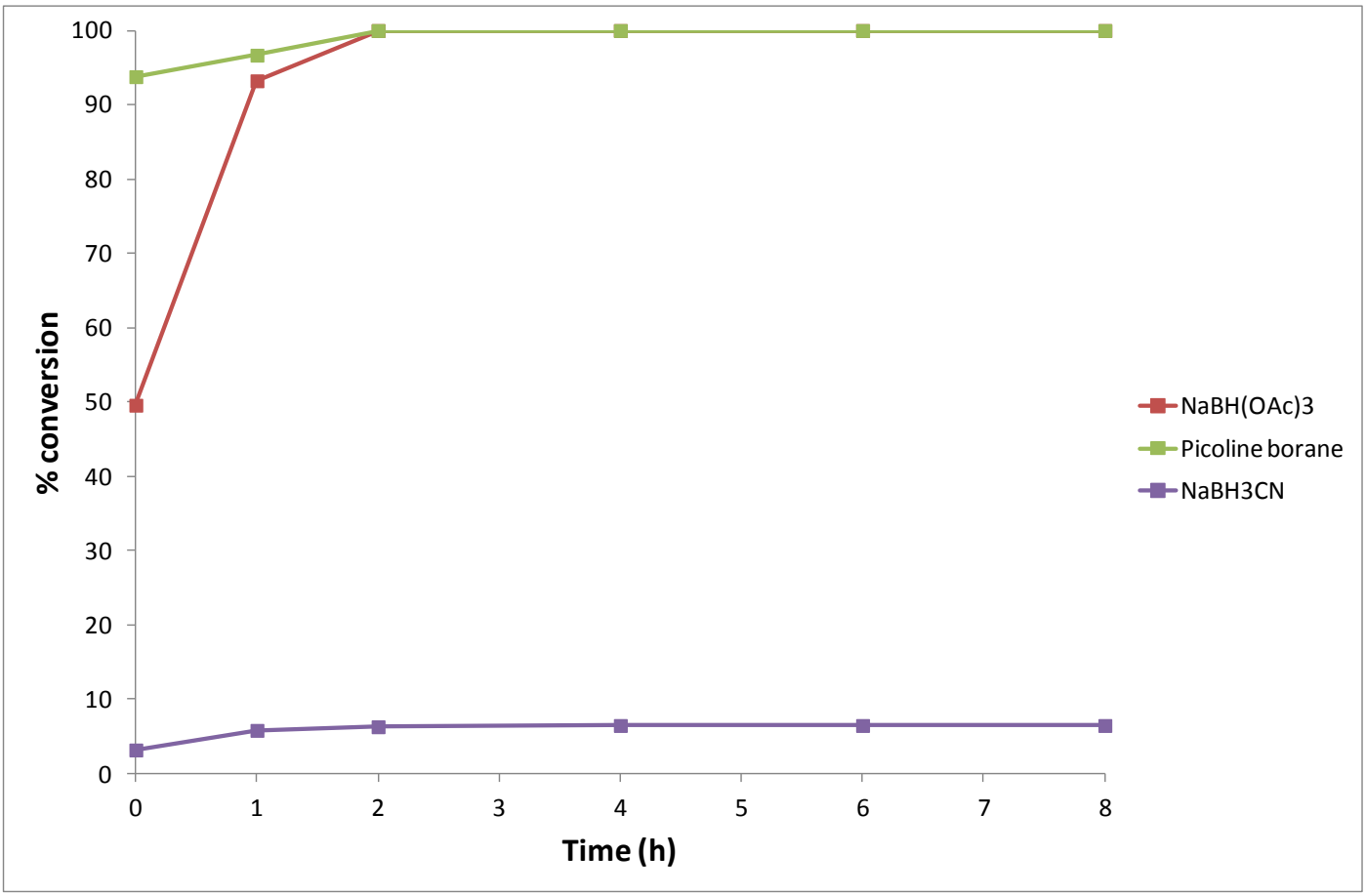
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	38.3	38.5	6.7
1	98.6	62.1	7.1
2	100.0	76.4	7.5
4	100.0	100.0	7.5
6	100.0	100.0	7.5
8	100.0	100.0	13.3
24	100.0	100.0	13.3

Reaction 2: 2-MeTHF



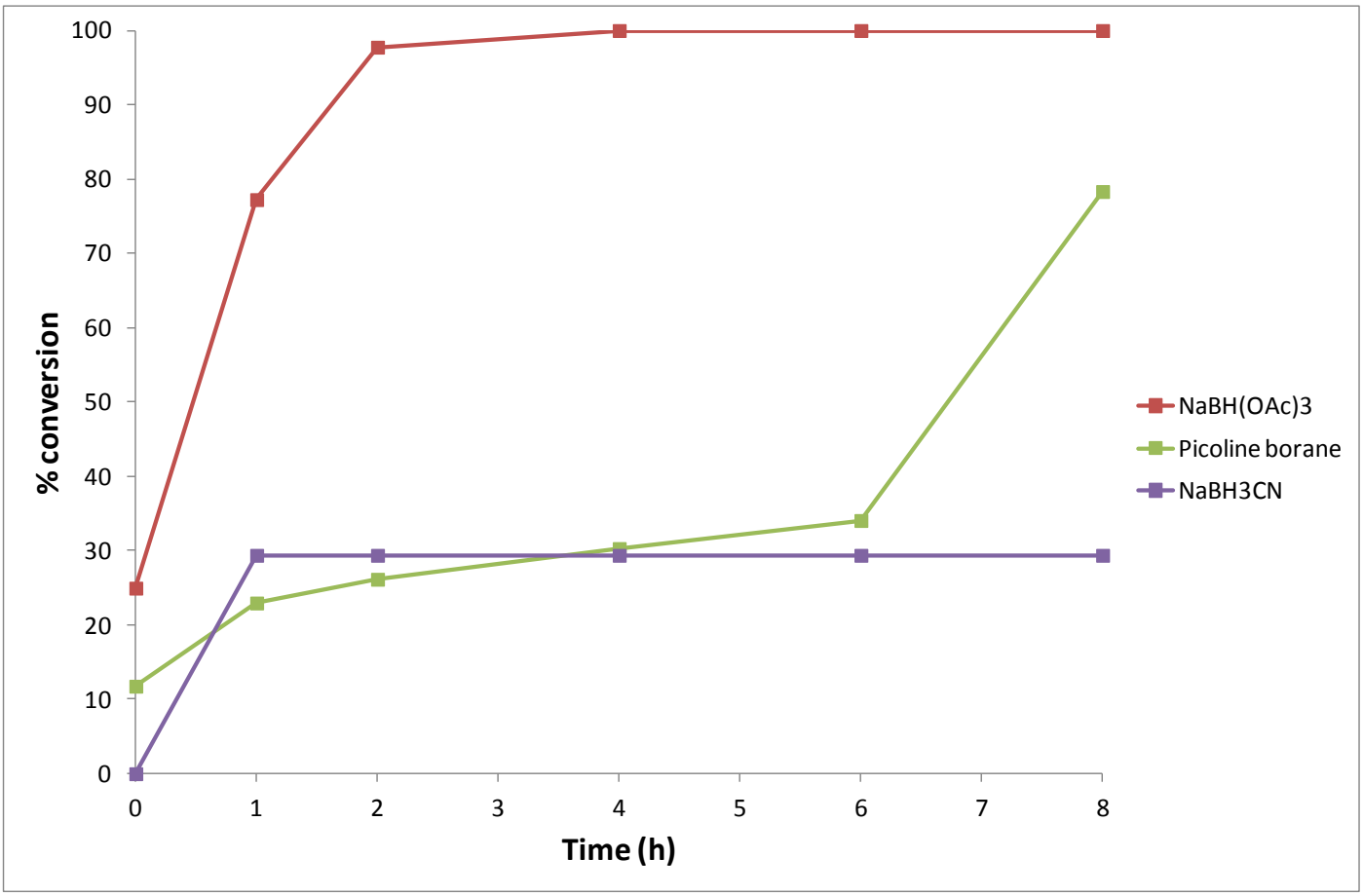
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	45.0	88.4	4.2
1	100.0	89.5	4.5
2	100.0	98.6	4.7
4	100.0	100.0	4.9
6	100.0	100.0	4.9
8	100.0	100.0	4.9
24	100.0	100.0	4.9

Reaction 2: THF



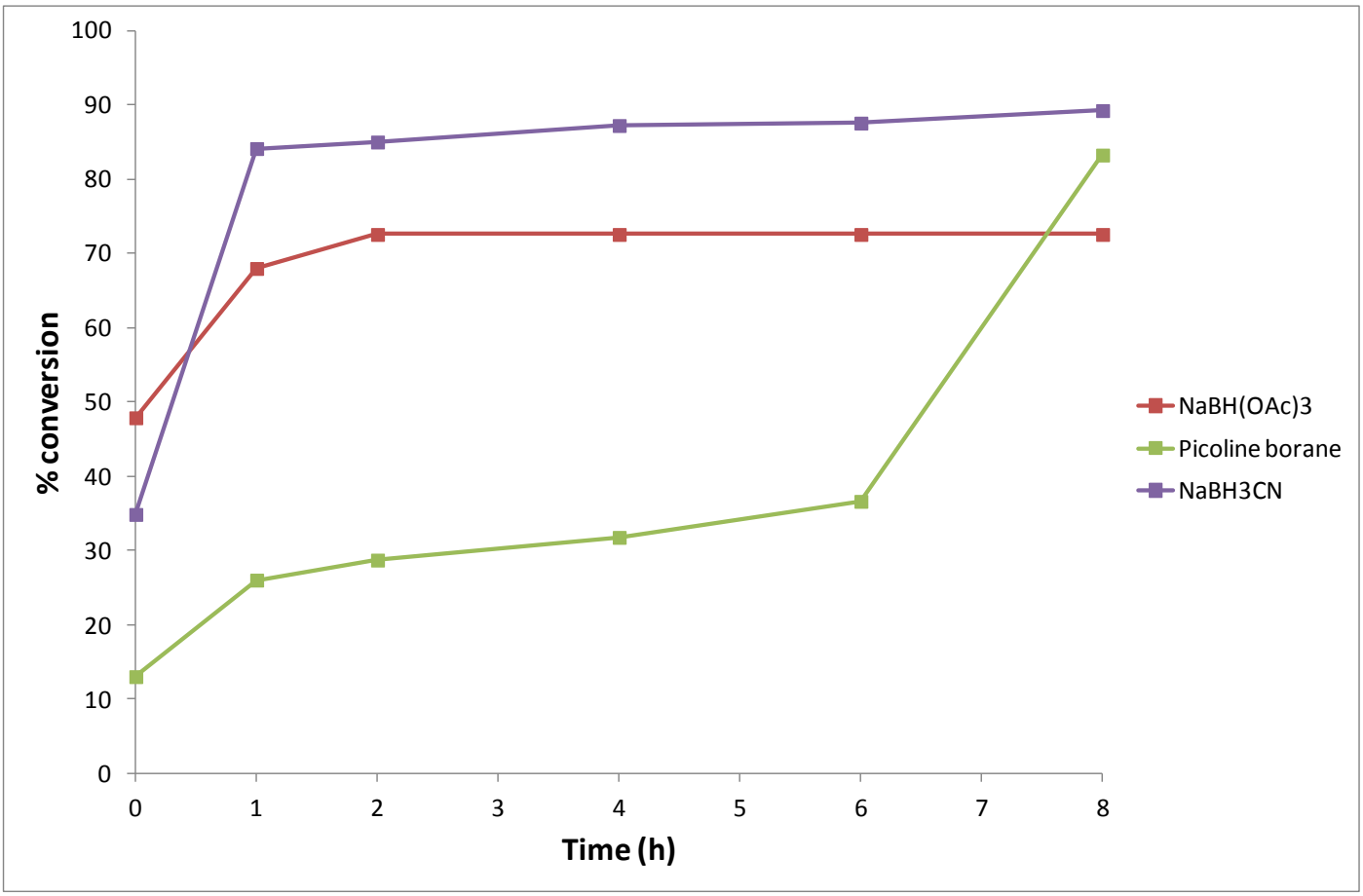
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	49.6	93.8	3.2
1	93.2	96.7	5.8
2	100.0	100.0	6.3
4	100.0	100.0	6.5
6	100.0	100.0	6.5
8	100.0	100.0	6.5
24	100.0	100.0	6.5

Reaction 3: TBME



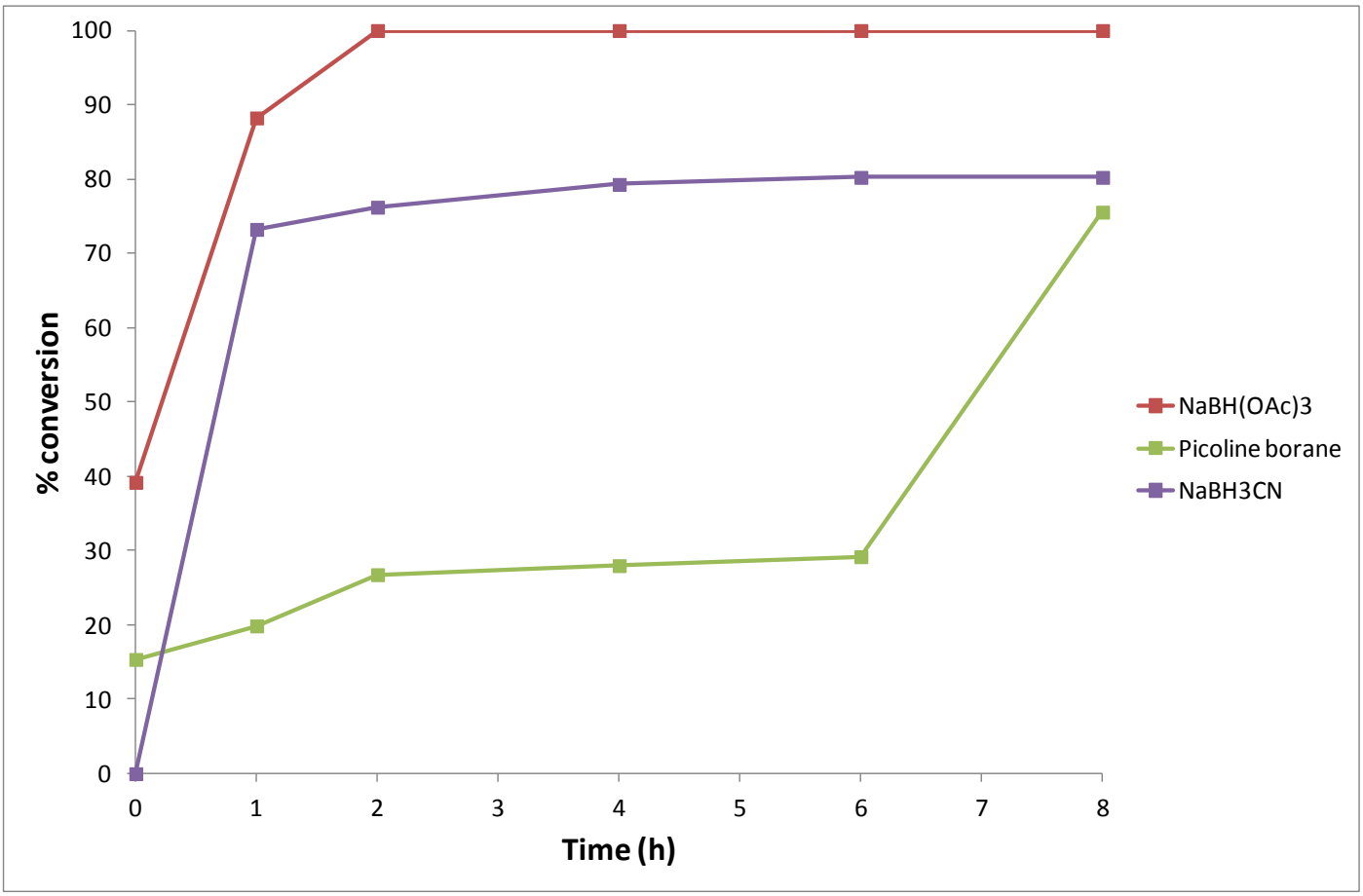
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	25.0	11.8	0.0
1	77.3	23.0	29.4
2	97.8	26.2	29.4
4	100.0	30.3	29.4
6	100.0	34.1	29.4
8	100.0	78.3	29.4
24	100.0	78.3	29.4

Reaction 3: CPME



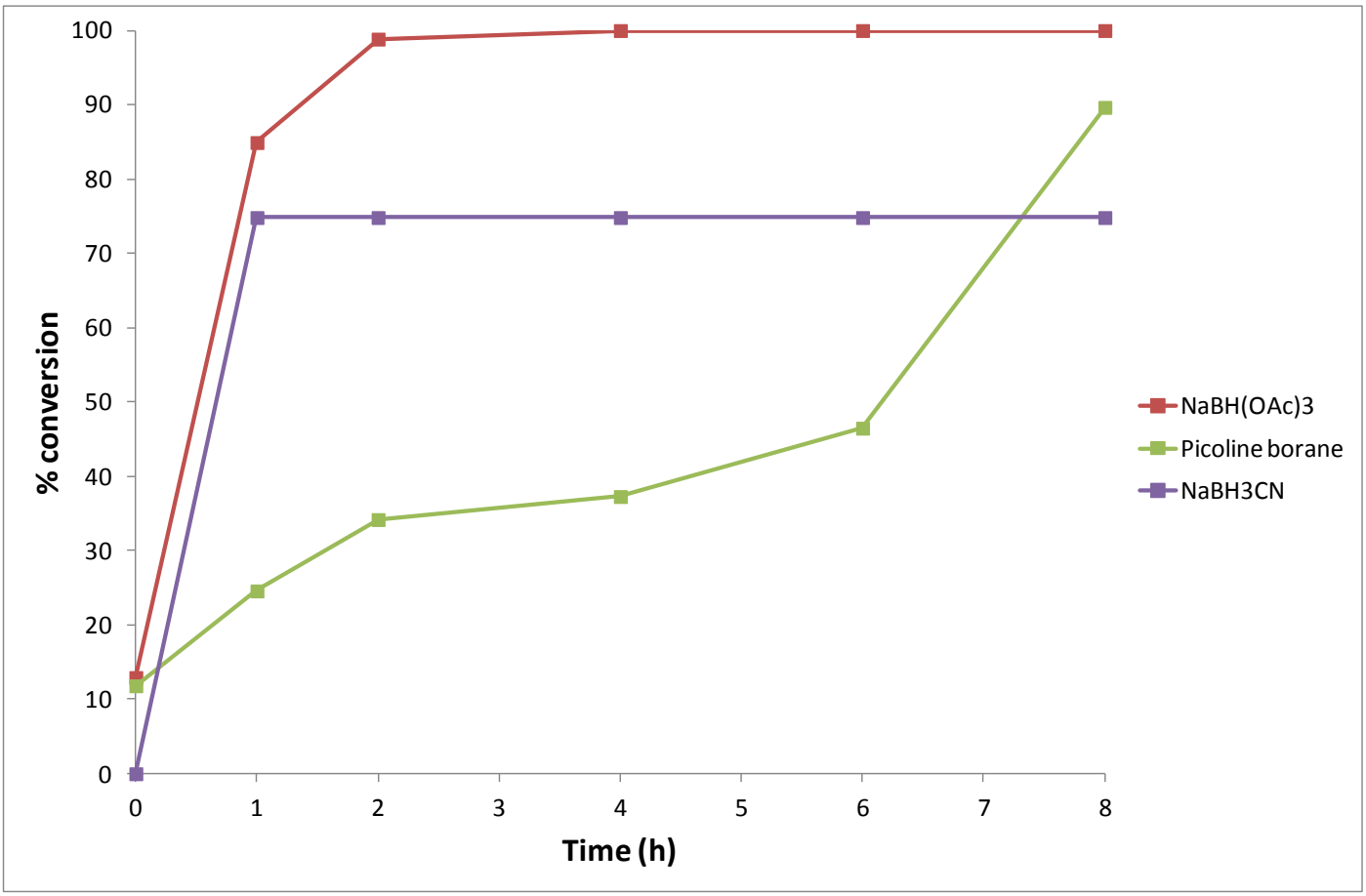
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	47.9	13.1	34.9
1	68.0	26.1	84.1
2	72.6	28.7	85.0
4	72.6	31.8	87.2
6	72.6	36.6	87.5
8	72.6	83.2	89.2
24	72.6	83.2	100.0

Reaction 3: DCE



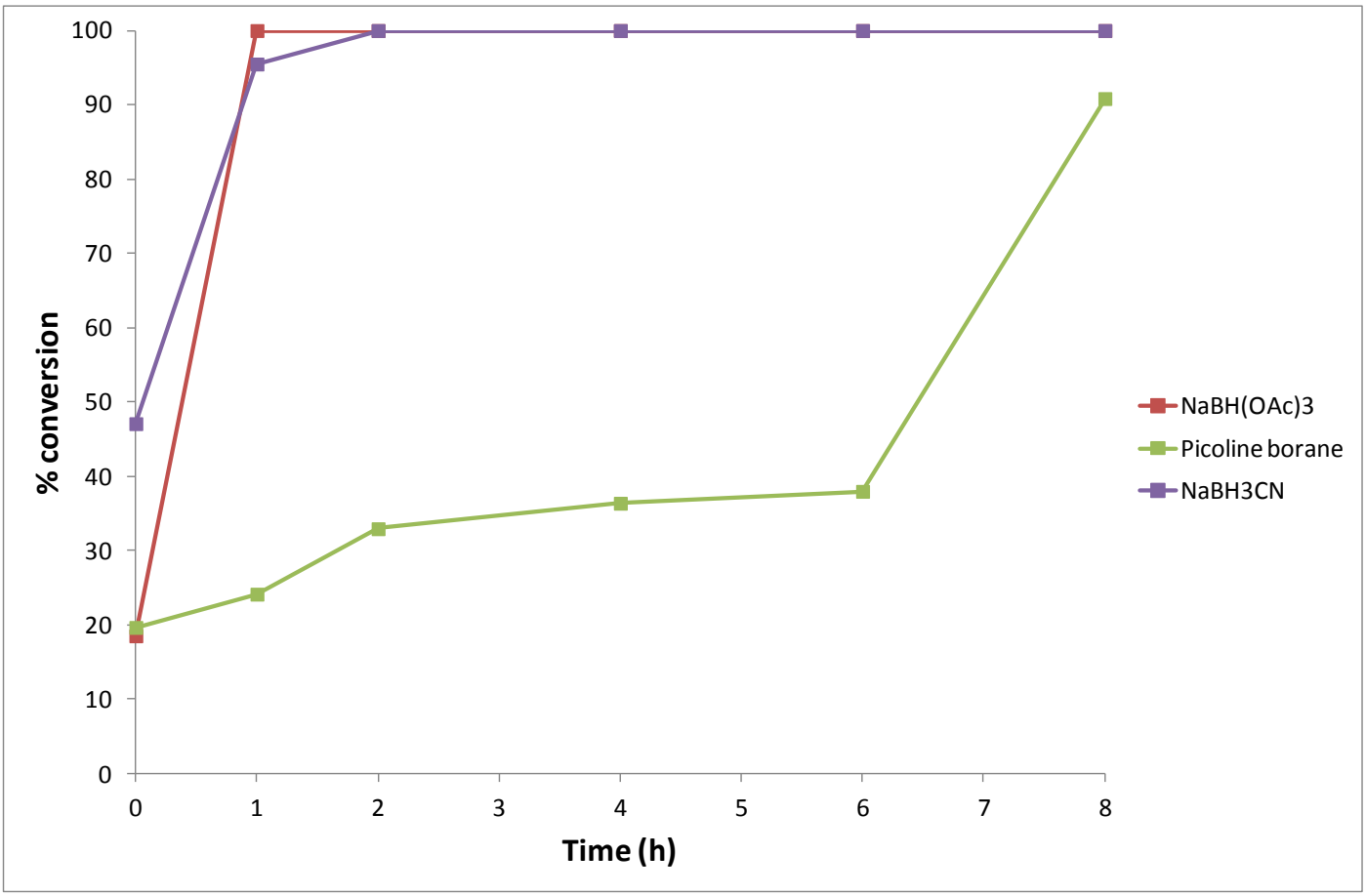
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	39.2	15.4	0.0
1	88.2	19.9	73.2
2	100.0	26.8	76.2
4	100.0	28.0	79.3
6	100.0	29.2	80.2
8	100.0	75.6	80.2
24	100.0	75.6	80.2

Reaction 3: CH_2Cl_2



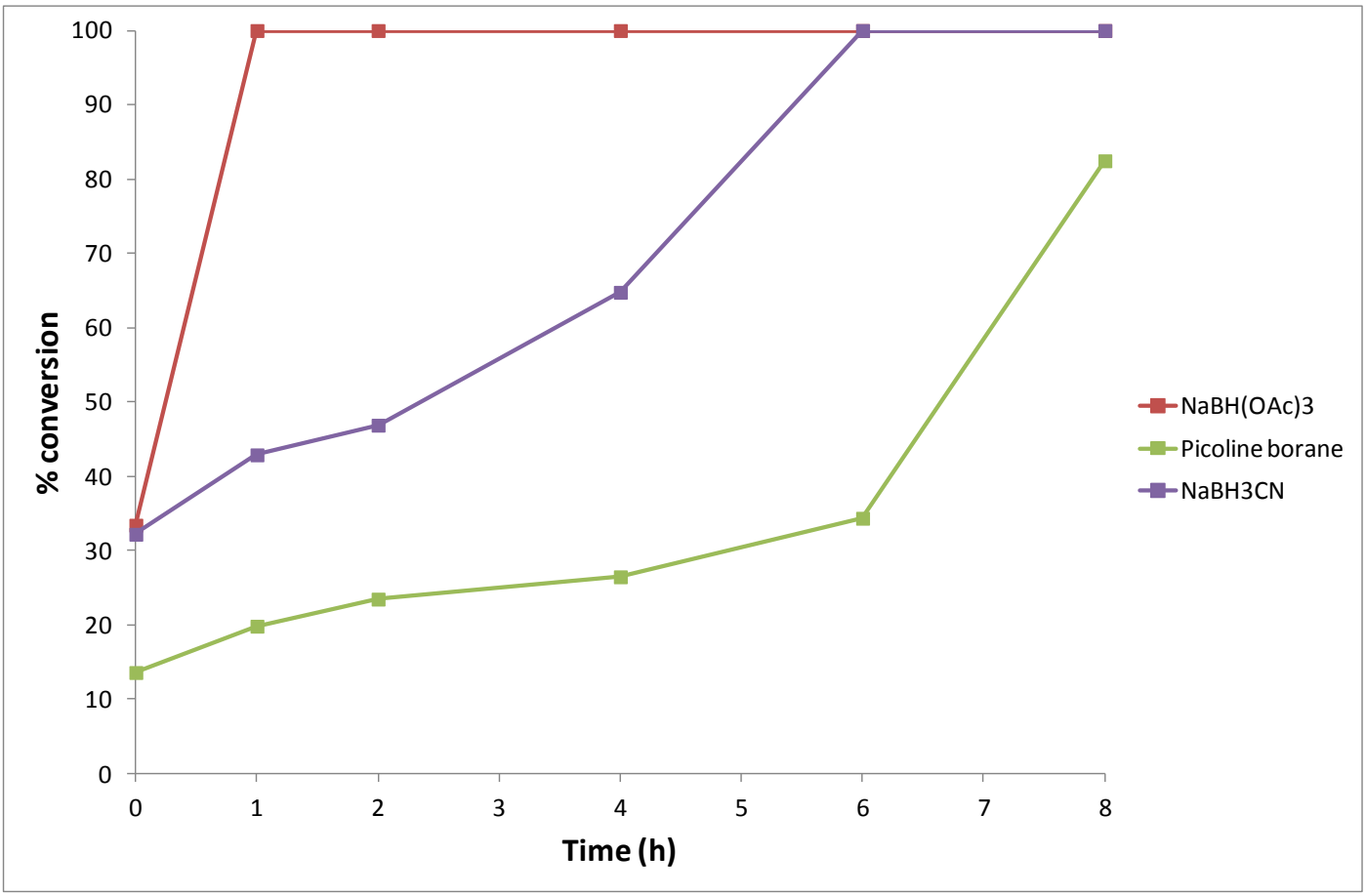
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	12.9	11.8	0.0
1	84.9	24.6	74.8
2	98.8	34.2	74.8
4	100.0	37.3	74.8
6	100.0	46.5	74.8
8	100.0	89.7	74.8
24	100.0	89.7	74.8

Reaction 3: DMC



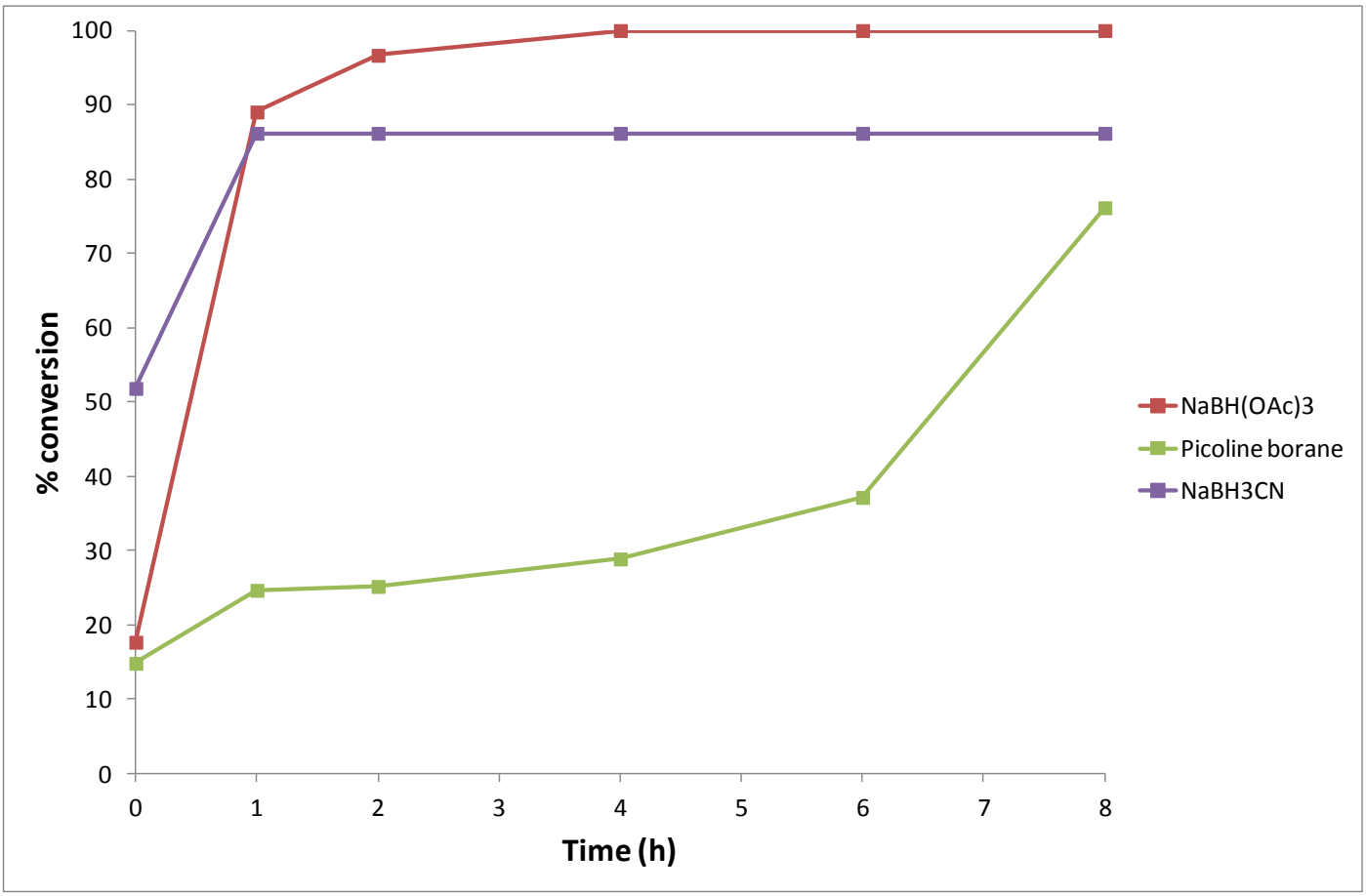
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	18.6	19.7	47.1
1	100.0	24.2	95.5
2	100.0	33.0	100.0
4	100.0	36.4	100.0
6	100.0	38.0	100.0
8	100.0	90.8	100.0
24	100.0	93.2	100.0

Reaction 3: DMF



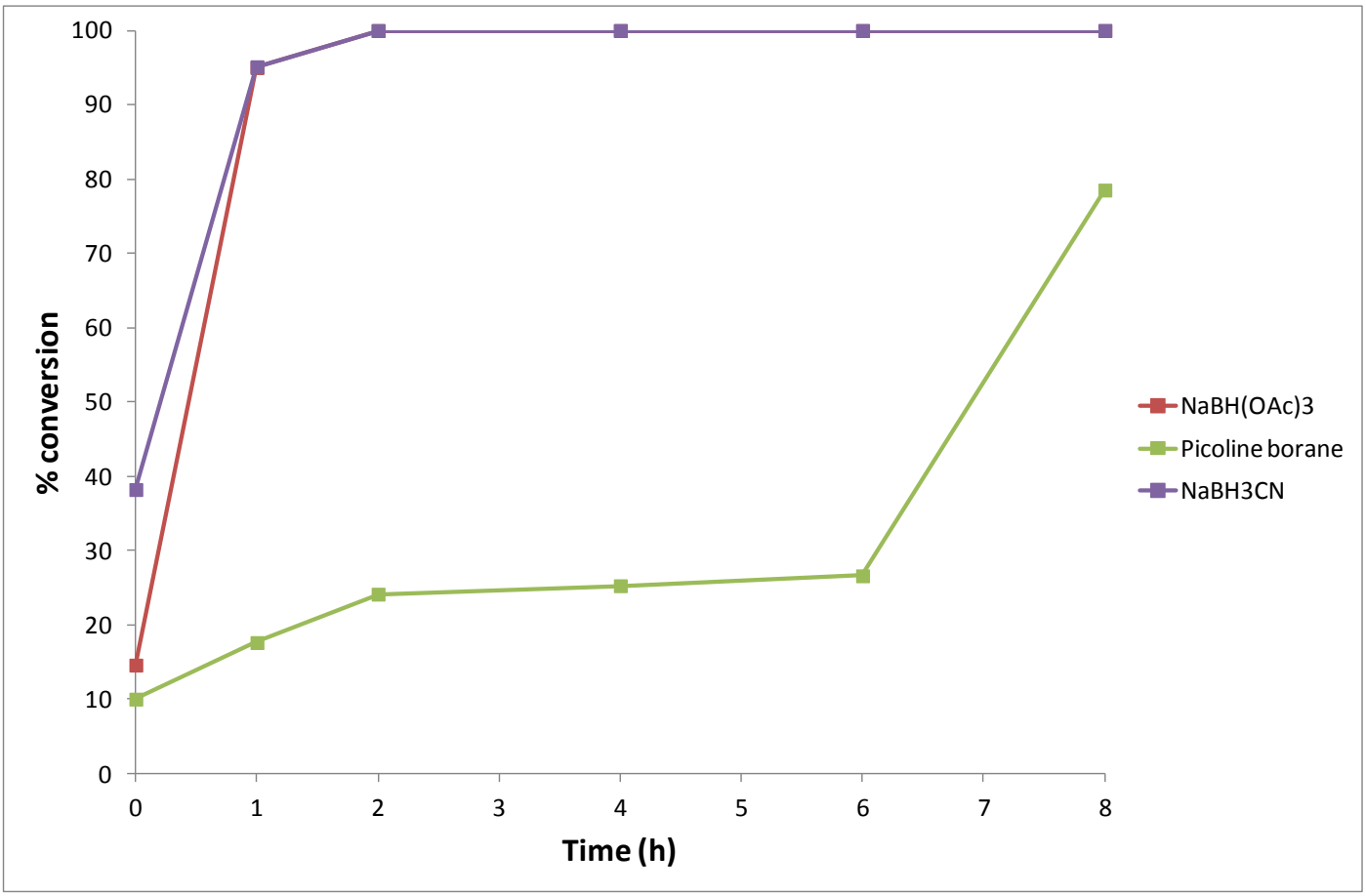
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	33.4	13.6	32.2
1	100.0	19.9	42.9
2	100.0	23.5	46.9
4	100.0	26.5	64.8
6	100.0	34.4	100.0
8	100.0	82.5	100.0
24	100.0	83.0	100.0

Reaction 3: EtOAc



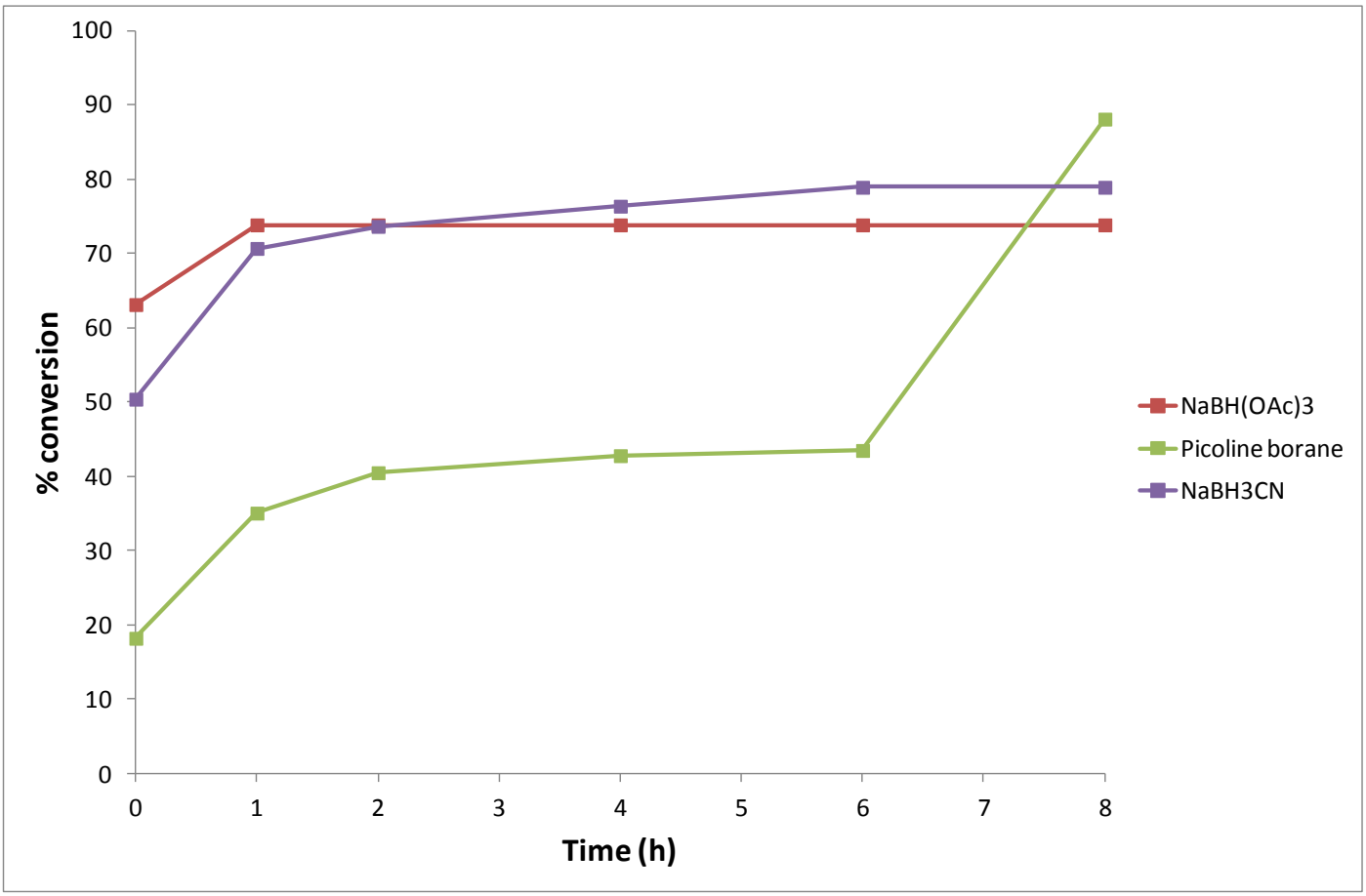
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	17.7	14.9	51.8
1	89.0	24.7	86.2
2	96.7	25.2	86.2
4	100.0	28.9	86.2
6	100.0	37.2	86.2
8	100.0	76.2	86.2
24	100.0	76.2	86.2

Reaction 3: IPA



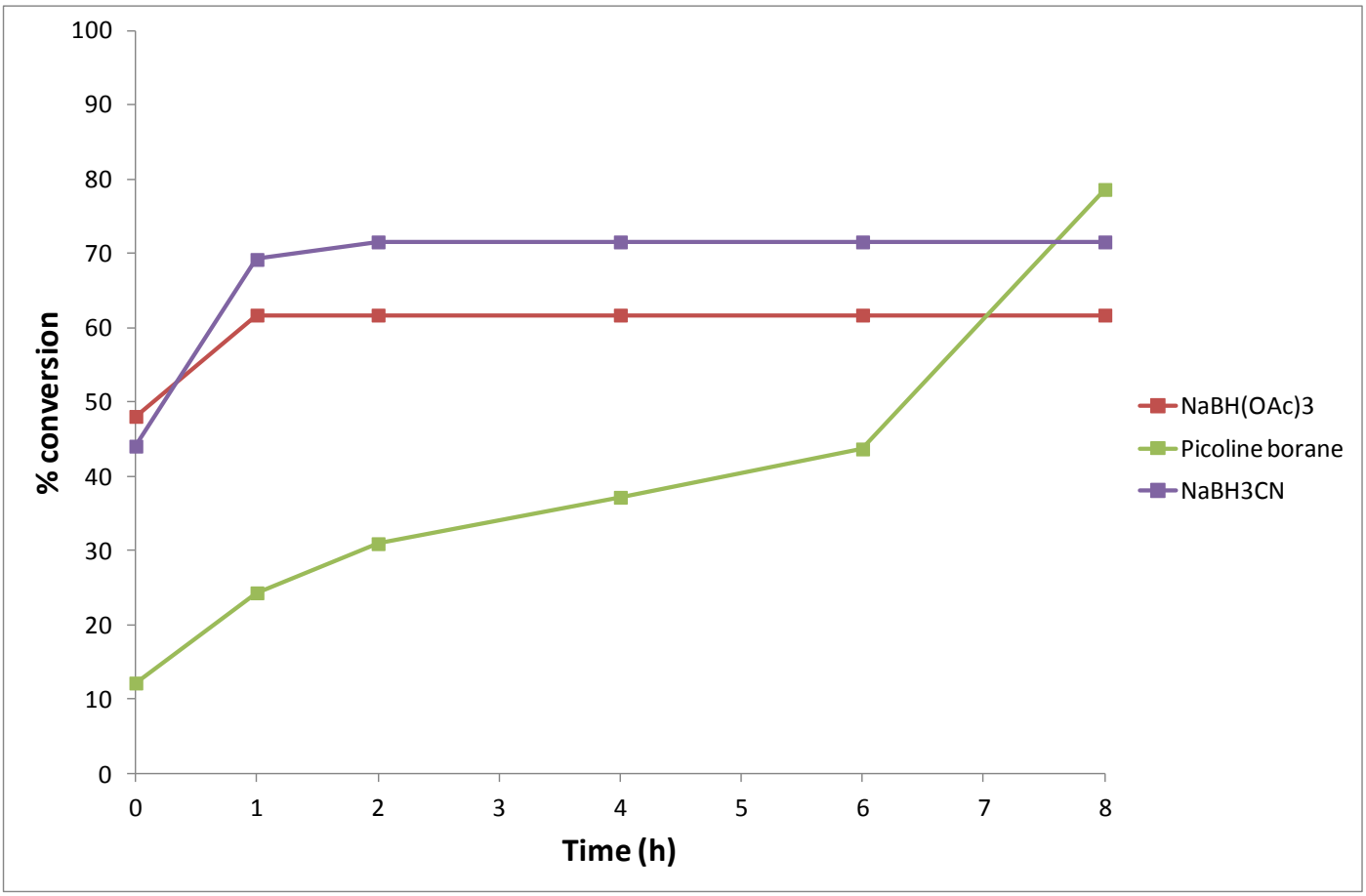
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	14.6	10.0	38.2
1	95.0	17.7	95.1
2	100.0	24.2	100.0
4	100.0	25.3	100.0
6	100.0	26.6	100.0
8	100.0	78.5	100.0
24	100.0	78.5	100.0

Reaction 3: 2-MeTHF



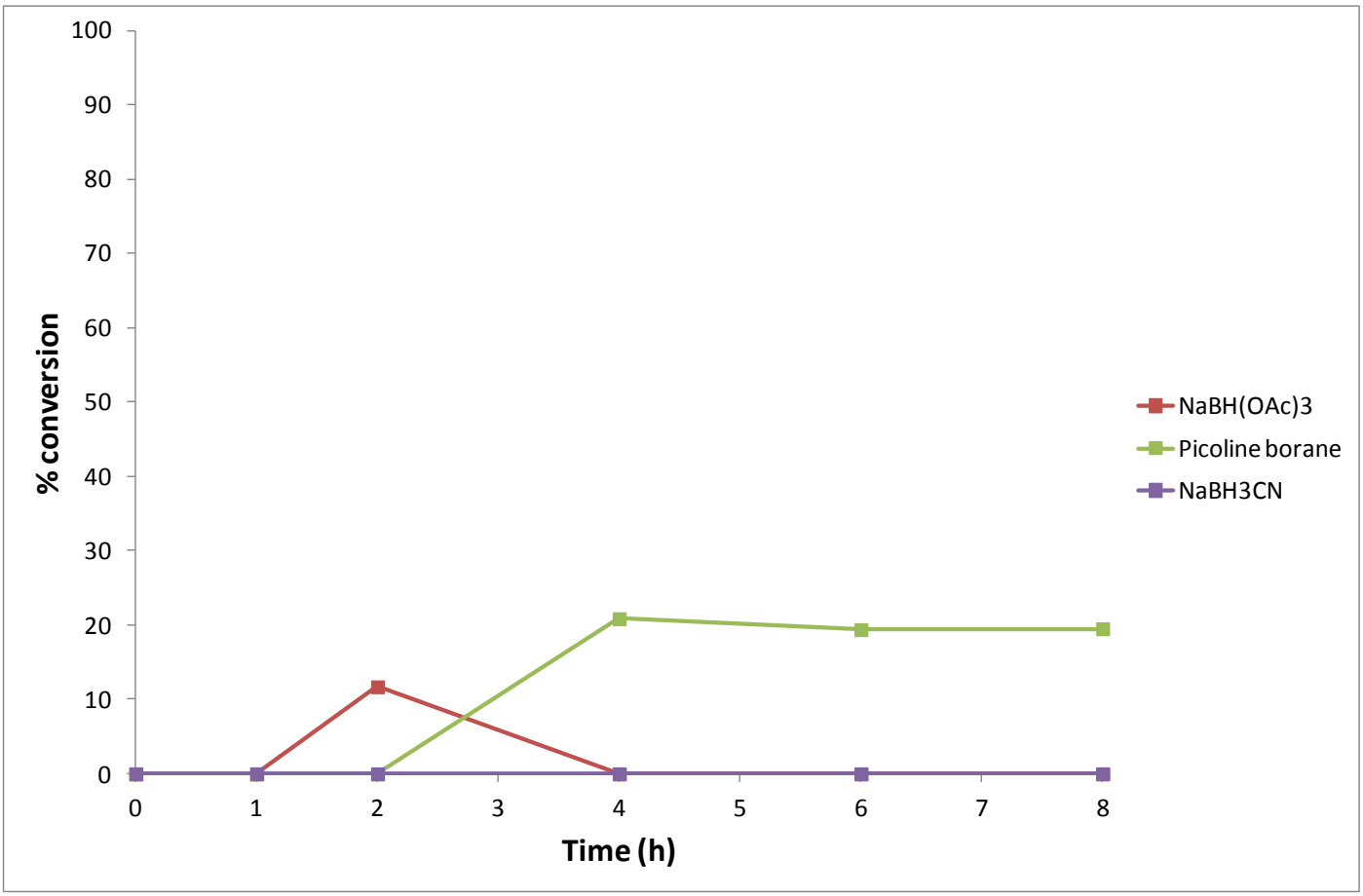
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	63.1	18.2	50.4
1	73.9	35.1	70.7
2	73.9	40.5	73.7
4	73.9	42.8	76.4
6	73.9	43.5	78.9
8	73.9	88.1	78.9
24	73.9	88.1	78.9

Reaction 3: THF



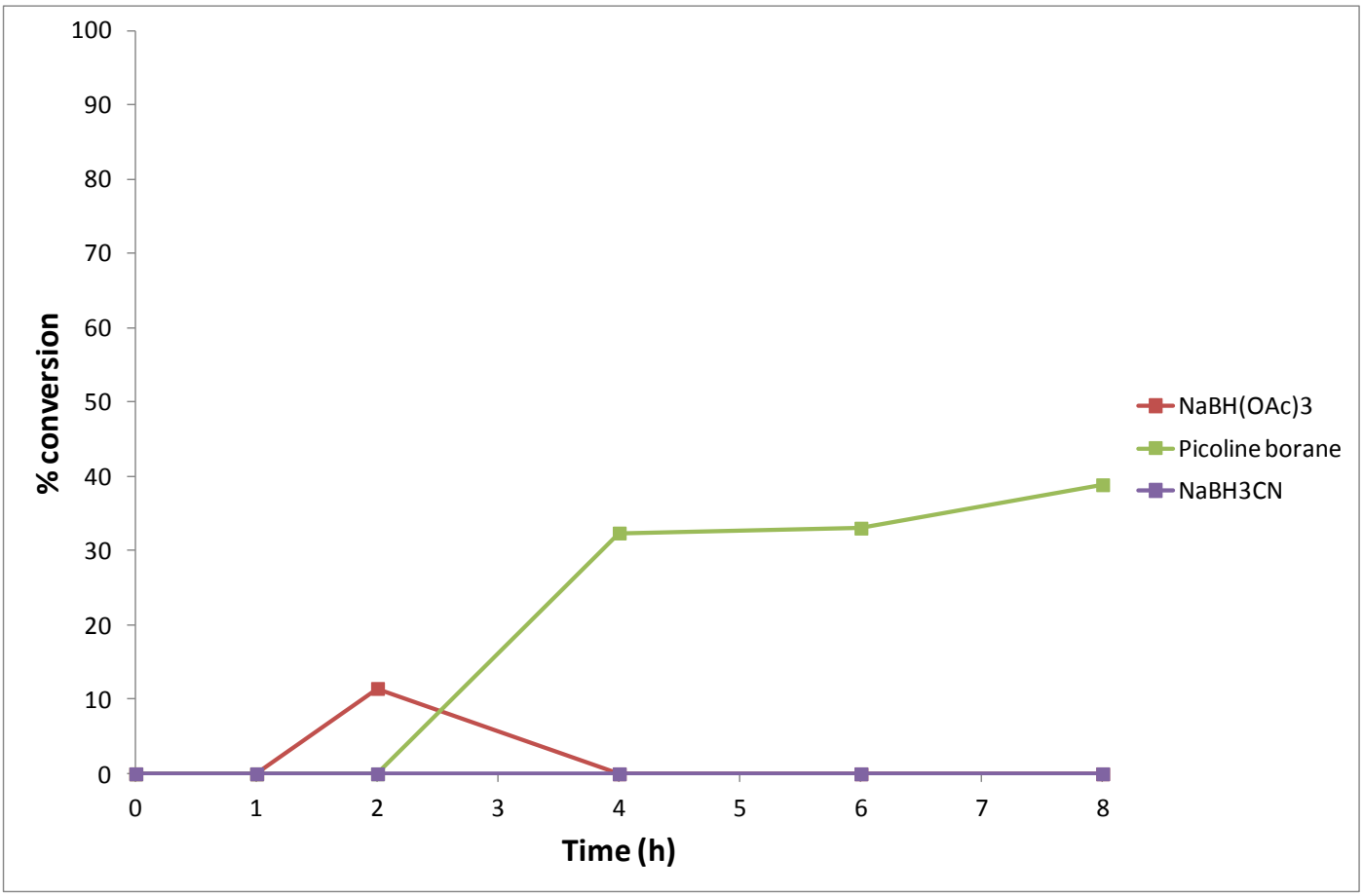
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	48.1	12.2	44.1
1	61.7	24.3	69.2
2	61.7	31.0	71.6
4	61.7	37.2	71.6
6	61.7	43.7	71.6
8	61.7	78.6	71.6
24	61.7	78.6	71.6

Reaction 4: TBME



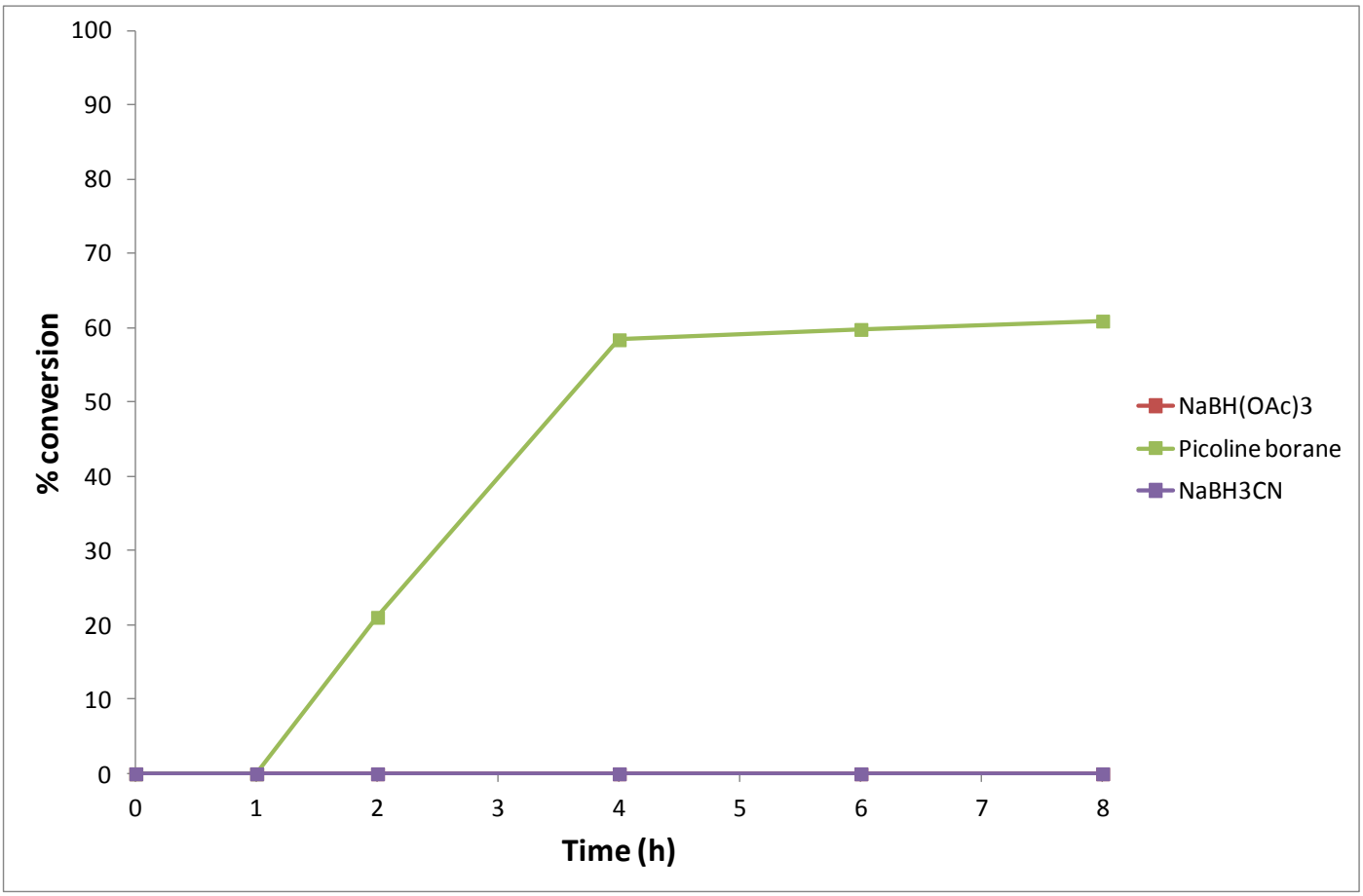
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.0	0.0
1	0.0	0.0	0.0
2	11.7	0.0	0.0
4	0.0	20.9	0.0
6	0.0	19.4	0.0
8	0.0	19.5	0.0
24	0.0	19.5	0.0

Reaction 4: CPME



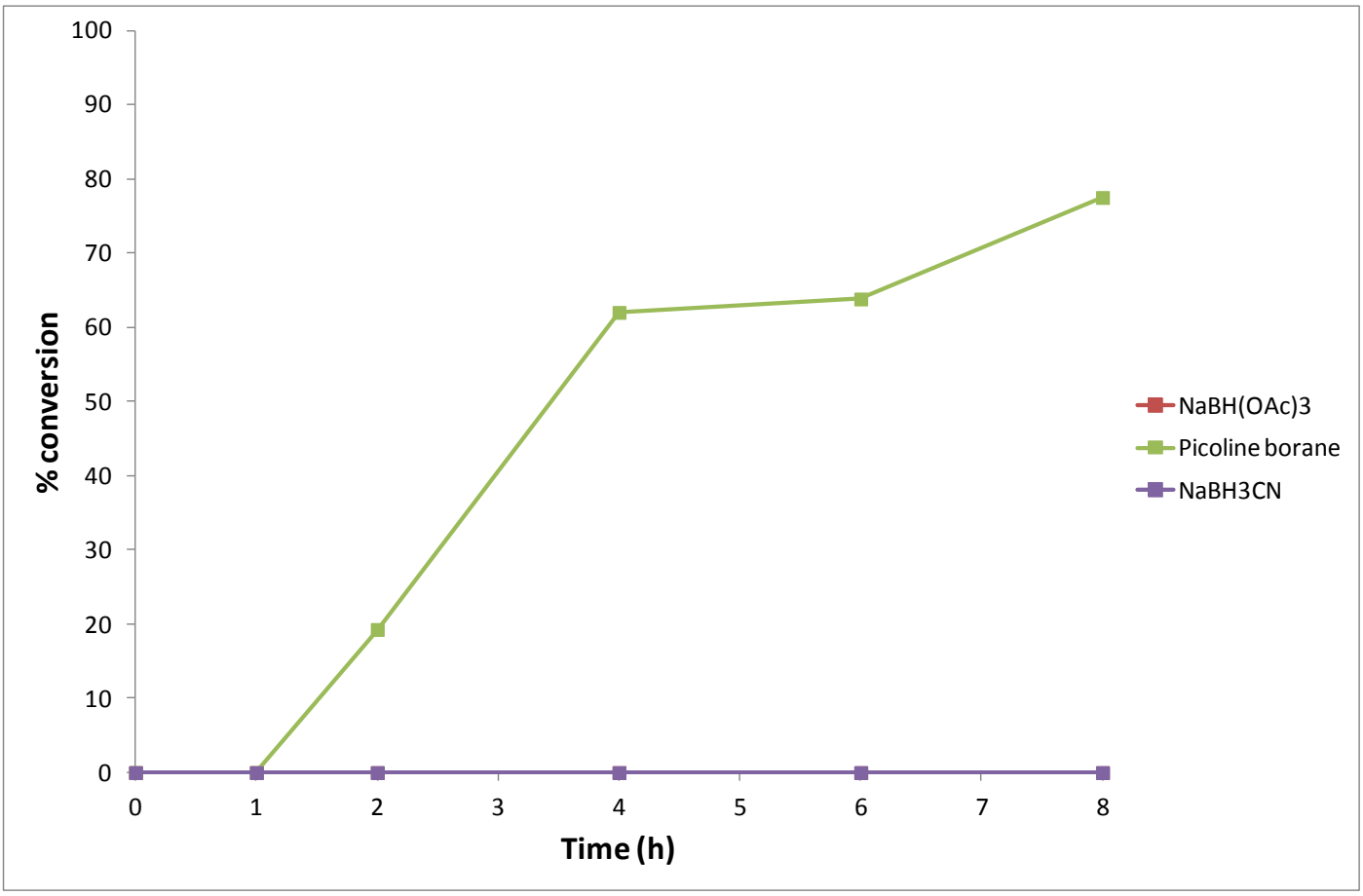
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.0	0.0
1	0.0	0.0	0.0
2	11.5	0.0	0.0
4	0.0	32.4	0.0
6	0.0	33.1	0.0
8	0.0	38.9	0.0
24	0.0	38.9	0.0

Reaction 4: DCE



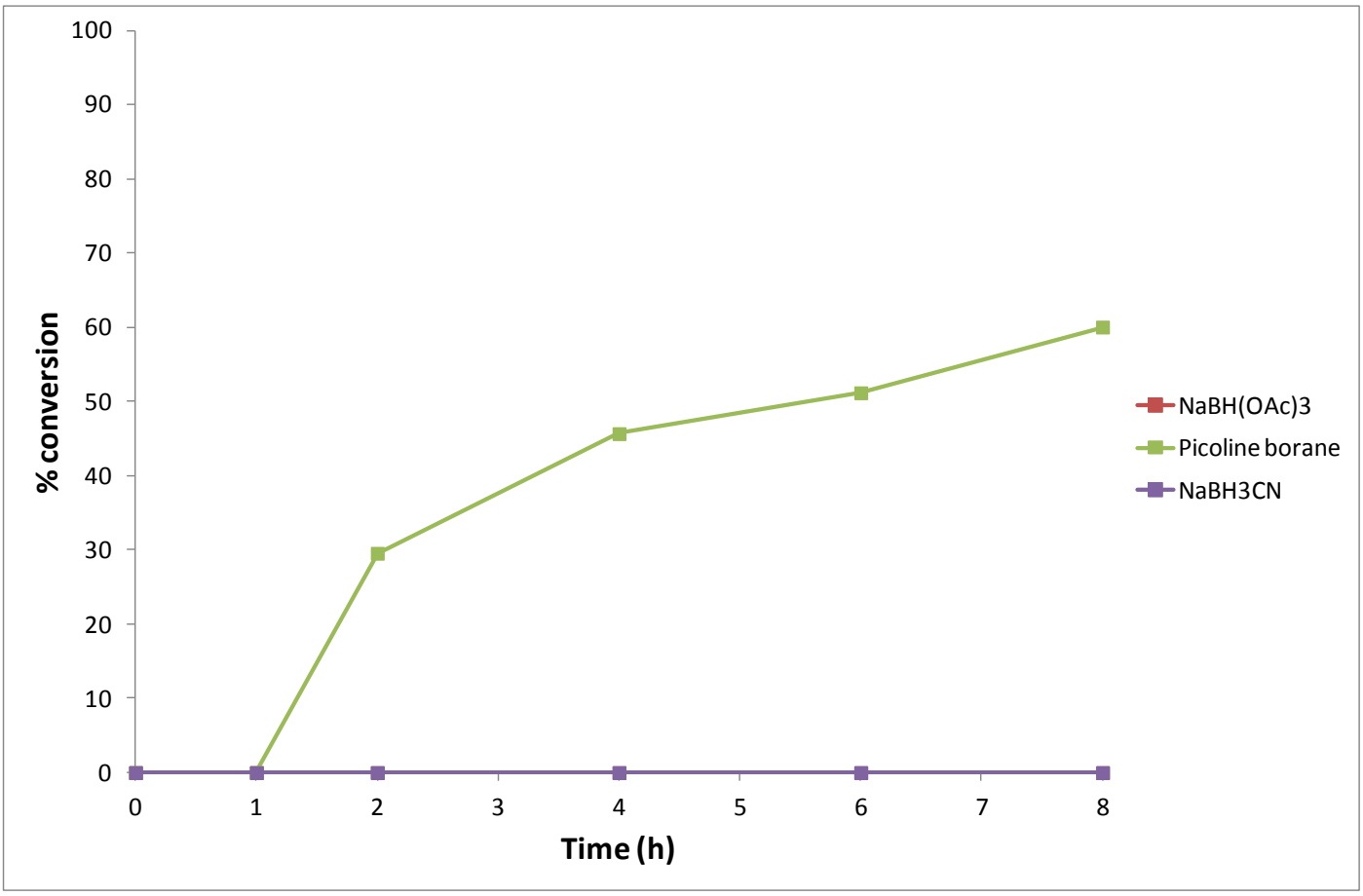
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.0	0.0
1	0.0	0.0	0.0
2	0.0	21.1	0.0
4	0.0	58.4	0.0
6	0.0	59.8	0.0
8	0.0	60.9	0.0
24	0.0	60.9	0.0

Reaction 4: CH_2Cl_2



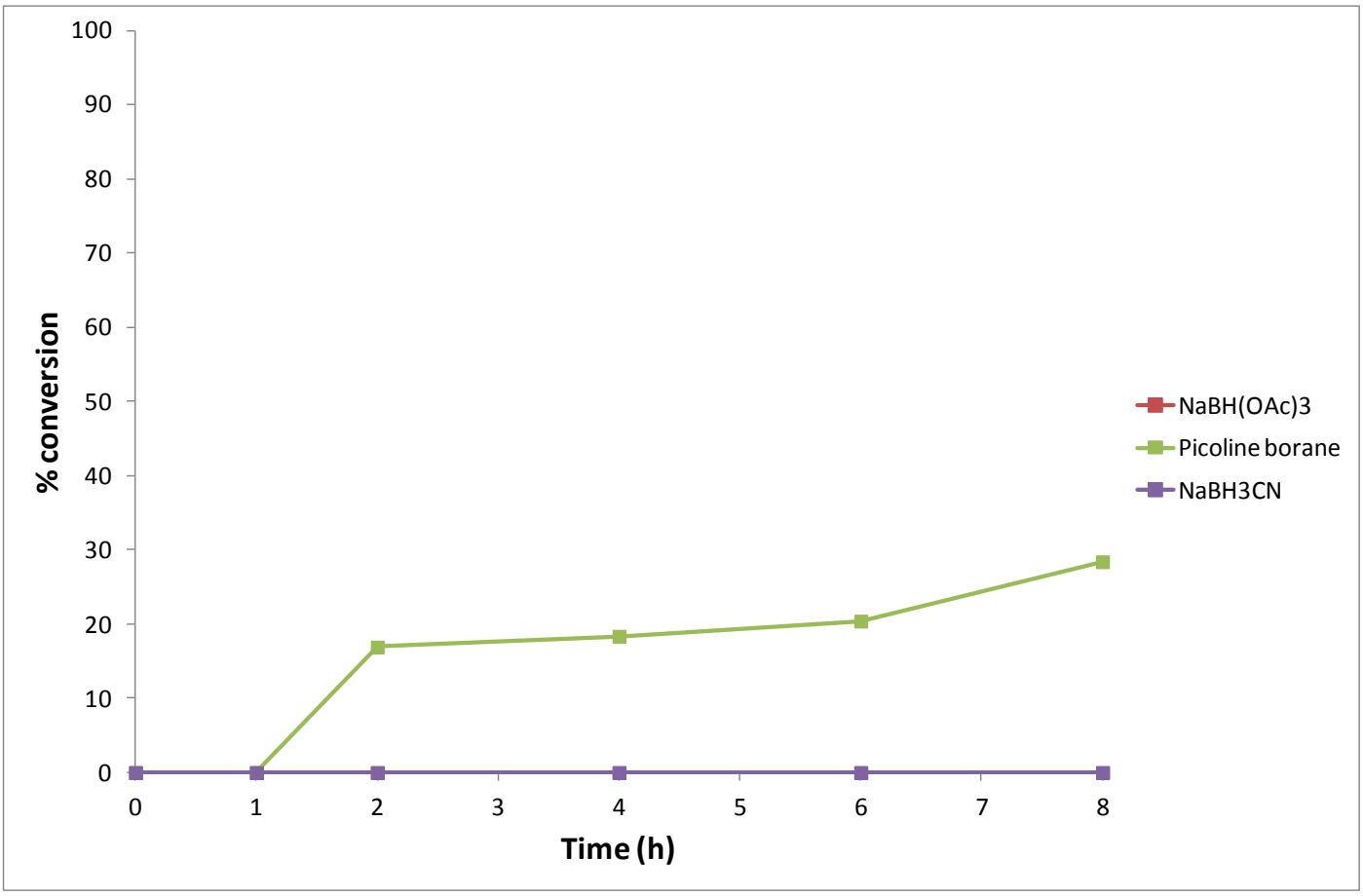
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.0	0.0
1	0.0	0.0	0.0
2	0.0	19.3	0.0
4	0.0	62.0	0.0
6	0.0	63.8	0.0
8	0.0	77.5	0.0
24	0.0	77.5	0.0

Reaction 4: DMC



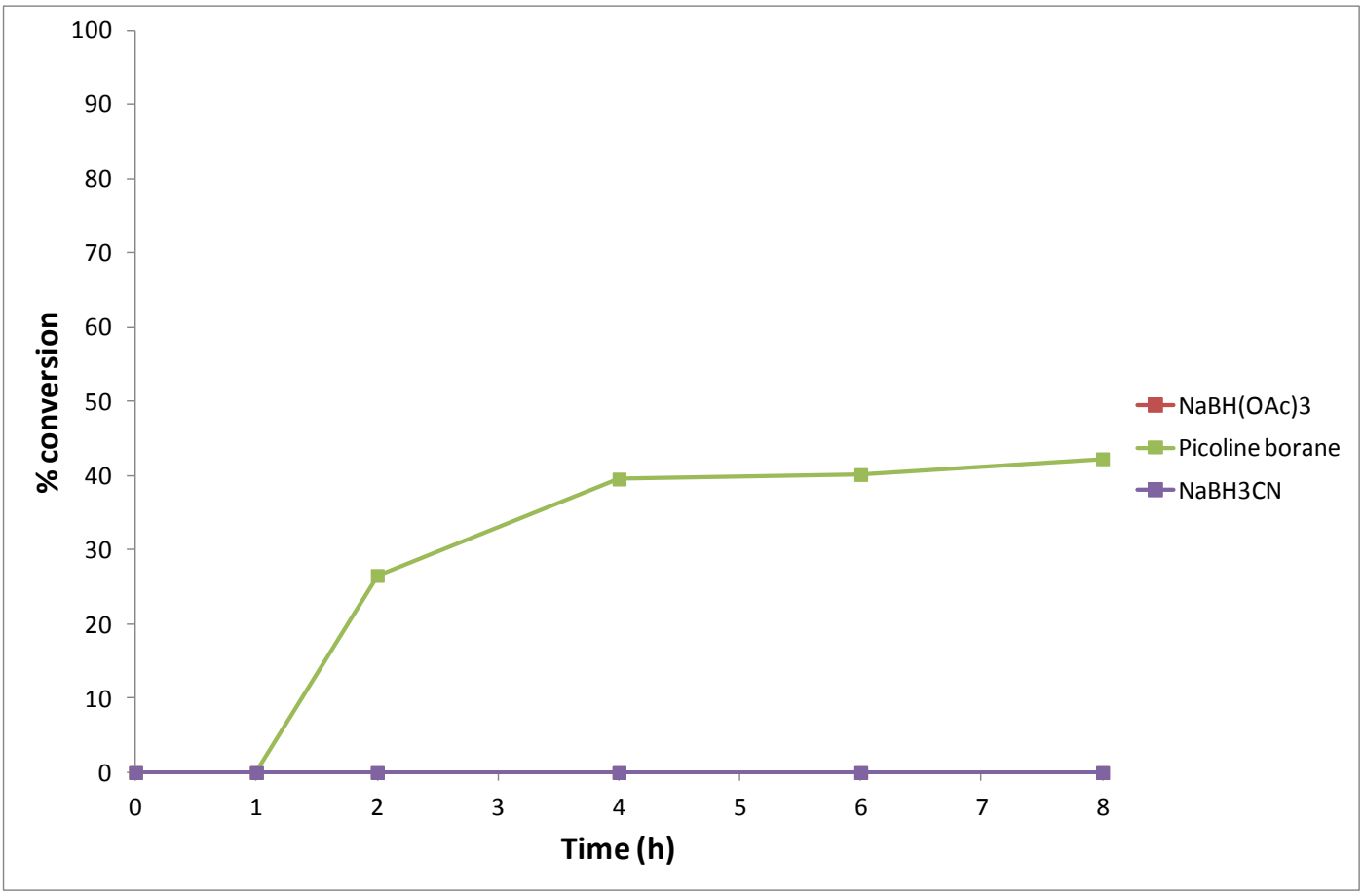
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.0	0.0
1	0.0	0.0	0.0
2	0.0	29.6	0.0
4	0.0	45.7	0.0
6	0.0	51.2	0.0
8	0.0	60.0	0.0
24	0.0	60.0	0.0

Reaction 4: DMF



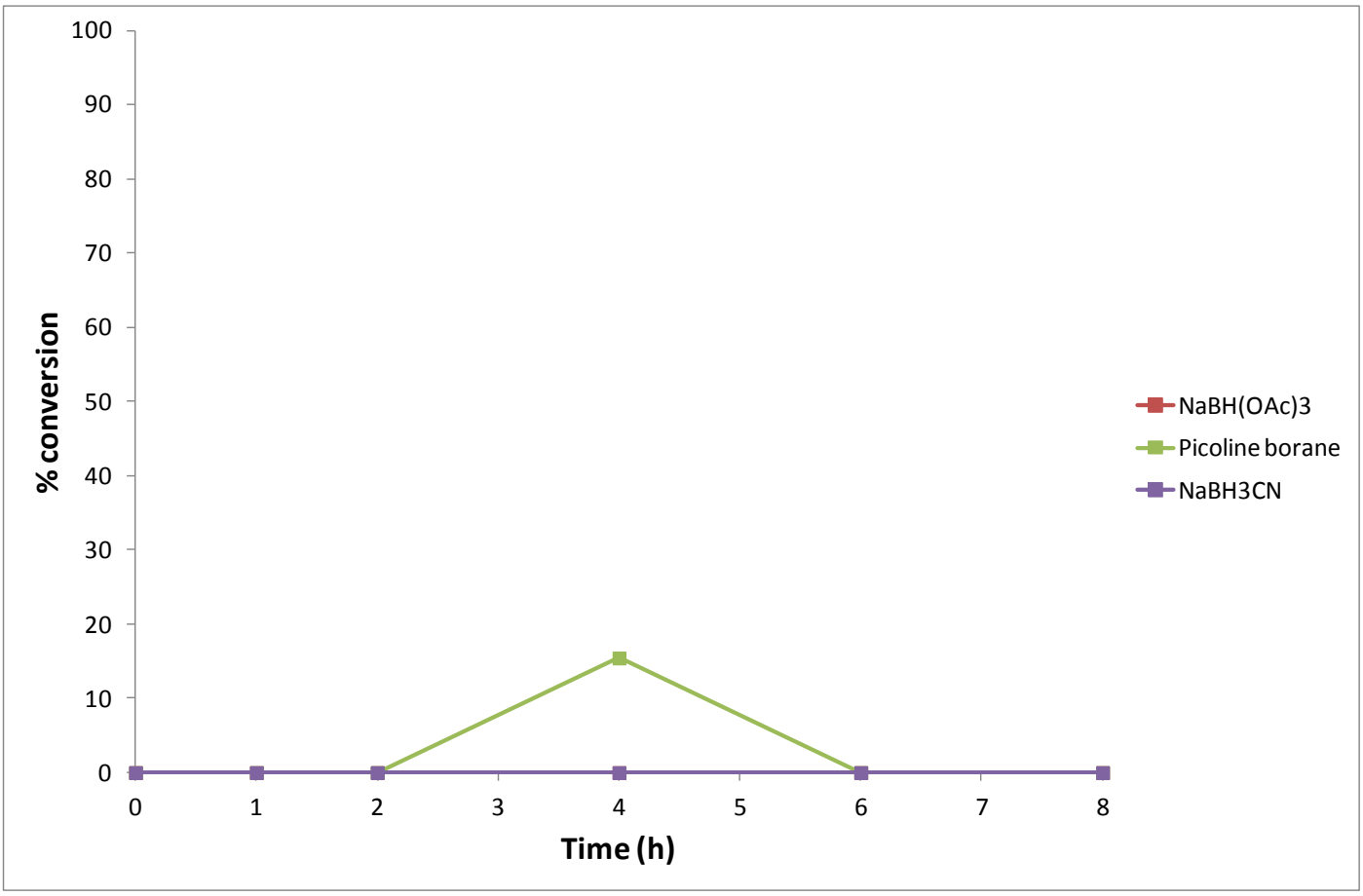
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.0	0.0
1	0.0	0.0	0.0
2	0.0	16.9	0.0
4	0.0	18.4	0.0
6	0.0	20.4	0.0
8	0.0	28.4	0.0
24	0.0	28.4	0.0

Reaction 4: EtOAc



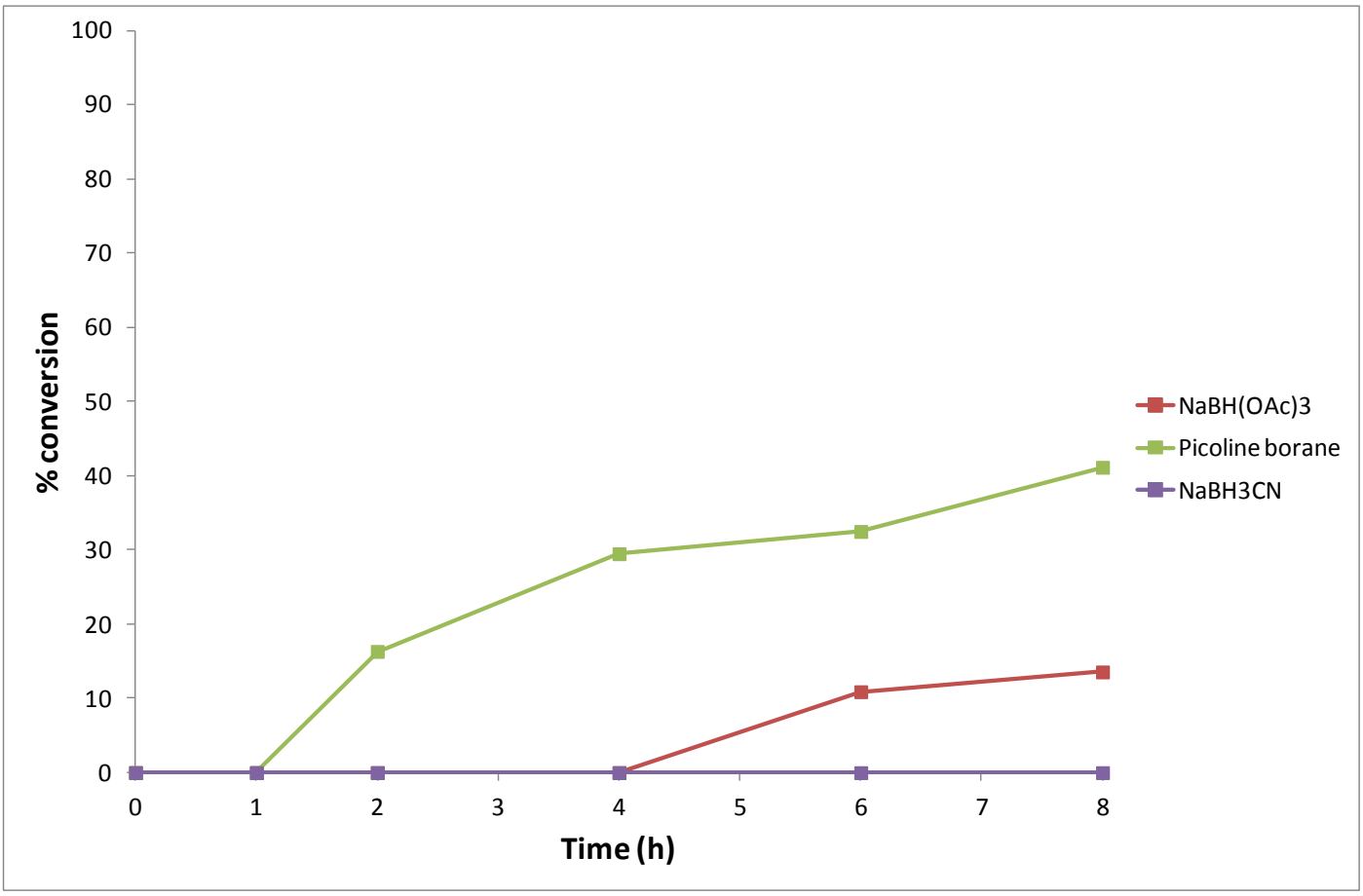
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.0	0.0
1	0.0	0.0	0.0
2	0.0	26.6	0.0
4	0.0	39.6	0.0
6	0.0	40.2	0.0
8	0.0	42.3	0.0
24	0.0	42.3	0.0

Reaction 4: IPA



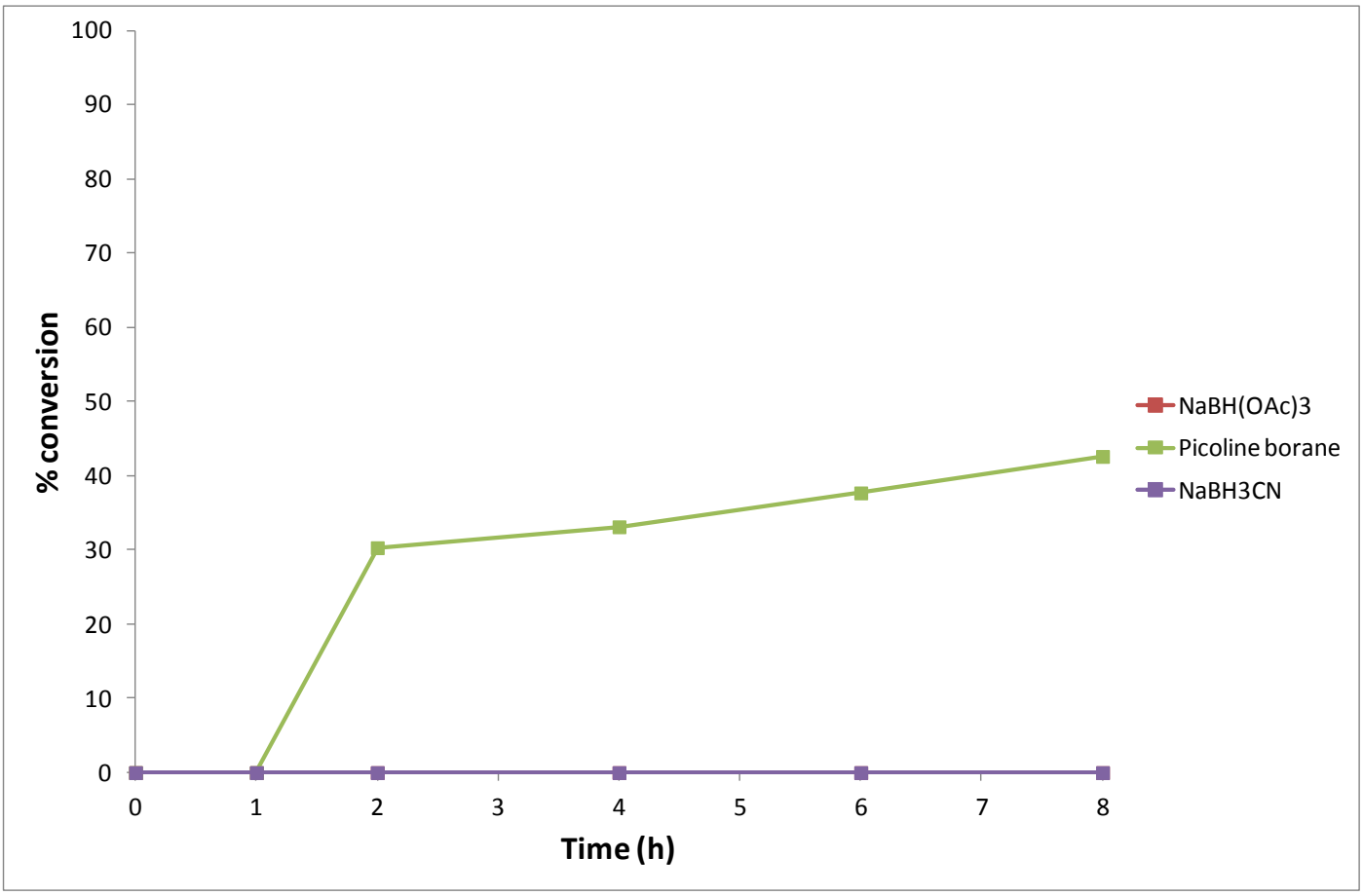
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.0	0.0
1	0.0	0.0	0.0
2	0.0	0.0	0.0
4	0.0	15.5	0.0
6	0.0	0.0	0.0
8	0.0	0.0	0.0
24	0.0	0.0	0.0

Reaction 4: 2-MeTHF



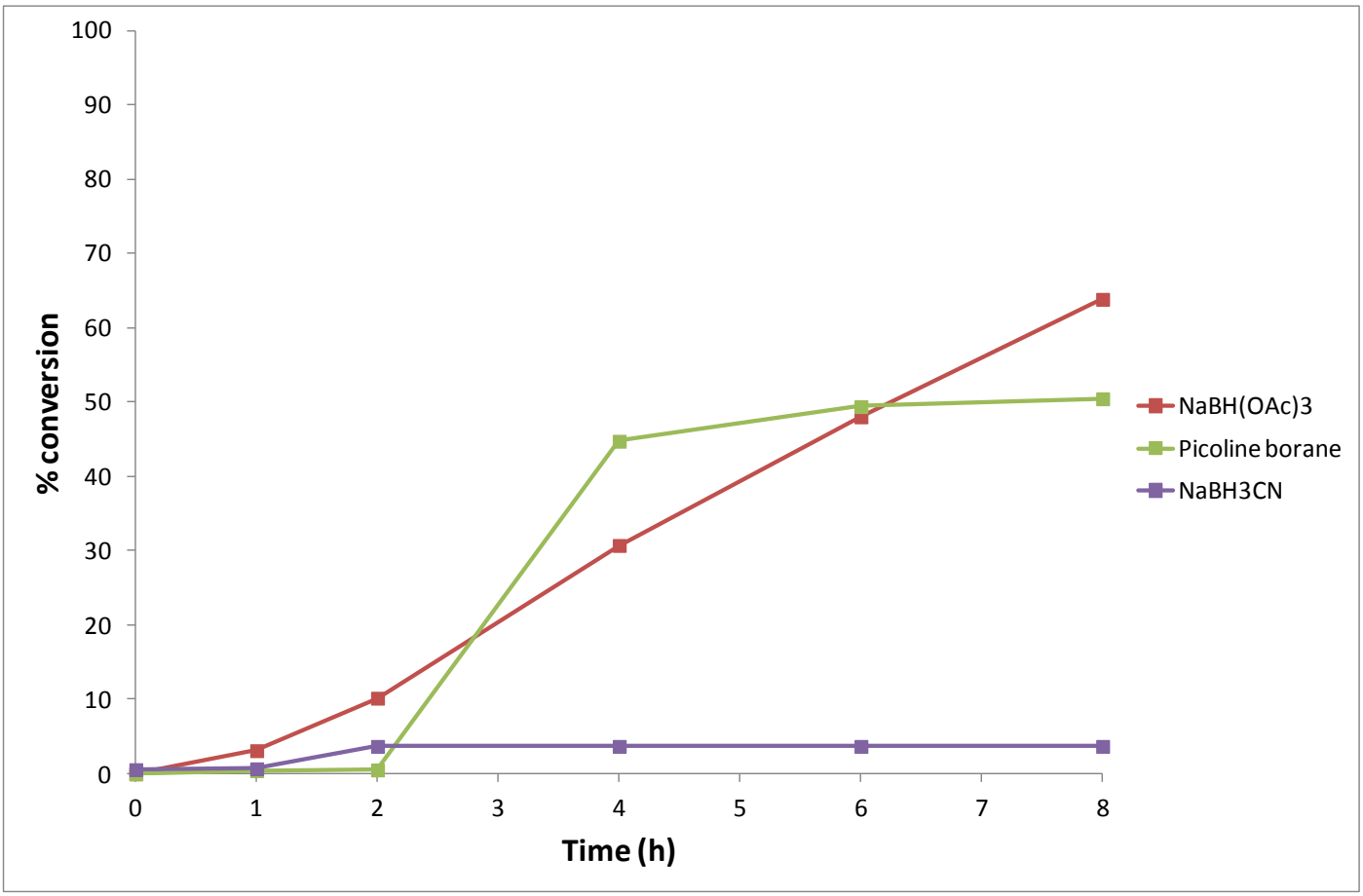
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.0	0.0
1	0.0	0.0	0.0
2	0.0	16.3	0.0
4	0.0	29.5	0.0
6	10.9	32.5	0.0
8	13.6	41.1	0.0
24	12.6	41.1	0.0

Reaction 4: THF



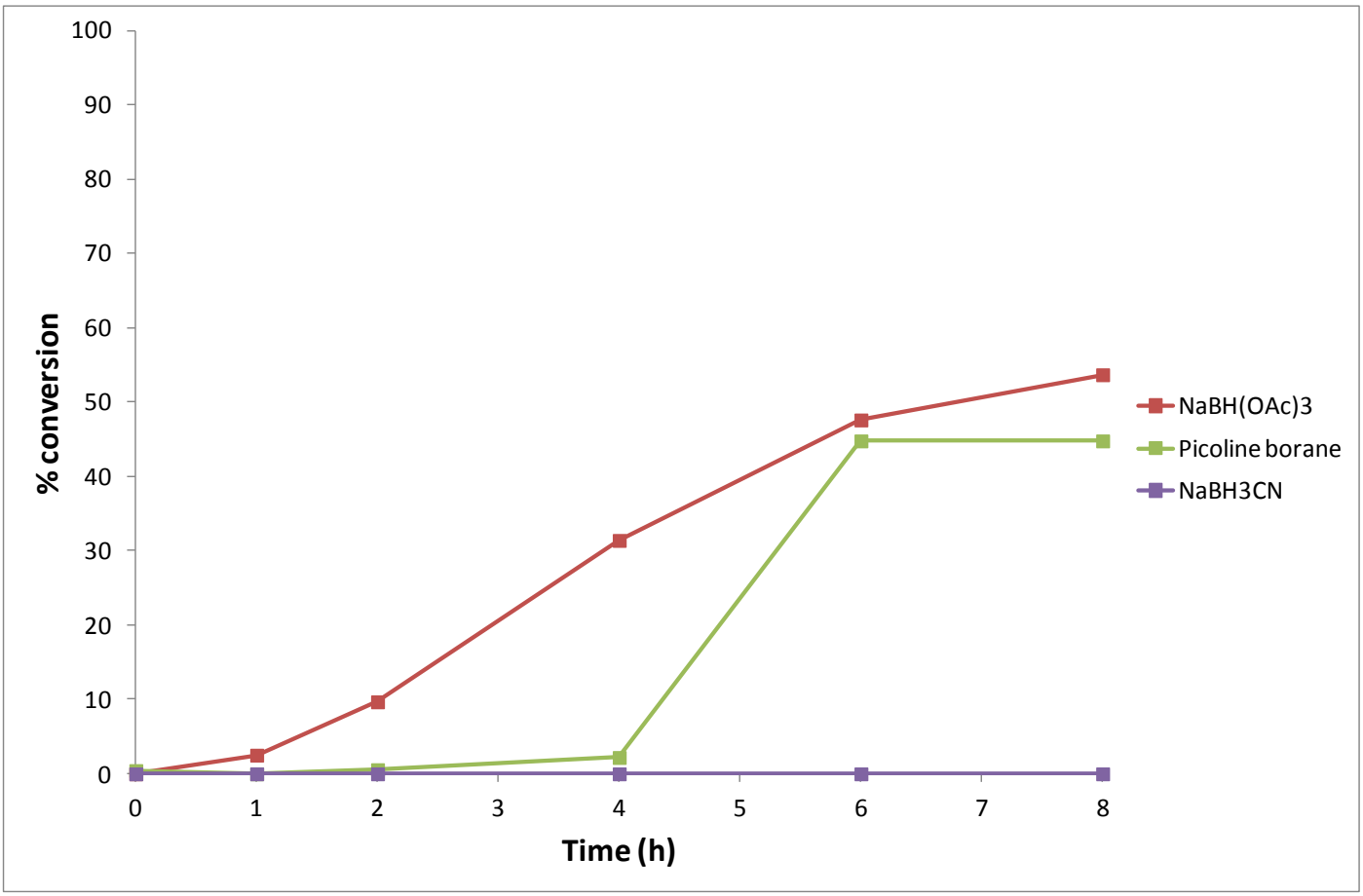
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.0	0.0
1	0.0	0.0	0.0
2	0.0	30.3	0.0
4	0.0	33.1	0.0
6	0.0	37.7	0.0
8	0.0	42.6	0.0
24	0.0	42.6	0.0

Reaction 5: TBME



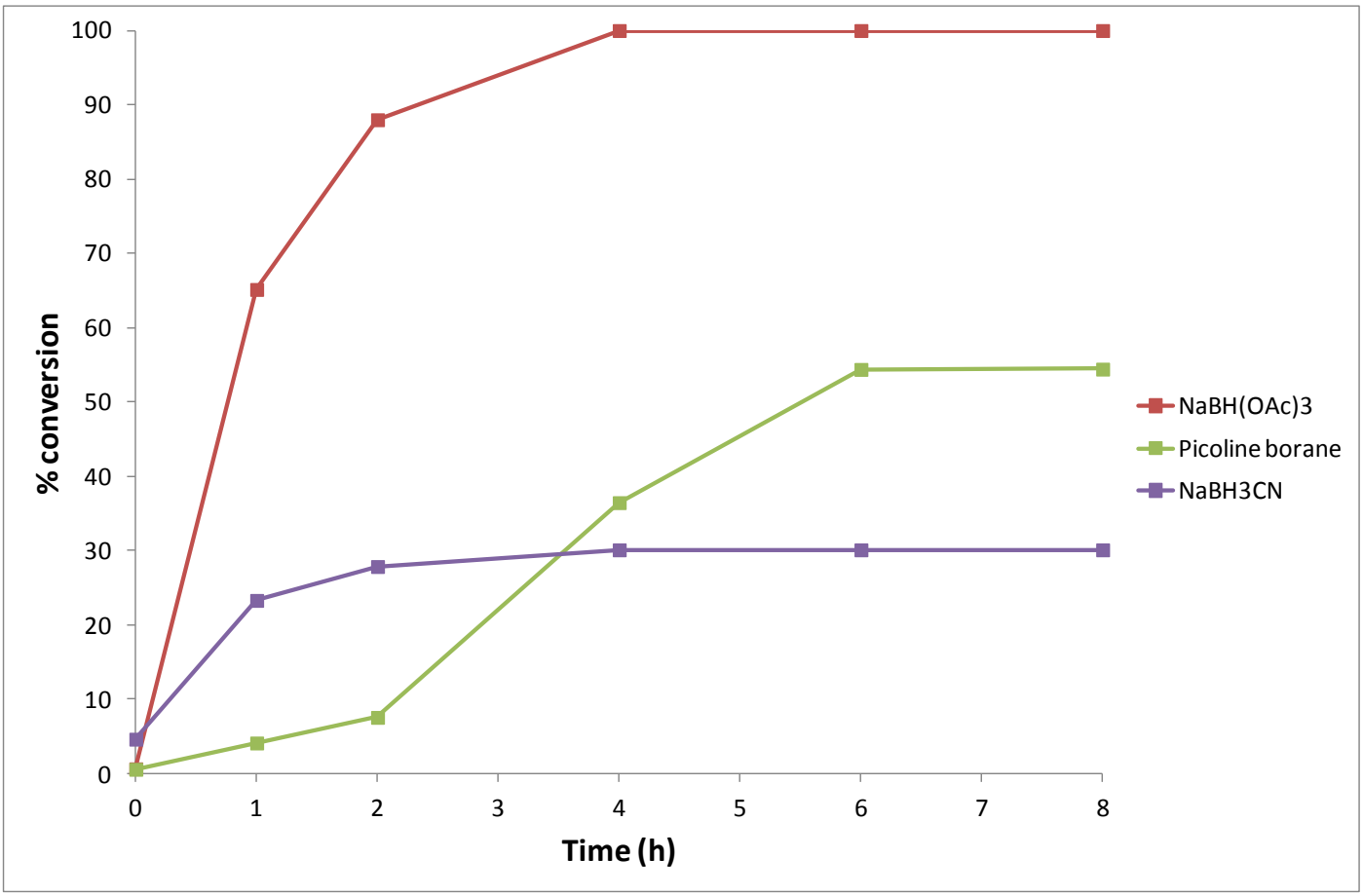
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.0	0.6
1	3.1	0.4	0.7
2	10.2	0.5	3.7
4	30.7	44.7	3.7
6	48.0	49.4	3.7
8	63.8	50.5	3.7
24	89.4	50.5	3.7

Reaction 5: CPME



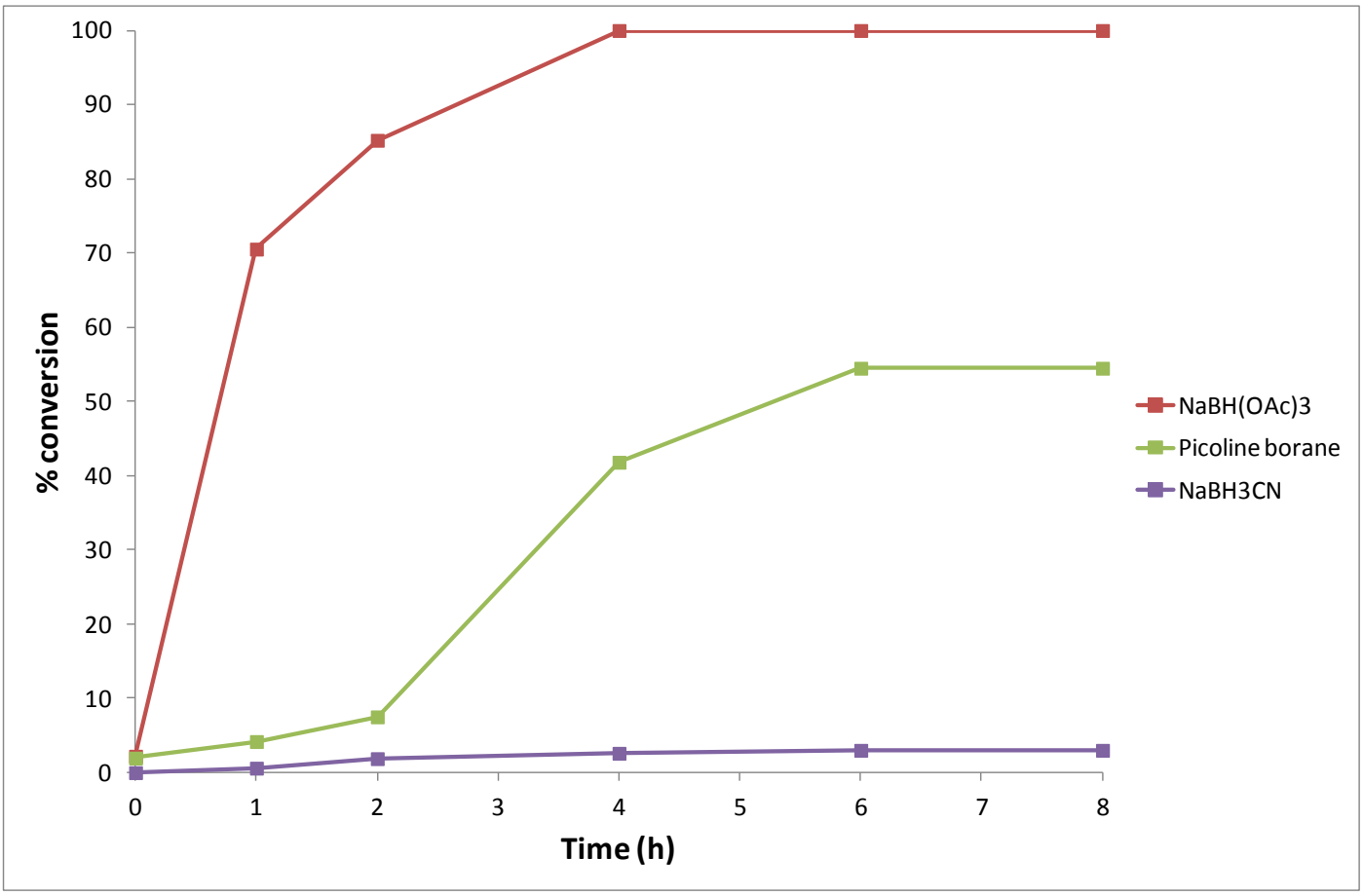
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.4	0.0
1	2.5	0.0	0.0
2	9.7	0.6	0.0
4	31.4	2.2	0.0
6	47.6	44.8	0.0
8	53.7	44.8	0.0
24	87.4	44.8	0.0

Reaction 5: DCE



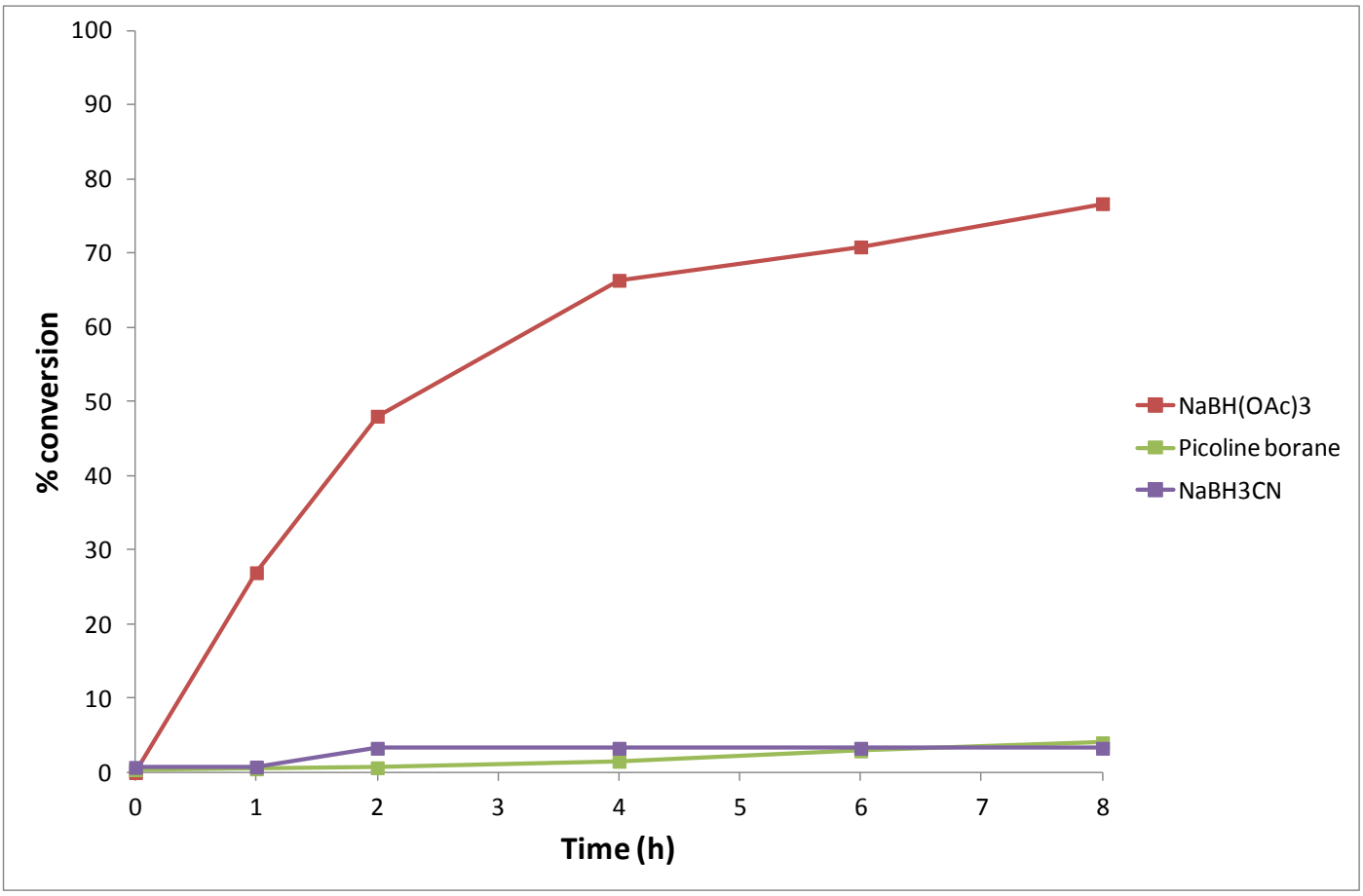
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.7	2.0	4.7
1	65.2	4.2	23.3
2	88.0	7.5	27.9
4	100.0	41.8	30.1
6	100.0	54.5	30.1
8	100.0	54.5	30.1
24	100.0	54.5	30.1

Reaction 5: CH_2Cl_2



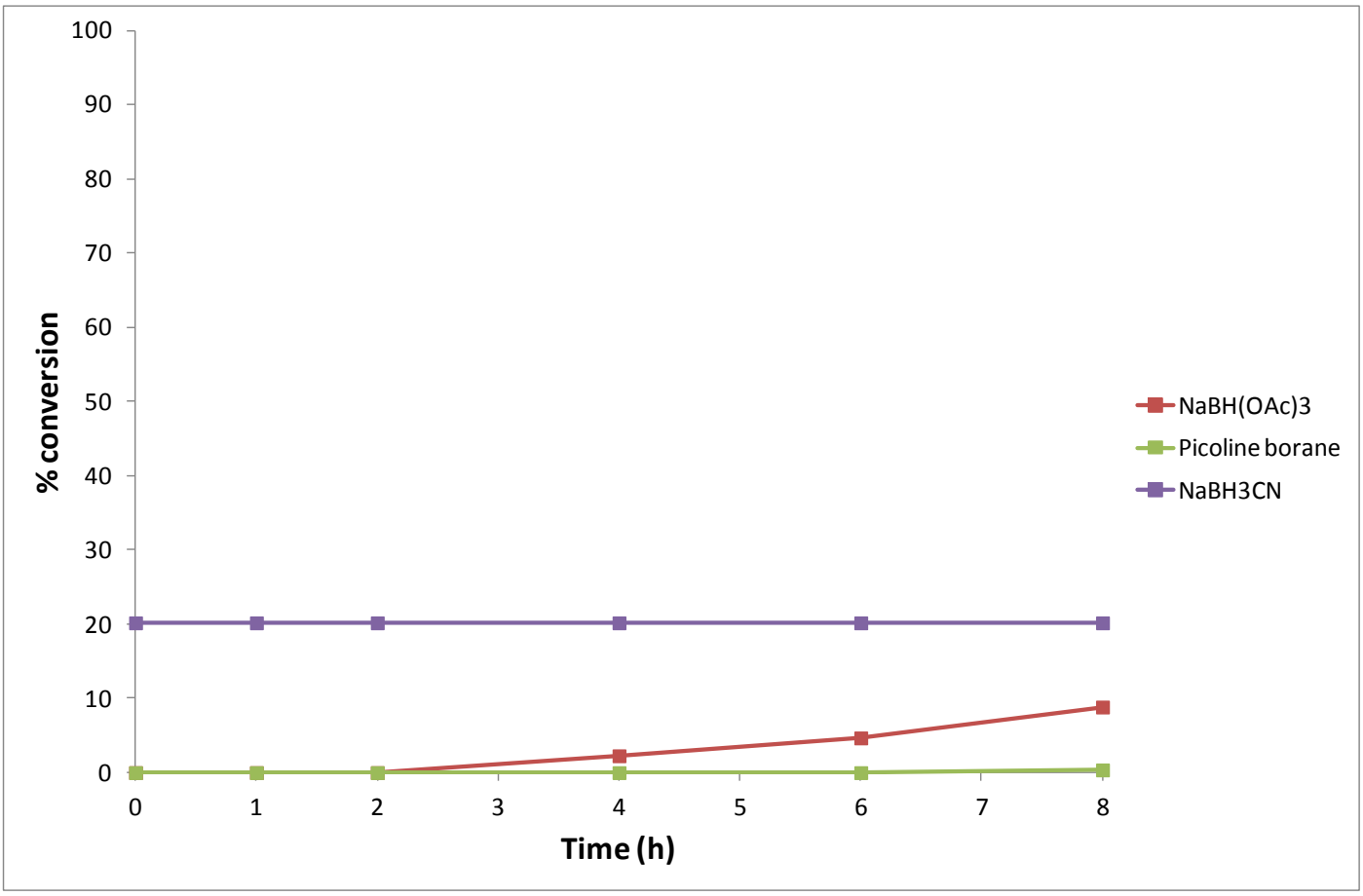
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	2.2	2.0	0.0
1	70.5	4.2	0.6
2	85.2	7.5	1.9
4	100.0	41.8	2.6
6	100.0	54.5	3.0
8	100.0	54.5	3.0
24	100.0	54.5	3.0

Reaction 5: DMC



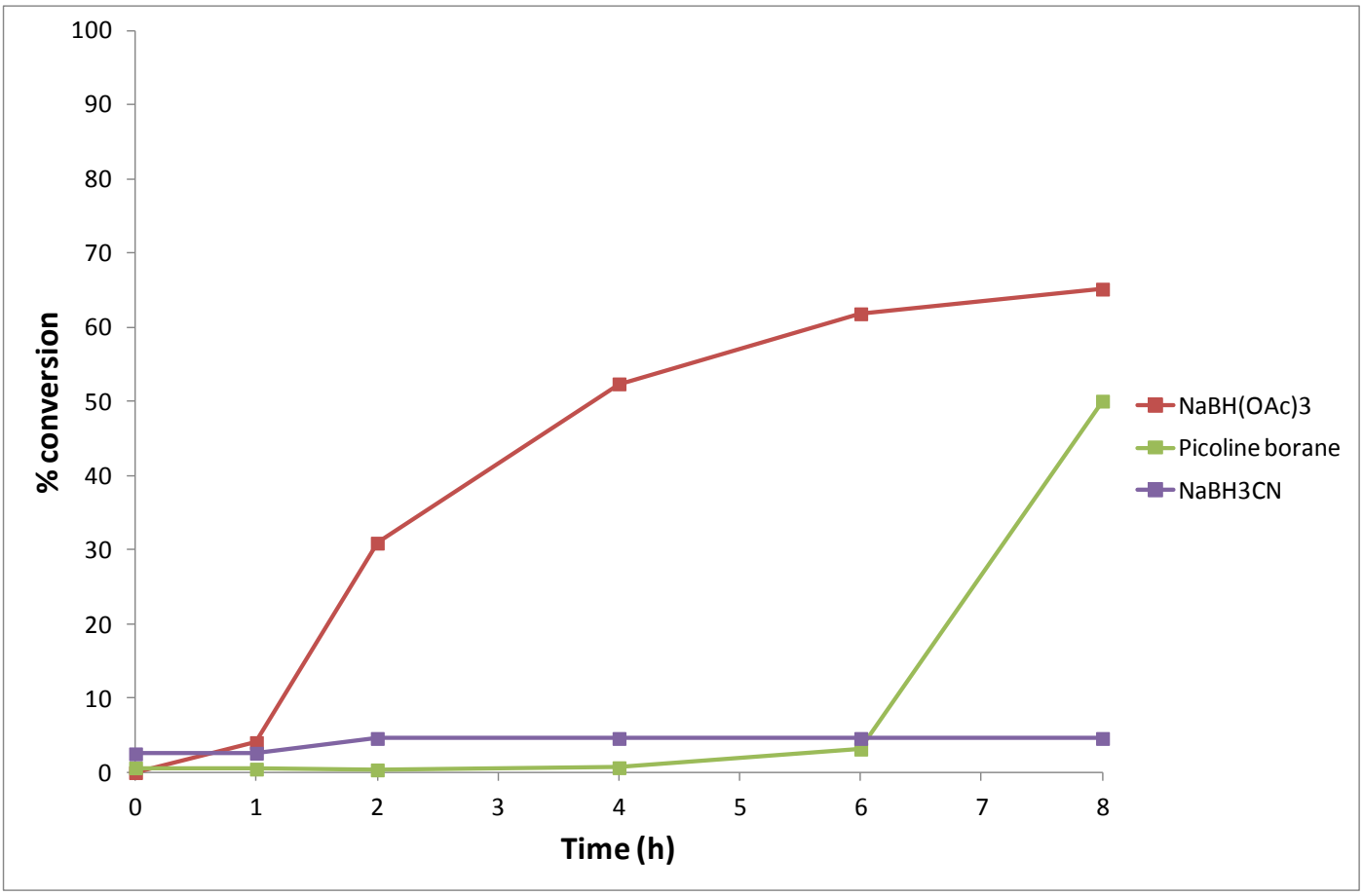
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.4	0.7
1	26.9	0.5	0.8
2	48.0	0.7	3.3
4	66.3	1.5	3.3
6	70.8	2.9	3.3
8	76.7	4.0	3.3
24	87.1	47.8	3.3

Reaction 5: DMF



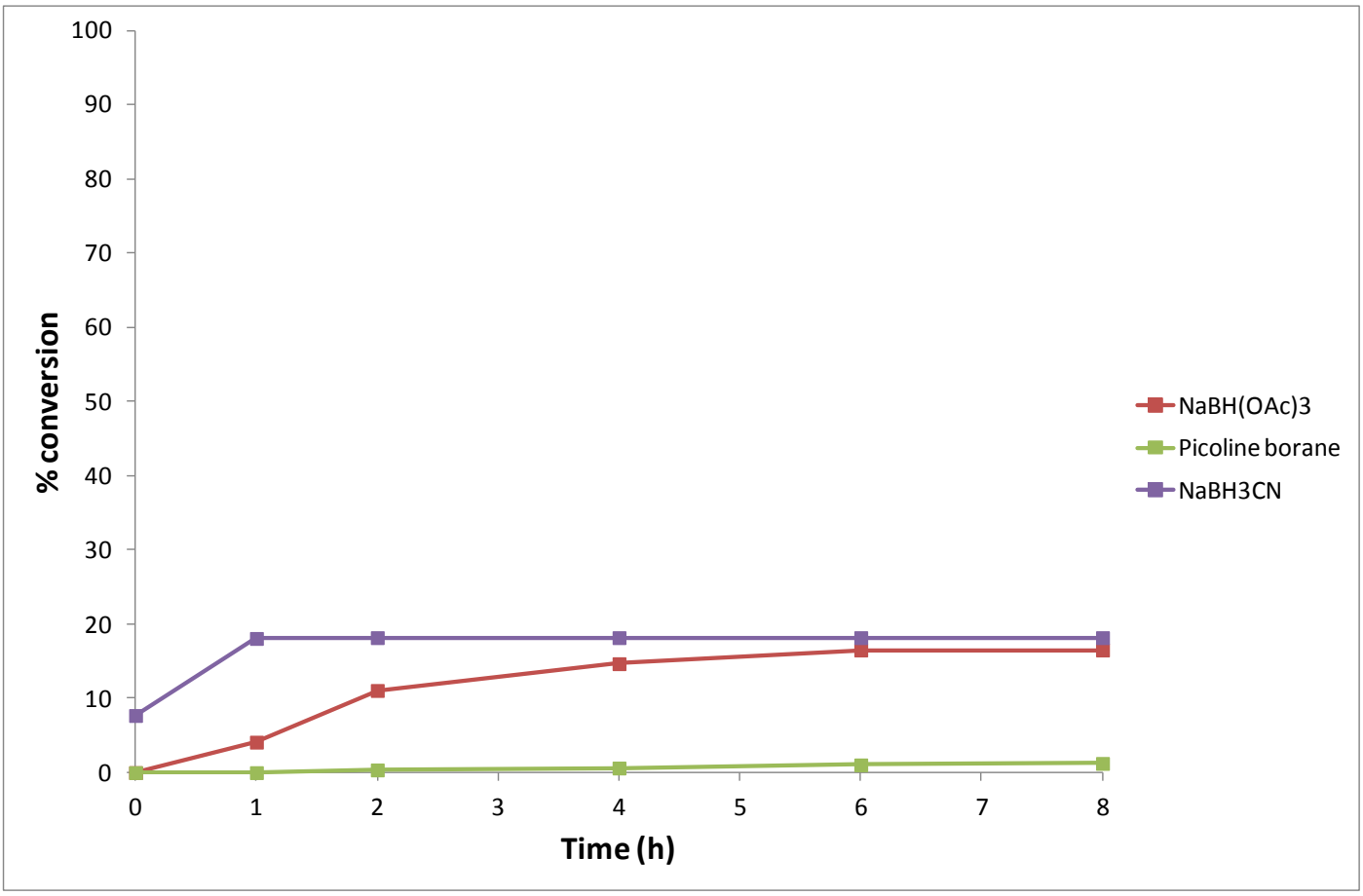
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.0	20.2
1	0.0	0.0	20.2
2	0.0	0.0	20.2
4	2.3	0.0	20.2
6	4.7	0.0	20.2
8	8.8	0.4	20.2
24	25.4	8.6	20.2

Reaction 5: EtOAc



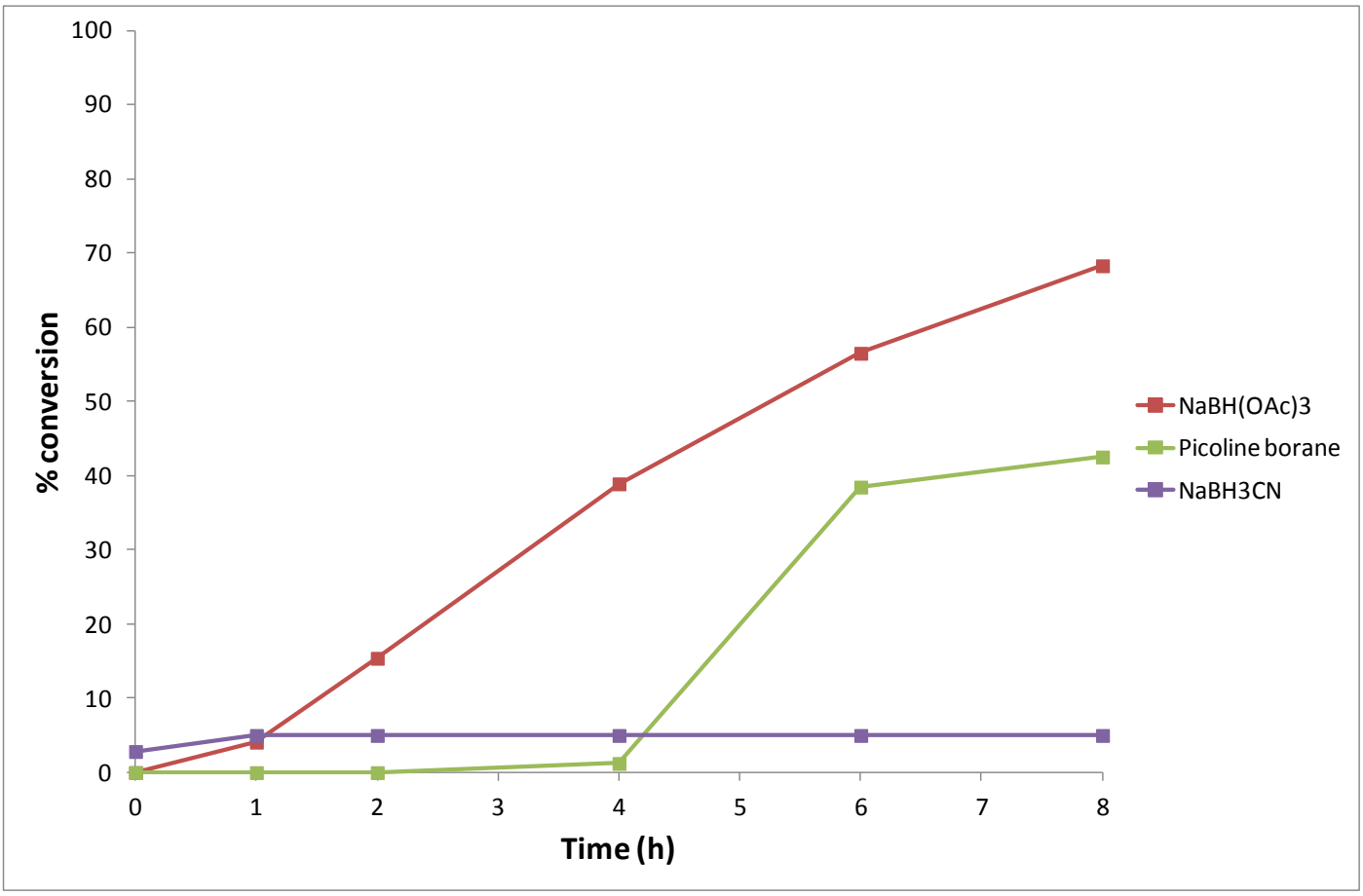
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.6	2.5
1	4.0	0.5	2.6
2	30.9	0.4	4.6
4	52.4	0.7	4.6
6	61.8	3.2	4.6
8	65.2	50.1	4.6
24	72.0	52.3	4.6

Reaction 5: IPA



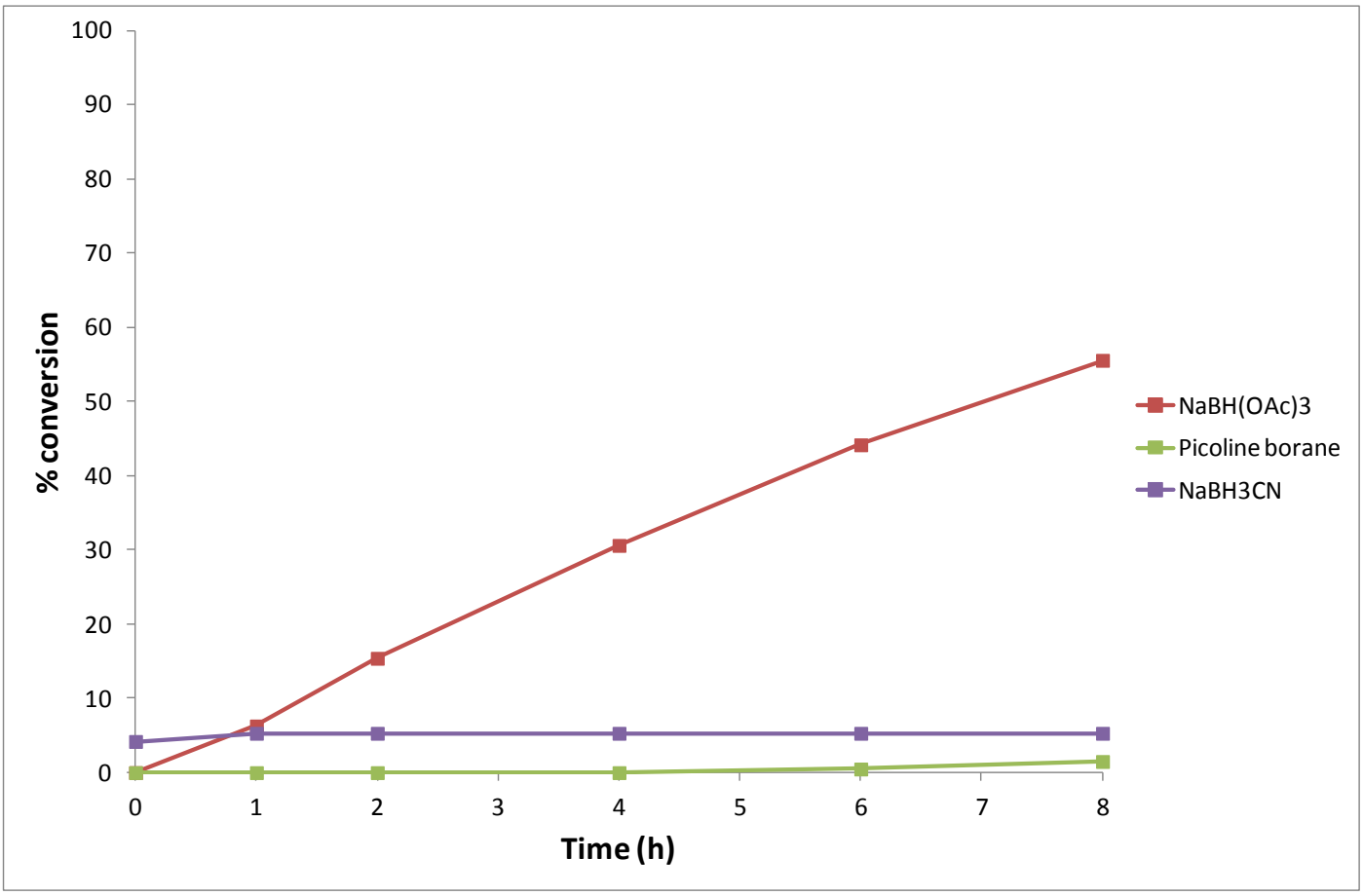
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.0	7.7
1	4.1	0.0	18.1
2	11.1	0.4	18.2
4	14.7	0.6	18.2
6	16.5	1.0	18.2
8	16.5	1.2	18.2
24	17.0	6.1	18.2

Reaction 5: 2-MeTHF



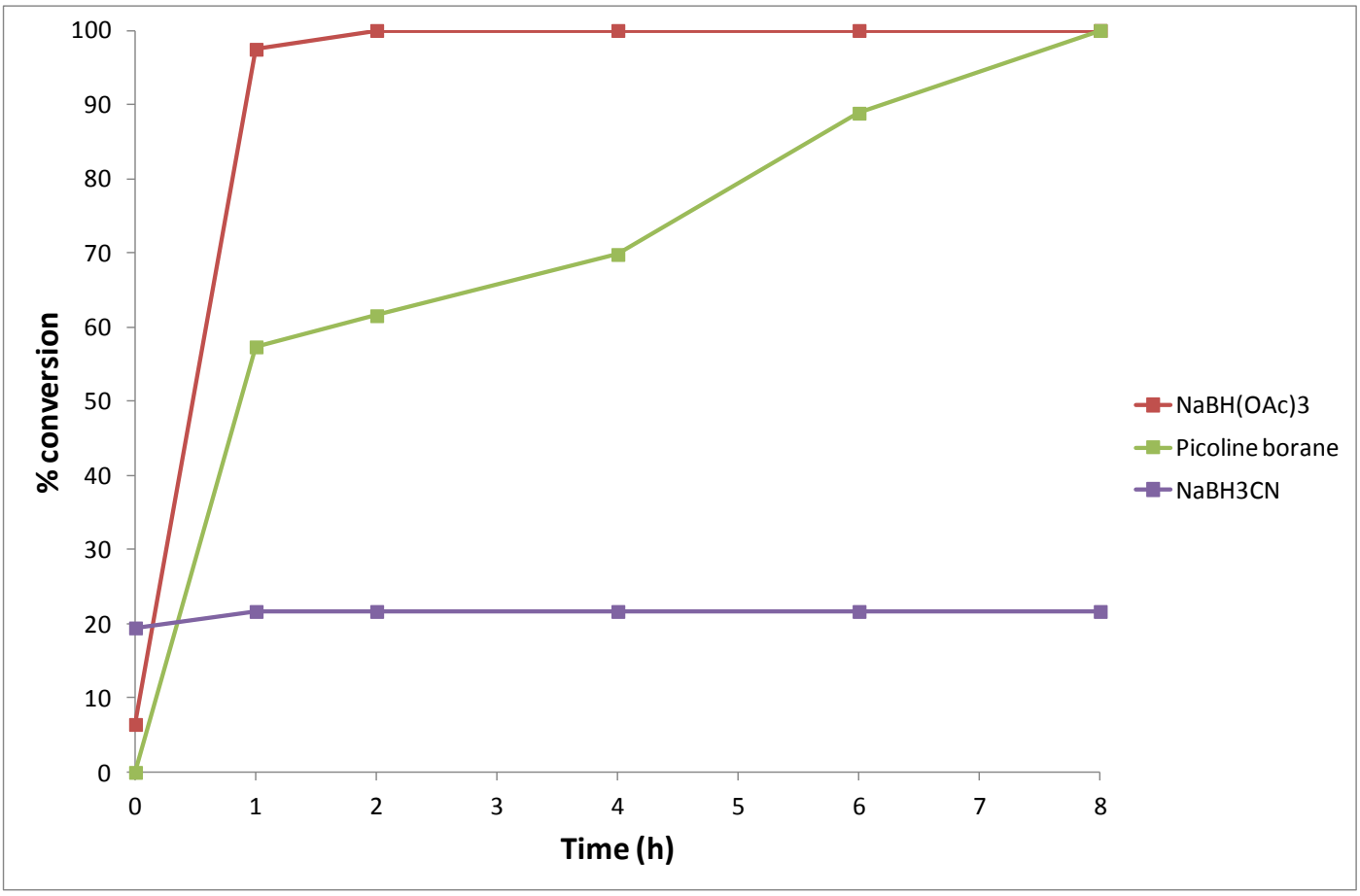
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.0	2.8
1	4.1	0.0	5.0
2	15.4	0.0	5.0
4	38.9	1.2	5.0
6	56.5	38.5	5.0
8	68.3	42.5	5.0
24	73.1	42.5	5.0

Reaction 5: THF



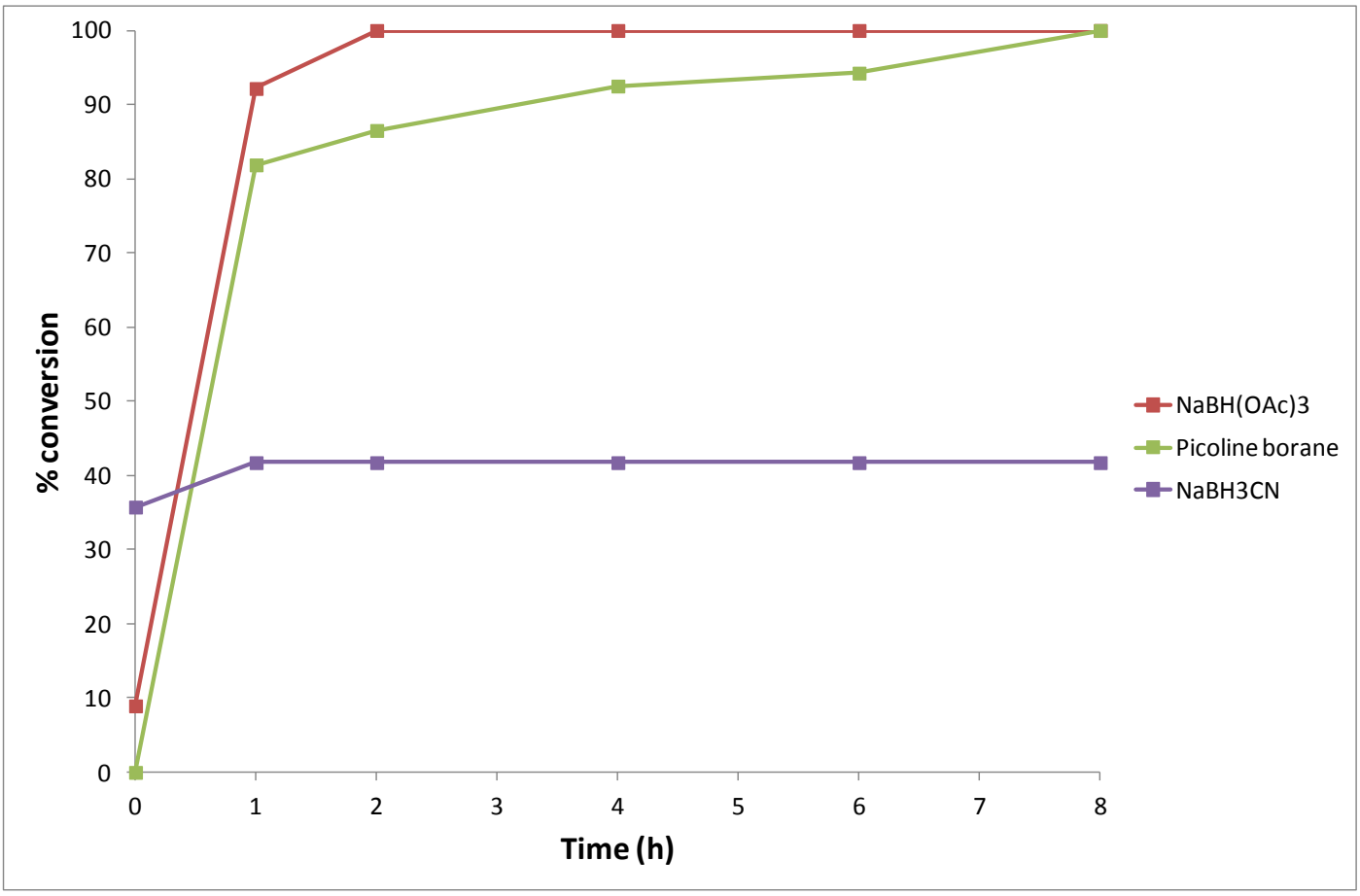
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.0	4.2
1	6.3	0.0	5.3
2	15.4	0.0	5.3
4	30.6	0.0	5.3
6	44.2	0.5	5.3
8	55.6	1.5	5.3
24	57.7	48.9	5.3

Reaction 6: TBME



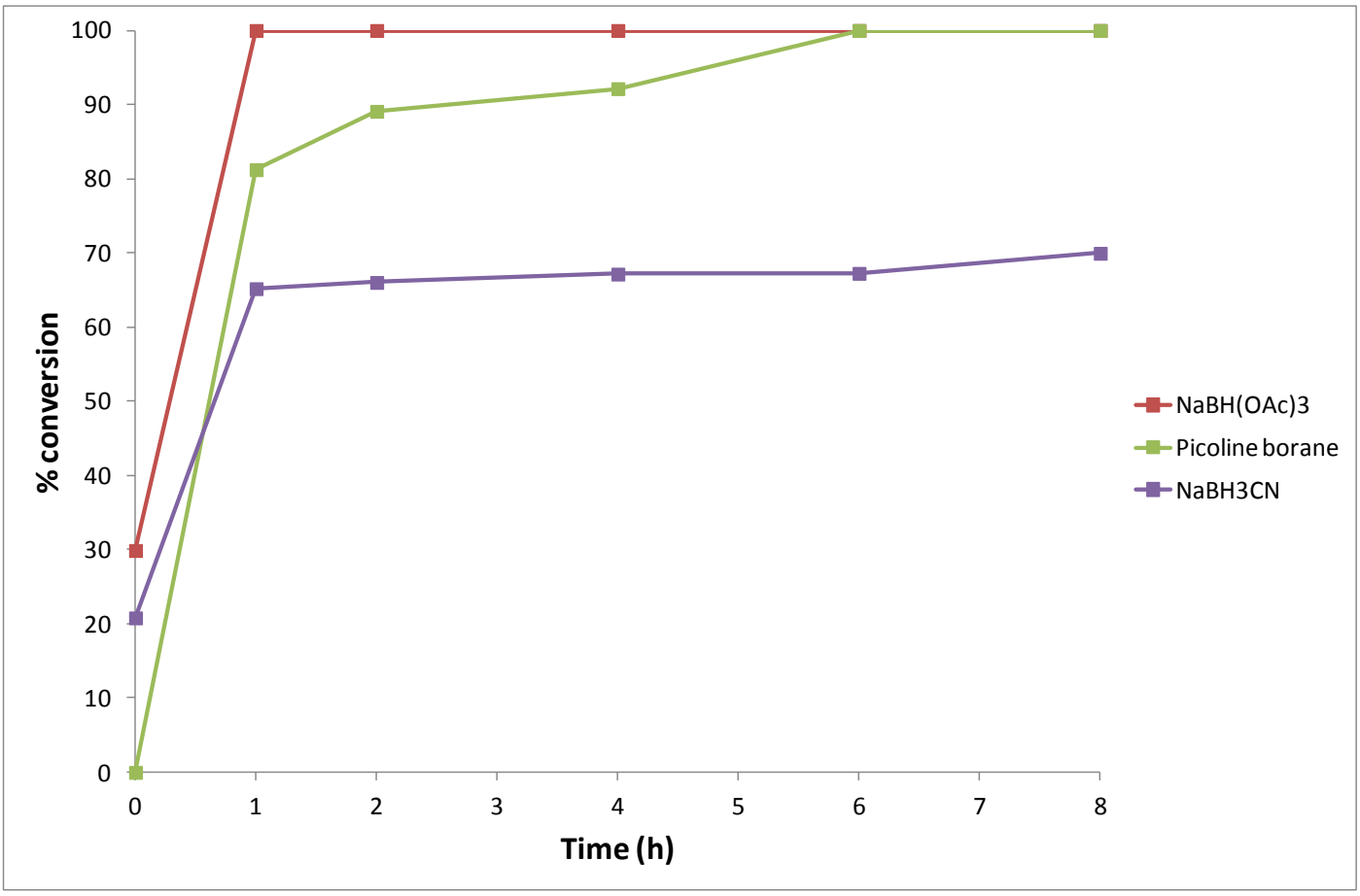
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	6.5	0.0	19.5
1	97.5	57.3	21.7
2	100.0	61.6	21.7
4	100.0	69.8	21.7
6	100.0	88.9	21.7
8	100.0	100.0	21.7
24	100.0	100.0	21.7

Reaction 6: CPME



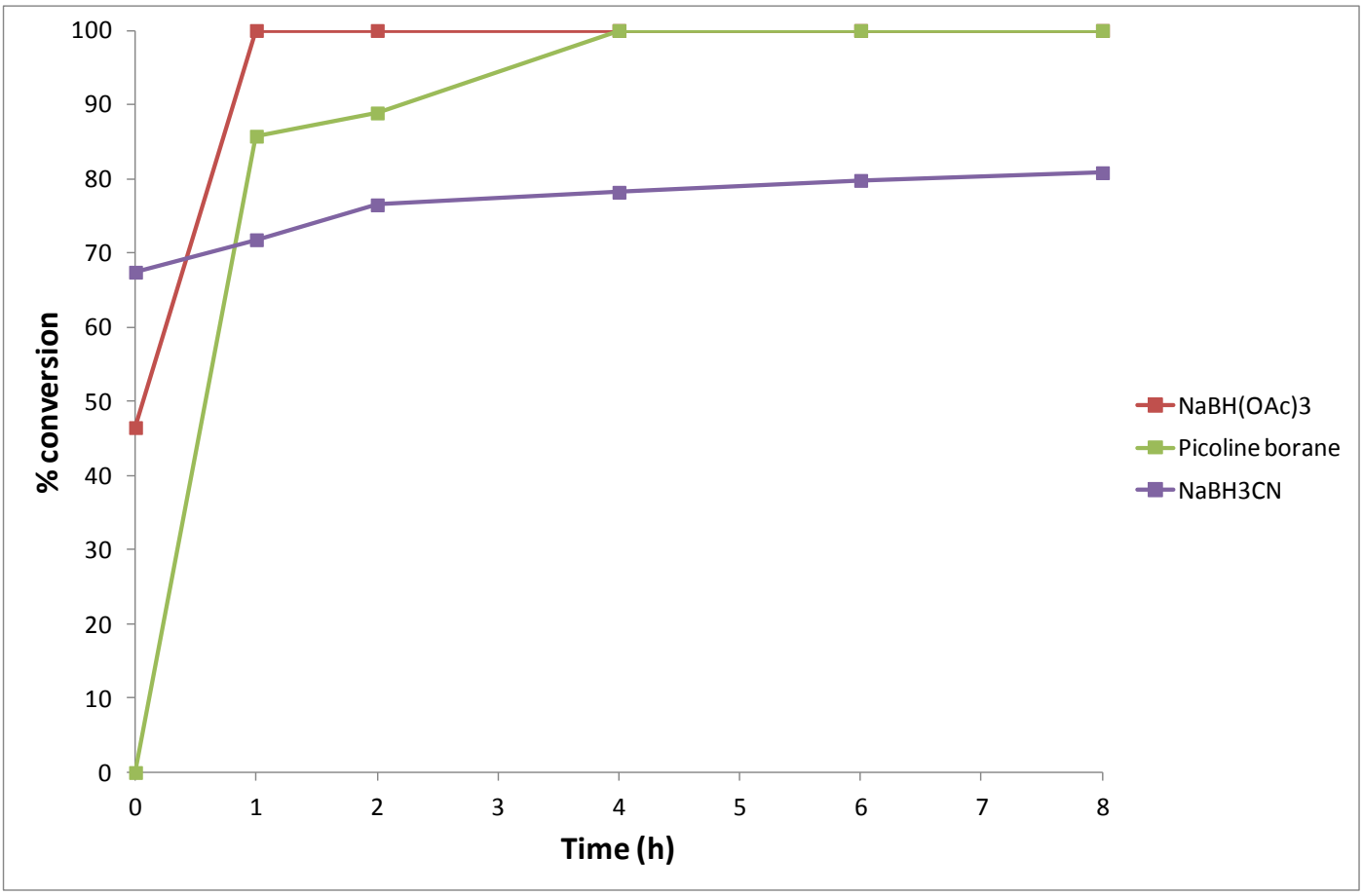
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	9.0	0.0	35.8
1	92.2	81.9	41.7
2	100.0	86.5	41.7
4	100.0	92.5	41.7
6	100.0	94.3	41.7
8	100.0	100.0	41.7
24	100.0	100.0	41.7

Reaction 6: DCE



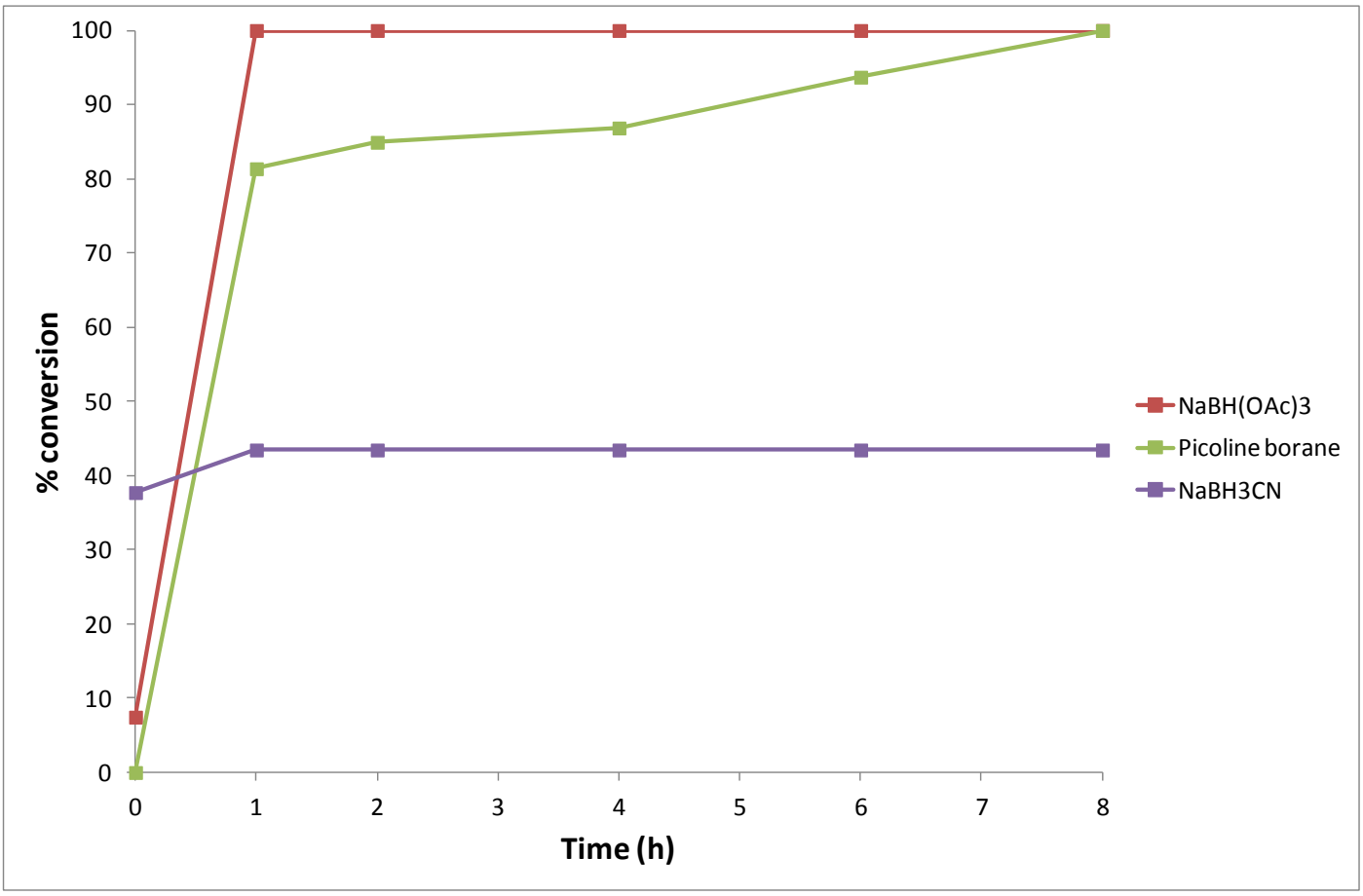
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	29.9	0.0	20.8
1	100.0	81.2	65.2
2	100.0	89.1	66.0
4	100.0	92.2	67.2
6	100.0	100.0	67.3
8	100.0	100.0	70.0
24	100.0	100.0	73.2

Reaction 6: CH_2Cl_2



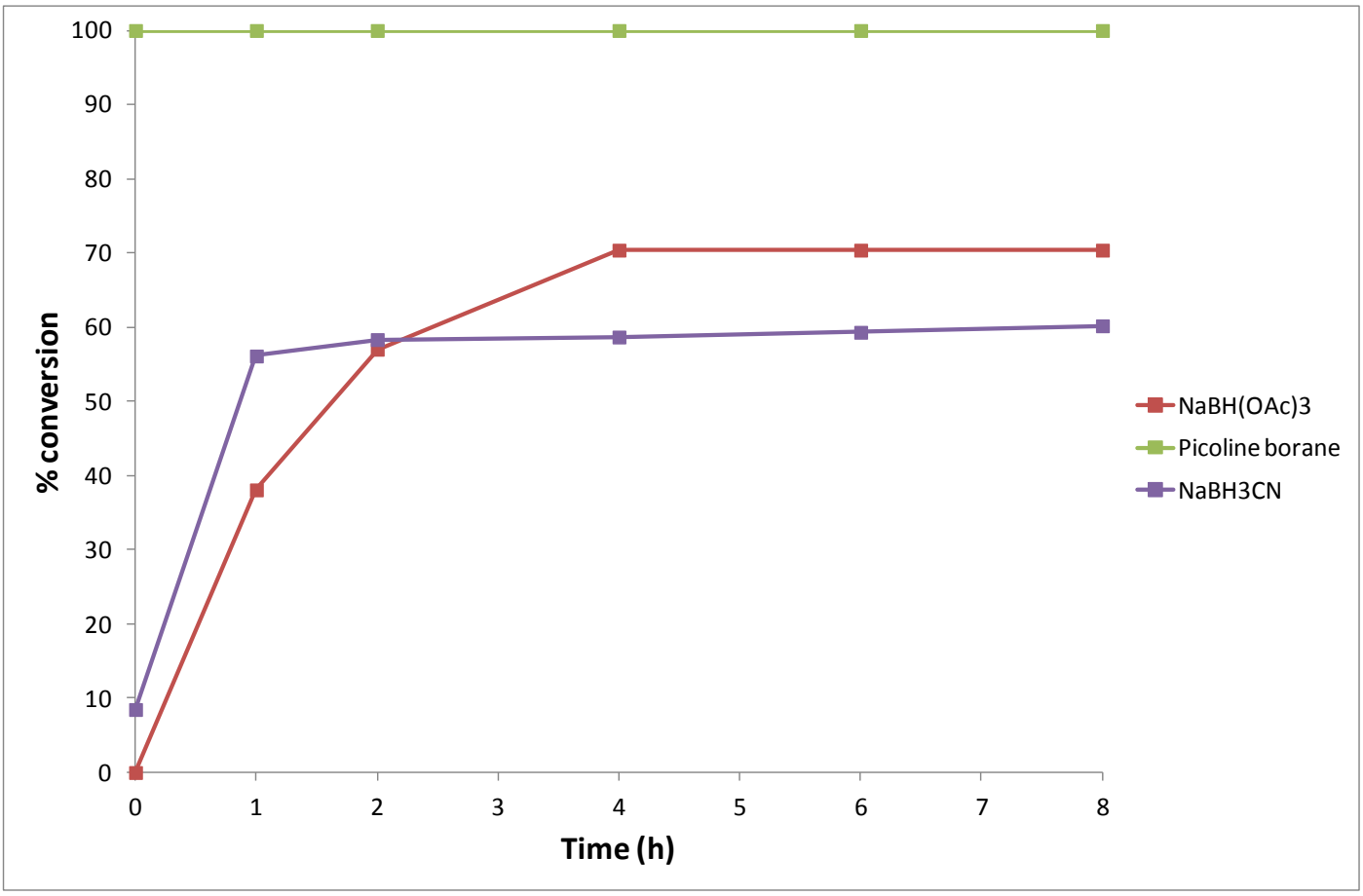
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	46.5	0.0	67.4
1	100.0	85.8	71.8
2	100.0	88.9	76.5
4	100.0	100.0	78.2
6	100.0	100.0	79.8
8	100.0	100.0	80.8
24	100.0	100.0	82.5

Reaction 6: DMC



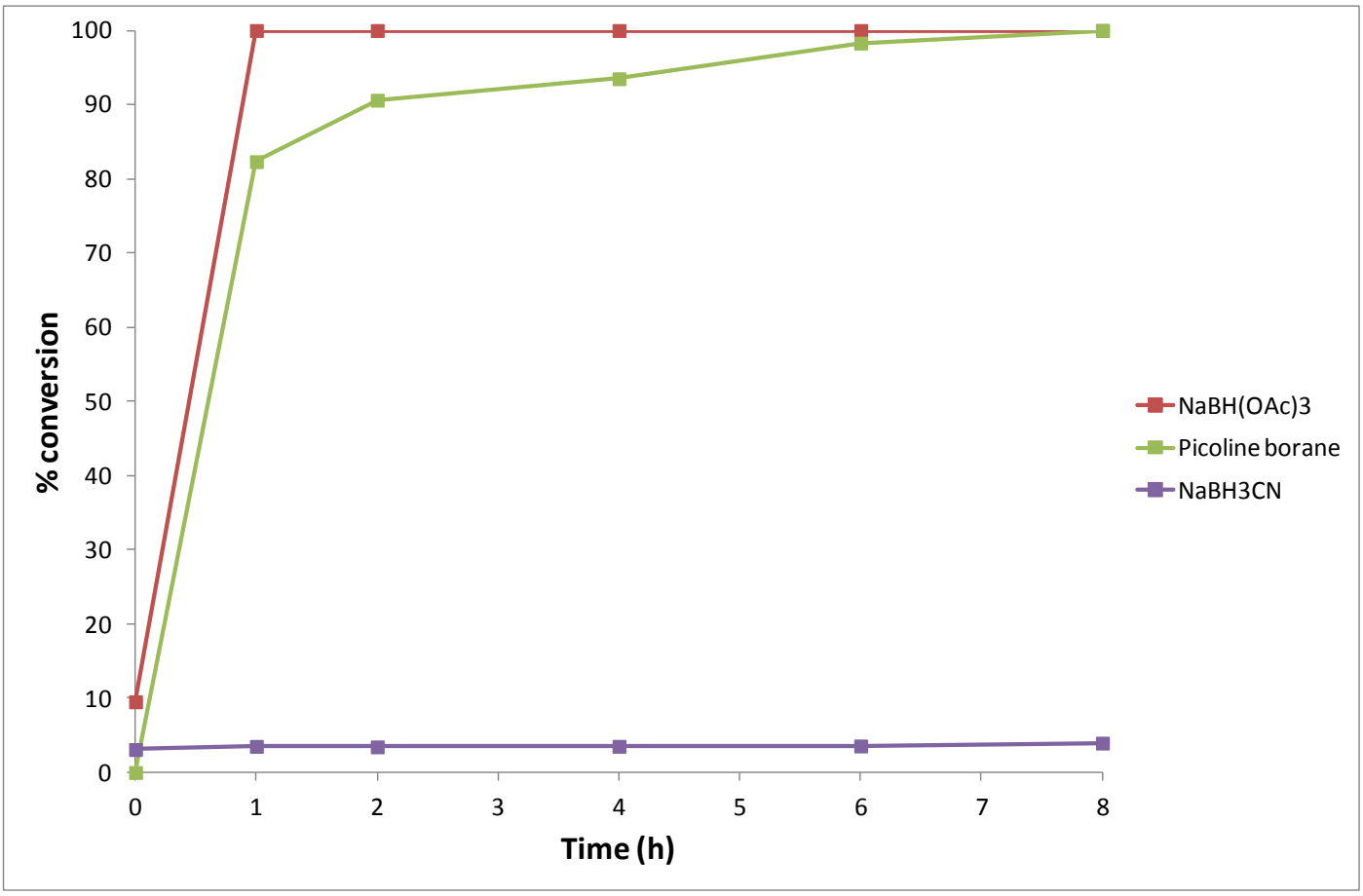
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	7.5	0.0	37.7
1	100.0	81.4	43.5
2	100.0	84.9	43.5
4	100.0	86.9	43.5
6	100.0	93.7	43.5
8	100.0	100.0	43.5
24	100.0	100.0	43.5

Reaction 6: DMF



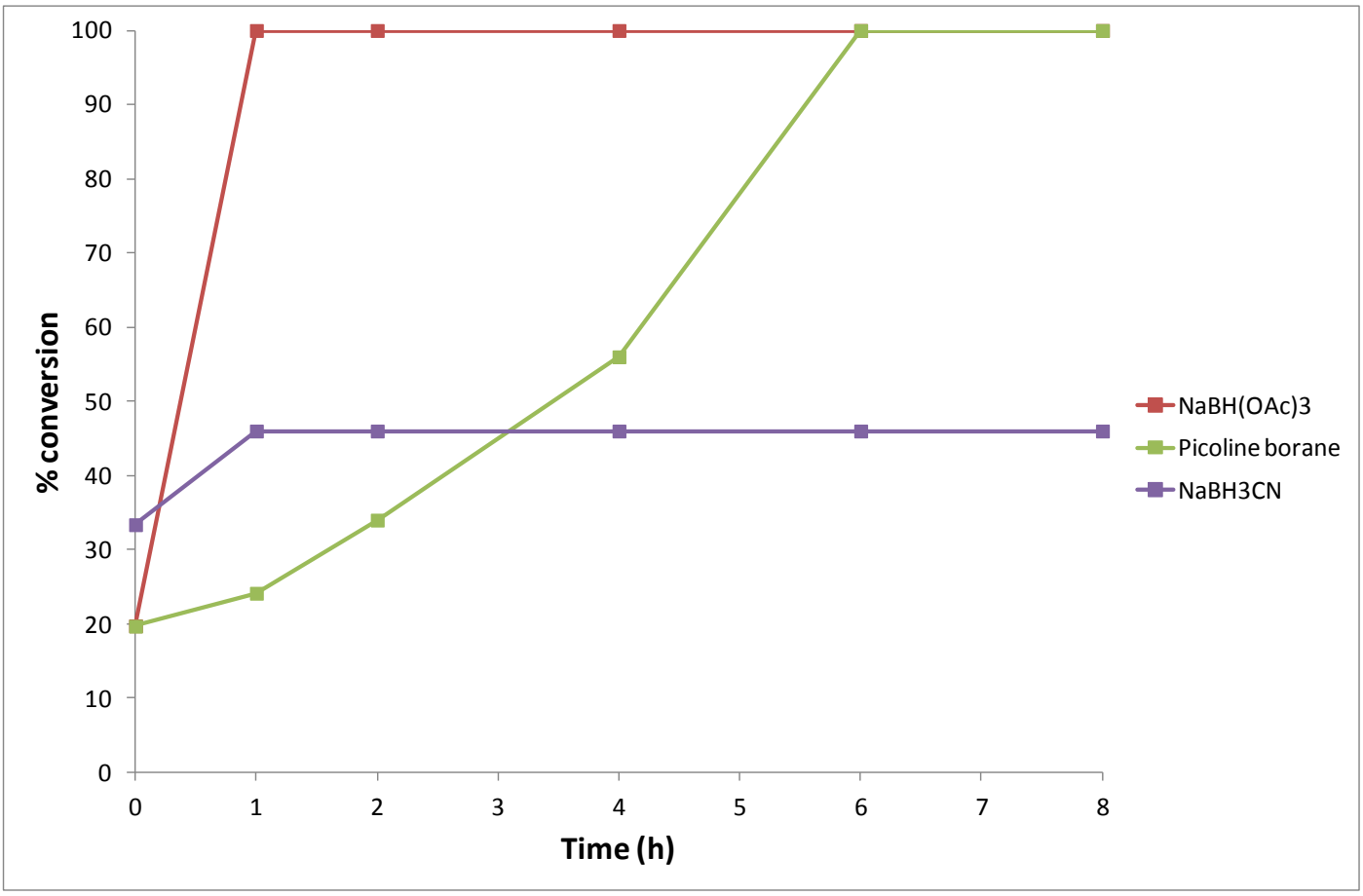
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	100.0	8.5
1	38.1	100.0	56.1
2	57.0	100.0	58.3
4	70.4	100.0	58.7
6	70.4	100.0	59.3
8	70.4	100.0	60.2
24	70.4	100.0	93.6

Reaction 6: EtOAc



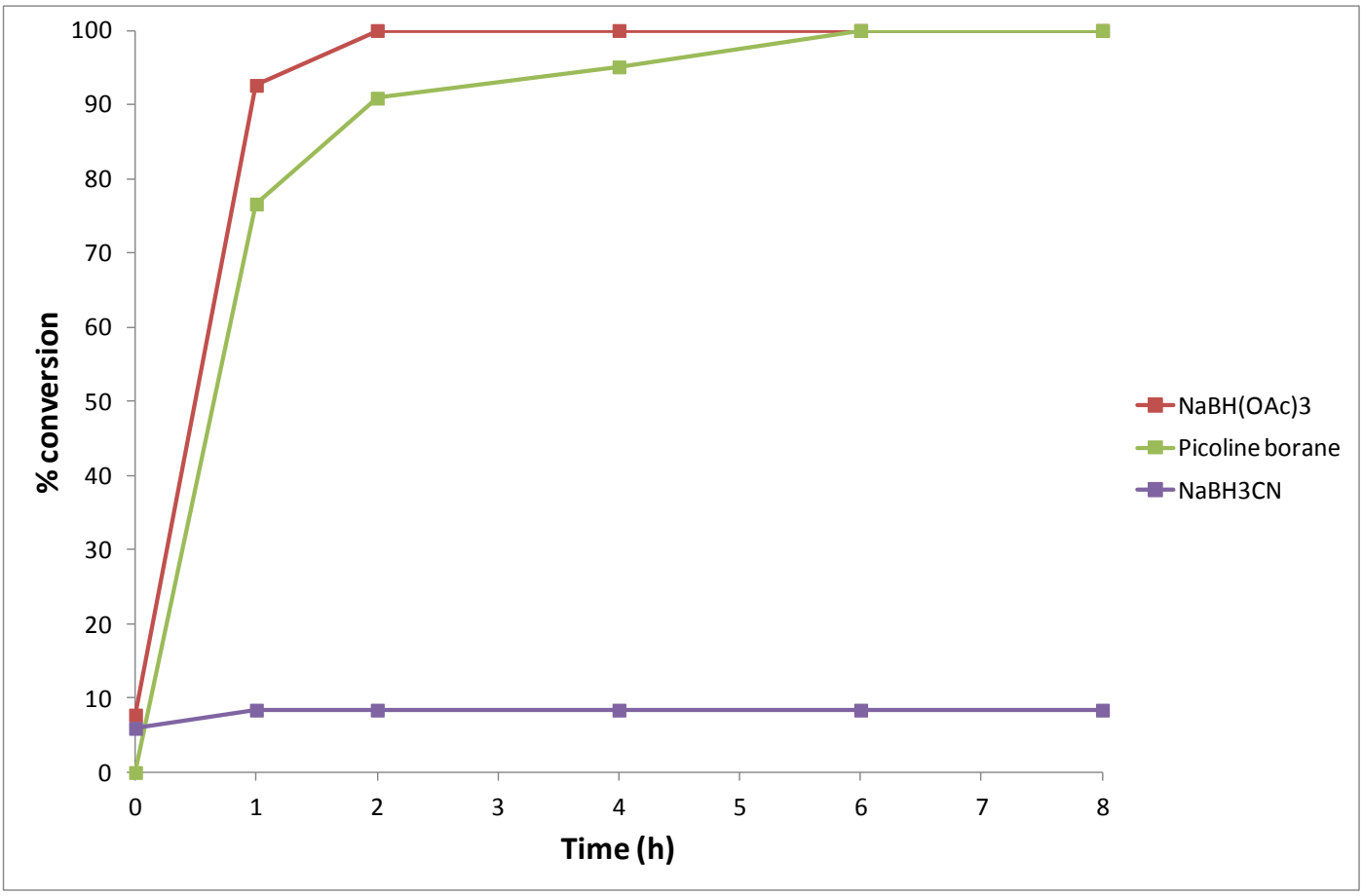
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	9.5	0.0	3.1
1	100.0	82.3	3.5
2	100.0	90.6	3.5
4	100.0	93.5	3.5
6	100.0	98.3	3.6
8	100.0	100.0	4.0
24	100.0	100.0	31.0

Reaction 6: IPA



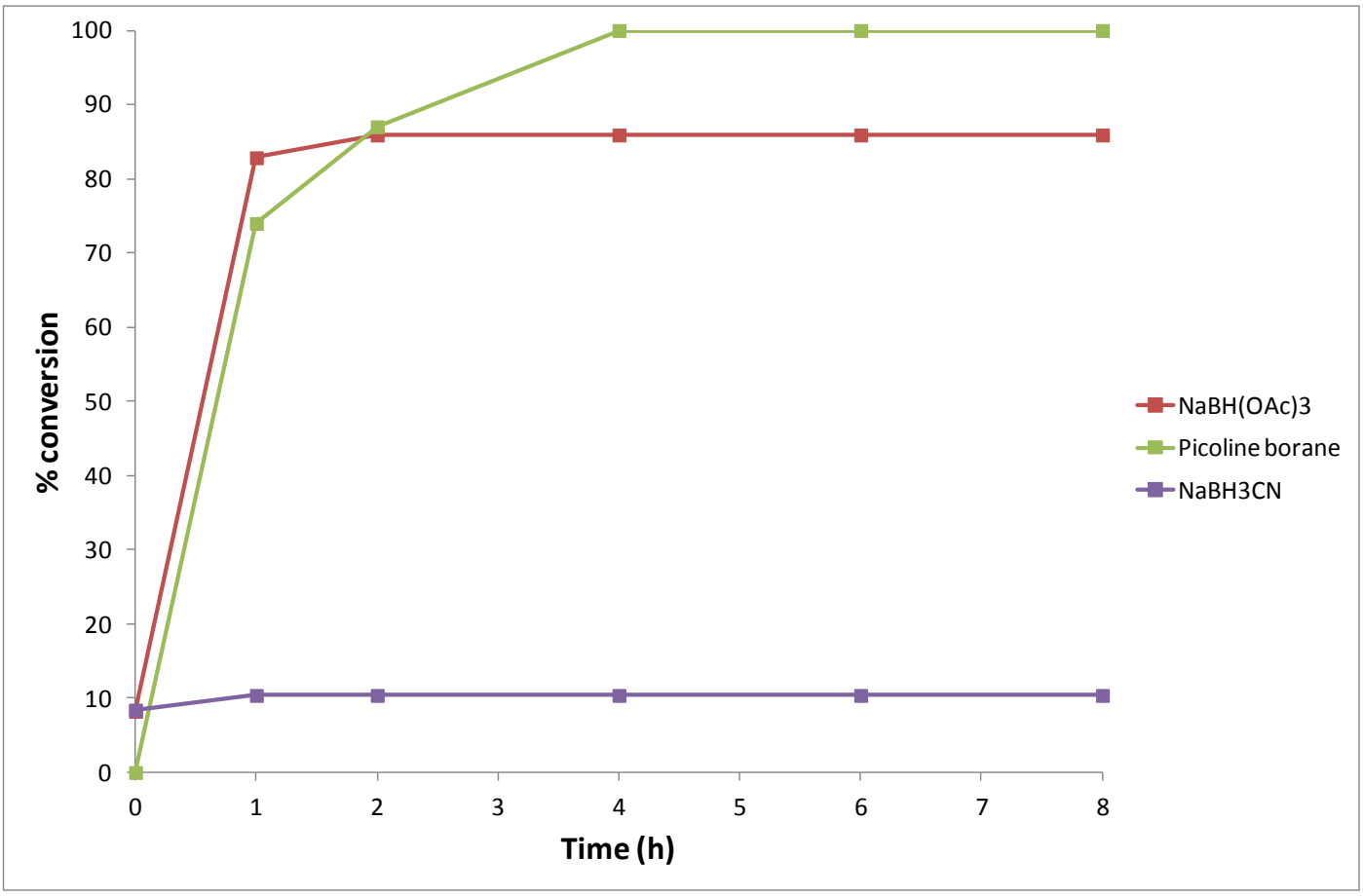
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	19.8	19.7	33.4
1	100.0	24.2	46.0
2	100.0	34.0	46.0
4	100.0	56.0	46.0
6	100.0	100.0	46.0
8	100.0	100.0	46.0
24	100.0	100.0	46.0

Reaction 6: 2-MeTHF



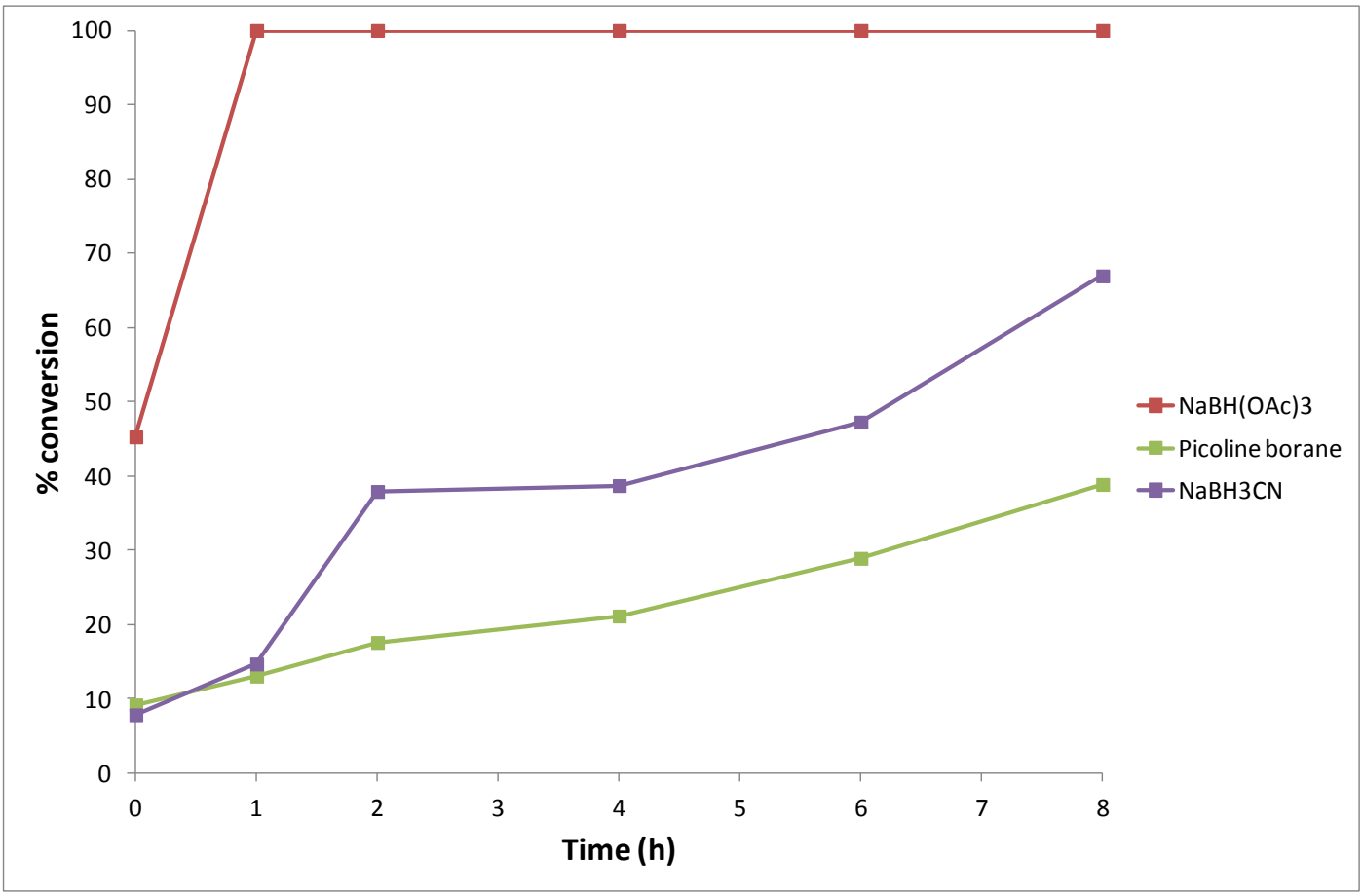
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	7.7	0.0	5.9
1	92.6	76.6	8.4
2	100.0	90.9	8.4
4	100.0	95.1	8.4
6	100.0	100.0	8.4
8	100.0	100.0	8.4
24	100.0	100.0	8.4

Reaction 6: THF



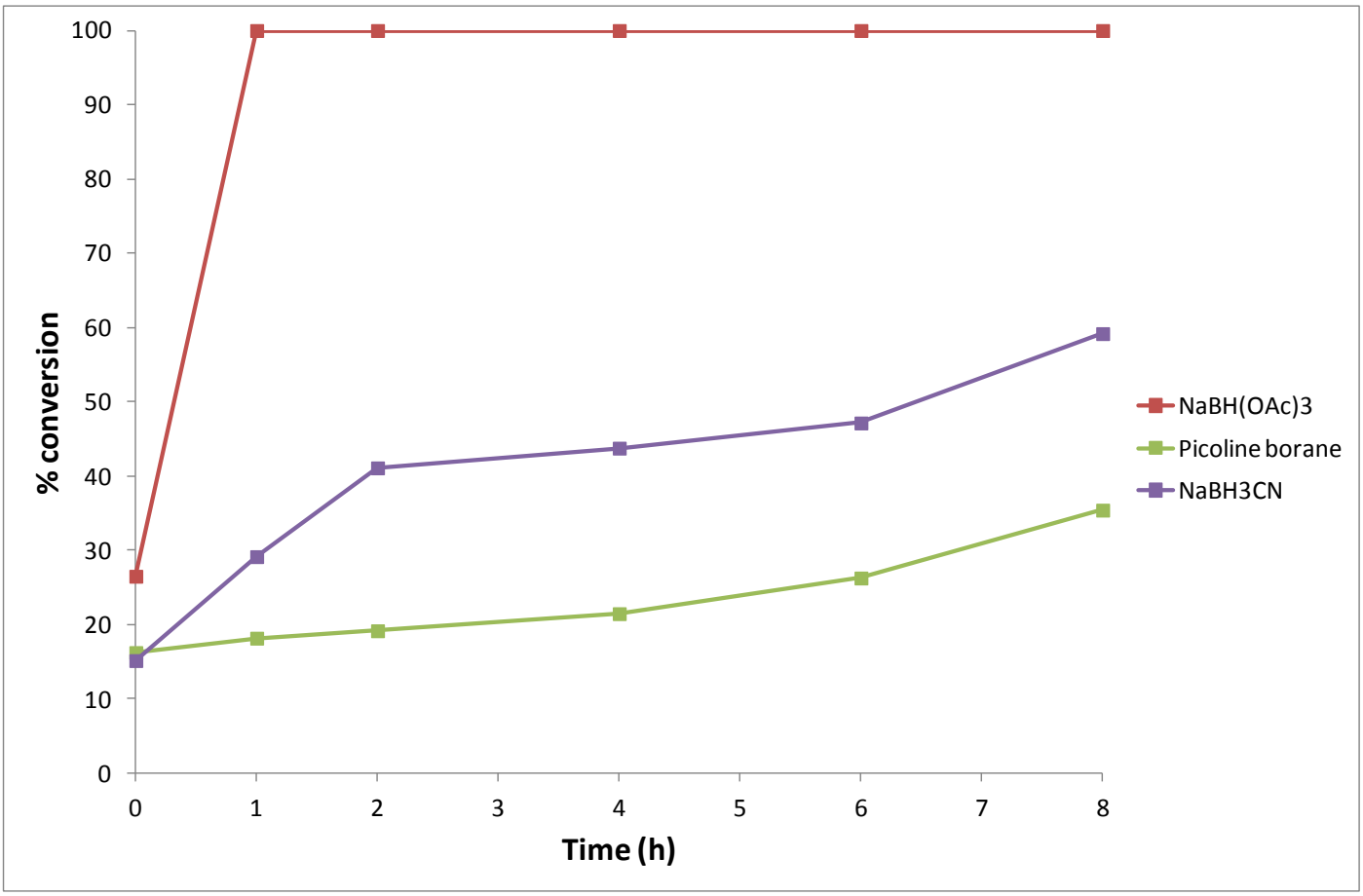
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	8.2	0.0	8.4
1	82.8	74.0	10.4
2	85.9	87.0	10.4
4	85.9	100.0	10.4
6	85.9	100.0	10.4
8	85.9	100.0	10.4
24	85.9	100.0	10.4

Reaction 7: TBME



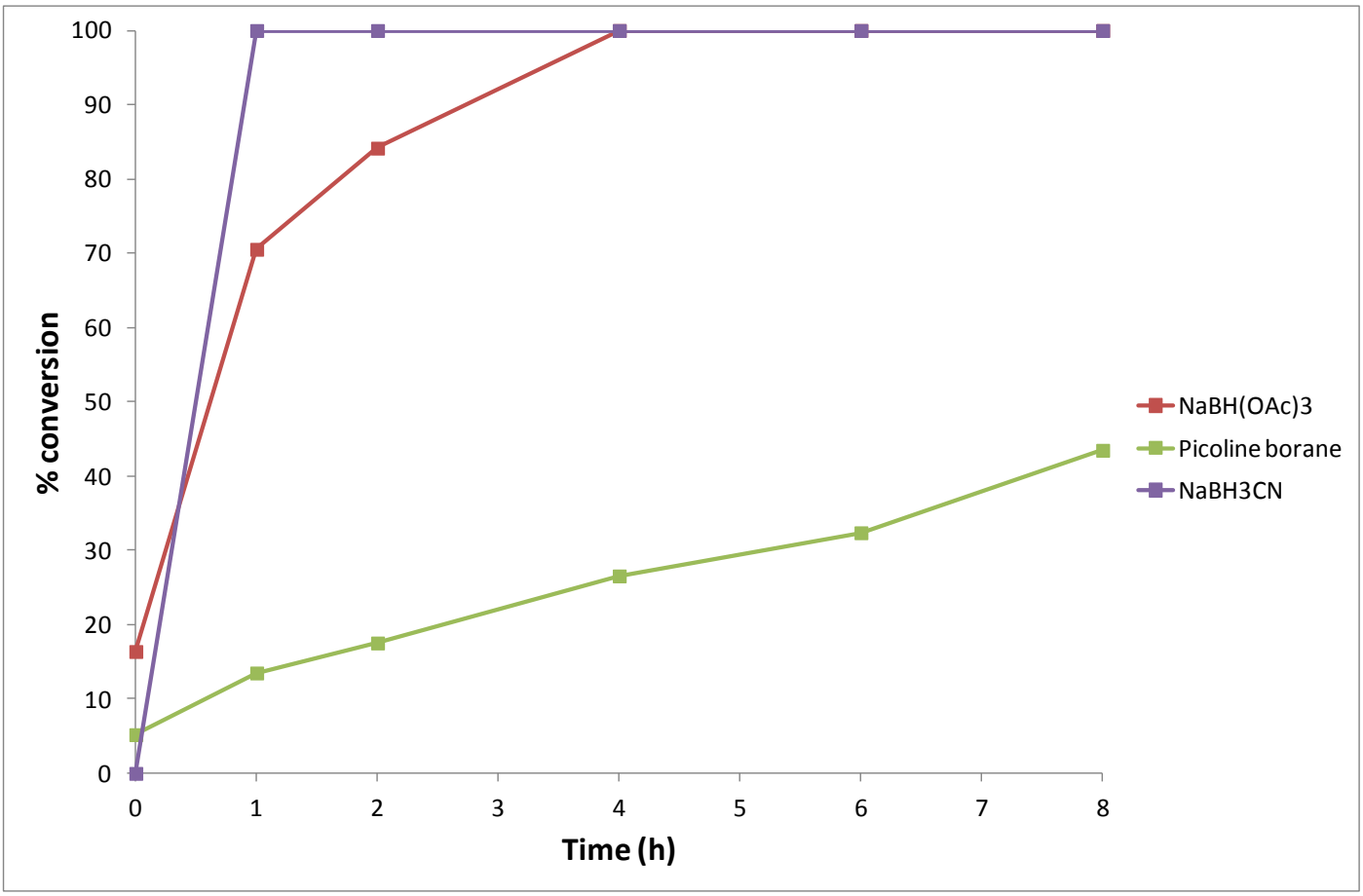
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	45.3	9.2	7.9
1	100.0	13.1	14.7
2	100.0	17.6	37.9
4	100.0	21.2	38.7
6	100.0	29.0	47.3
8	100.0	38.9	67.0
24	100.0	59.3	82.0

Reaction 7: CPME



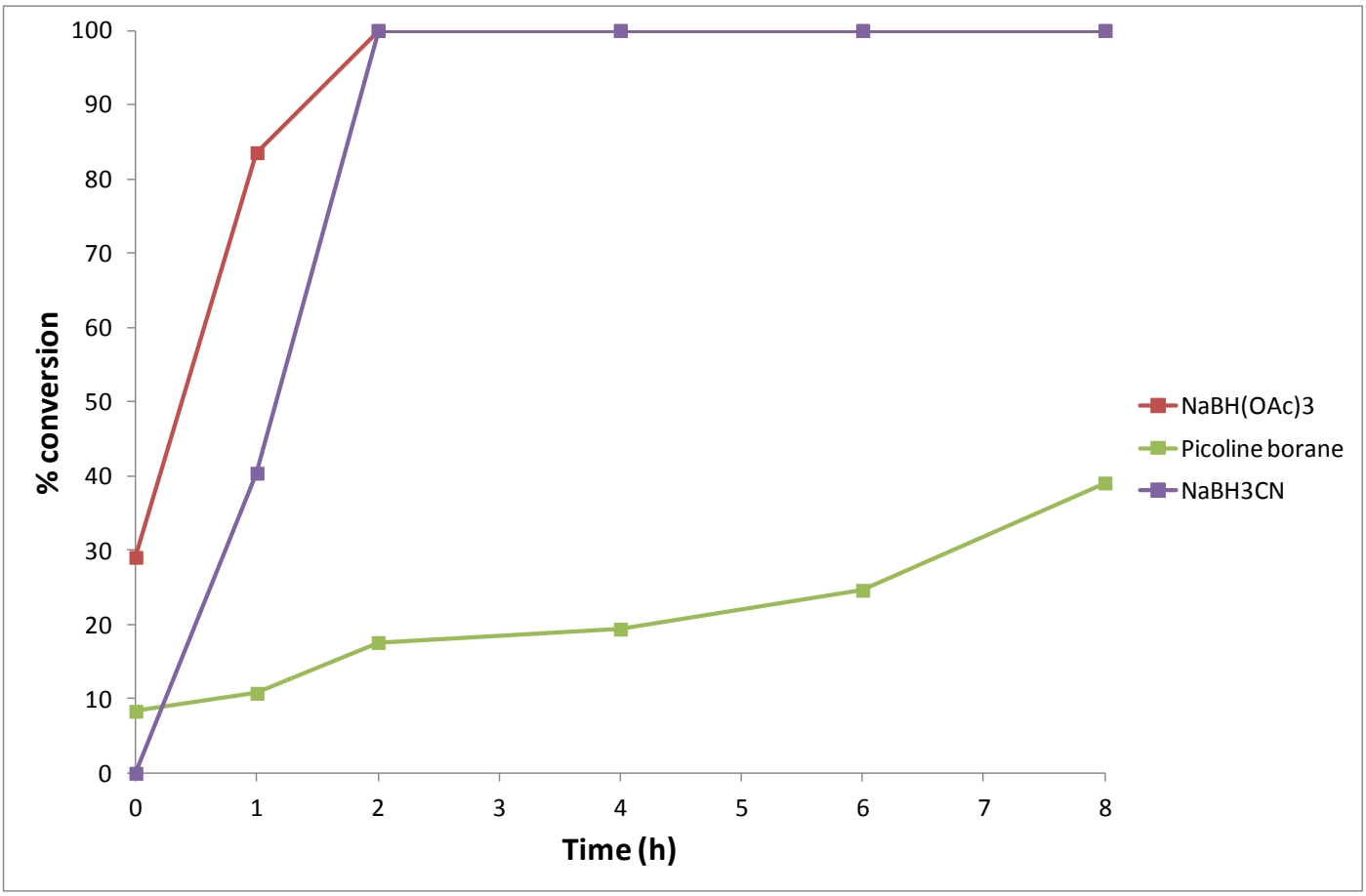
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	26.5	16.3	15.2
1	100.0	18.2	29.2
2	100.0	19.2	41.1
4	100.0	21.5	43.8
6	100.0	26.3	47.2
8	100.0	35.4	59.2
24	100.0	55.4	59.2

Reaction 7: DCE



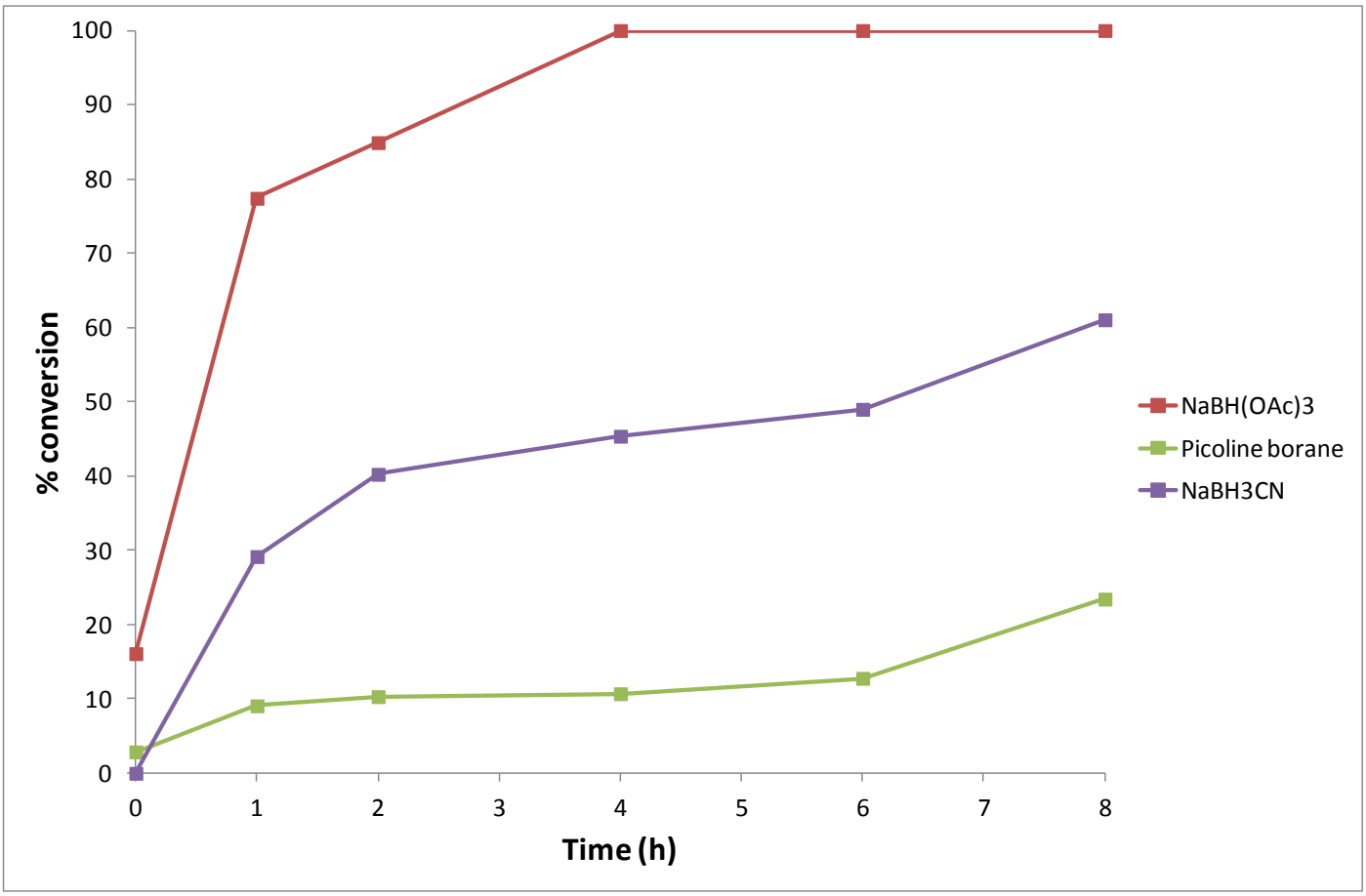
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	16.4	5.2	0.0
1	70.5	13.5	100.0
2	84.2	17.6	100.0
4	100.0	26.6	100.0
6	100.0	32.4	100.0
8	100.0	43.5	100.0
24	100.0	58.0	100.0

Reaction 7: CH_2Cl_2



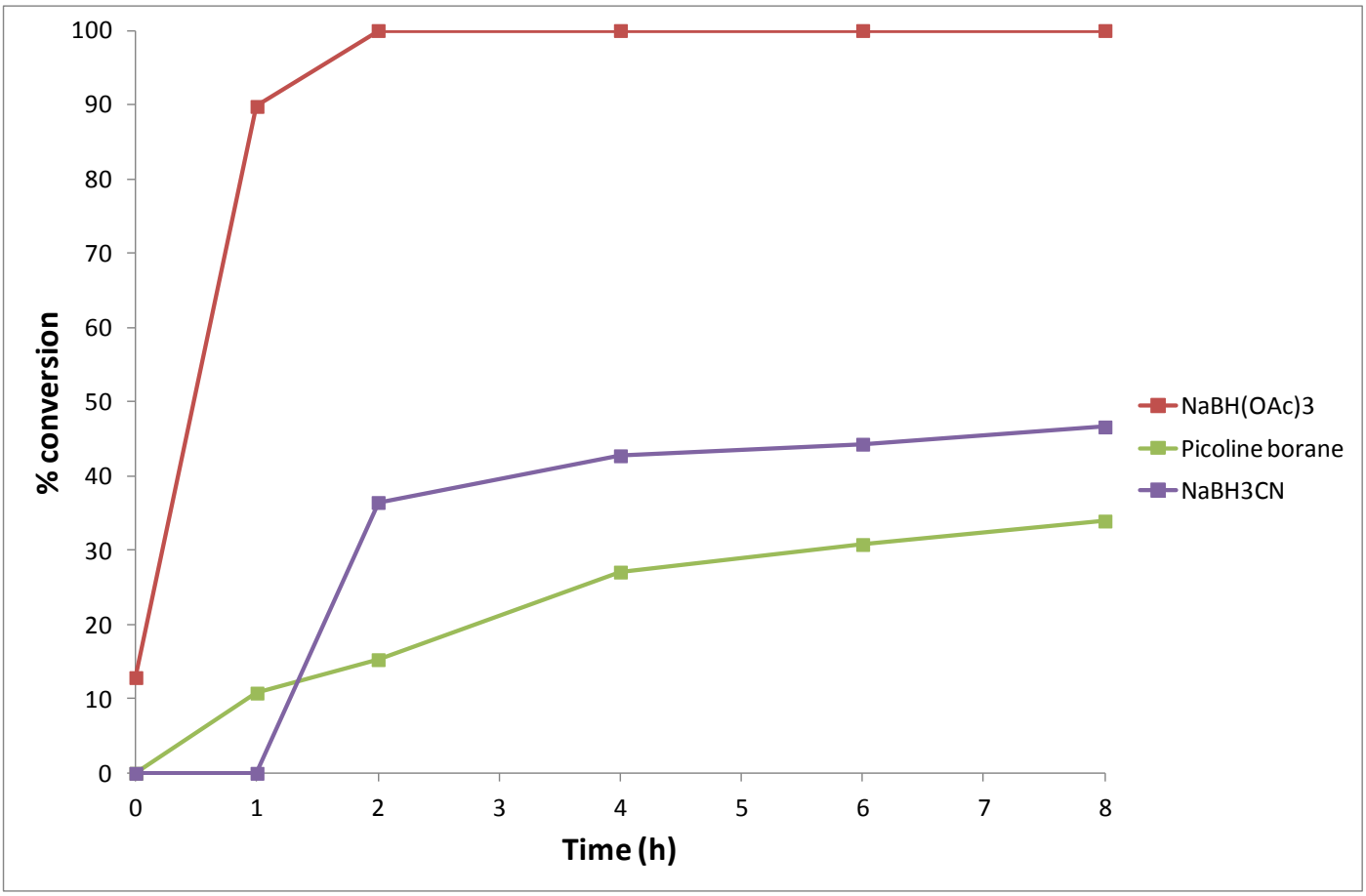
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	29.1	8.3	0.0
1	83.5	10.8	40.4
2	100.0	17.6	100.0
4	100.0	19.4	100.0
6	100.0	24.6	100.0
8	100.0	39.1	100.0
24	100.0	60.8	100.0

Reaction 7: DMC



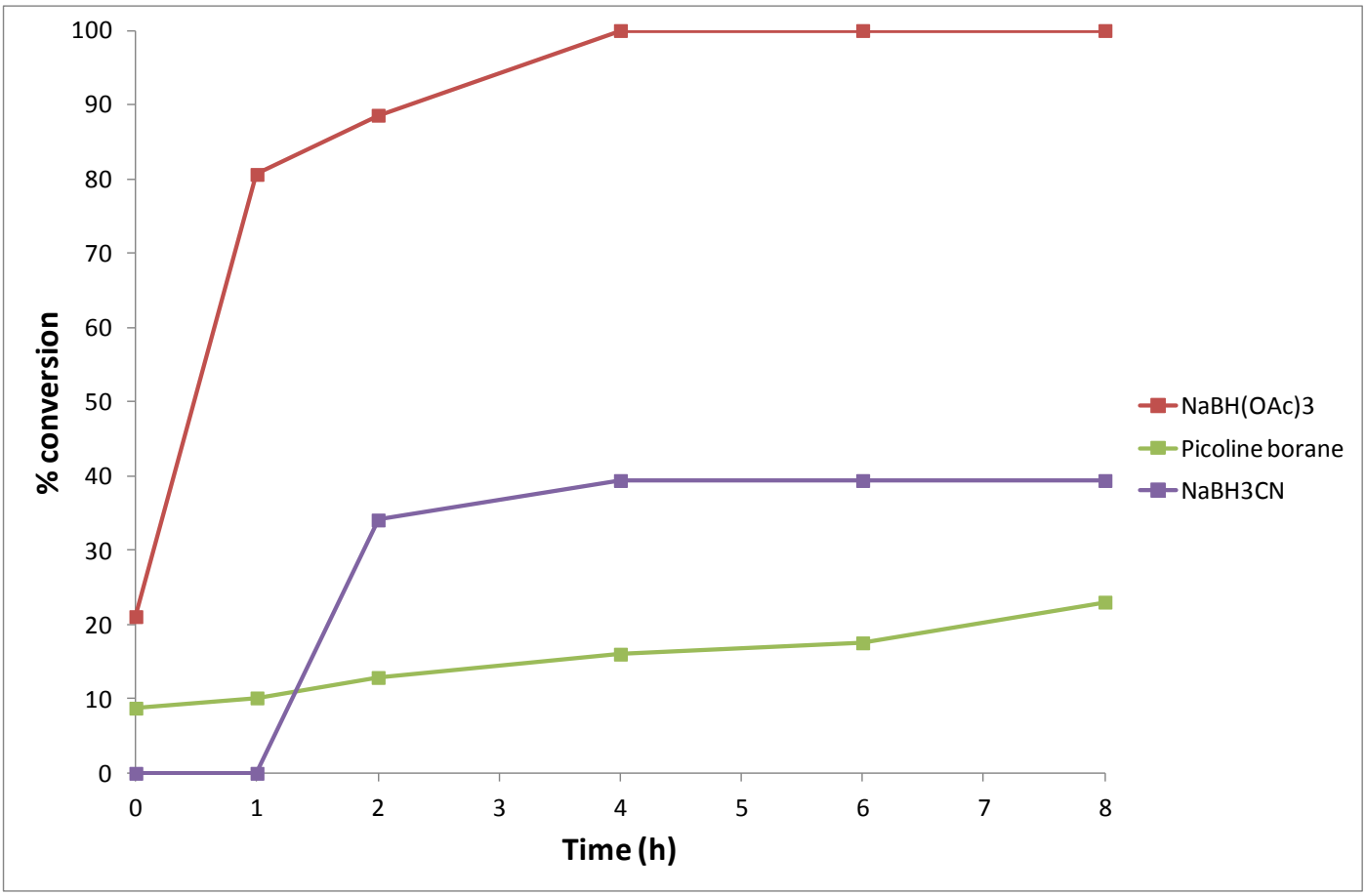
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	16.1	2.9	0.0
1	77.4	9.1	29.2
2	84.9	10.3	40.3
4	100.0	10.7	45.4
6	100.0	12.8	49.0
8	100.0	23.5	61.1
24	100.0	41.7	100.0

Reaction 7: DMF



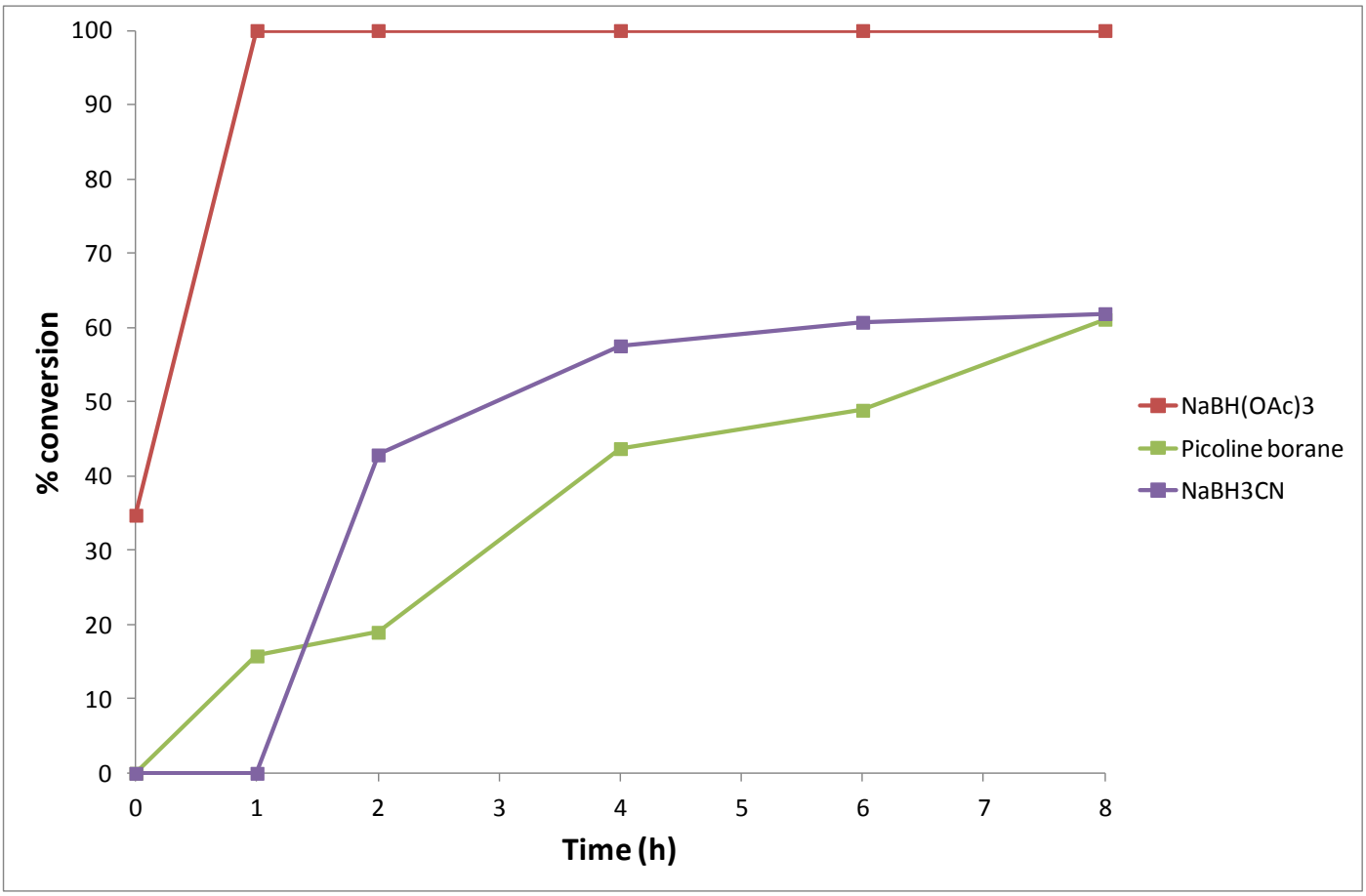
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	12.9	0.0	0.0
1	89.8	10.8	0.0
2	100.0	15.3	36.5
4	100.0	27.1	42.7
6	100.0	30.8	44.3
8	100.0	34.0	46.6
24	100.0	66.5	46.6

Reaction 7: EtOAc



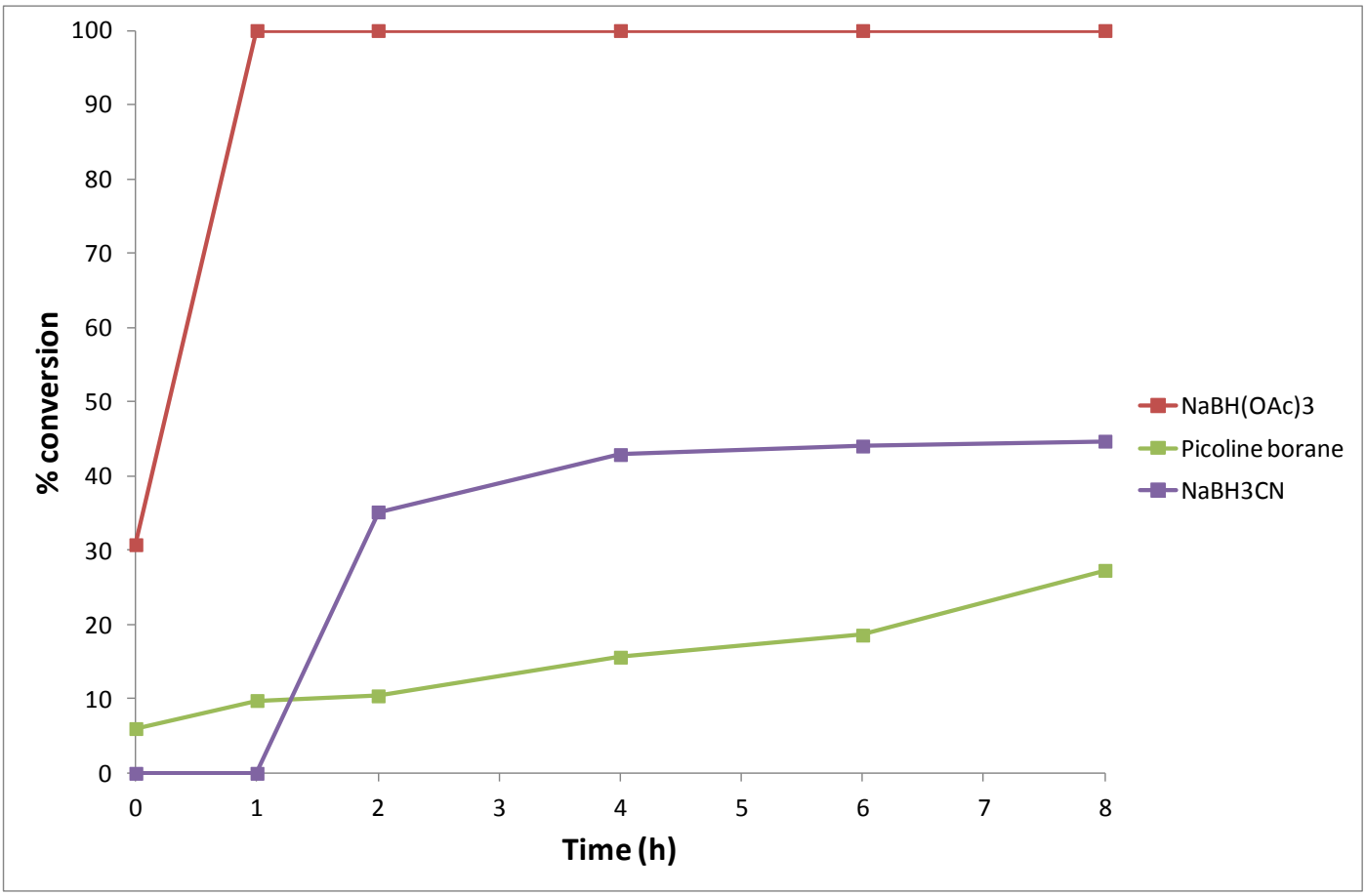
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	21.1	8.8	0.0
1	80.6	10.1	0.0
2	88.6	12.9	34.1
4	100.0	16.0	39.4
6	100.0	17.6	39.4
8	100.0	23.0	39.4
24	100.0	46.2	39.4

Reaction 7: IPA



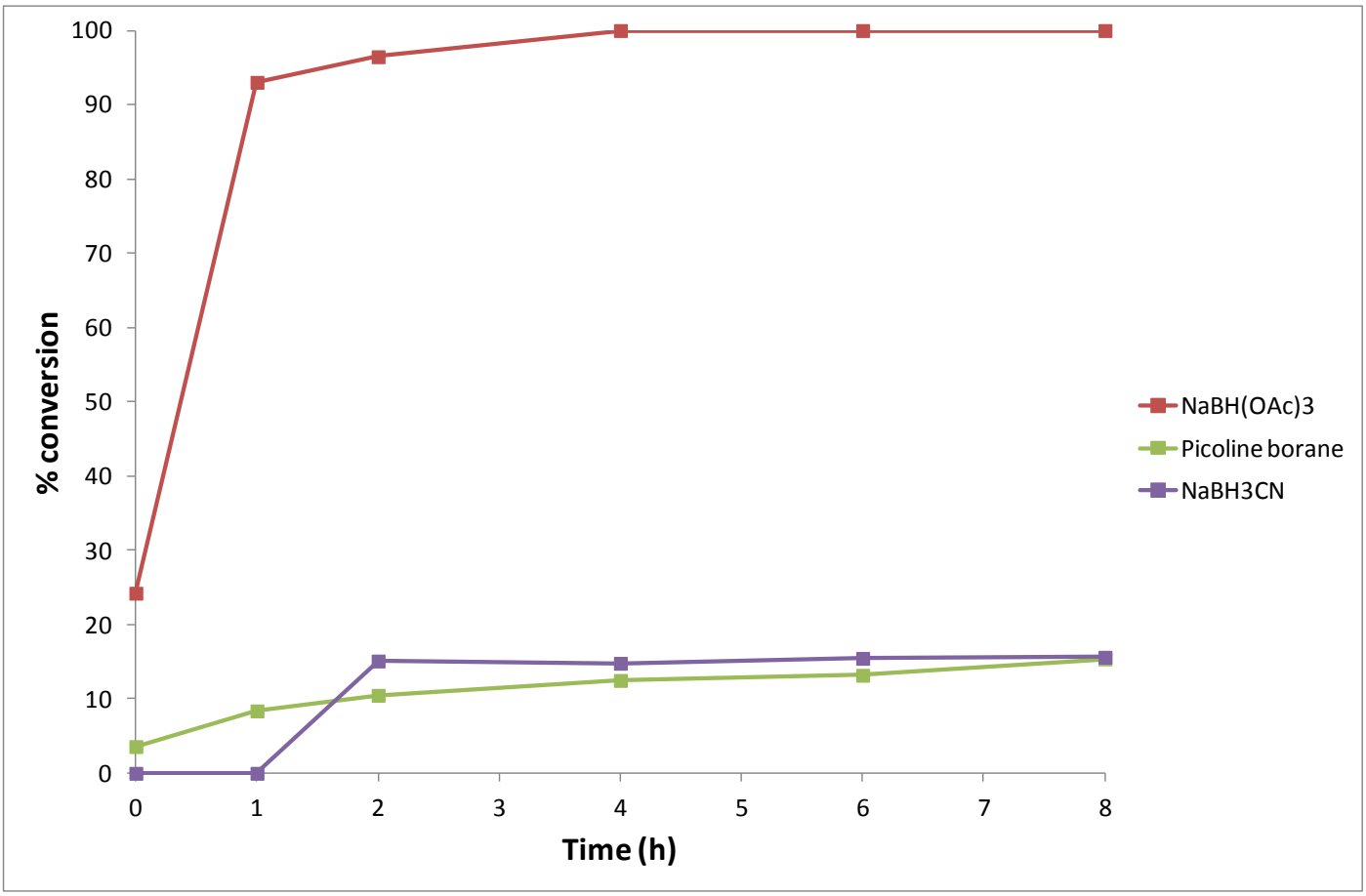
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	34.7	0.0	0.0
1	100.0	15.8	0.0
2	100.0	19.0	42.9
4	100.0	43.7	57.5
6	100.0	48.9	60.7
8	100.0	61.1	61.9
24	100.0	74.0	68.1

Reaction 7: 2-MeTHF



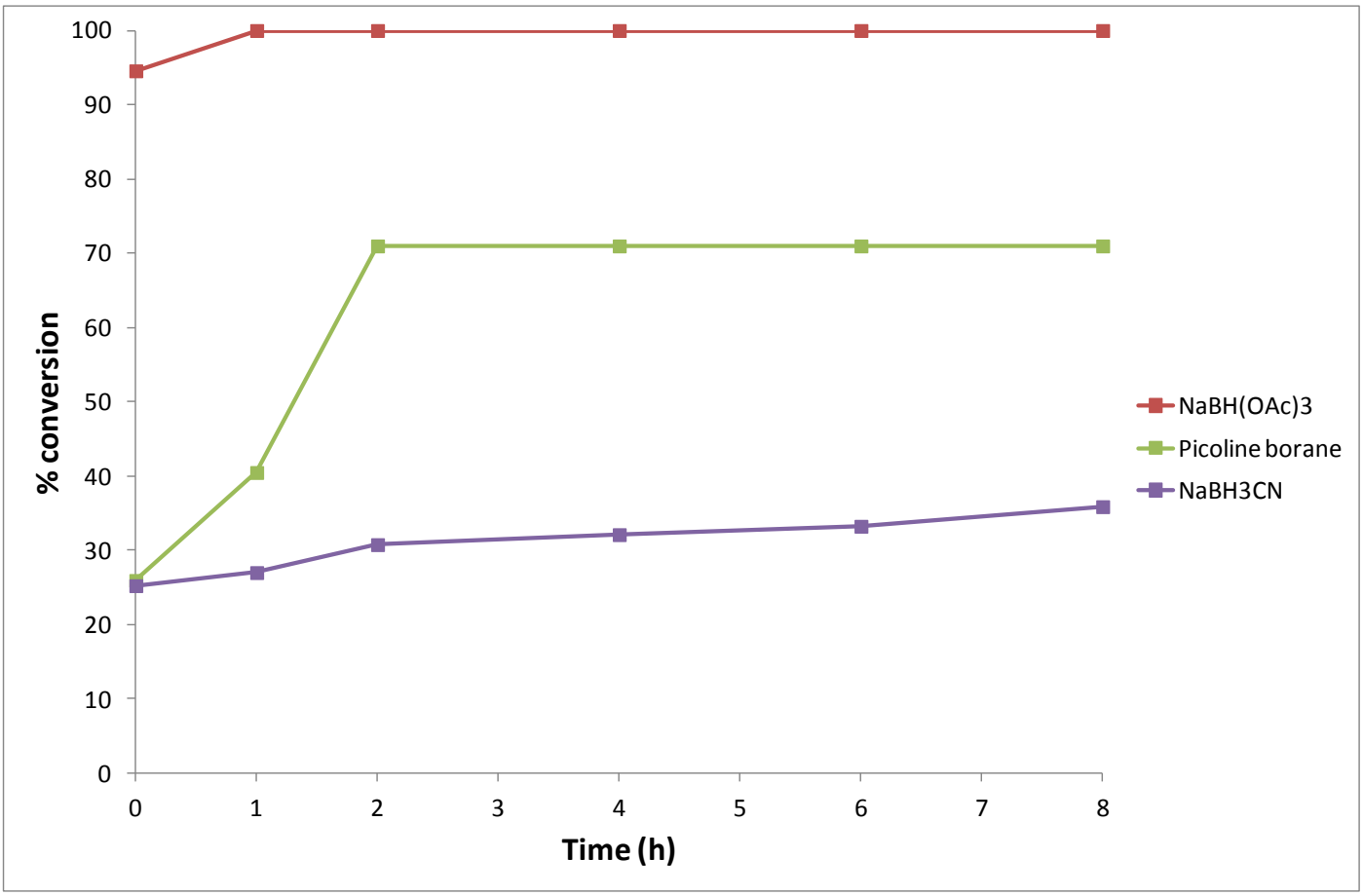
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	30.8	6.0	0.0
1	100.0	9.8	0.0
2	100.0	10.4	35.2
4	100.0	15.6	42.9
6	100.0	18.6	44.1
8	100.0	27.3	44.7
24	100.0	65.8	44.7

Reaction 7: THF



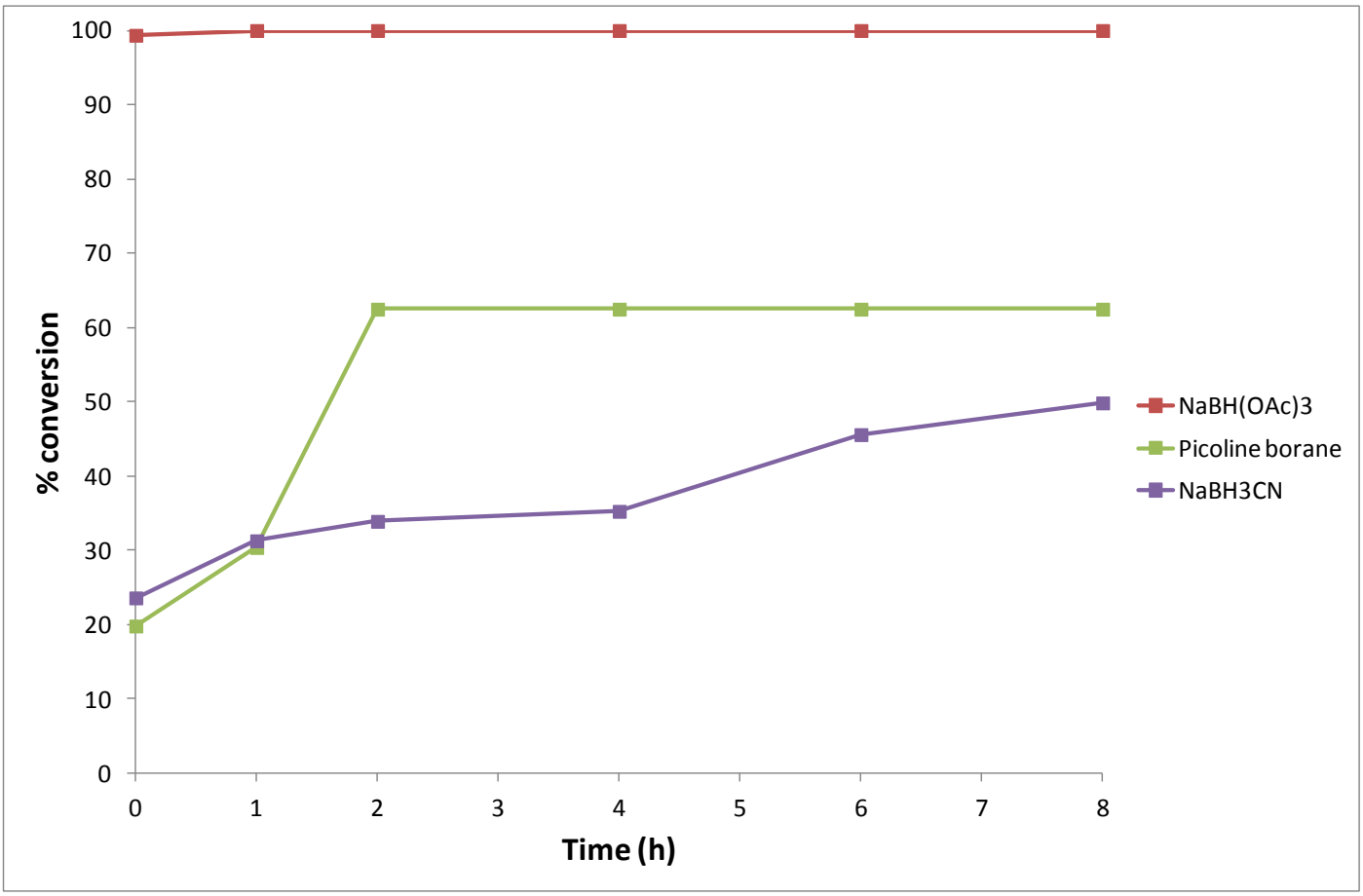
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	24.2	3.6	0.0
1	93.0	8.4	0.0
2	96.5	10.5	15.1
4	100.0	12.5	14.8
6	100.0	13.2	15.5
8	100.0	15.4	15.6
24	100.0	27.9	22.2

Reaction 8: TBME



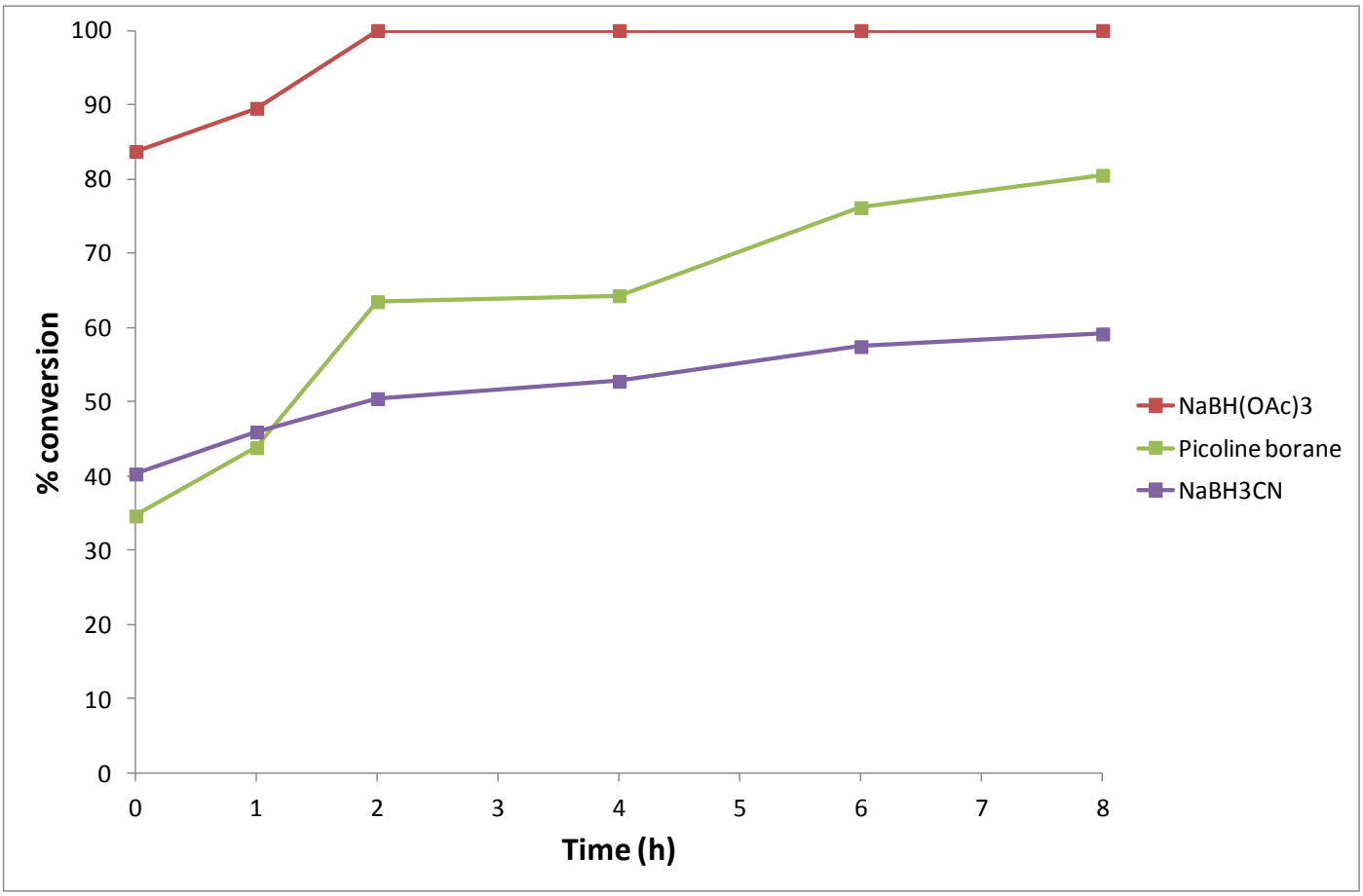
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	94.6	26.0	25.3
1	100.0	40.5	27.0
2	100.0	71.0	30.8
4	100.0	71.0	32.1
6	100.0	71.0	33.3
8	100.0	71.0	35.9
24	100.0	71.0	35.9

Reaction 8: CPME



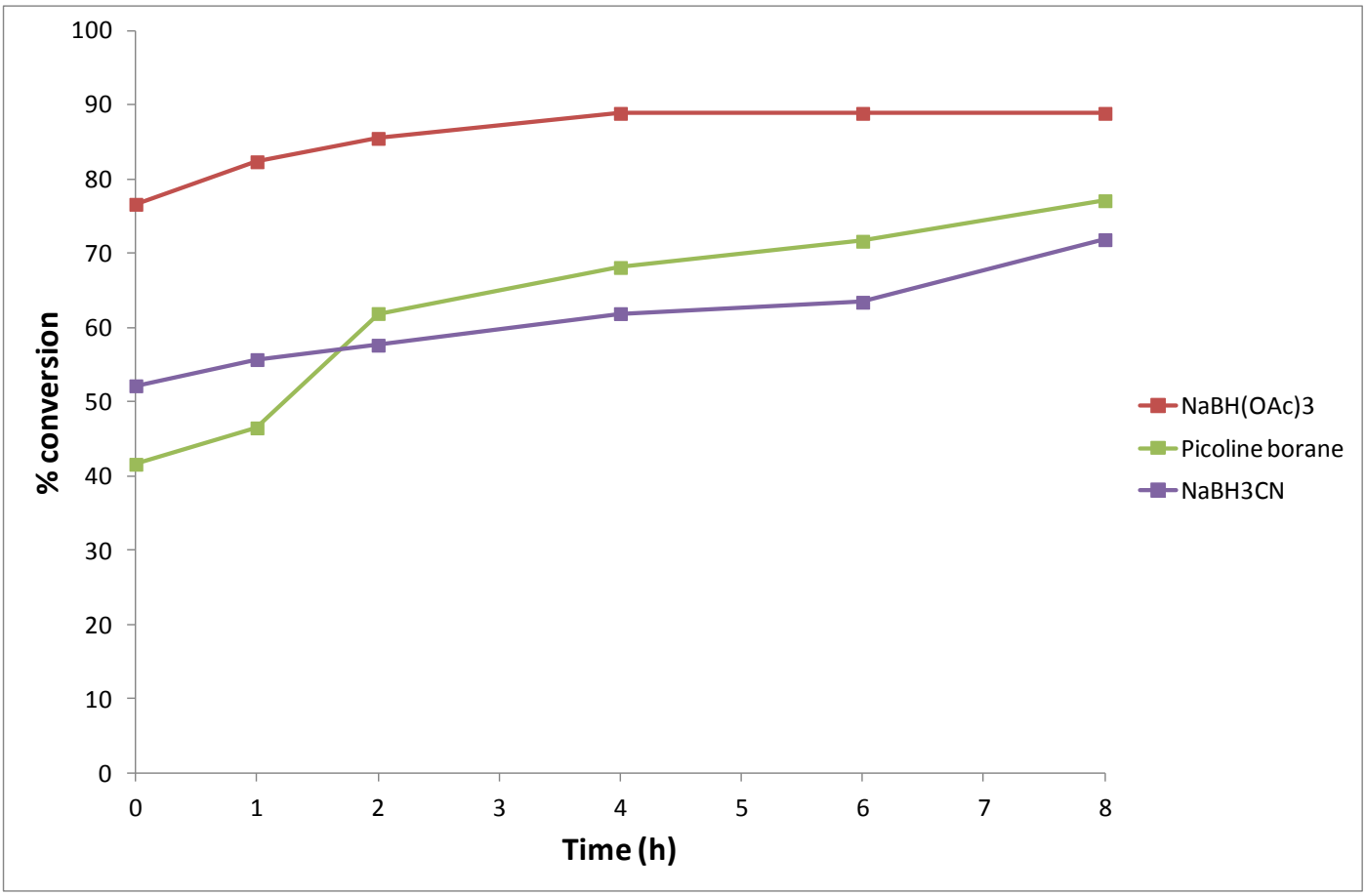
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	99.4	19.8	23.6
1	100.0	30.4	31.3
2	100.0	62.5	33.9
4	100.0	62.5	35.3
6	100.0	62.5	45.6
8	100.0	62.5	49.9
24	100.0	62.5	51.2

Reaction 8: DCE



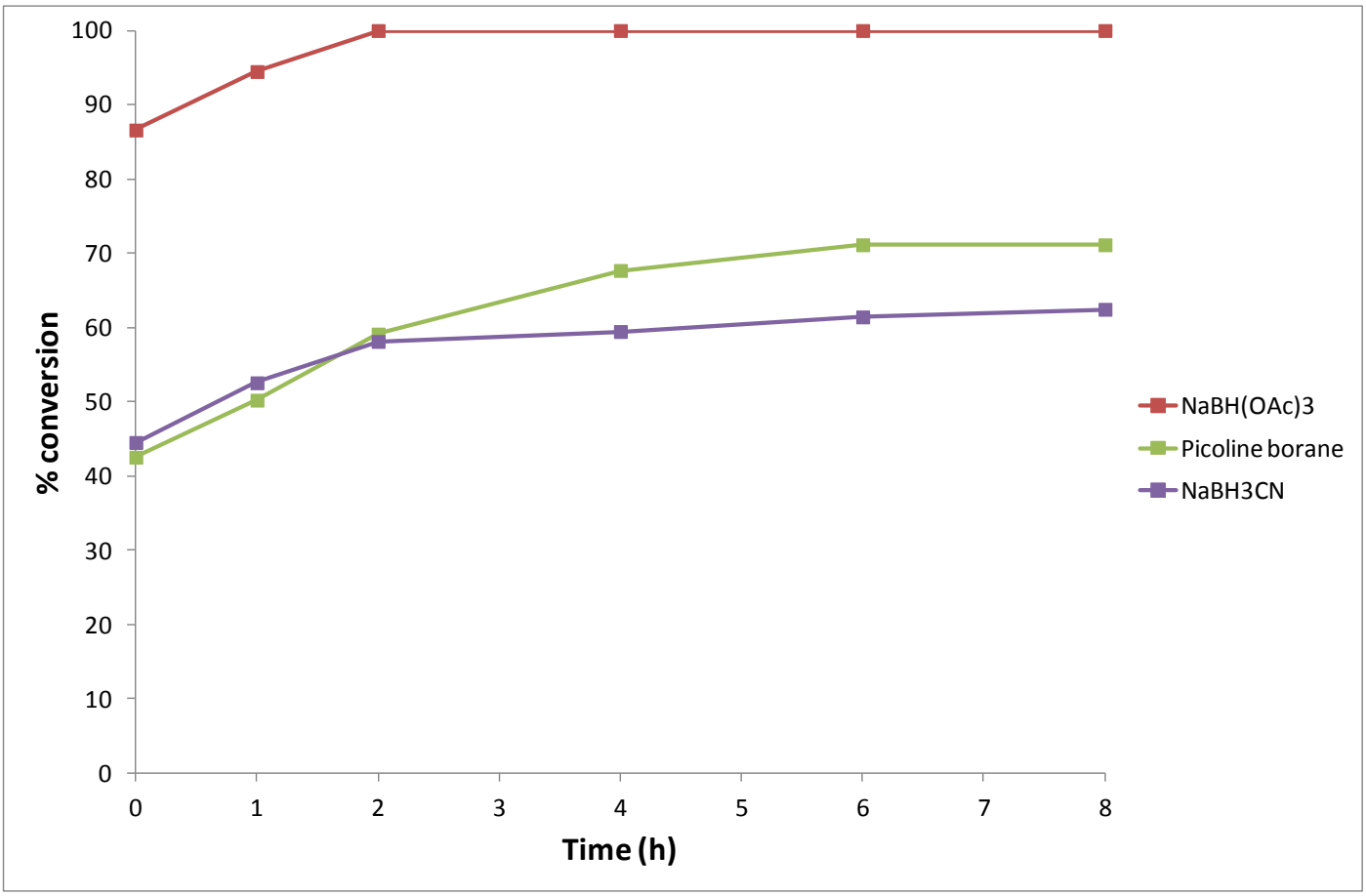
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	83.7	34.7	40.3
1	89.5	43.8	46.0
2	100.0	63.5	50.4
4	100.0	64.3	52.8
6	100.0	76.1	57.4
8	100.0	80.5	59.2
24	100.0	81.4	59.2

Reaction 8: CH_2Cl_2



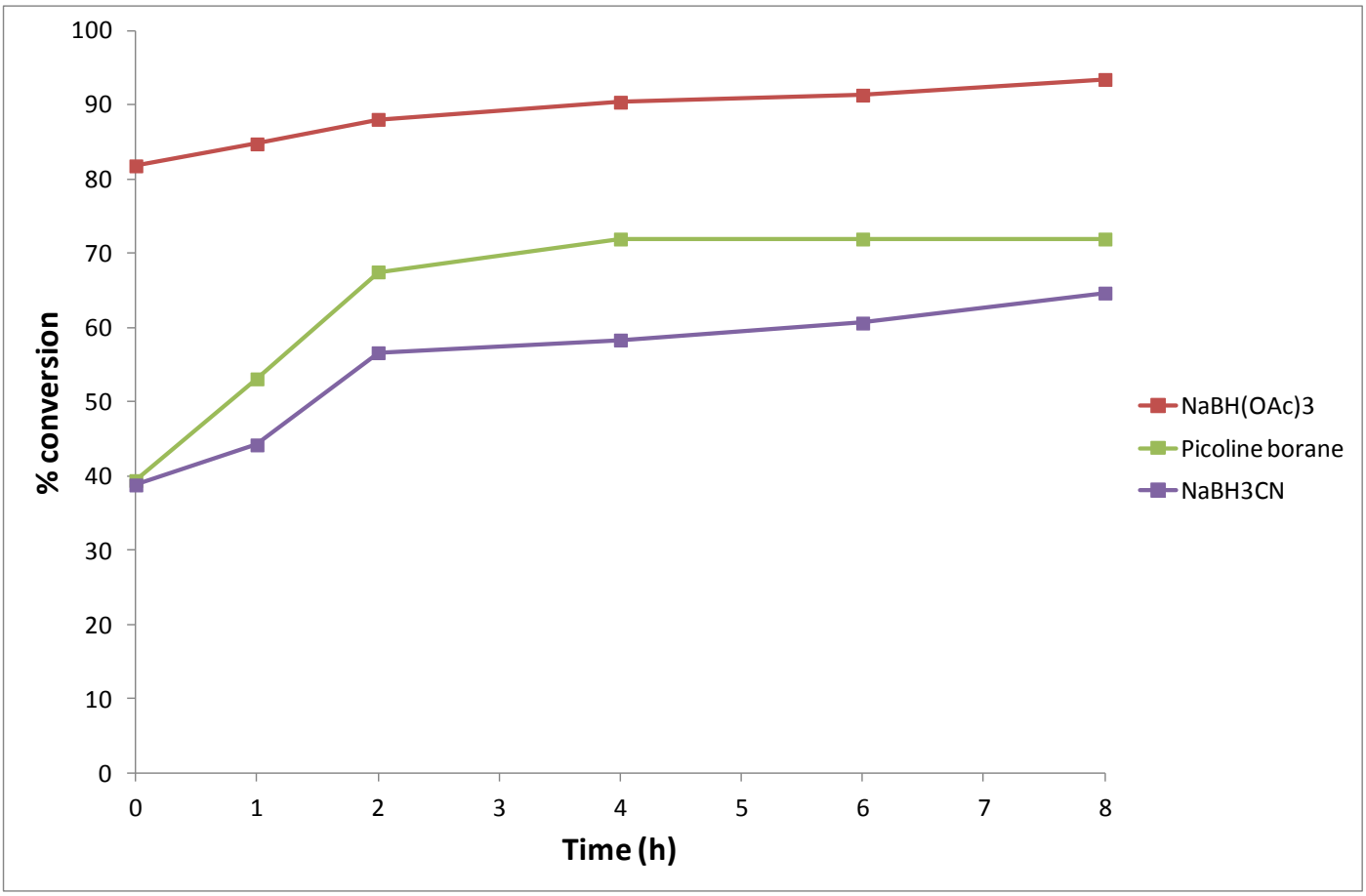
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	76.6	41.6	52.2
1	82.3	46.5	55.7
2	85.5	61.9	57.6
4	88.8	68.1	61.9
6	88.8	71.6	63.4
8	88.8	77.1	71.8
24	88.8	82.4	72.4

Reaction 8: DMC



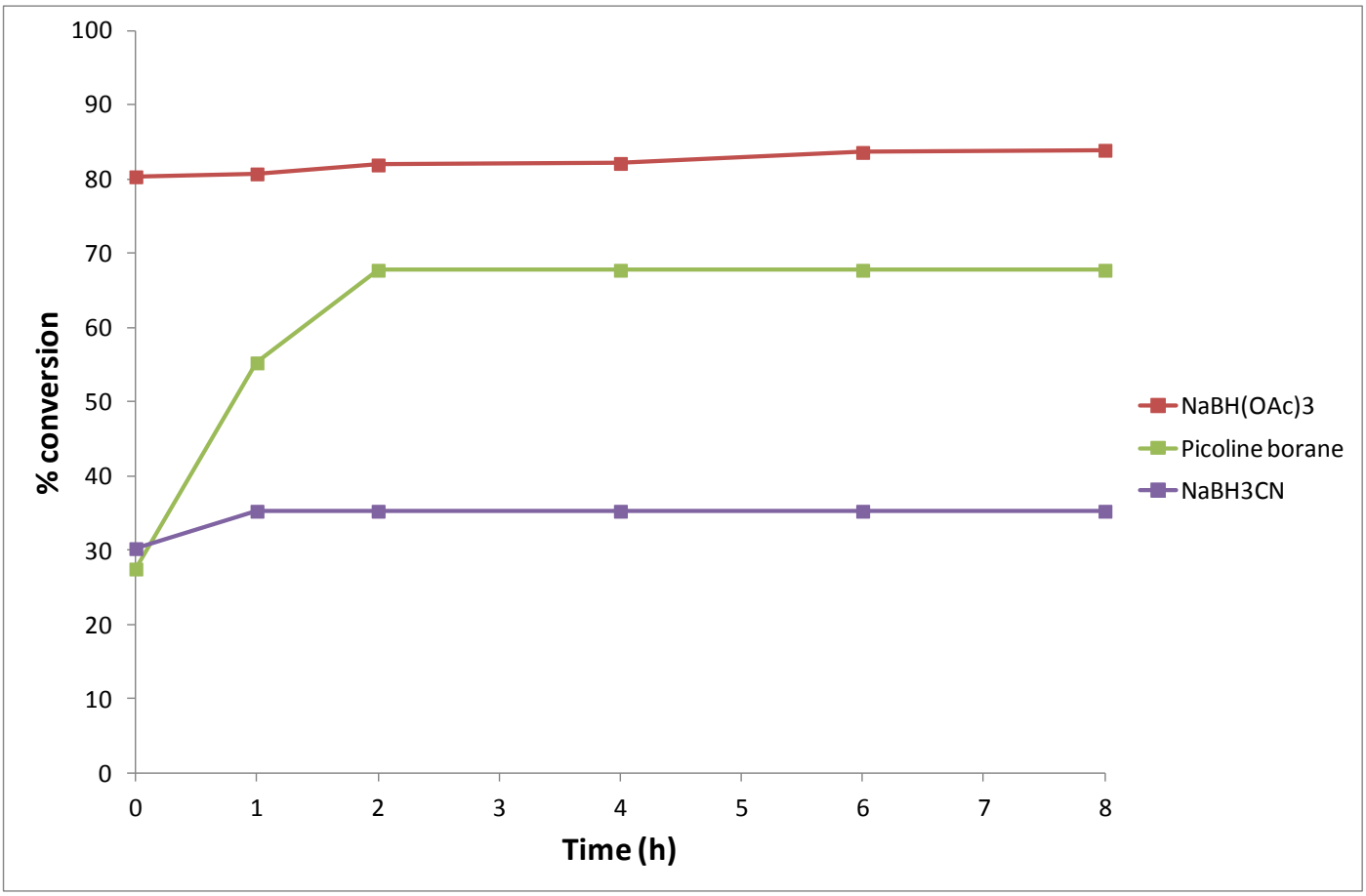
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	86.6	42.6	44.5
1	94.5	50.2	52.6
2	100.0	59.1	58.1
4	100.0	67.7	59.5
6	100.0	71.2	61.4
8	100.0	71.2	62.5
24	100.0	71.2	62.5

Reaction 8: DMF



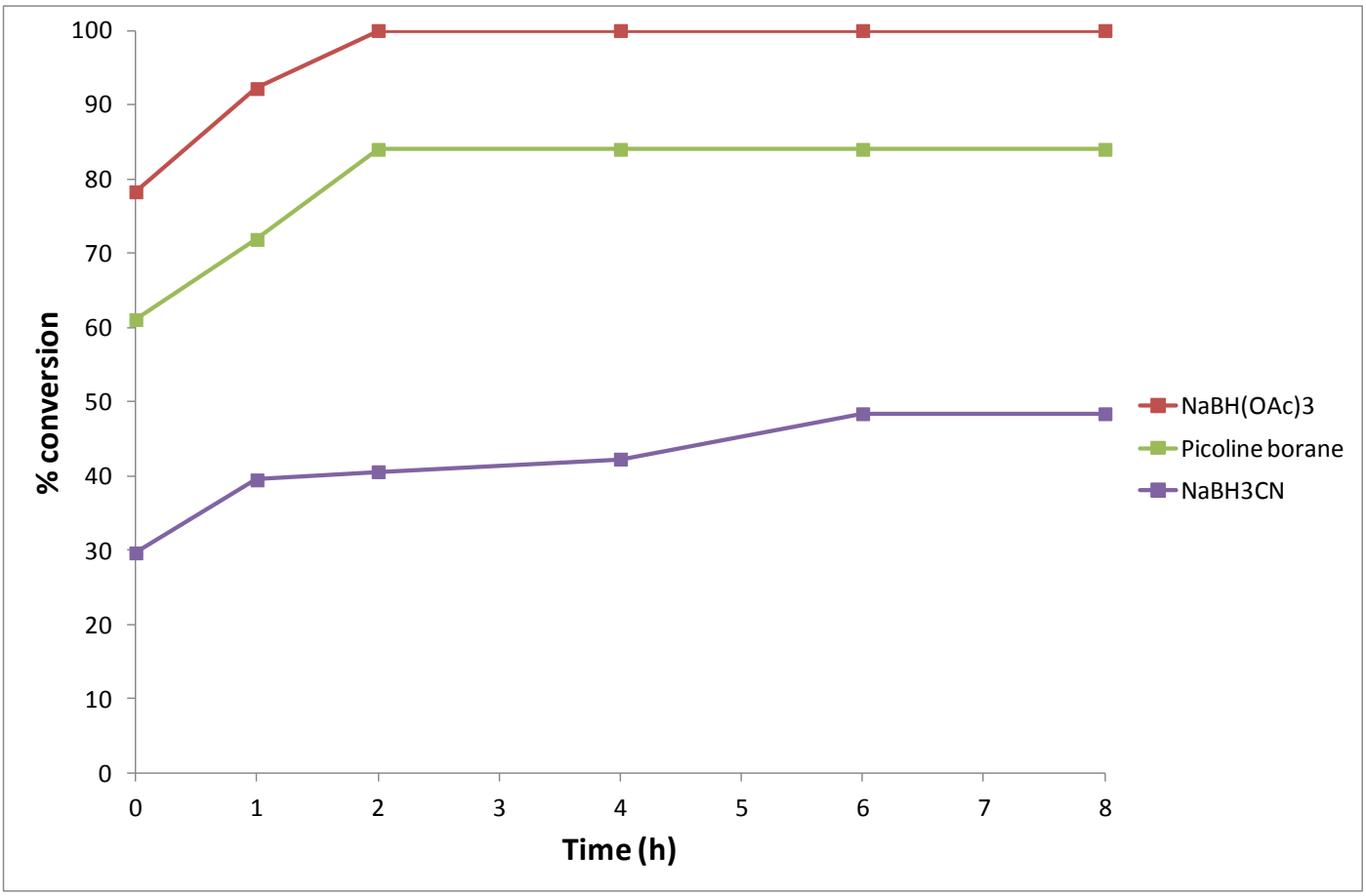
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	81.8	39.4	38.8
1	84.7	53.1	44.2
2	88.0	67.5	56.6
4	90.4	71.9	58.3
6	91.3	71.9	60.6
8	93.4	71.9	64.7
24	100.0	71.9	64.7

Reaction 8: EtOAc



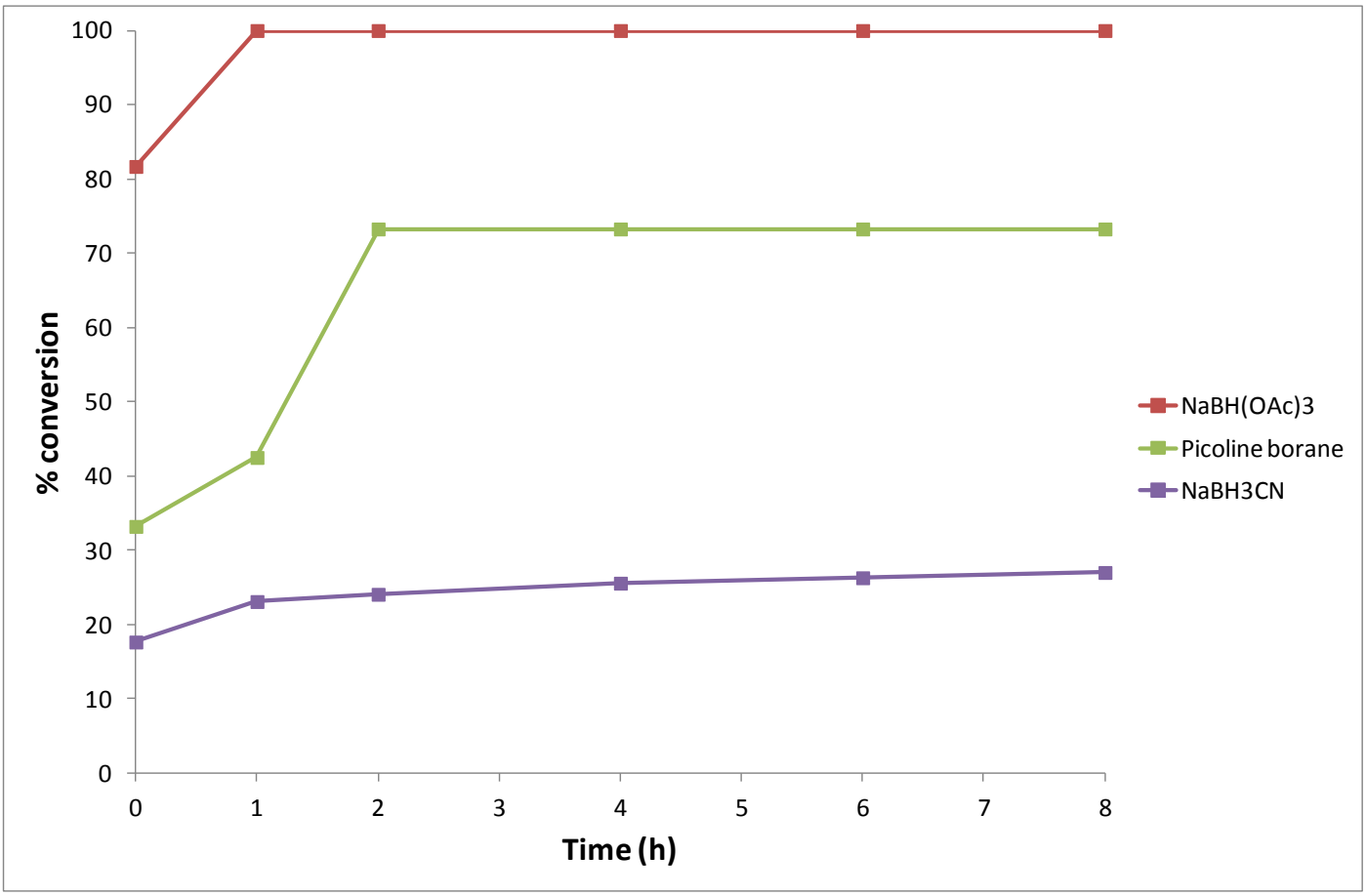
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	80.3	27.5	30.2
1	80.7	55.3	35.3
2	81.9	67.7	35.3
4	82.1	67.7	35.3
6	83.6	67.7	35.3
8	83.9	67.7	35.3
24	93.7	67.7	35.3

Reaction 8: IPA



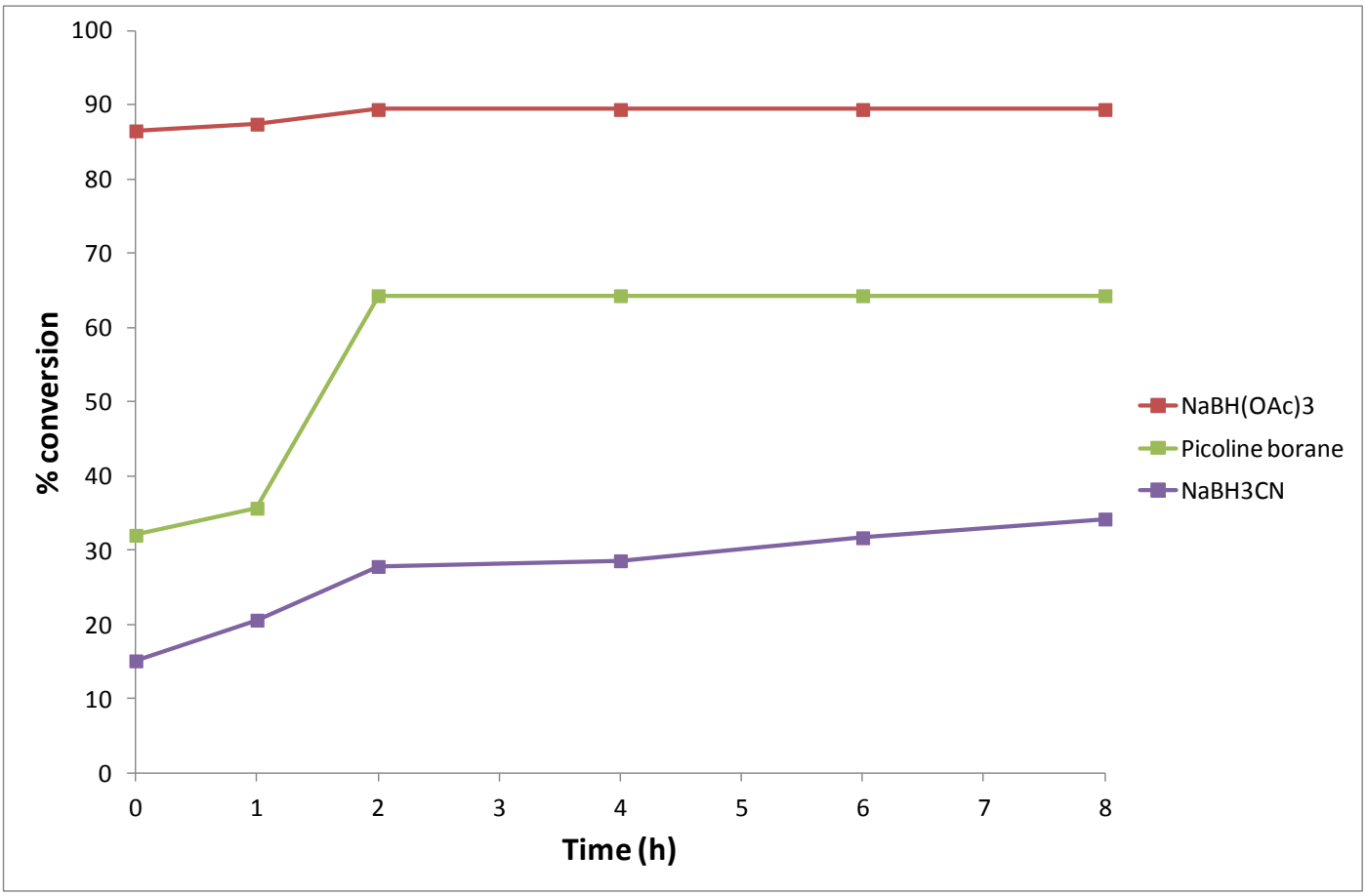
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	78.3	61.1	29.7
1	92.2	71.9	39.5
2	100.0	84.0	40.6
4	100.0	84.0	42.3
6	100.0	84.0	48.4
8	100.0	84.0	48.4
24	100.0	84.0	48.4

Reaction 8: 2-MeTHF



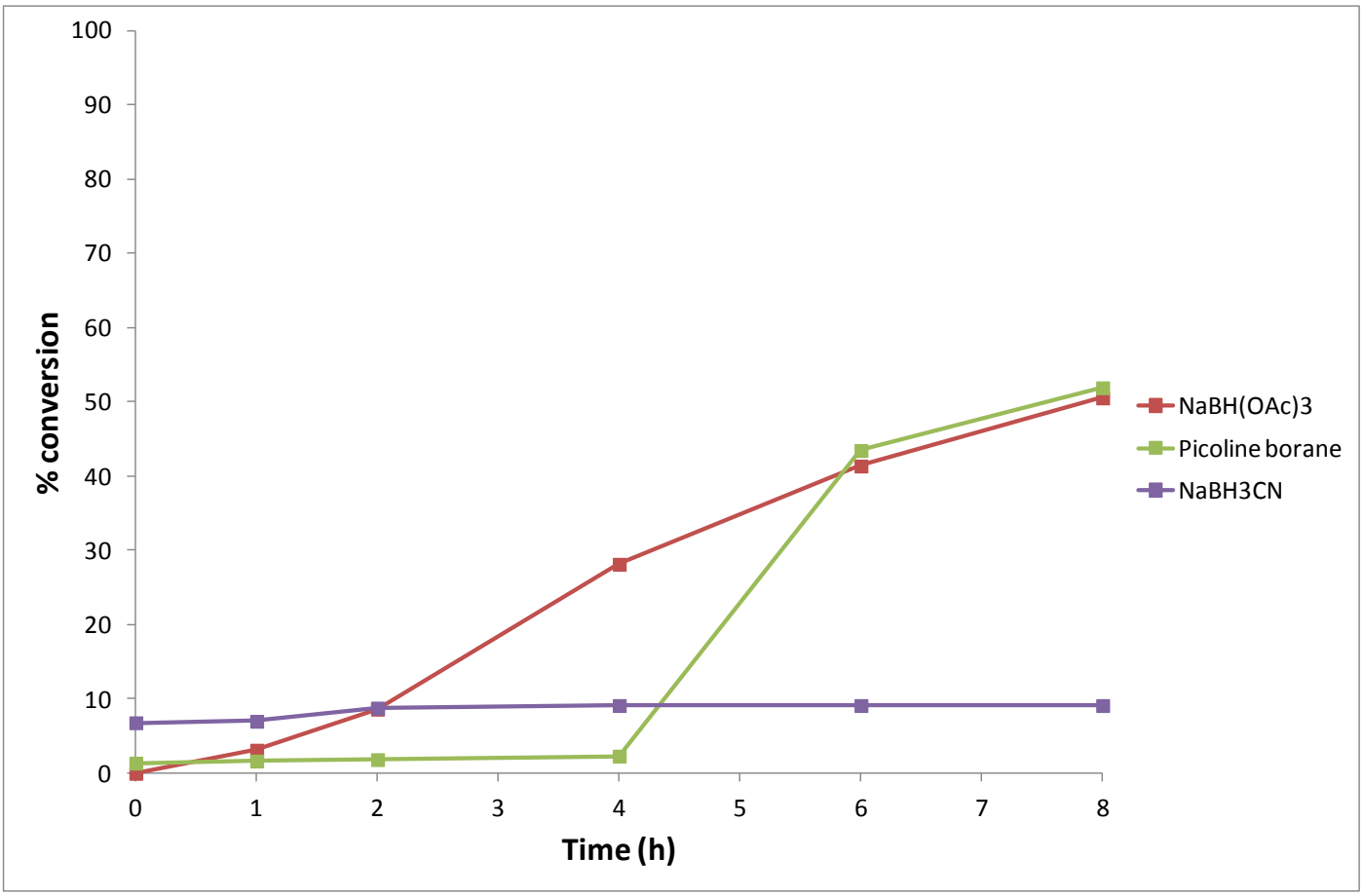
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	81.7	33.2	17.7
1	100.0	42.5	23.1
2	100.0	73.3	24.1
4	100.0	73.3	25.6
6	100.0	73.3	26.3
8	100.0	73.3	27.0
24	100.0	73.3	27.0

Reaction 8: THF



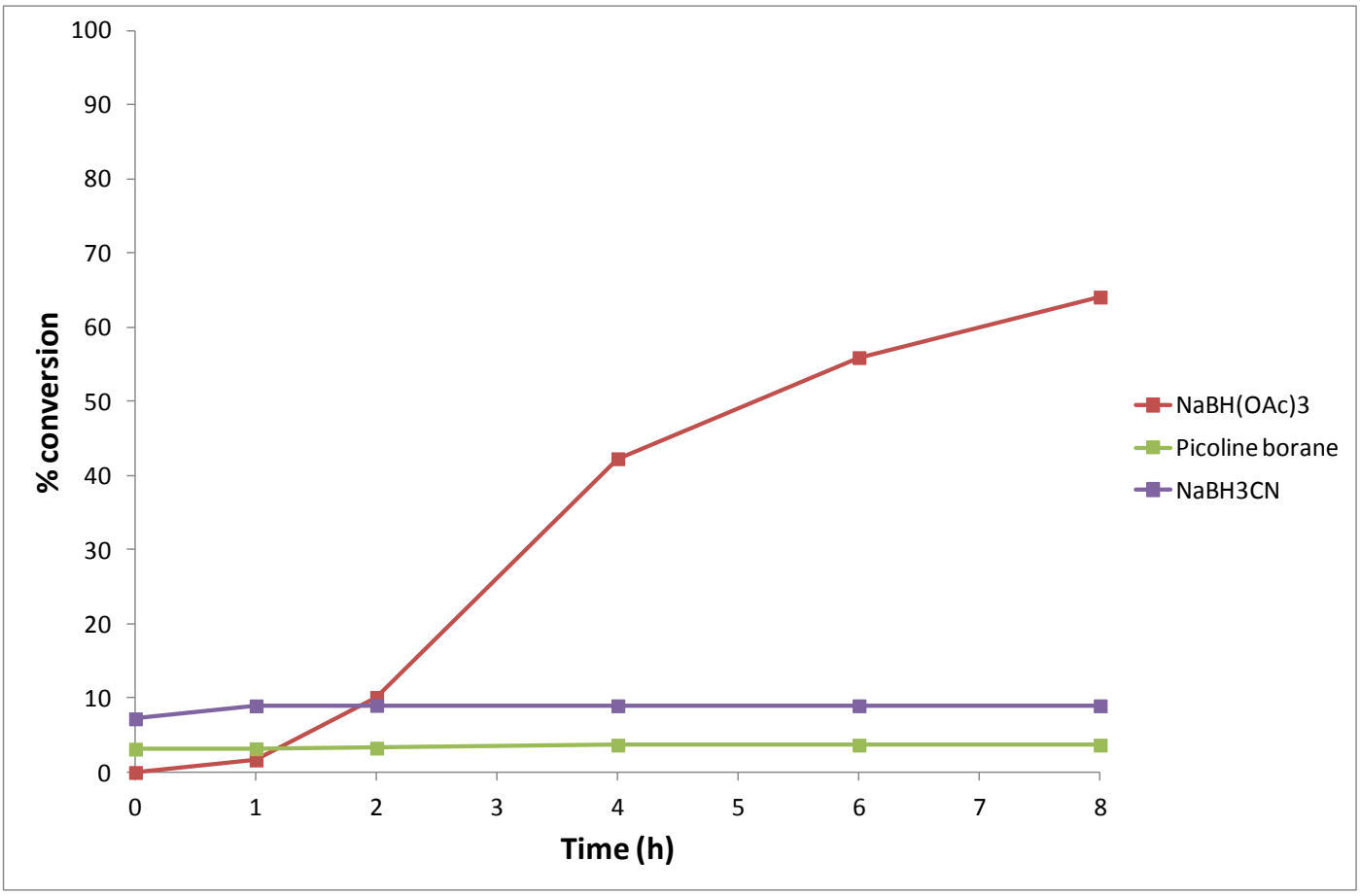
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	86.5	32.0	15.1
1	87.4	35.7	20.6
2	89.4	64.3	27.8
4	89.4	64.3	28.6
6	89.4	64.3	31.7
8	89.4	64.3	34.2
24	89.4	64.3	34.7

Reaction 9: TBME



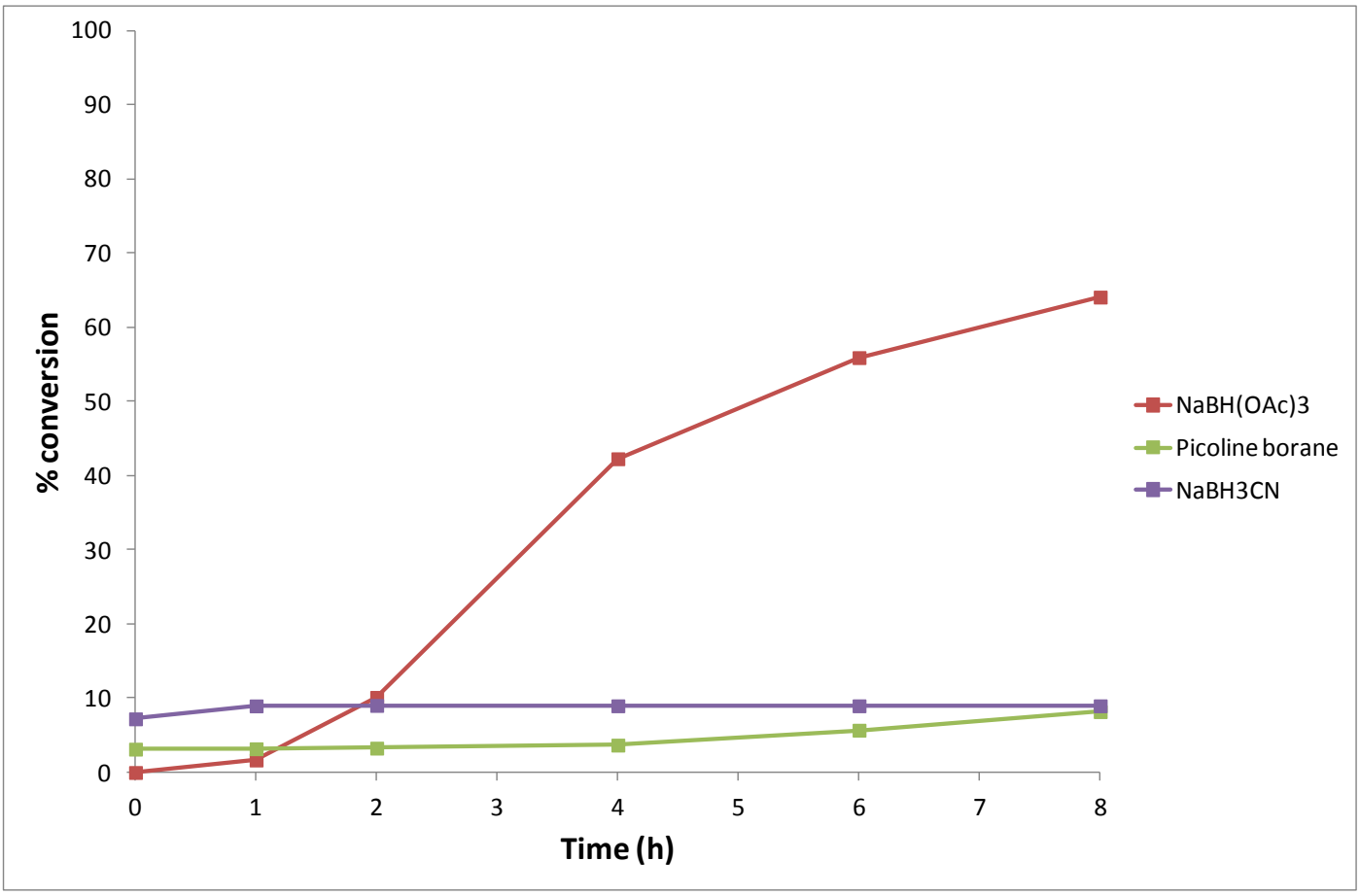
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	1.4	6.8
1	3.1	1.7	7.0
2	8.6	1.9	8.8
4	28.1	2.3	9.1
6	41.4	43.5	9.1
8	50.5	51.9	9.1
24	73.8	51.9	9.1

Reaction 9: CPME



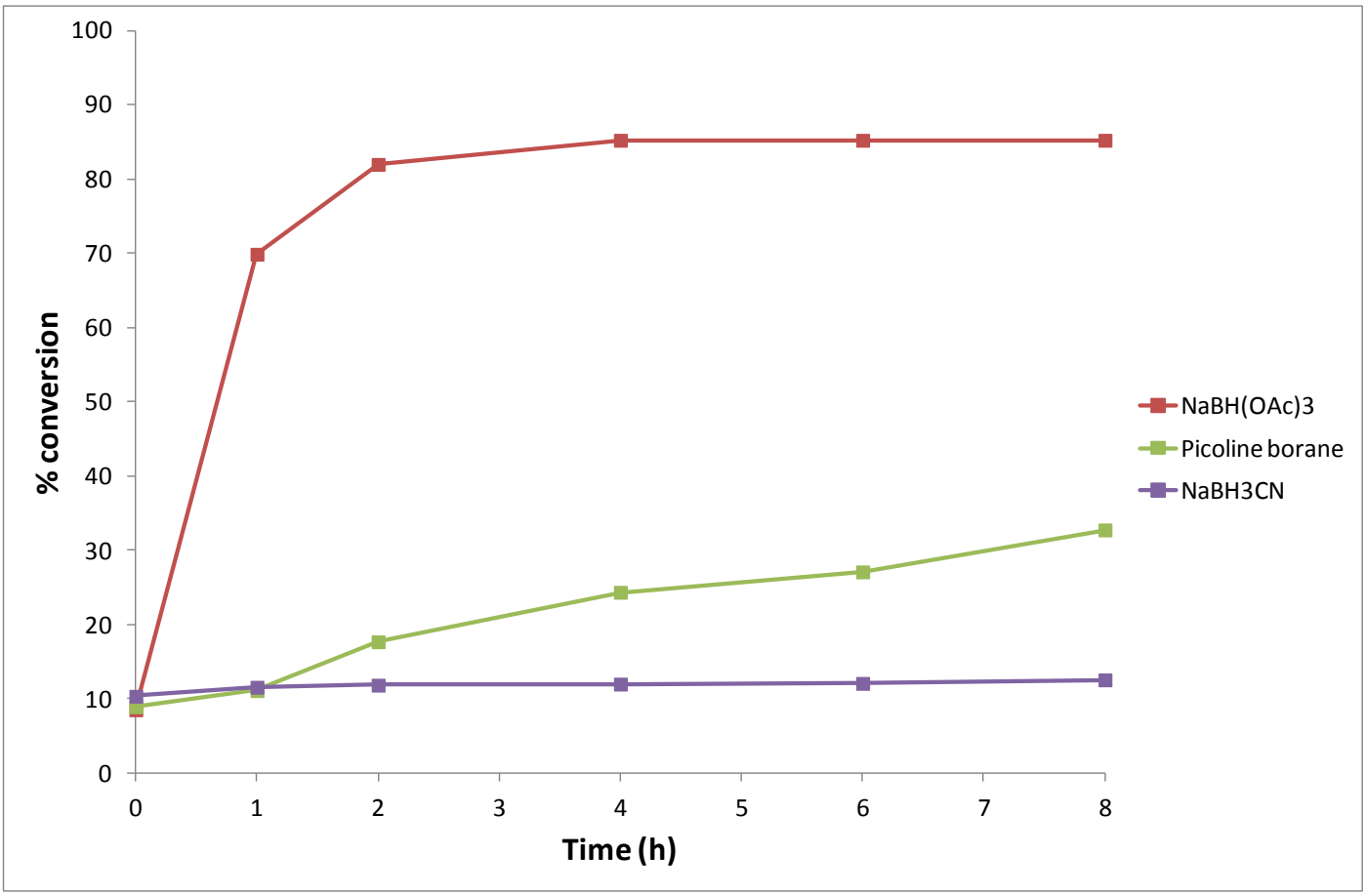
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	3.1	7.2
1	1.7	3.2	9.0
2	10.1	3.3	9.0
4	42.3	3.7	9.0
6	55.9	3.7	9.0
8	64.1	3.7	9.0
24	81.4	3.7	9.0

Reaction 9: DCE



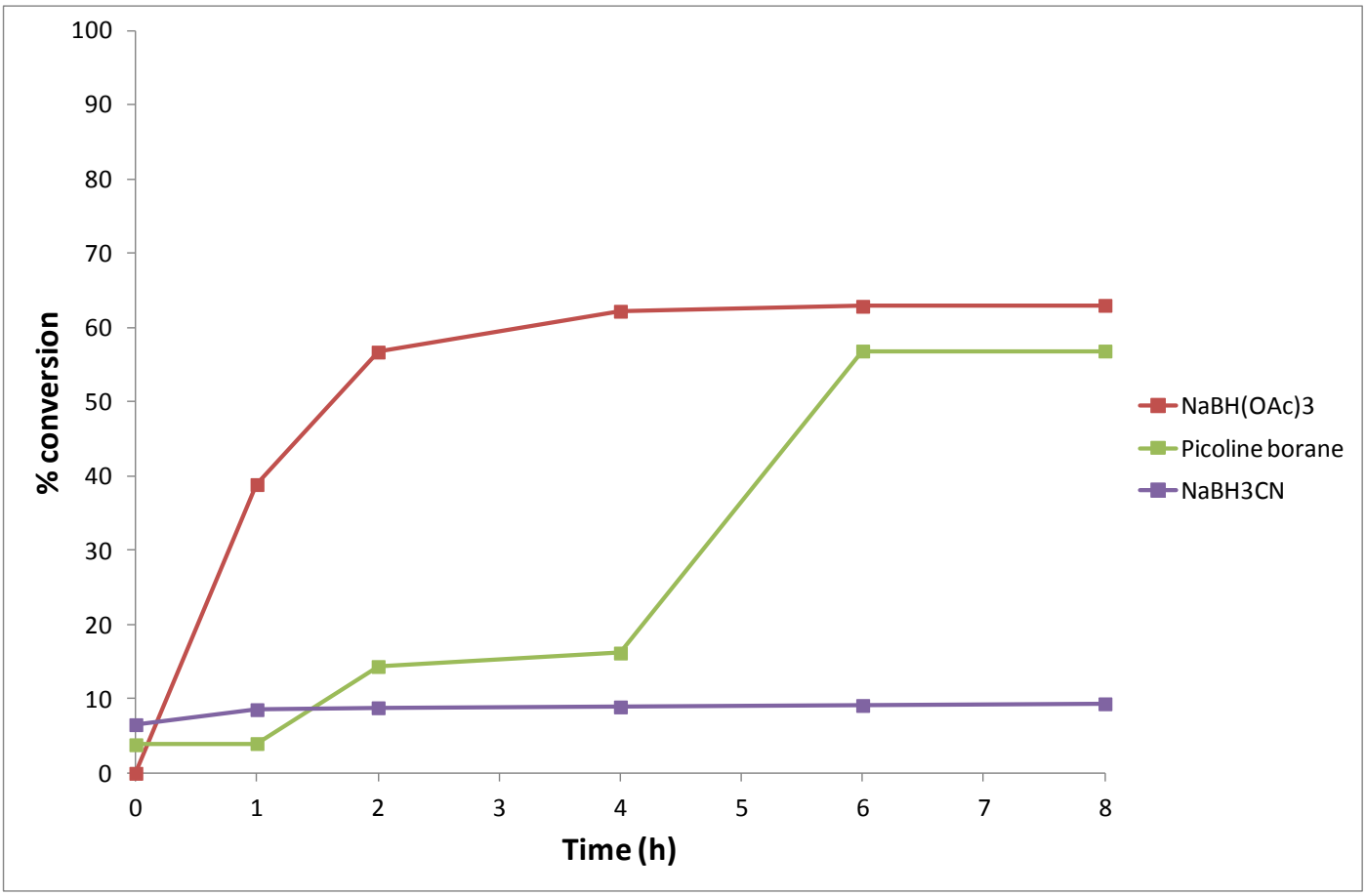
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	8.1	3.2
1	57.8	12.1	26.1
2	73.8	17.5	26.4
4	79.4	24.5	26.4
6	79.4	26.1	26.4
8	79.4	29.5	26.4
24	79.4	61.4	26.4

Reaction 9: CH_2Cl_2



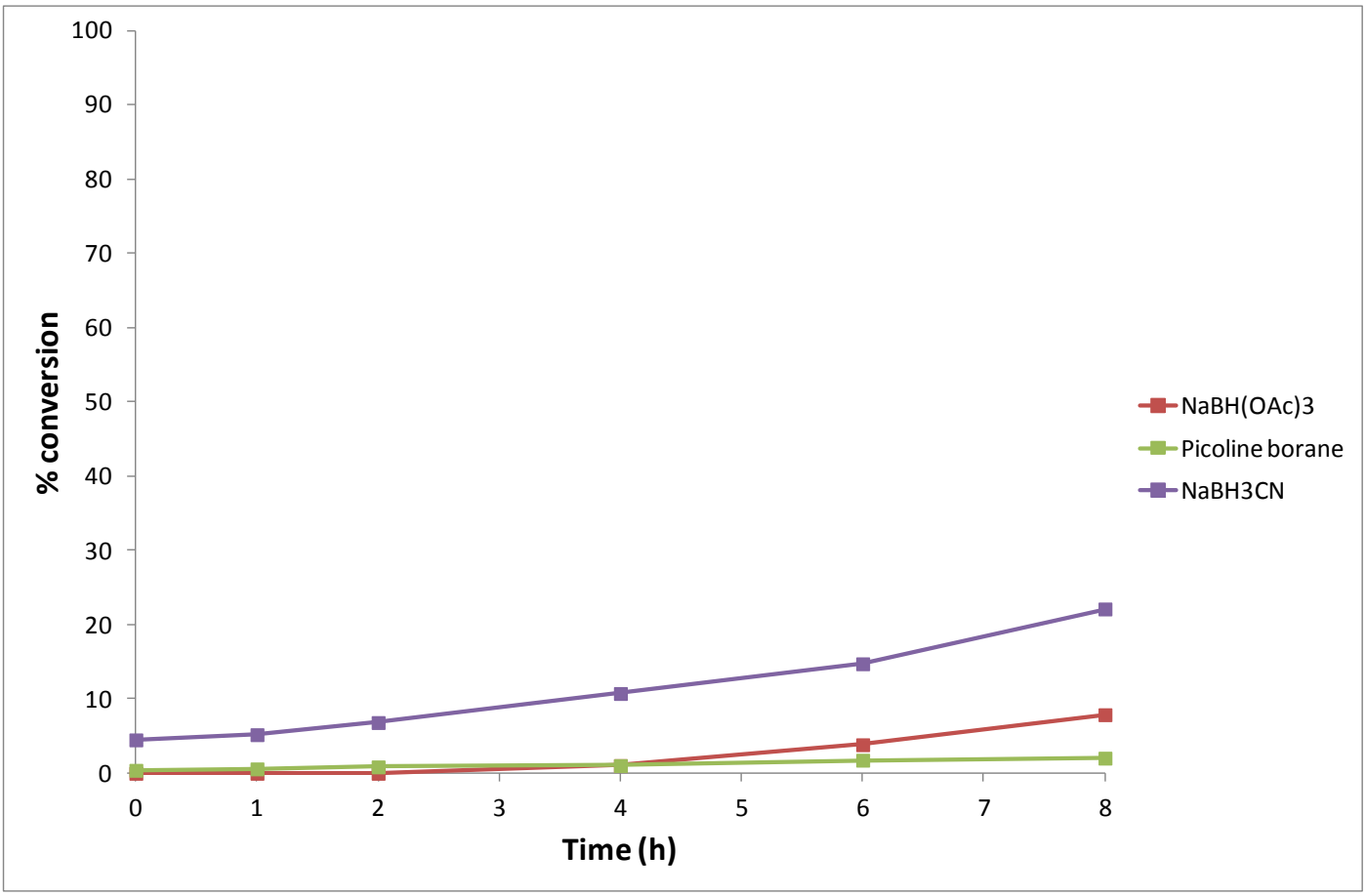
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	8.6	9.0	10.4
1	69.9	11.1	11.6
2	82.0	17.7	11.9
4	85.2	24.4	12.0
6	85.2	27.1	12.1
8	85.2	32.8	12.6
24	85.2	69.7	12.6

Reaction 9: DMC



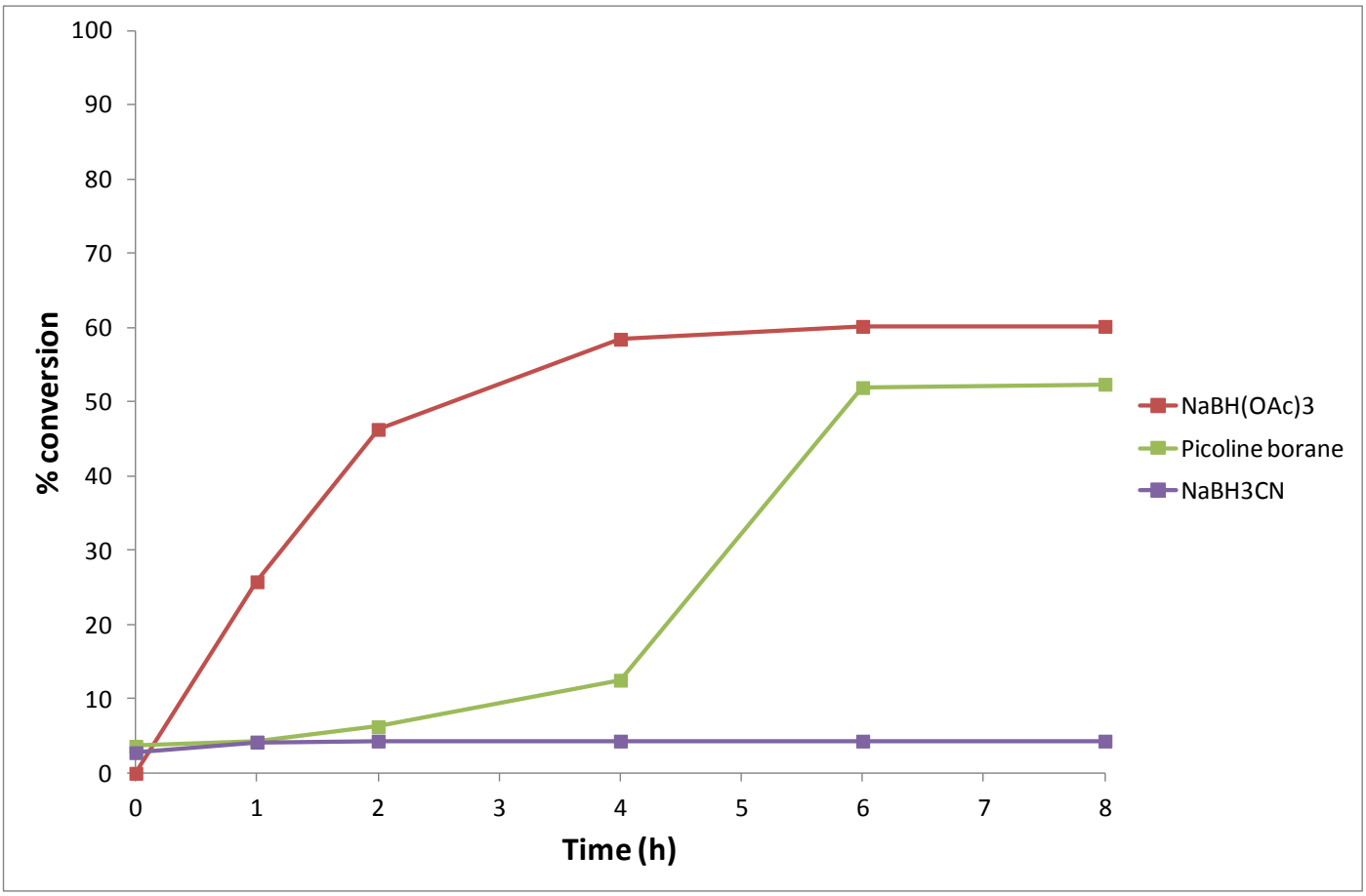
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	3.8	6.5
1	38.9	4.0	8.6
2	56.7	14.4	8.8
4	62.2	16.2	8.9
6	62.9	56.9	9.1
8	63.0	56.9	9.4
24	63.7	56.9	9.4

Reaction 9: DMF



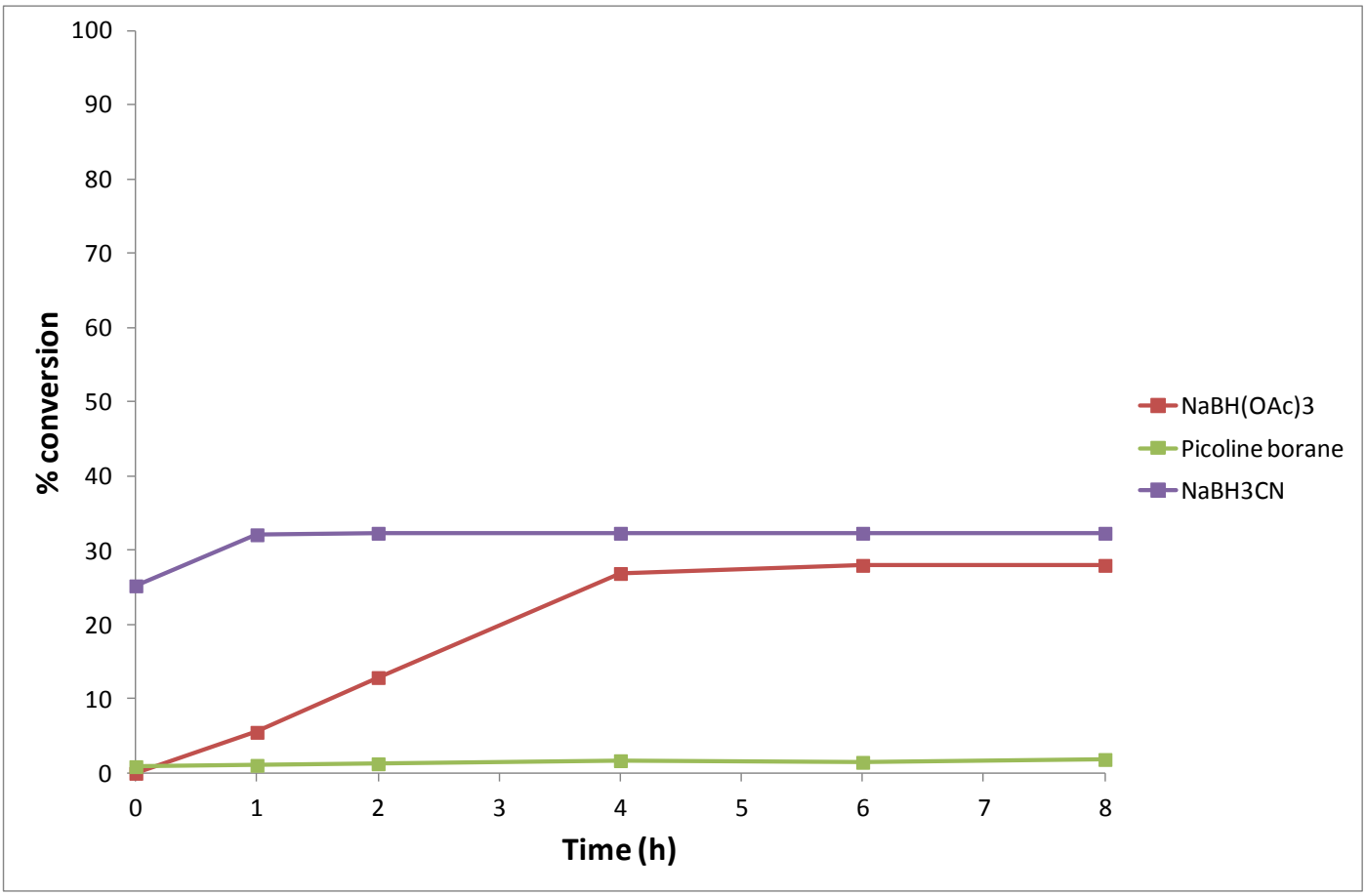
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.4	4.5
1	0.0	0.6	5.2
2	0.0	0.9	6.8
4	1.0	1.0	10.7
6	3.8	1.8	14.7
8	7.9	2.0	22.1
24	32.5	59.4	22.1

Reaction 9: EtOAc



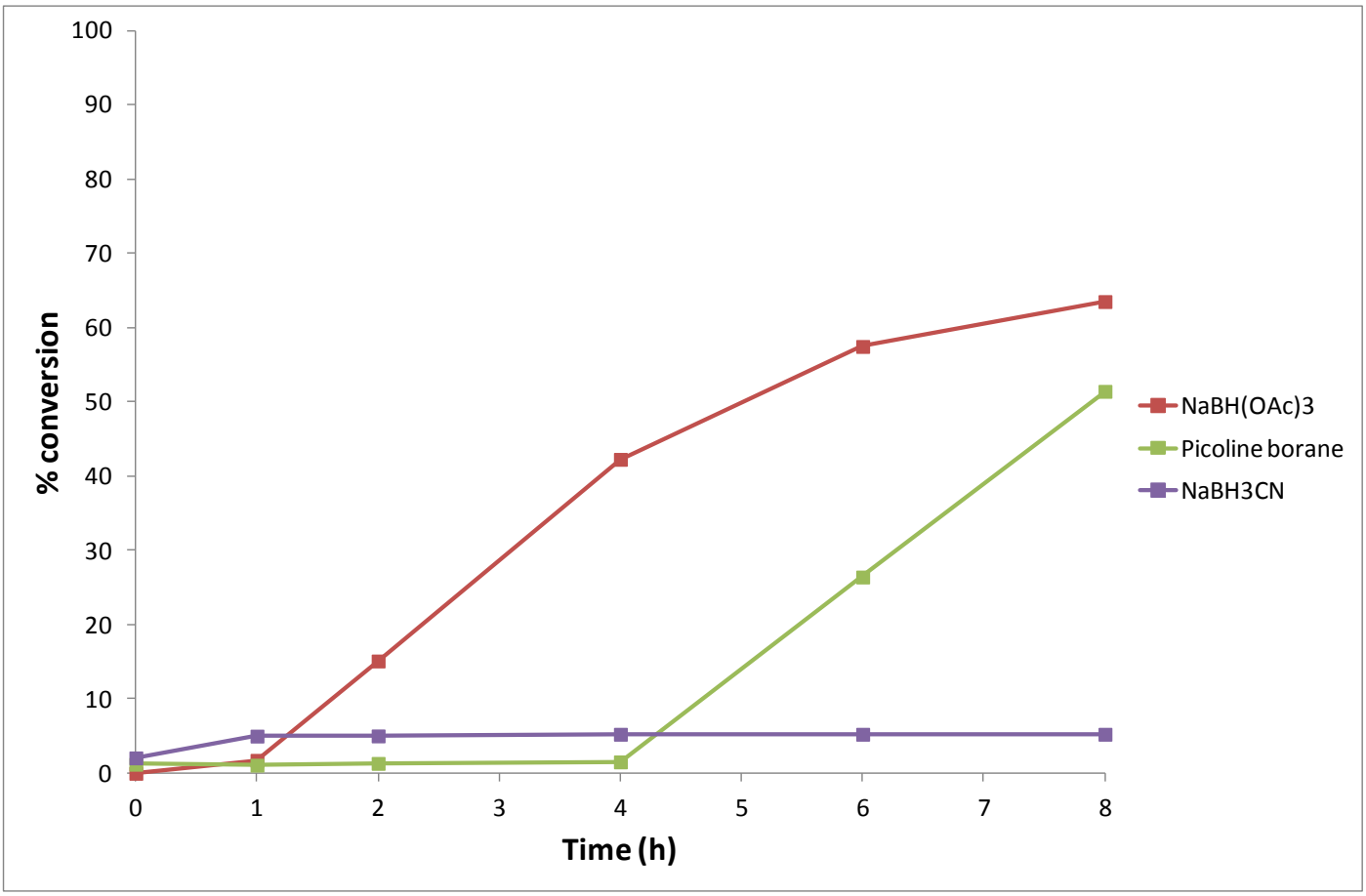
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	3.6	2.8
1	25.8	4.2	4.2
2	46.3	6.3	4.3
4	58.4	12.5	4.3
6	60.2	51.9	4.3
8	60.2	52.4	4.3
24	60.2	52.4	4.3

Reaction 9: IPA



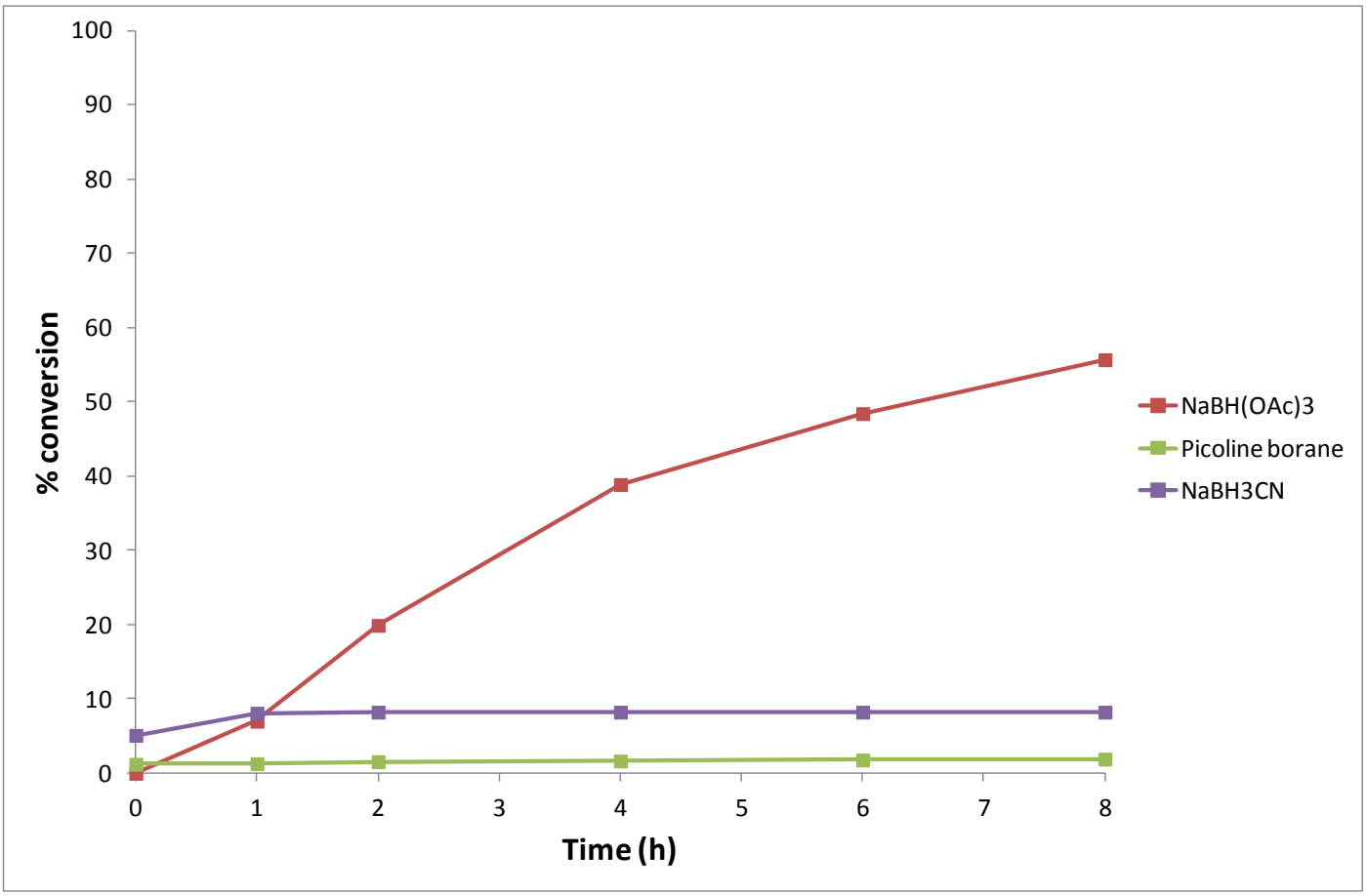
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	0.9	25.2
1	5.5	1.1	32.1
2	12.9	1.3	32.3
4	26.9	1.7	32.3
6	28.0	1.5	32.3
8	28.0	1.9	32.3
24	28.0	71.4	32.3

Reaction 9: 2-MeTHF



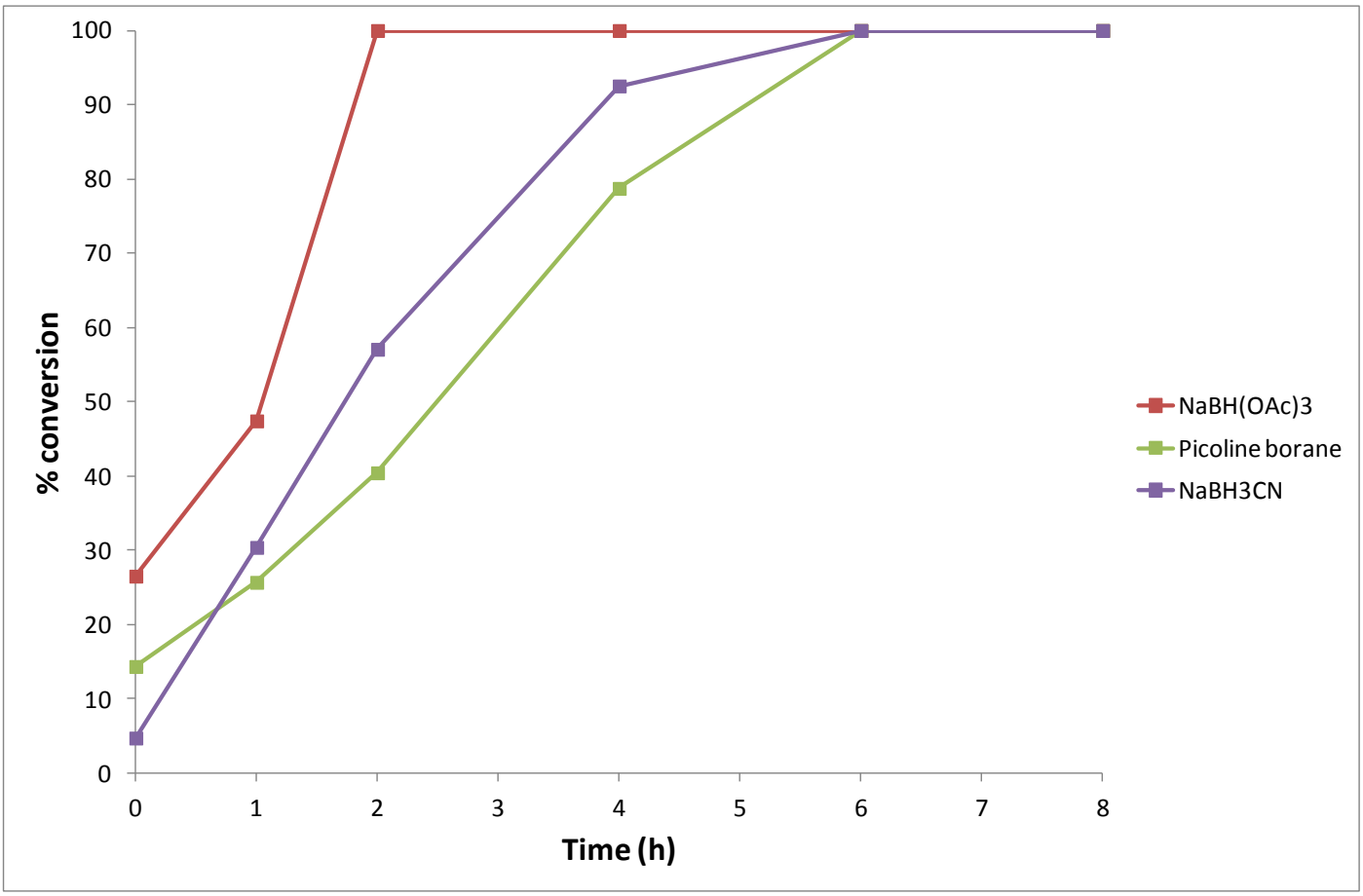
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	1.0	2.1
1	1.7	1.2	5.0
2	15.1	1.3	5.0
4	42.3	1.5	5.3
6	57.5	26.4	5.3
8	63.5	51.4	5.3
24	76.6	51.4	5.3

Reaction 9: THF



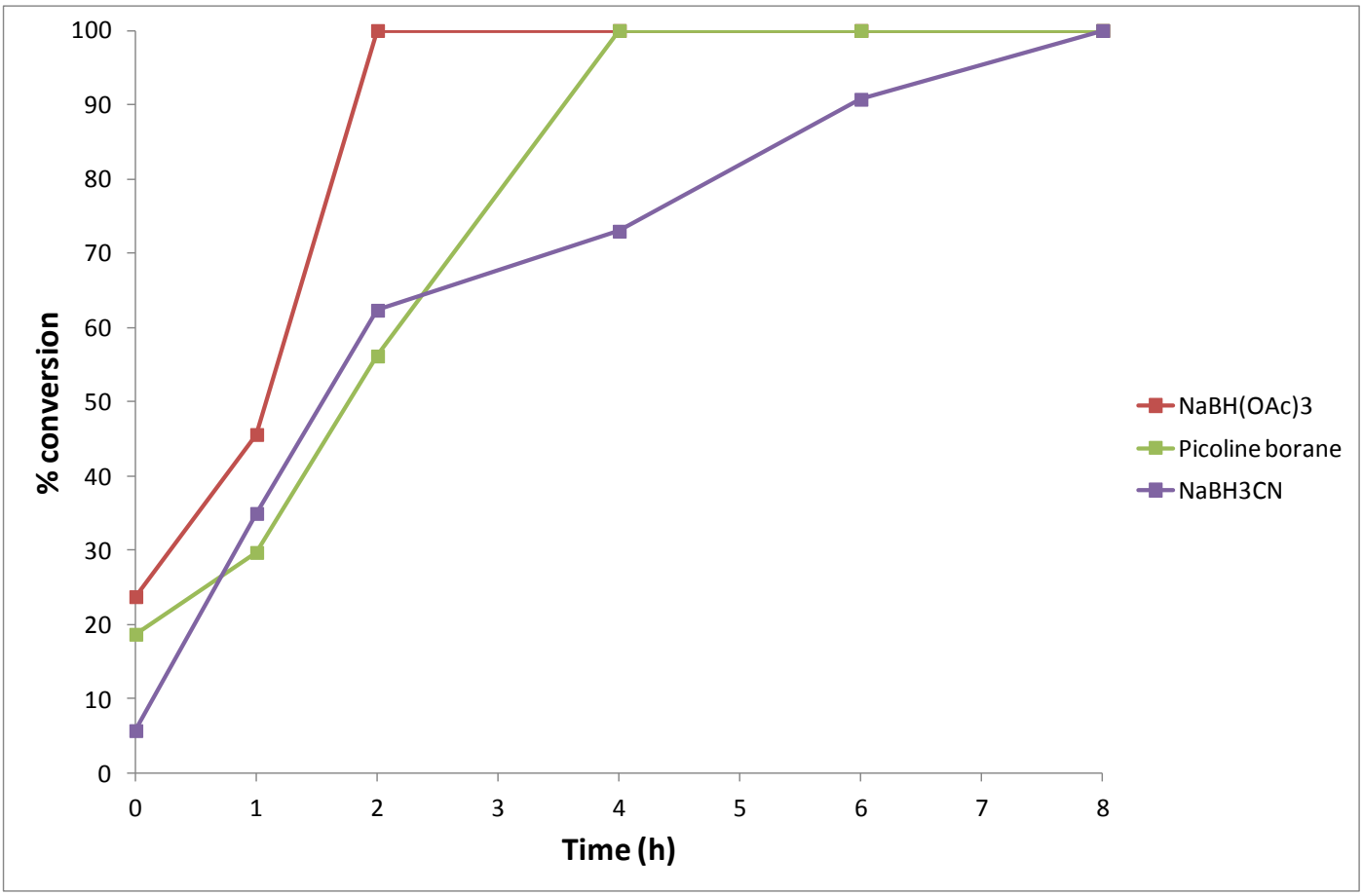
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	0.0	1.2	5.1
1	7.0	1.3	8.1
2	19.9	1.6	8.2
4	38.9	1.7	8.2
6	48.4	1.8	8.2
8	55.7	1.9	8.2
24	69.1	52.6	8.2

Reaction 10: TBME



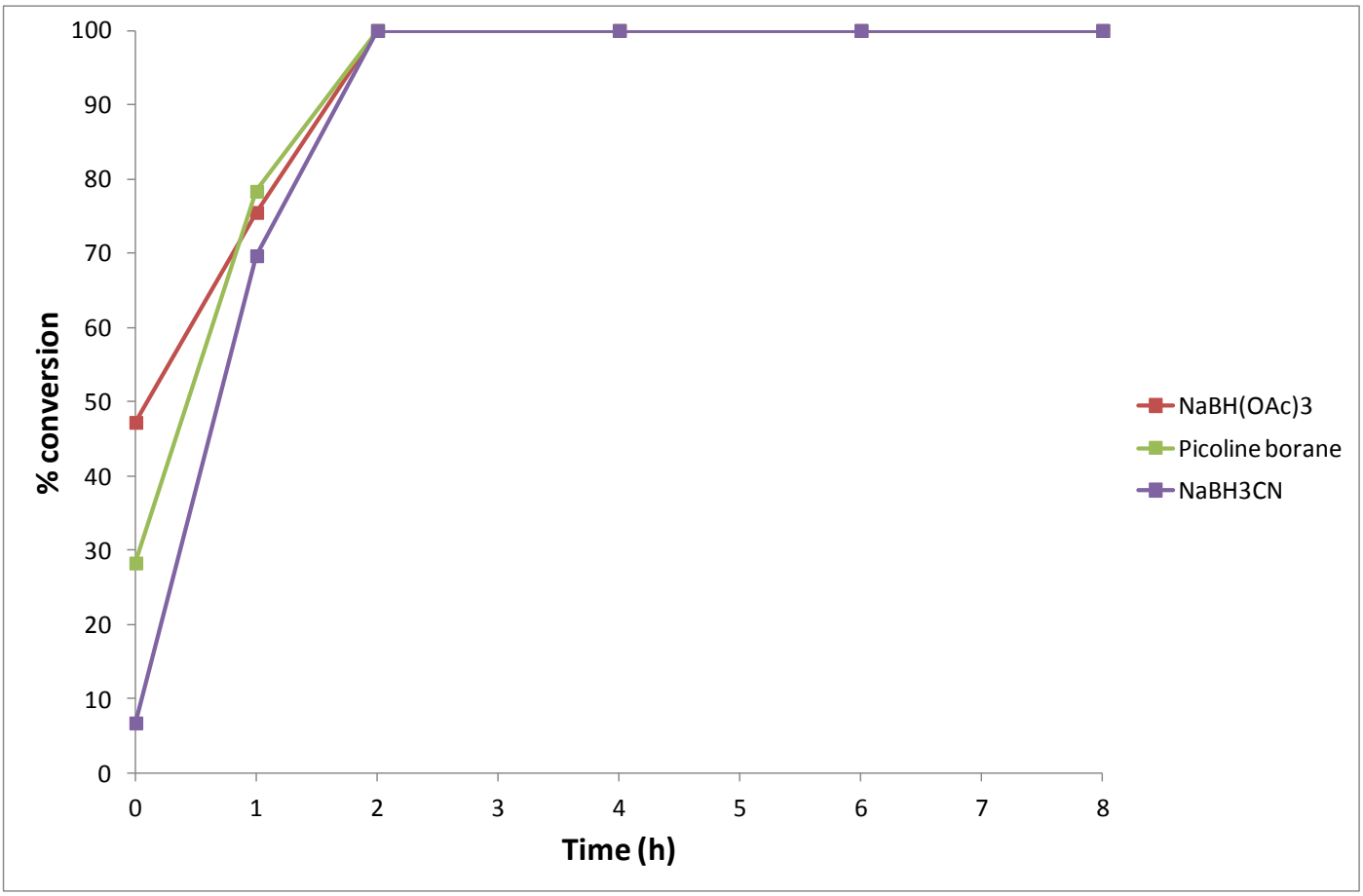
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	26.6	14.4	4.8
1	47.4	25.7	30.4
2	100.0	40.5	57.1
4	100.0	78.8	92.5
6	100.0	100.0	100.0
8	100.0	100.0	100.0
24	100.0	100.0	100.0

Reaction 10: CPME



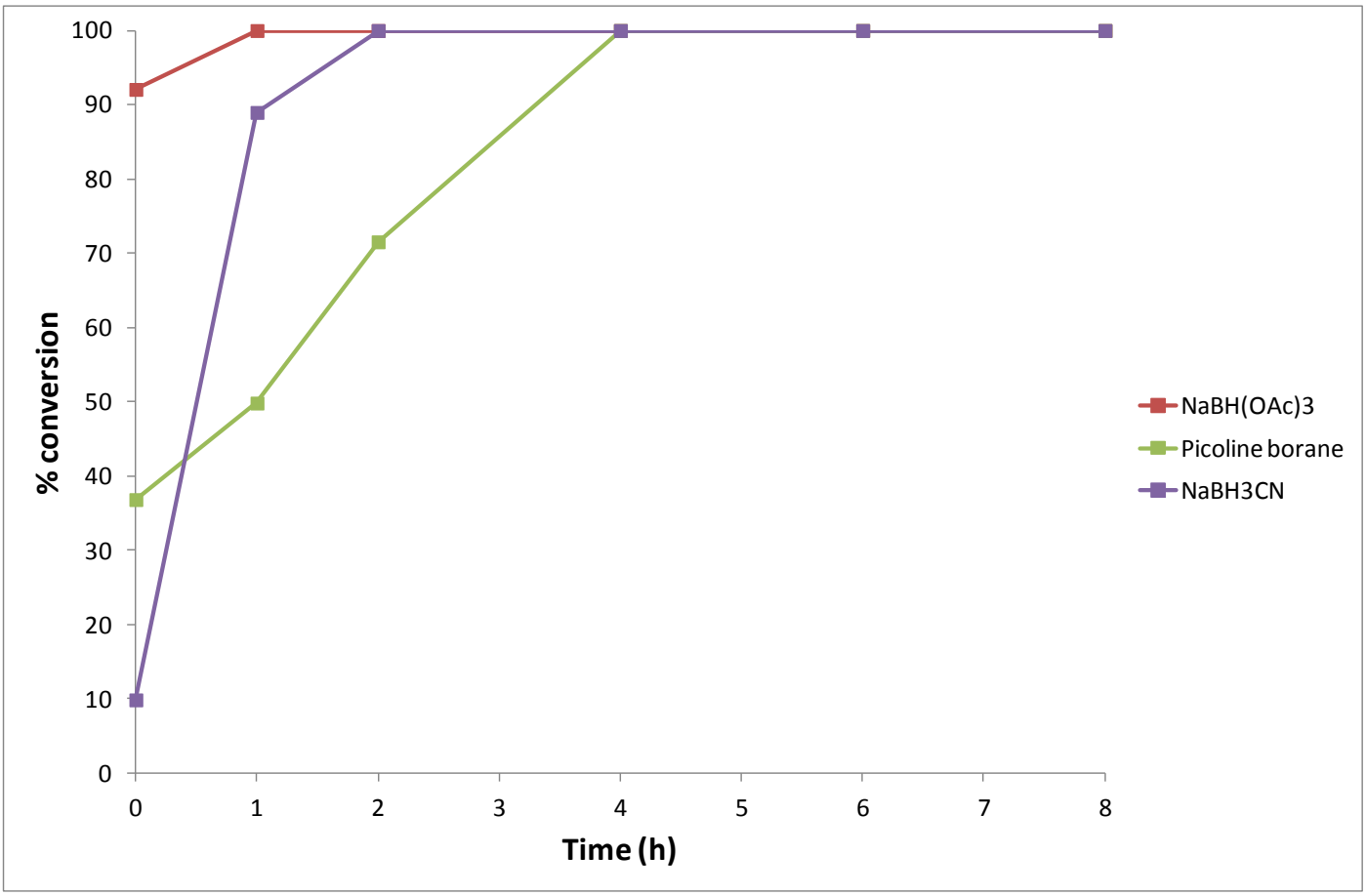
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	23.8	18.7	5.8
1	45.6	29.7	35.0
2	100.0	56.2	62.3
4	100.0	100.0	73.0
6	100.0	100.0	90.7
8	100.0	100.0	100.0
24	100.0	100.0	100.0

Reaction 10: DCE



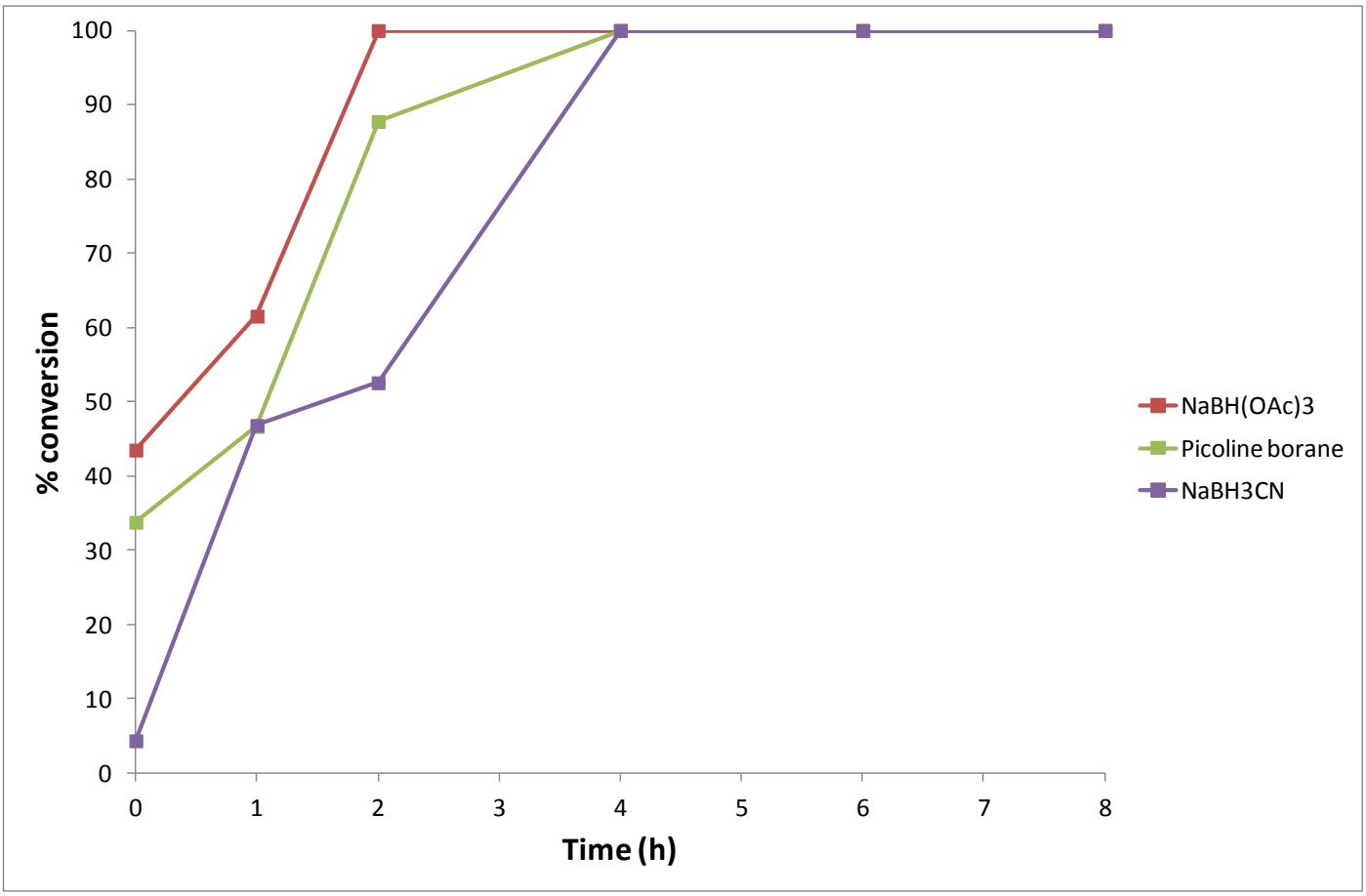
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	47.3	28.3	6.8
1	75.5	78.4	69.7
2	100.0	100.0	100.0
4	100.0	100.0	100.0
6	100.0	100.0	100.0
8	100.0	100.0	100.0
24	100.0	100.0	100.0

Reaction 10: CH_2Cl_2



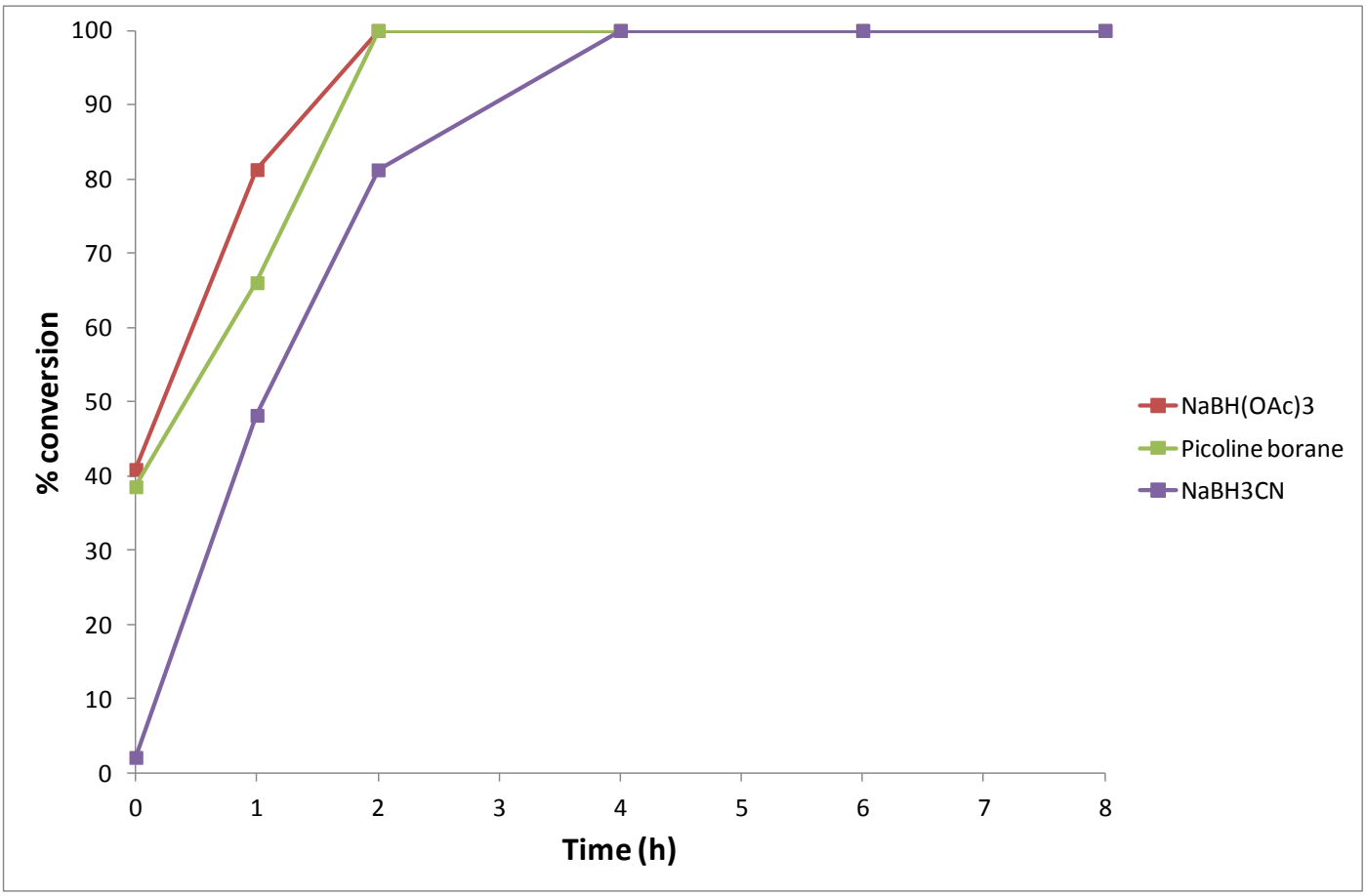
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	92.1	36.9	9.9
1	100.0	49.8	89.0
2	100.0	71.6	100.0
4	100.0	100.0	100.0
6	100.0	100.0	100.0
8	100.0	100.0	100.0
24	100.0	100.0	100.0

Reaction 10: DMC



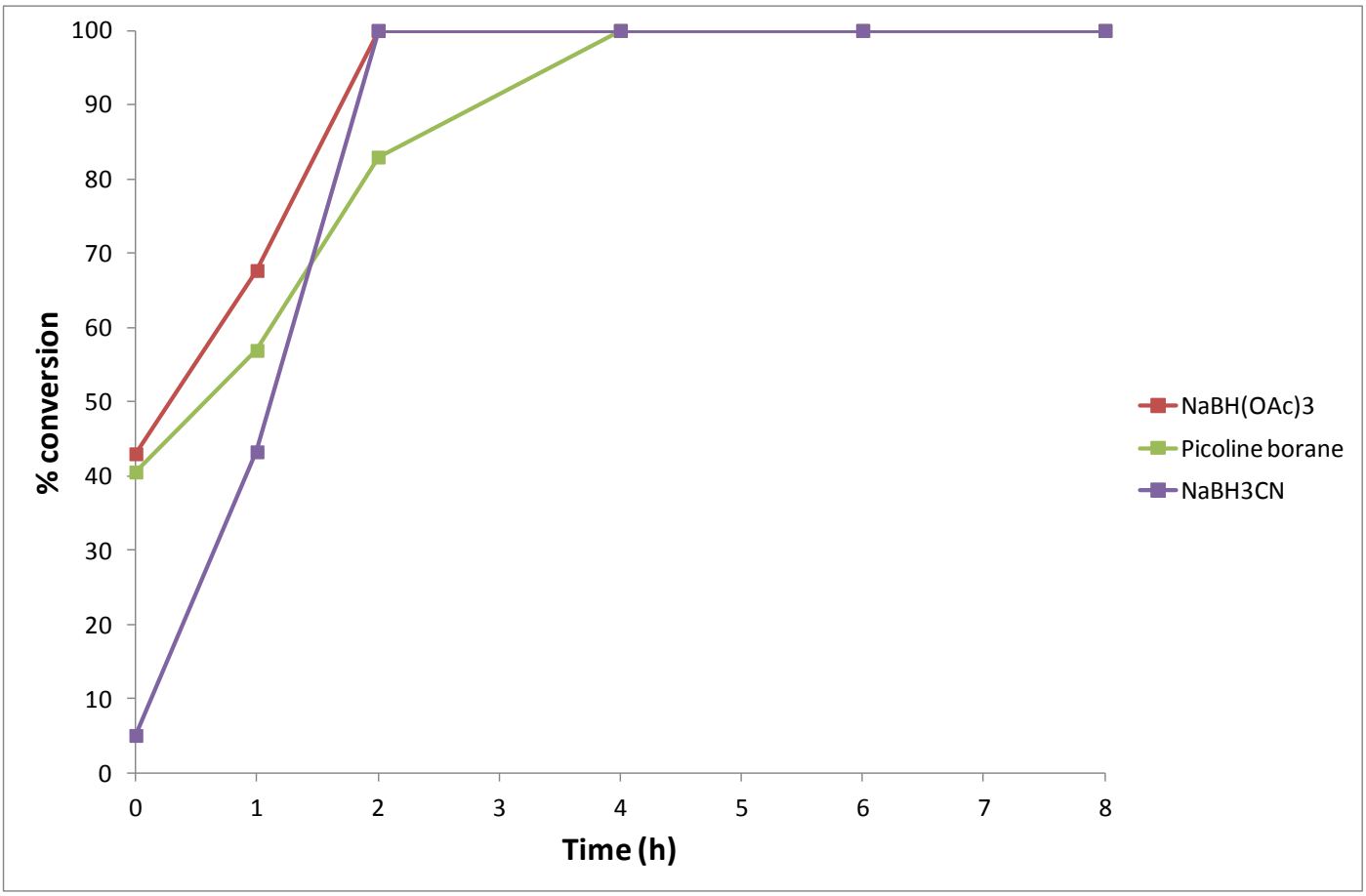
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	43.5	33.8	4.4
1	61.5	46.7	46.8
2	100.0	87.8	52.6
4	100.0	100.0	100.0
6	100.0	100.0	100.0
8	100.0	100.0	100.0
24	100.0	100.0	100.0

Reaction 10: DMF



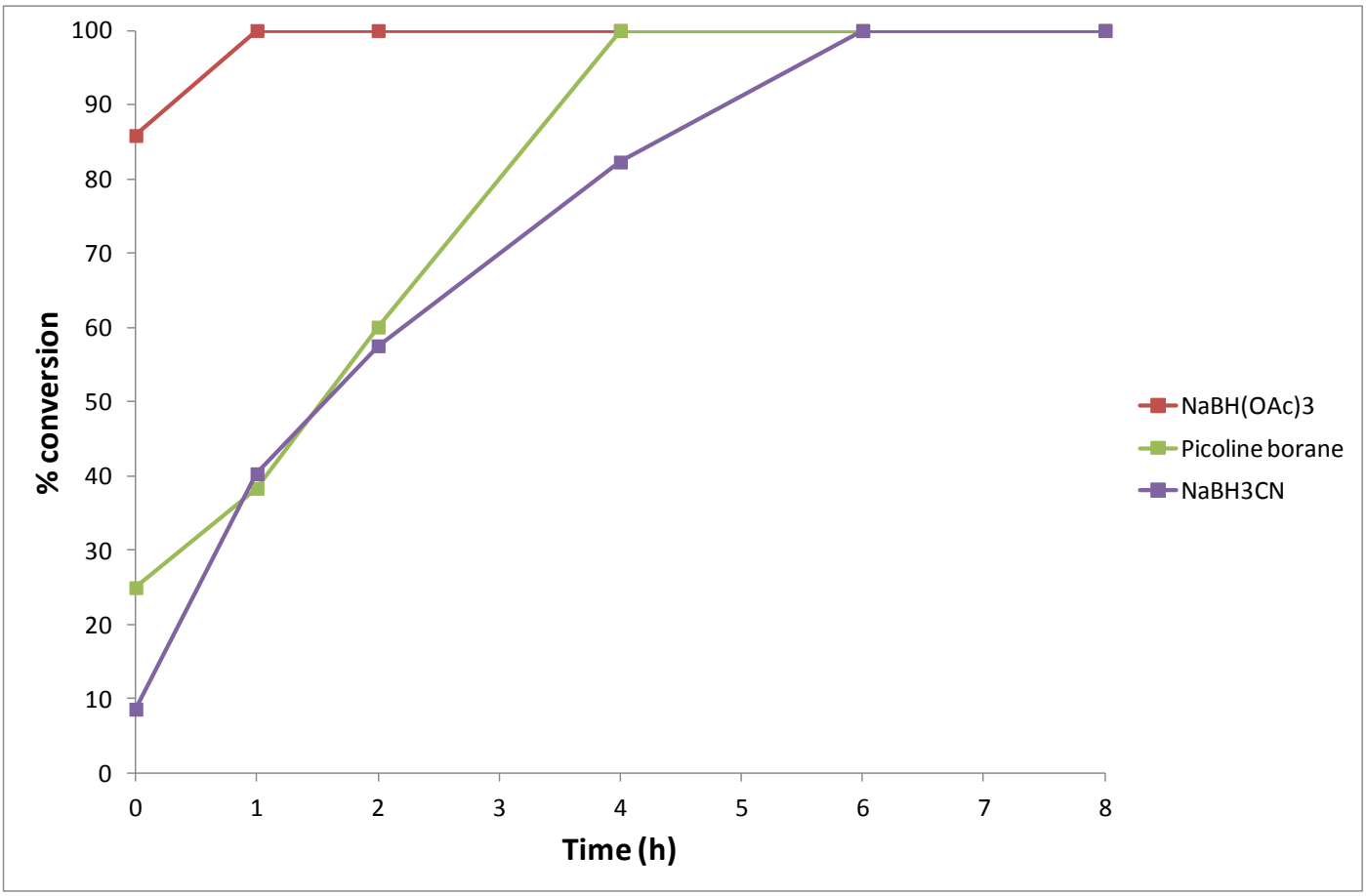
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	40.9	38.6	2.1
1	81.3	66.0	48.2
2	100.0	100.0	81.2
4	100.0	100.0	100.0
6	100.0	100.0	100.0
8	100.0	100.0	100.0
24	100.0	100.0	100.0

Reaction 10: EtOAc



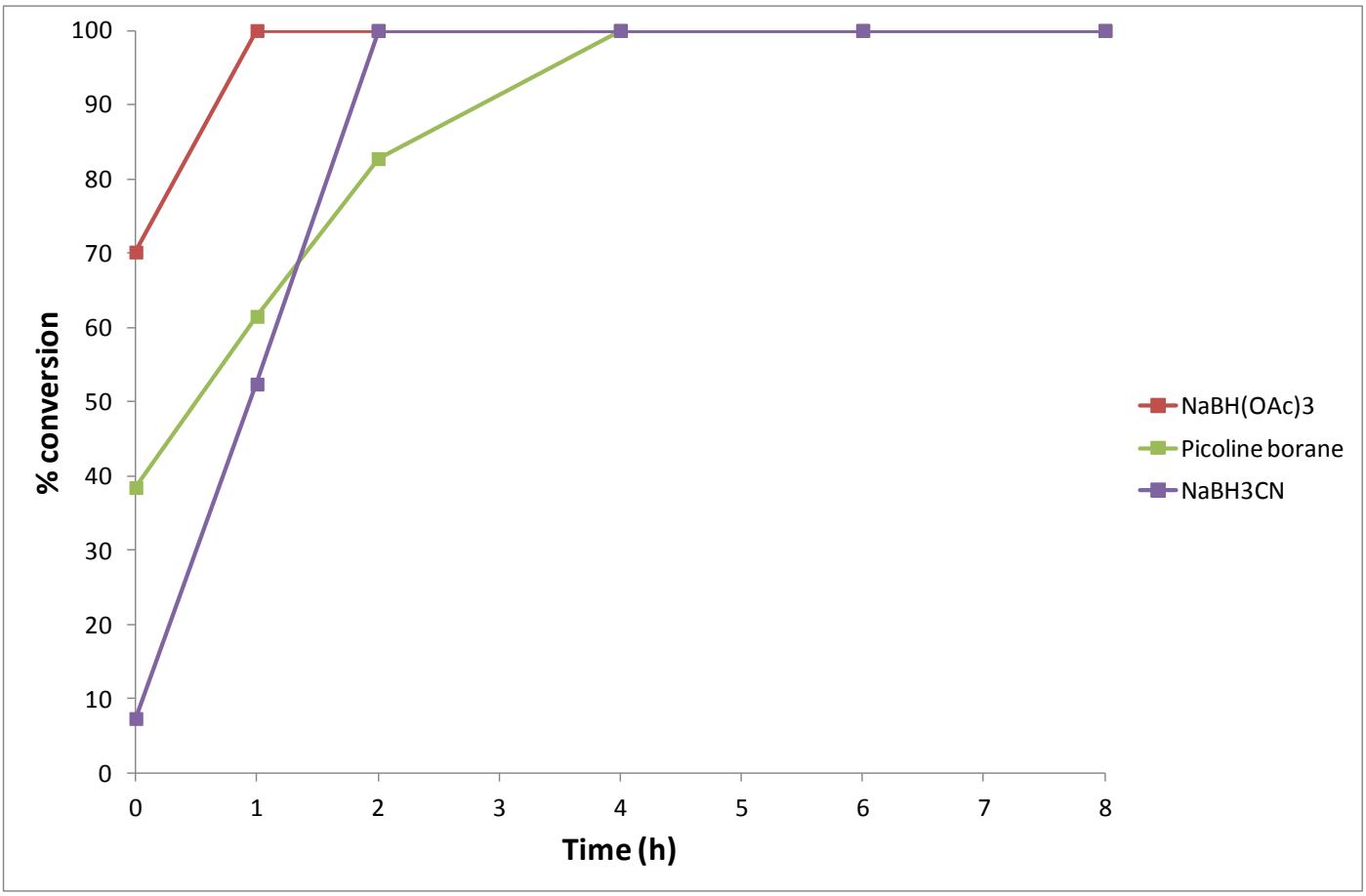
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	43.0	40.6	5.1
1	67.7	56.9	43.3
2	100.0	83.0	100.0
4	100.0	100.0	100.0
6	100.0	100.0	100.0
8	100.0	100.0	100.0
24	100.0	100.0	100.0

Reaction 10: IPA



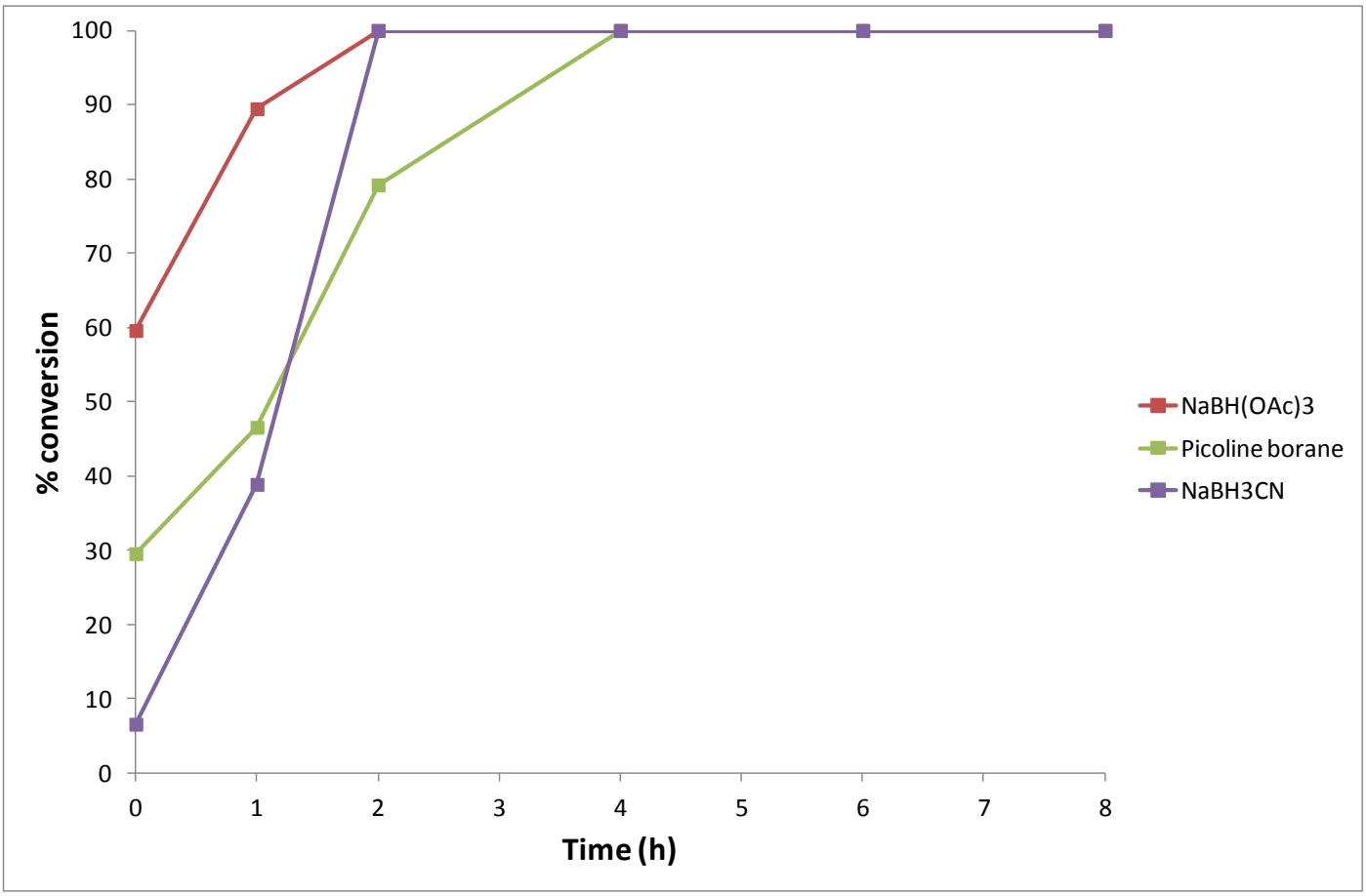
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	85.9	25.0	8.6
1	100.0	38.4	40.3
2	100.0	60.1	57.6
4	100.0	100.0	82.3
6	100.0	100.0	100.0
8	100.0	100.0	100.0
24	100.0	100.0	100.0

Reaction 10: 2-MeTHF



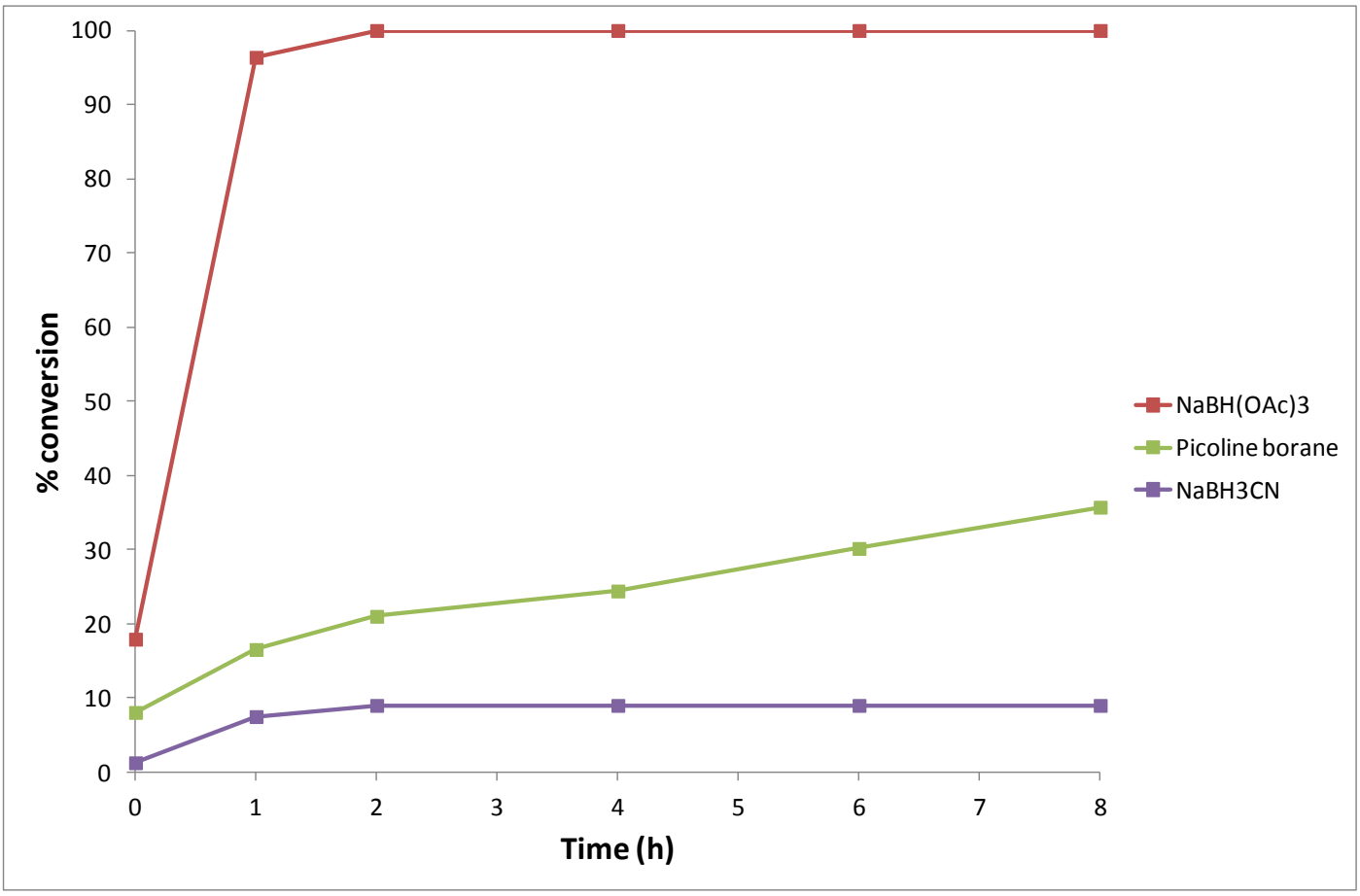
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	70.2	38.5	7.4
1	100.0	61.5	52.4
2	100.0	82.8	100.0
4	100.0	100.0	100.0
6	100.0	100.0	100.0
8	100.0	100.0	100.0
24	100.0	100.0	100.0

Reaction 10: THF



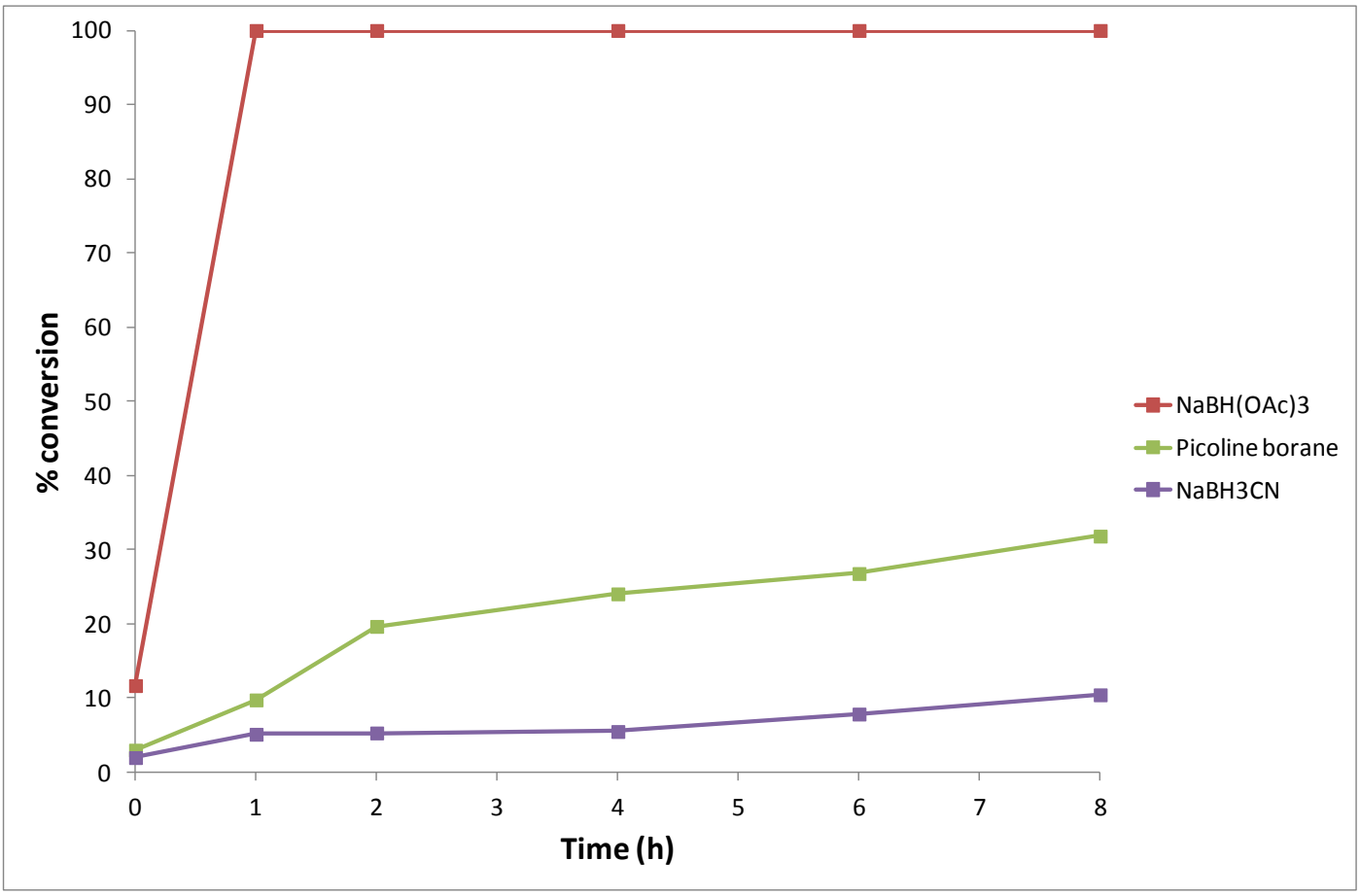
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	59.6	29.6	6.6
1	89.5	46.6	38.9
2	100.0	79.2	100.0
4	100.0	100.0	100.0
6	100.0	100.0	100.0
8	100.0	100.0	100.0
24	100.0	100.0	100.0

Reaction 11: TBME



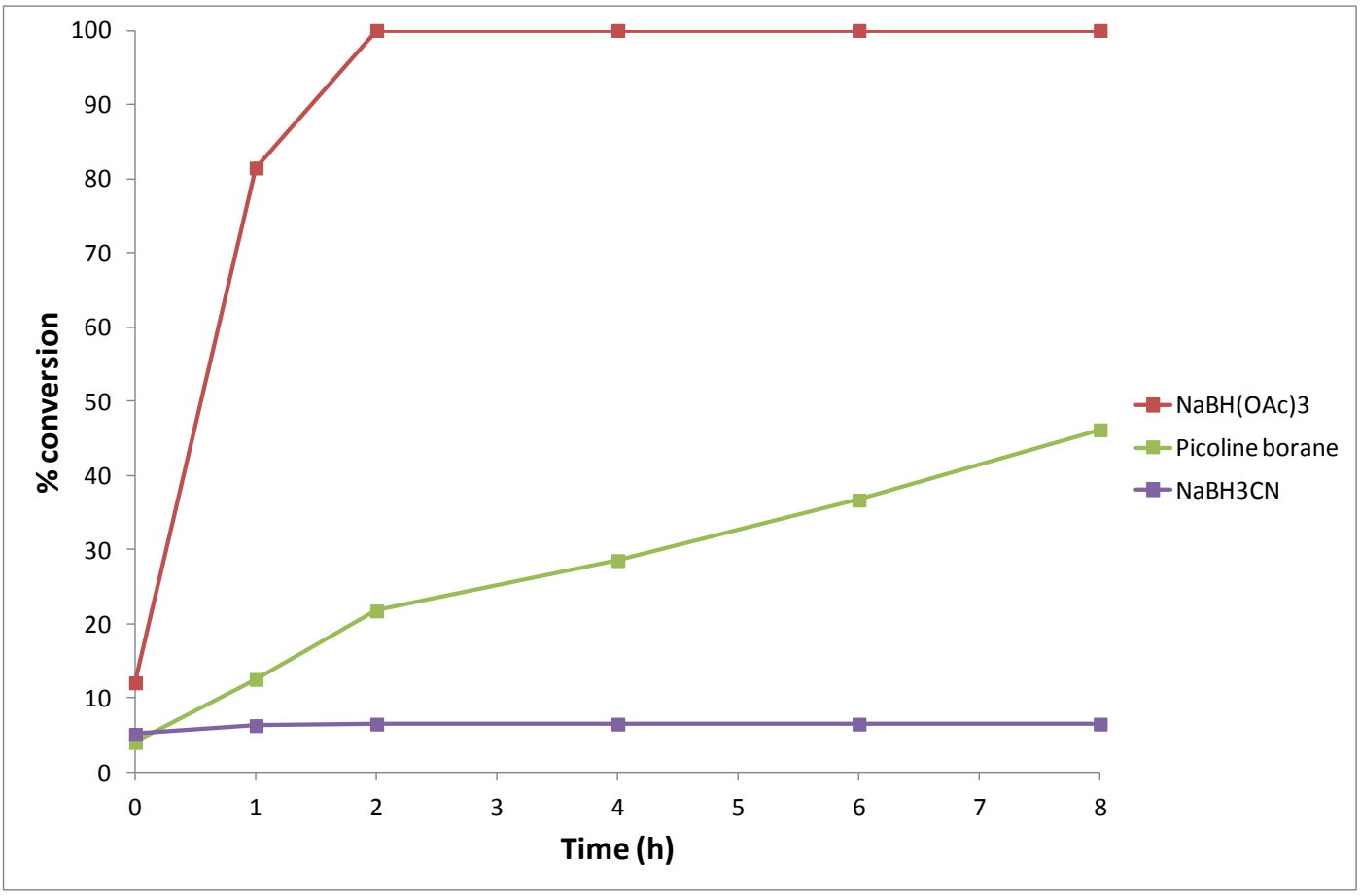
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	18.0	8.1	0.0
1	96.4	16.6	1.3
2	100.0	21.0	7.5
4	100.0	24.5	9.0
6	100.0	30.2	9.0
8	100.0	35.8	9.0
24	100.0	40.8	9.0

Reaction 11: CPME



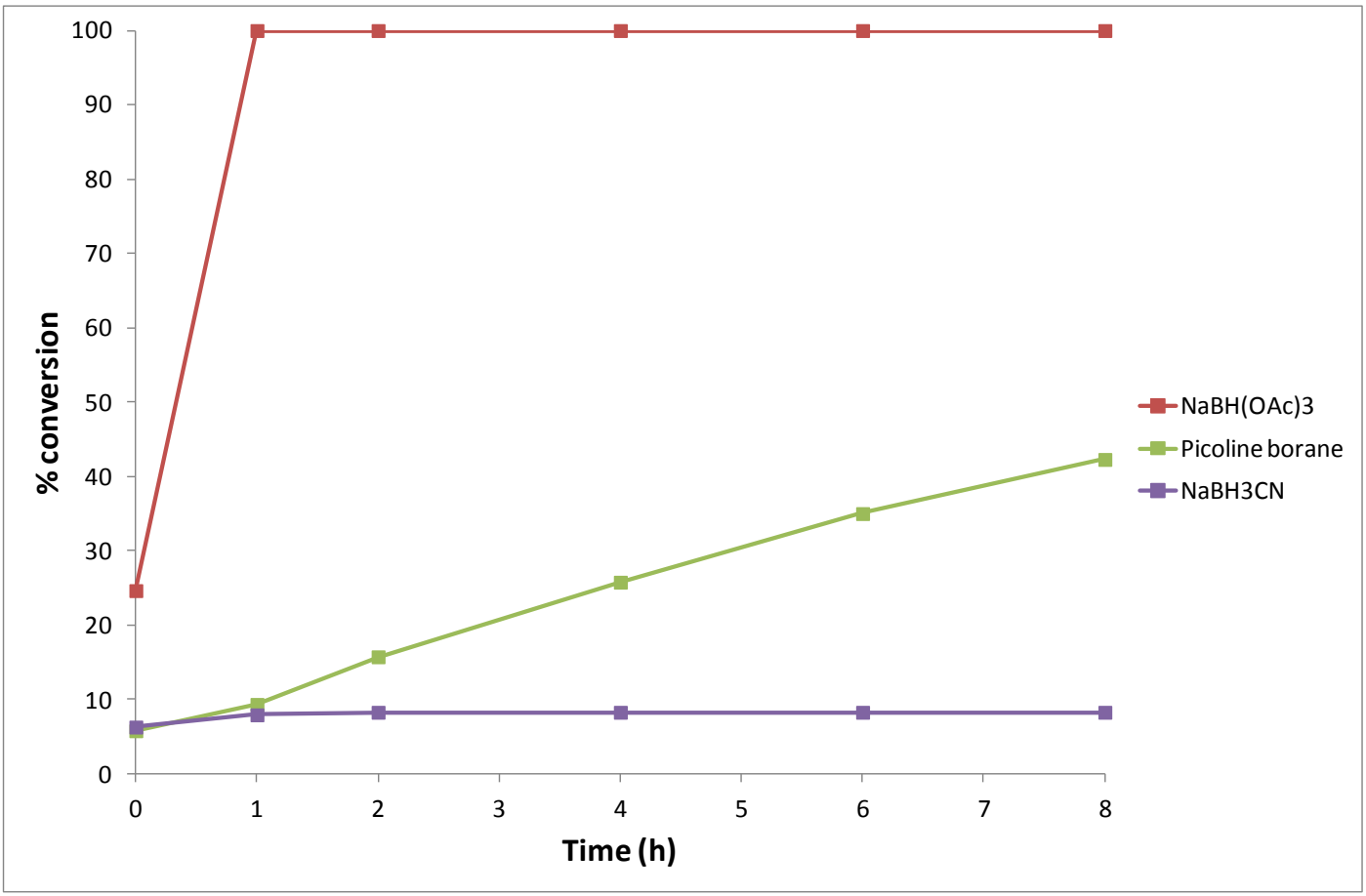
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	11.7	3.0	0.0
1	100.0	9.8	2.0
2	100.0	19.7	5.2
4	100.0	24.1	5.3
6	100.0	26.8	5.5
8	100.0	31.9	7.9
24	100.0	38.4	10.5

Reaction 11: DCE



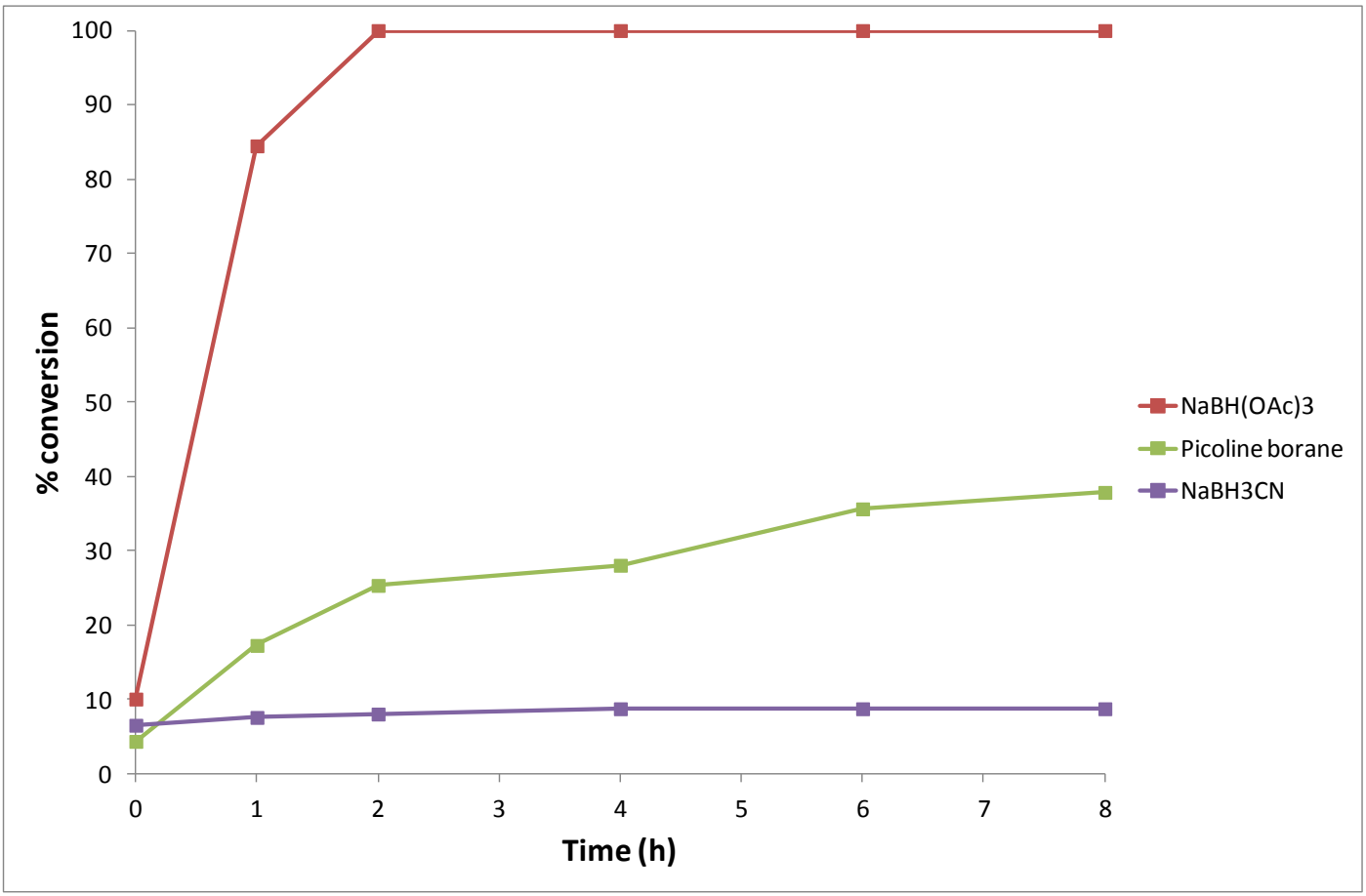
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	12.1	4.0	0.0
1	81.5	12.5	5.2
2	100.0	21.8	6.3
4	100.0	28.5	6.5
6	100.0	36.7	6.5
8	100.0	46.2	6.5
24	100.0	61.1	6.5

Reaction 11: CH_2Cl_2



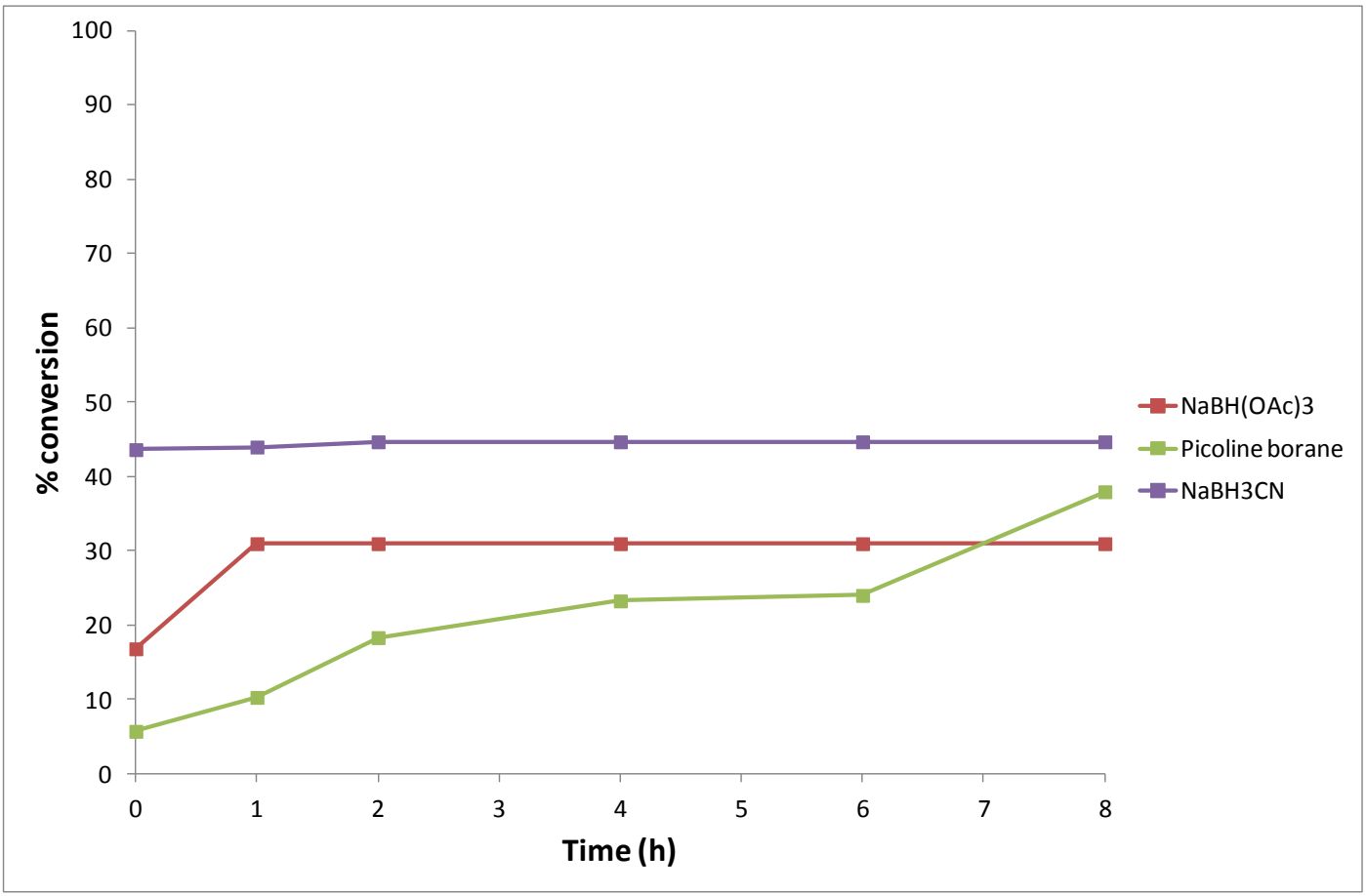
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	24.7	5.8	0.0
1	100.0	9.4	6.3
2	100.0	15.8	8.0
4	100.0	25.8	8.3
6	100.0	35.0	8.3
8	100.0	42.3	8.3
24	100.0	63.5	8.3

Reaction 11: DMC



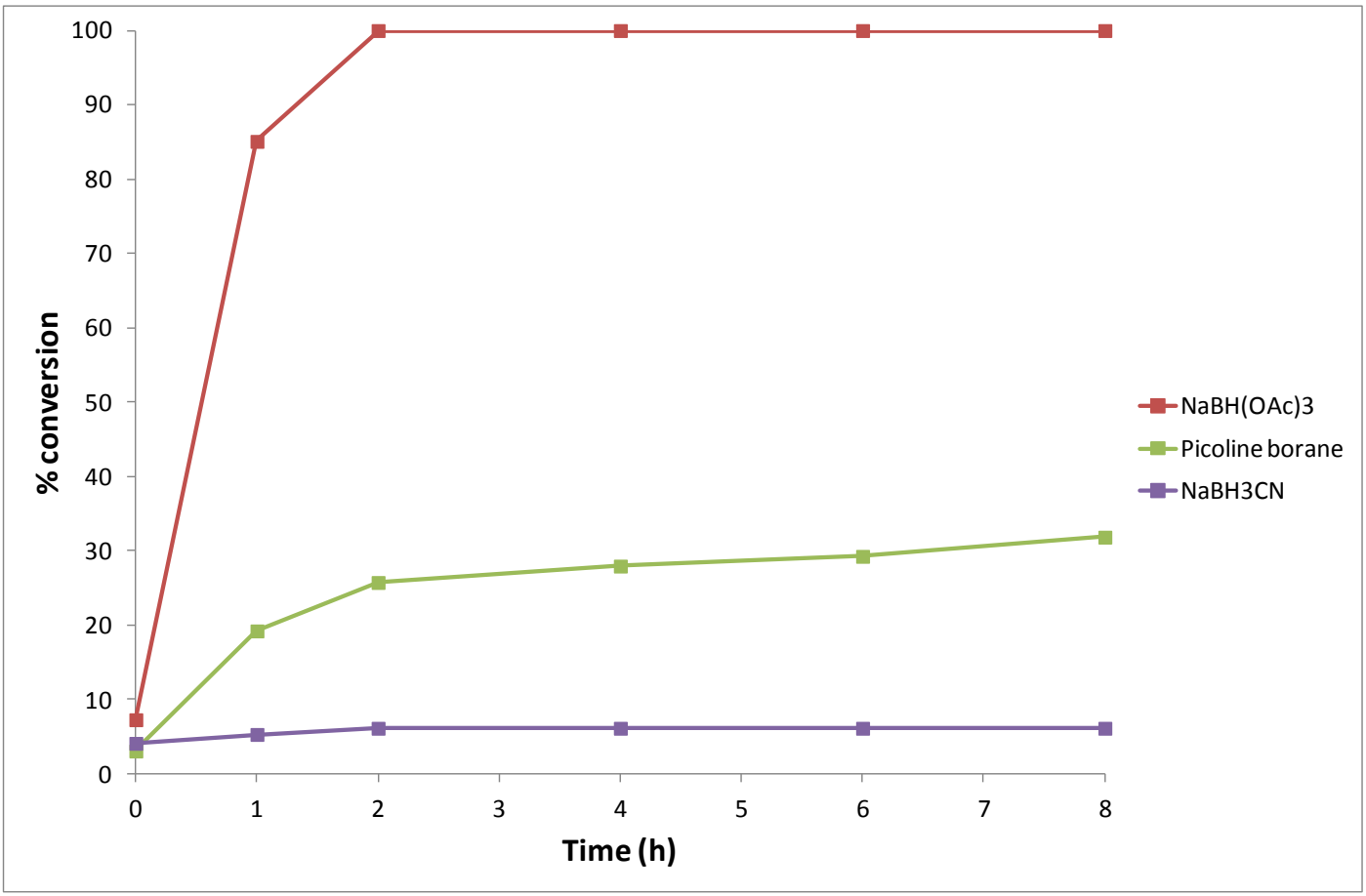
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	10.1	4.4	0.0
1	84.5	17.3	6.6
2	100.0	25.4	7.6
4	100.0	28.1	8.1
6	100.0	35.7	8.8
8	100.0	37.9	8.8
24	100.0	44.7	8.8

Reaction 11: DMF



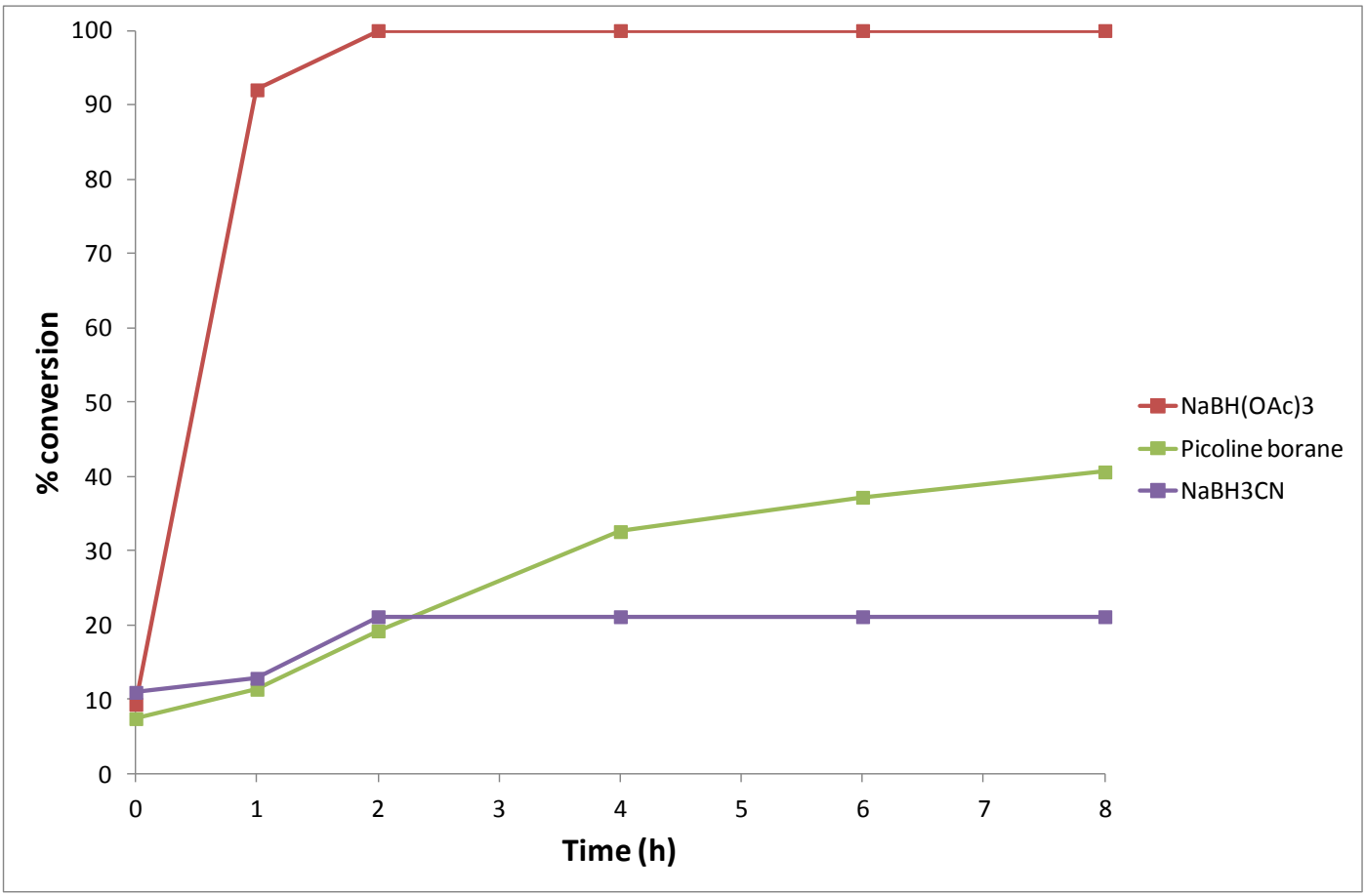
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	16.8	5.7	0.0
1	31.0	10.3	43.6
2	31.0	18.3	44.0
4	31.0	23.3	44.7
6	31.0	24.0	44.7
8	31.0	38.0	44.7
24	31.0	63.9	44.7

Reaction 11: EtOAc



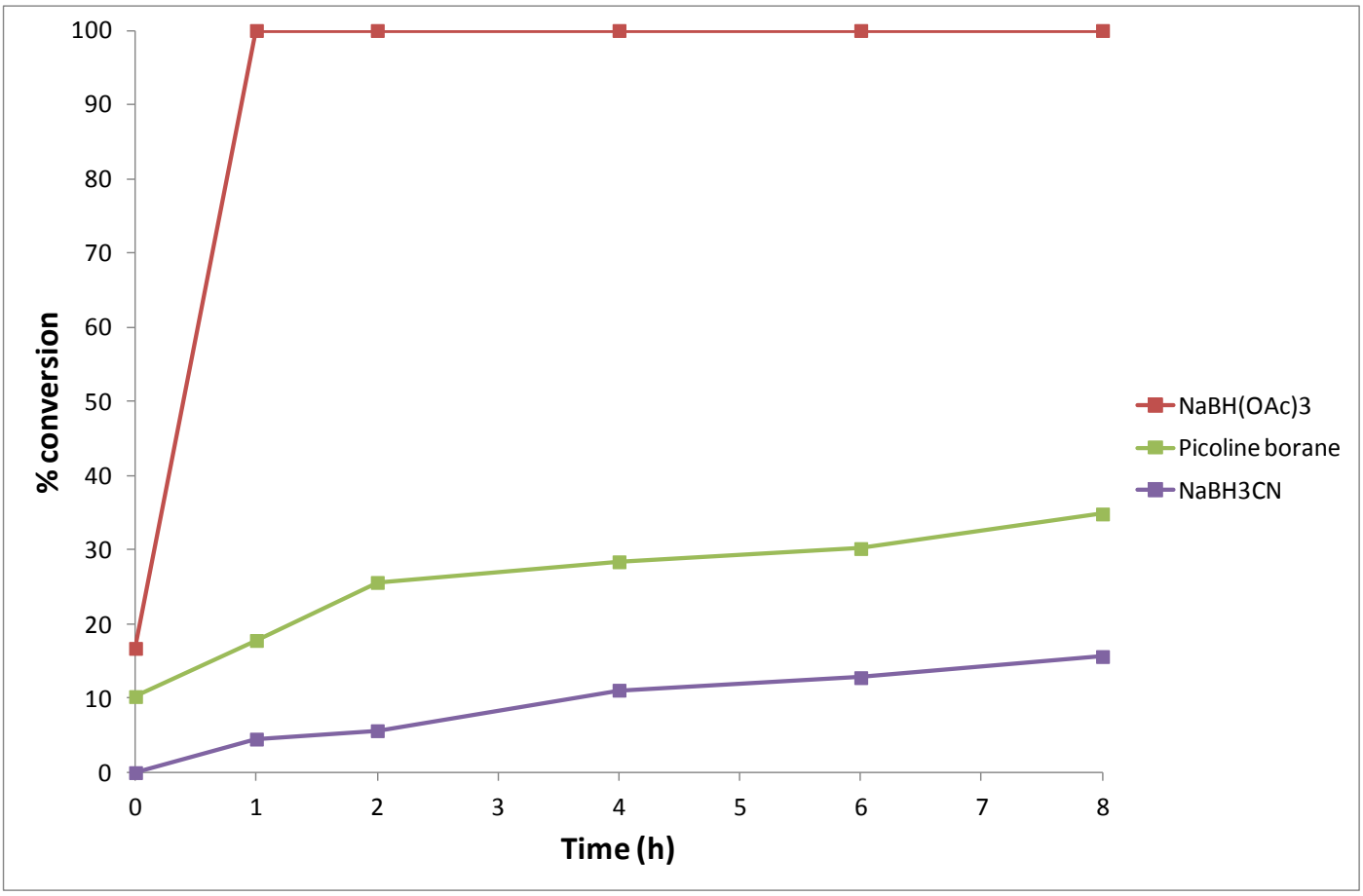
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	7.3	3.1	0.0
1	85.1	19.2	4.1
2	100.0	25.8	5.3
4	100.0	28.0	6.2
6	100.0	29.3	6.2
8	100.0	31.9	6.2
24	100.0	45.3	6.2

Reaction 11: IPA



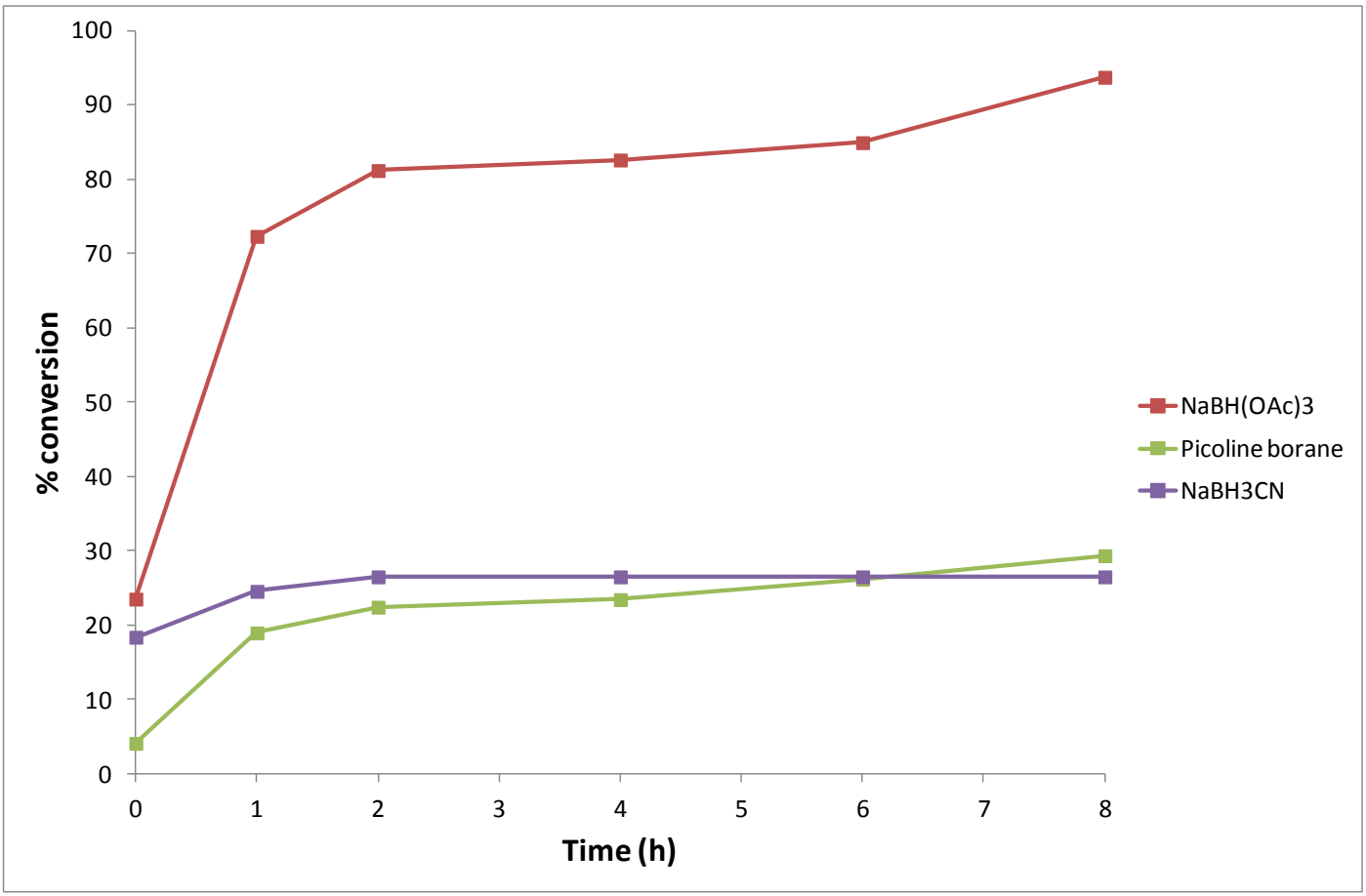
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	9.4	7.4	0.0
1	92.0	11.4	11.0
2	100.0	19.2	12.9
4	100.0	32.6	21.2
6	100.0	37.2	21.2
8	100.0	40.6	21.2
24	100.0	40.6	21.2

Reaction 11: 2-MeTHF



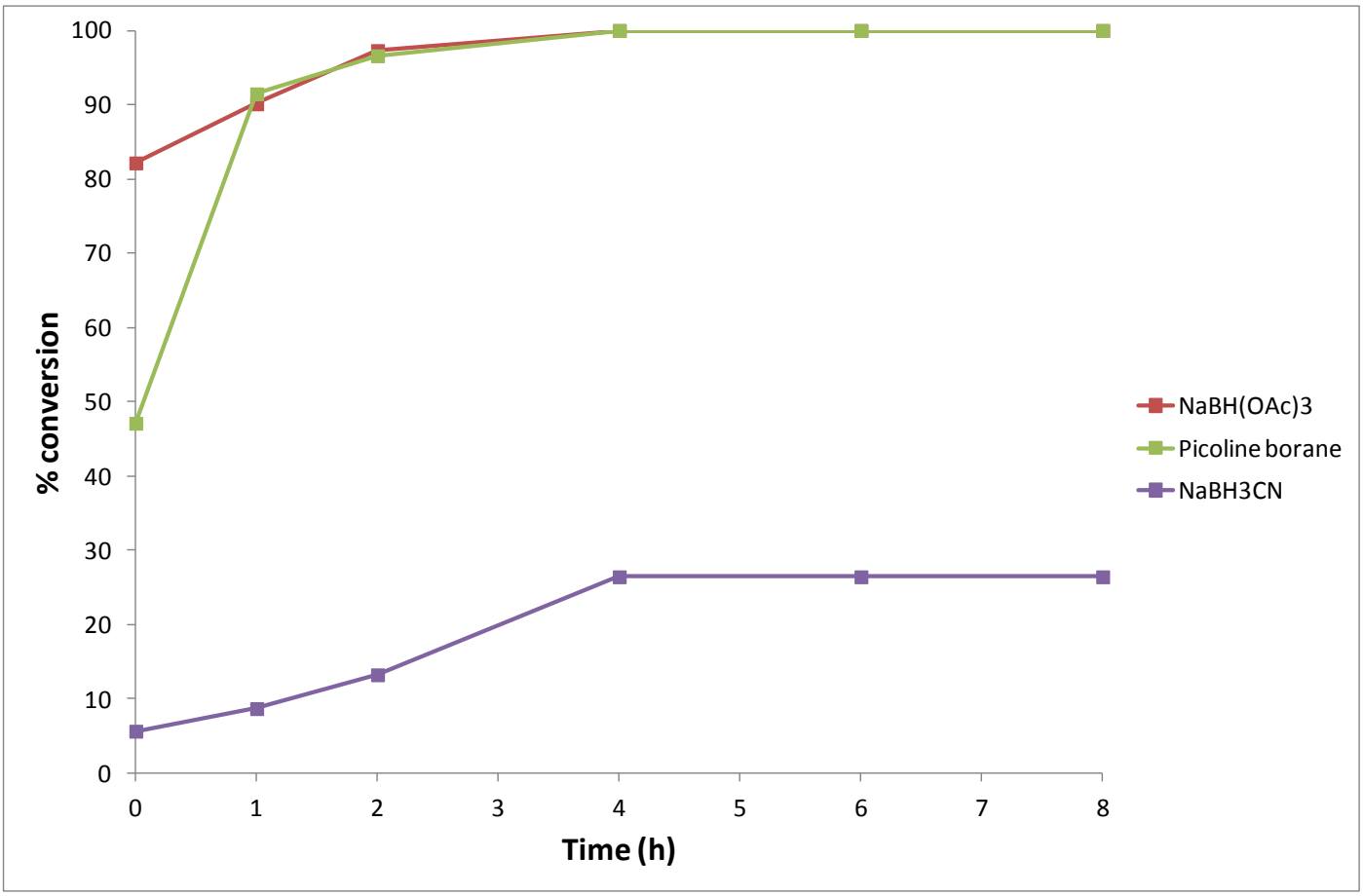
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	16.7	10.3	0.0
1	100.0	17.8	4.5
2	100.0	25.6	5.6
4	100.0	28.4	11.1
6	100.0	30.2	12.8
8	100.0	34.9	15.6
24	100.0	43.2	40.5

Reaction 11: THF



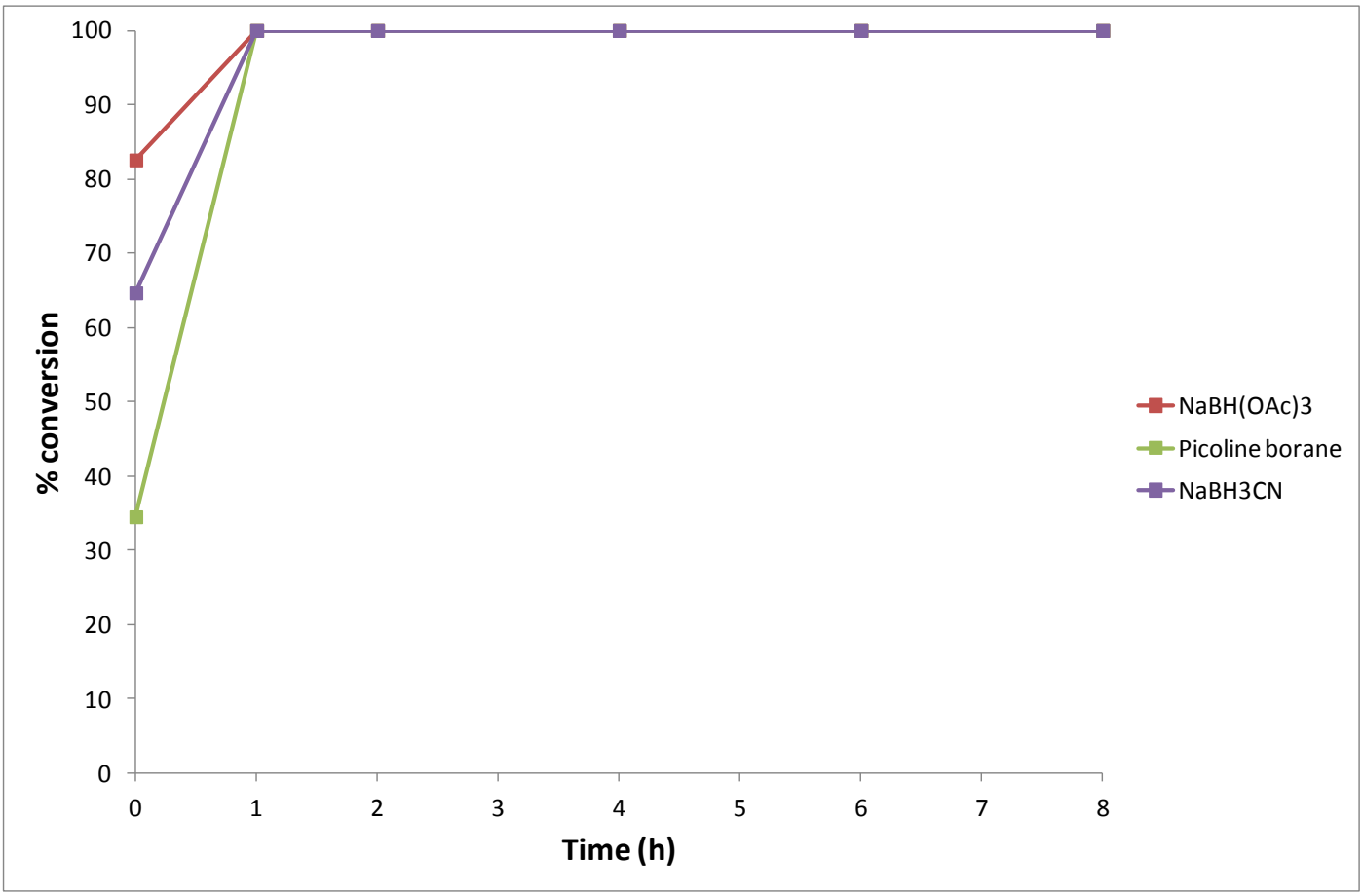
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	23.5	4.1	0.0
1	72.3	19.0	18.4
2	81.2	22.4	24.6
4	82.6	23.5	26.5
6	84.9	26.2	26.5
8	93.7	29.4	26.5
24	100.0	36.9	26.5

Reaction 12: TBME



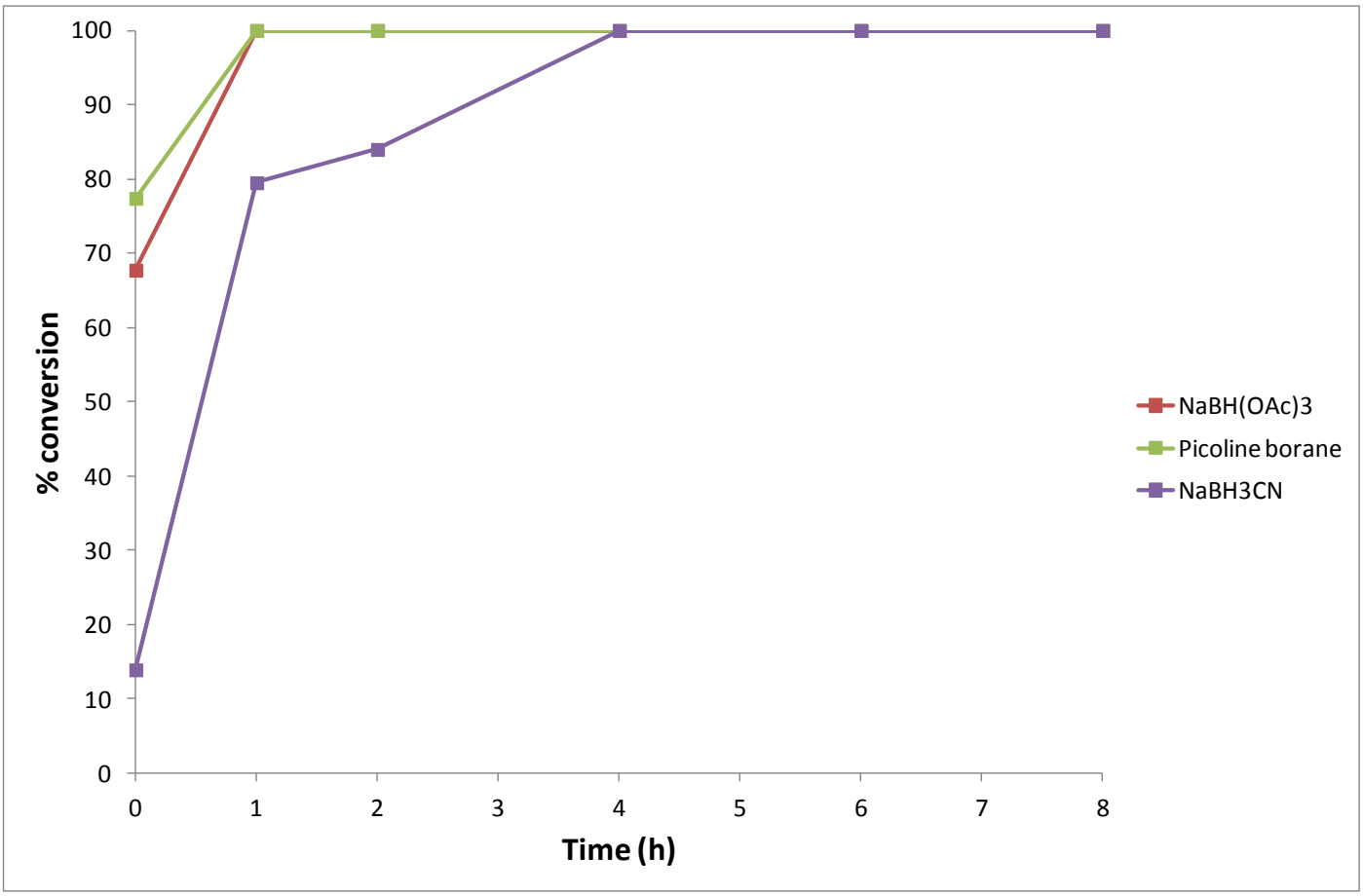
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	82.2	47.1	5.7
1	90.1	91.5	8.7
2	97.3	96.6	13.3
4	100.0	100.0	26.5
6	100.0	100.0	26.5
8	100.0	100.0	26.5
24	100.0	100.0	26.5

Reaction 12: CPME



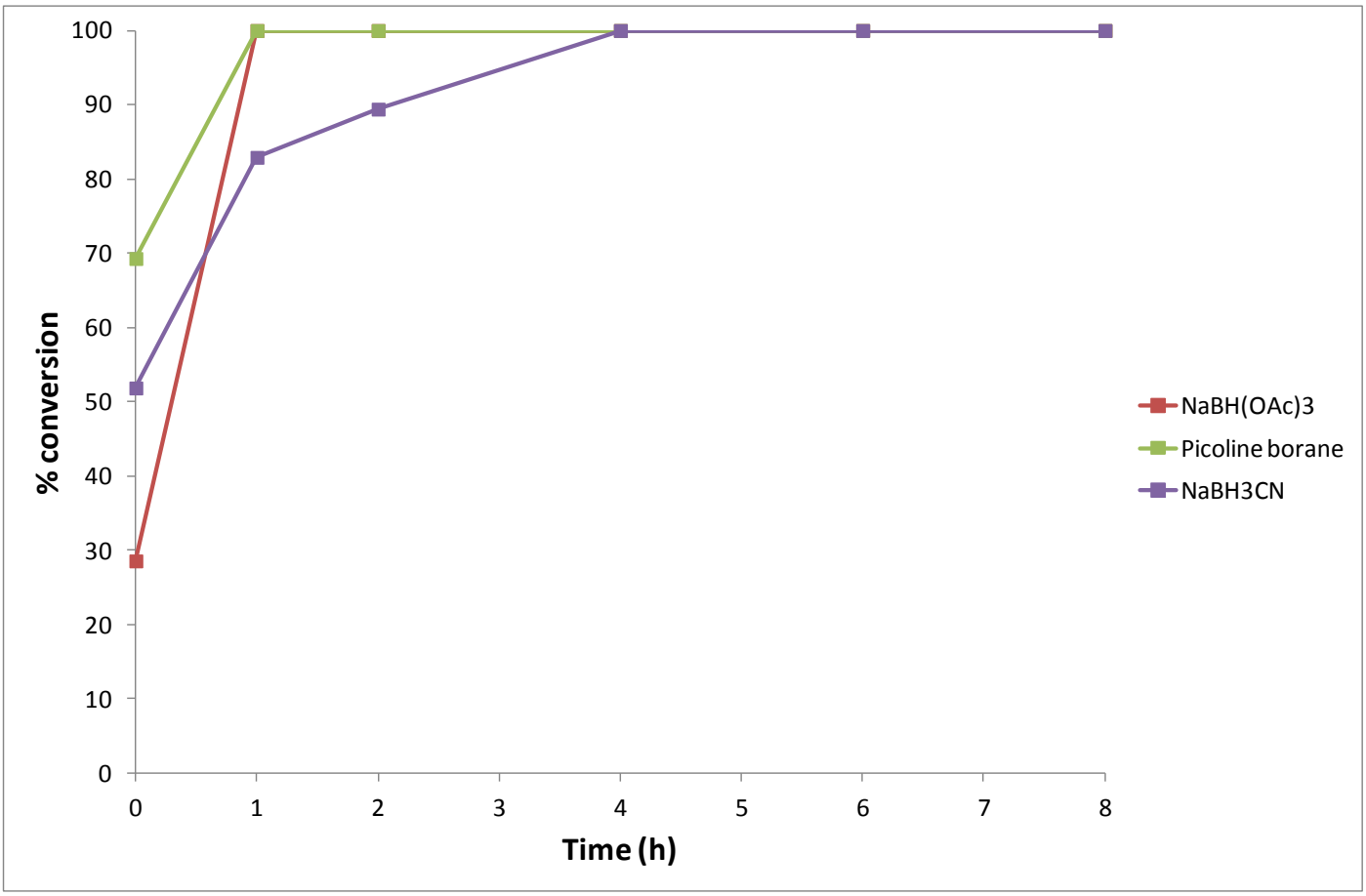
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	82.6	34.5	64.7
1	100.0	100.0	100.0
2	100.0	100.0	100.0
4	100.0	100.0	100.0
6	100.0	100.0	100.0
8	100.0	100.0	100.0
24	100.0	100.0	100.0

Reaction 12: DCE



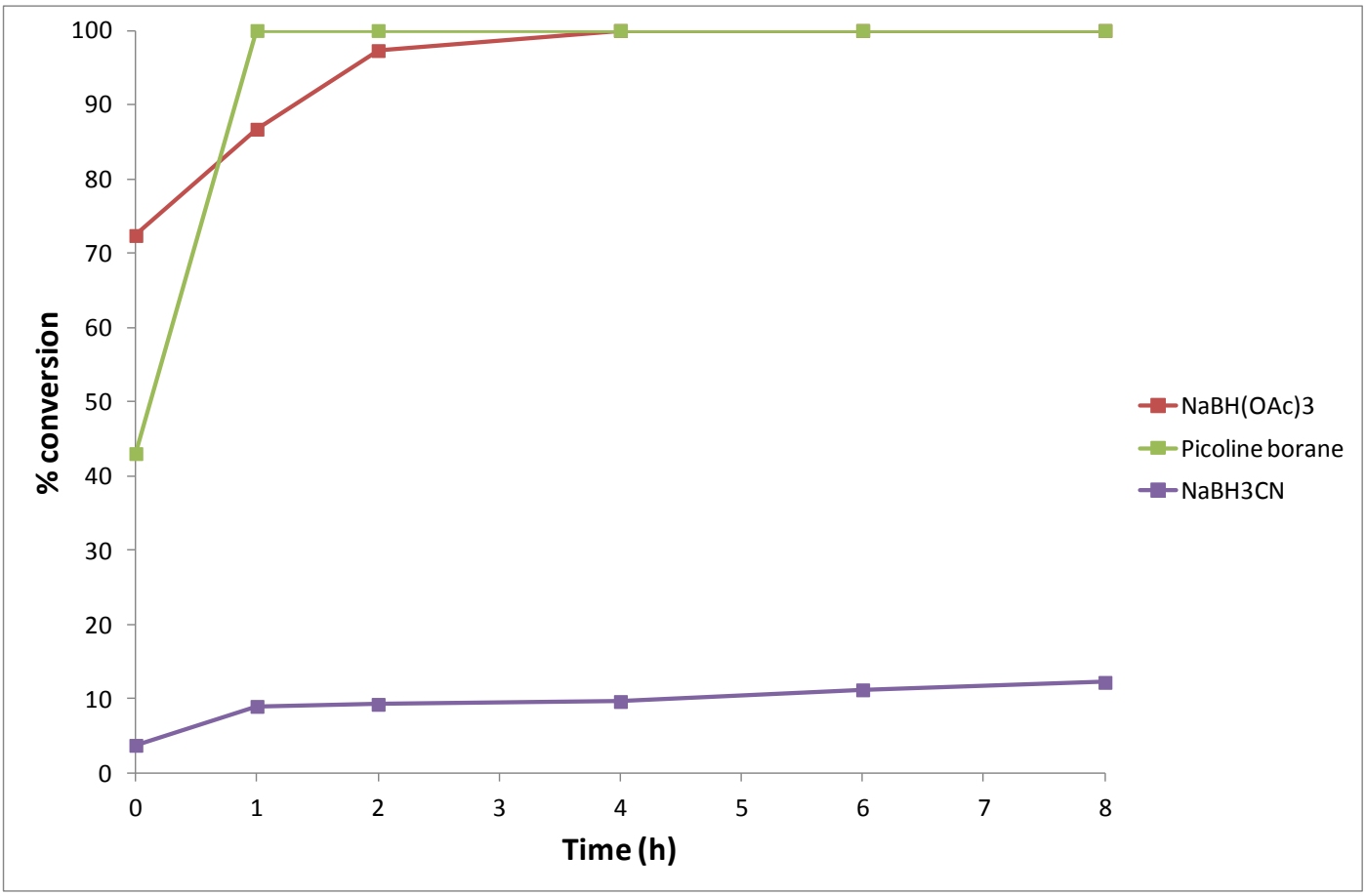
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	67.7	77.4	13.9
1	100.0	100.0	79.5
2	100.0	100.0	84.0
4	100.0	100.0	100.0
6	100.0	100.0	100.0
8	100.0	100.0	100.0
24	100.0	100.0	100.0

Reaction 12: CH_2Cl_2



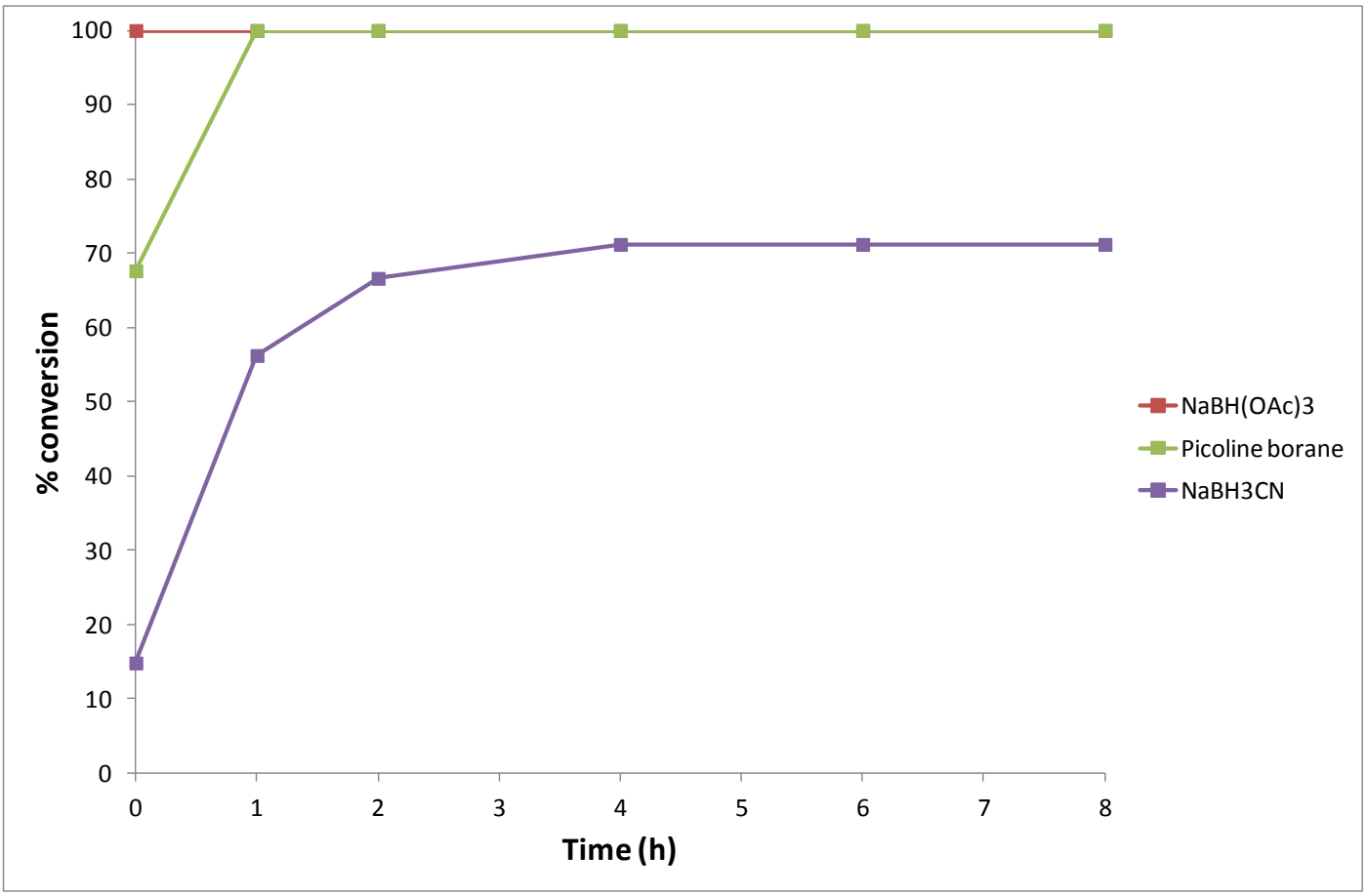
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	28.6	69.3	51.9
1	100.0	100.0	82.9
2	100.0	100.0	89.4
4	100.0	100.0	100.0
6	100.0	100.0	100.0
8	100.0	100.0	100.0
24	100.0	100.0	100.0

Reaction 12: DMC



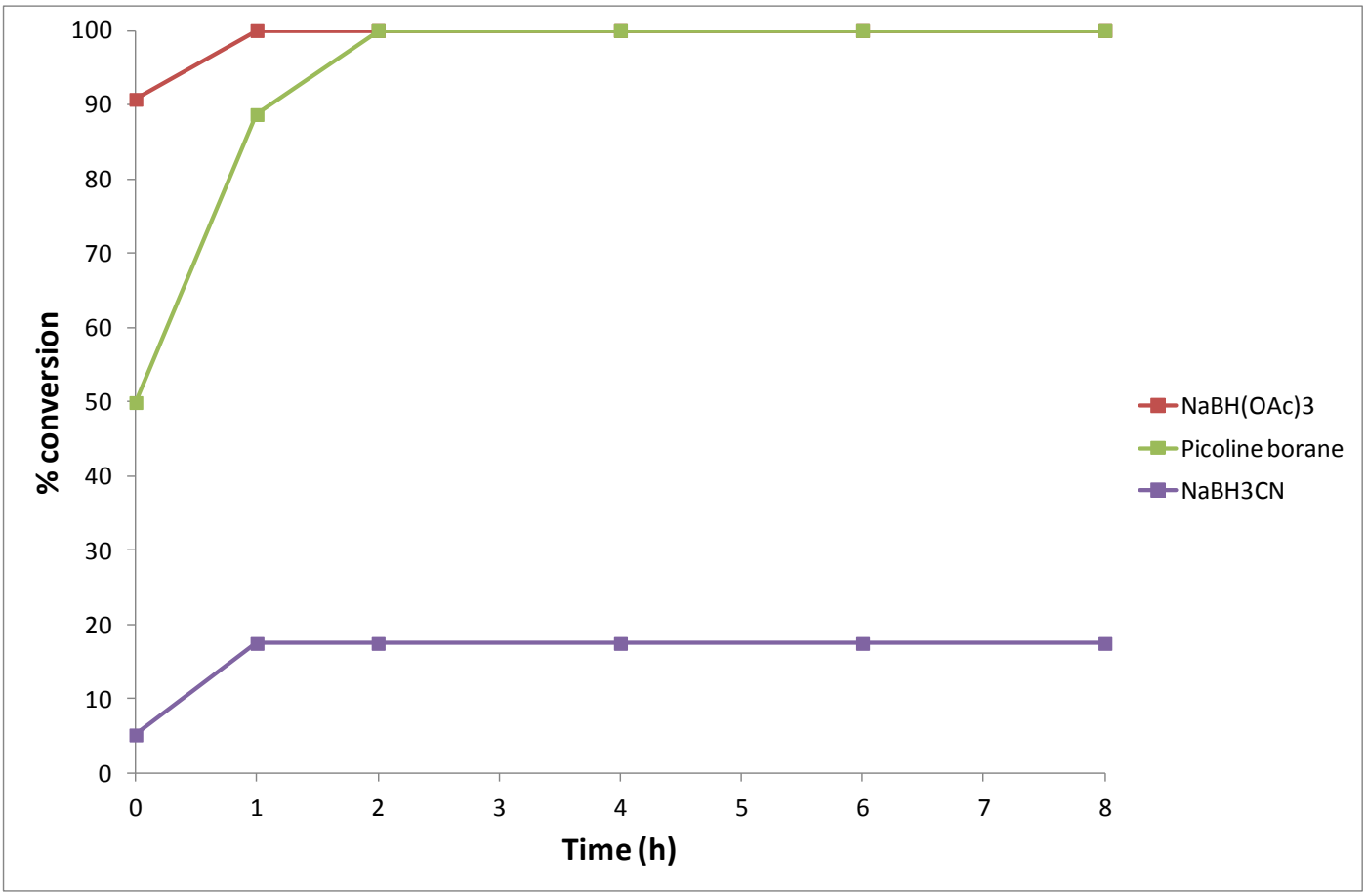
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	72.4	43.0	3.8
1	86.7	100.0	9.0
2	97.3	100.0	9.3
4	100.0	100.0	9.7
6	100.0	100.0	11.2
8	100.0	100.0	12.2
24	100.0	100.0	12.7

Reaction 12: DMF



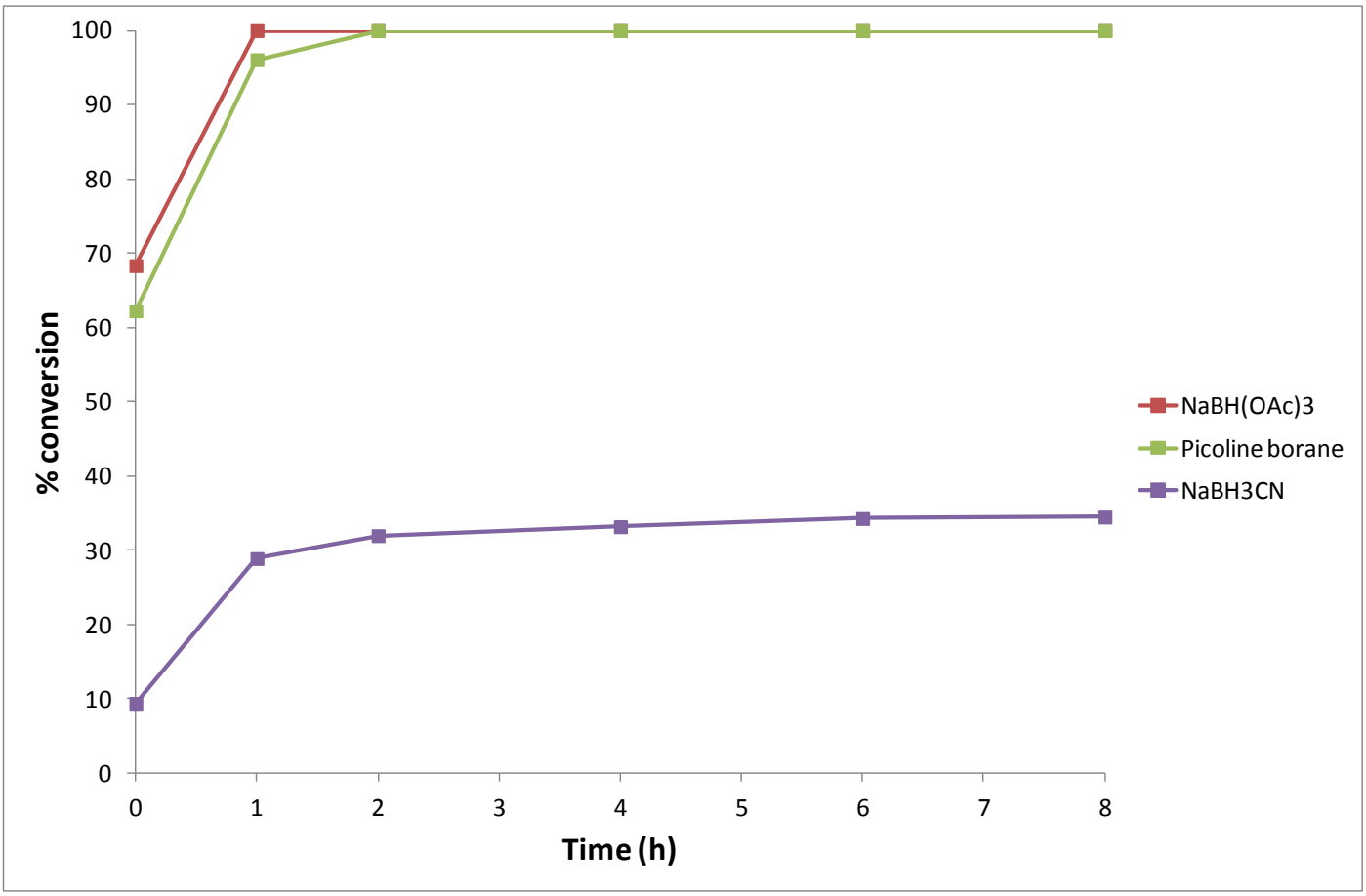
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	100.0	67.6	14.9
1	100.0	100.0	56.3
2	100.0	100.0	66.6
4	100.0	100.0	71.2
6	100.0	100.0	71.2
8	100.0	100.0	71.2
24	100.0	100.0	71.2

Reaction 12: EtOAc



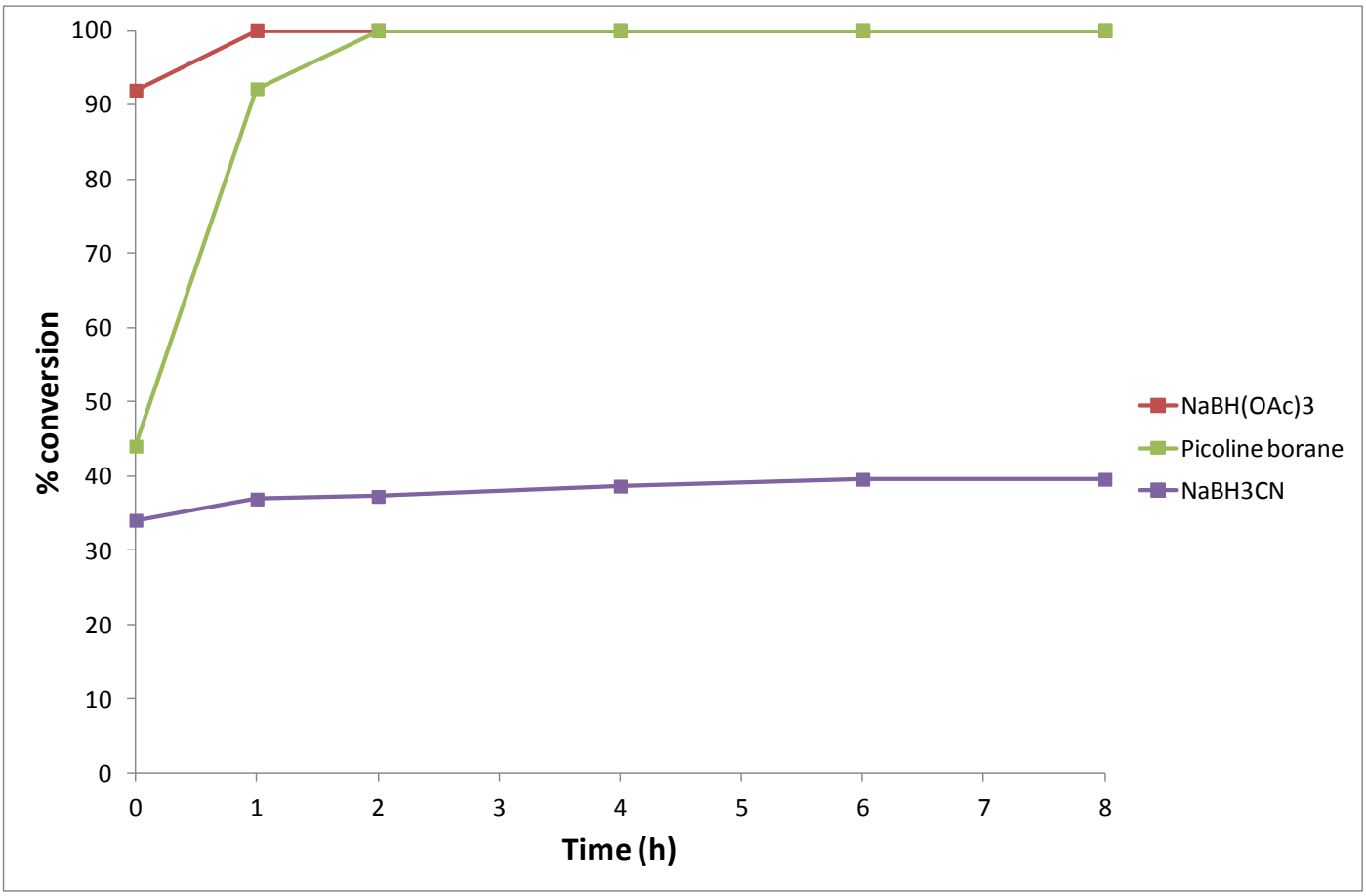
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	90.7	49.9	5.2
1	100.0	88.7	17.5
2	100.0	100.0	17.5
4	100.0	100.0	17.5
6	100.0	100.0	17.5
8	100.0	100.0	17.5
24	100.0	100.0	17.5

Reaction 12: IPA



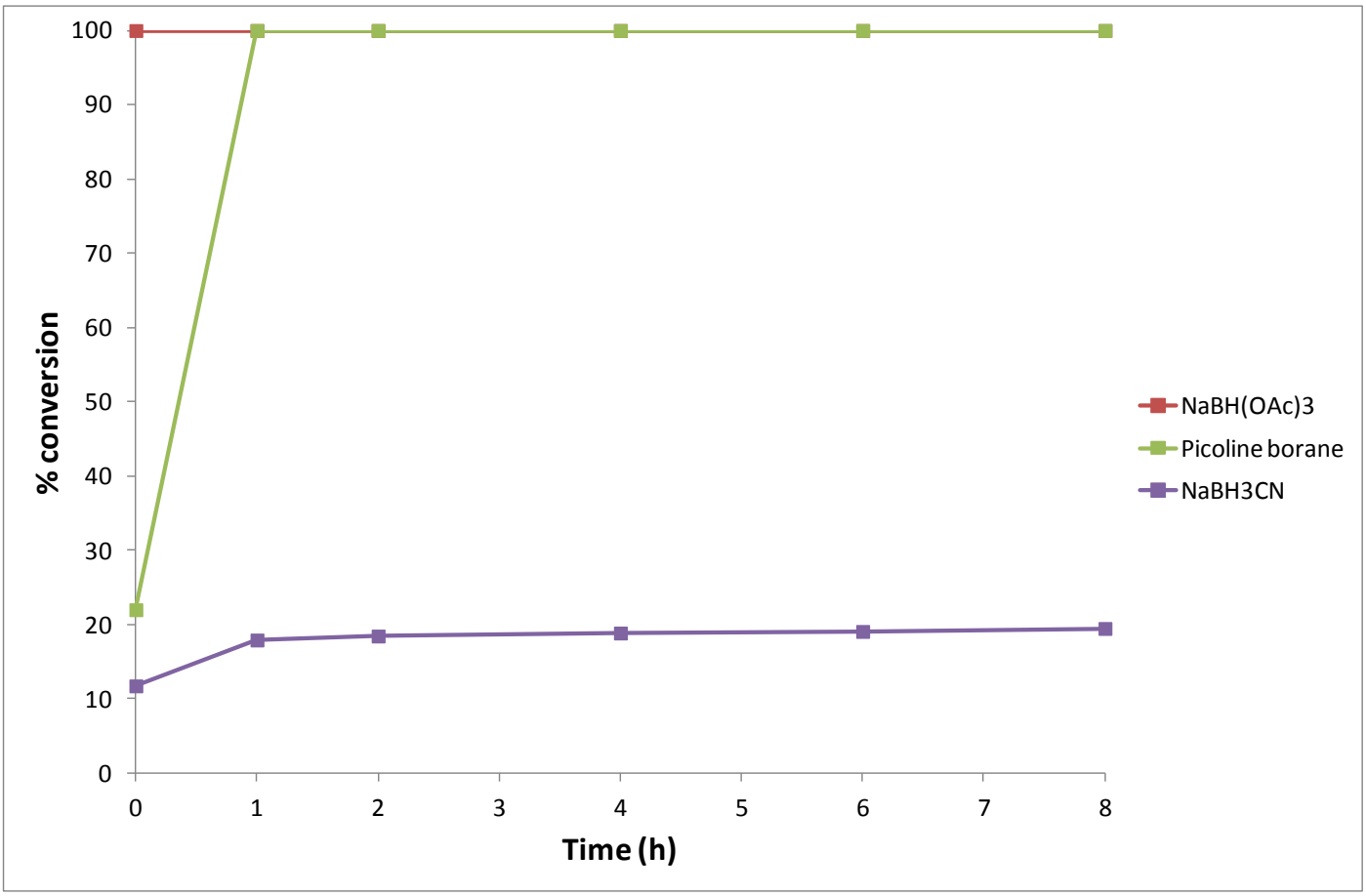
Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	68.3	62.3	9.4
1	100.0	96.1	28.9
2	100.0	100.0	32.0
4	100.0	100.0	33.2
6	100.0	100.0	34.3
8	100.0	100.0	34.5
24	100.0	100.0	37.1

Reaction 12: 2-MeTHF



Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	92.0	44.0	34.1
1	100.0	92.2	36.9
2	100.0	100.0	37.3
4	100.0	100.0	38.7
6	100.0	100.0	39.6
8	100.0	100.0	39.6
24	100.0	100.0	39.6

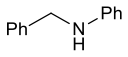
Reaction 12: THF



Time (h) / Reducing agent	$NaBH(OAc)_3$	Picoline borane	$NaBH_3CN$
0	100.0	22.0	11.8
1	100.0	100.0	17.9
2	100.0	100.0	18.5
4	100.0	100.0	18.9
6	100.0	100.0	19.1
8	100.0	100.0	19.5
24	100.0	100.0	20.4

3.4 Characterisation Data for Reductive Amination Products

Compound 1: *N*-Benzylaniline



N-Benzylaniline
Chemical Formula: $C_{13}H_{13}N$
Molecular Weight: 183.2490

Appearance: White solid.

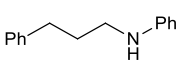
υ_{max} (neat): 3414, 3051, 3024, 2837, 1502, 746 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 7.39-7.50 (m, 5H), 7.31 (t, 2H, *J* = 7.6 Hz), 6.86 (t, 1H, *J* = 7.2 Hz), 6.75 (d, 2H, *J* = 8.0 Hz), 4.43 (s, 2H), 4.10 (br s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 148.4, 139.7, 129.5, 128.9, 127.8, 127.5, 117.8, 113.1, 48.5.

HRMS ($C_{13}H_{13}N$) [M+H^+] requires 184.1121, found [M+H^+] 184.1119.

Compound 2: *N*-(3-Phenylpropyl)aniline



N-(3-Phenylpropyl)aniline
Chemical Formula: $C_{15}H_{17}N$
Molecular Weight: 211.3022

Appearance: Yellow oil.

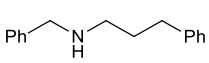
υ_{max} (neat): 3408, 3022, 2927, 2858, 1598, 1504, 742 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 7.31-7.35 (m, 2H), 7.17-7.25 (m, 5H), 6.72 (tt, 1H, *J* = 7.2, 1.2 Hz), 6.59-6.62 (m, 2H), 3.64 (br s, 1H), 3.18 (t, 2H, *J* = 7.2 Hz), 2.77 (t, 2H, *J* = 7.6 Hz), 1.95-2.02 (m, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 148.7, 142.0, 129.5, 128.8, 128.7, 126.3, 117.5, 113.1, 43.7, 33.7, 31.4.

HRMS ($C_{15}H_{17}N$) [M+H^+] requires 212.1434, found [M+H^+] 212.1434.

Compound 3: *N*-Benzyl-3-phenylpropan-1-amine



N-Benzyl-3-phenylpropan-1-amine
Chemical Formula: $C_{16}H_{19}N$
Molecular Weight: 225.3288

Appearance: Colourless oil.

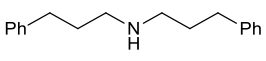
υ_{max} (neat): 3024, 2926, 2814, 2802, 1494, 1452, 731 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 7.24-7.34 (m, 7H), 7.18-7.21 (m, 3H), 3.80 (s, 2H), 2.69 (m, 4H), 1.83-1.90 (m, 2H), 1.59 (br s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 142.5, 140.8, 128.7, 128.7, 128.7, 128.4, 127.3, 126.1, 54.3, 49.2, 33.9, 32.0.

HRMS ($C_{16}H_{19}N$) [M+H^+] requires 226.1590, [M+H^+] found 226.1591.

Compound 4: Bis(3-phenylpropyl)amine



Bis(3-phenylpropyl)amine
Chemical Formula: $C_{18}H_{23}N$
Molecular Weight: 253.3819

Appearance: Colourless oil.

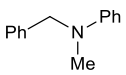
υ_{max} (neat): 2924, 2854, 1496, 1168, 742 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 8.19 (br s, 1H), 7.26-7.31 (m, 4H), 7.18-7.22 (m, 2H), 7.11-7.13 (m, 4H), 2.82 (4H, *J* = 8.0 Hz), 2.58 (t, 4H, *J* = 7.6 Hz), 1.95 (pent, 4H, *J* = 7.6 Hz).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 140.4, 128.9, 128.5, 126.6, 47.9, 32.9, 28.3.

HRMS ($C_{18}H_{23}N$) [M+H^+] requires 254.1903, found [M+H^+] 254.1906.

Compound 5: *N*-Benzyl-*N*-methylaniline



N-Benzyl-*N*-methylaniline
Chemical Formula: $C_{14}H_{15}N$
Molecular Weight: 197.2756

Appearance: Yellow oil.

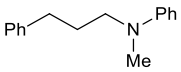
υ_{max} (neat): 3024, 2881, 2804, 1597, 1573, 943, 746 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 7.44-7.47 (m, 2H), 7.35-7.39 (m, 5H), 6.85-6.92 (m, 3H), 4.67 (s, 2H), 3.15 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 150.1, 139.3, 129.5, 128.9, 127.2, 127.1, 116.9, 112.7, 56.9, 38.8.

HRMS ($C_{14}H_{15}N$) [M+H^+] requires 198.1277, [M+H^+] found 198.1277.

Compound 6: *N*-Methyl-*N*-(3-phenylpropyl)aniline



N-Methyl-*N*-(3-phenylpropyl)aniline
Chemical Formula: $C_{16}H_{19}N$
Molecular Weight: 225.3288

Appearance: Yellow oil.

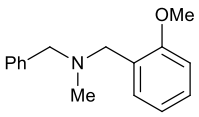
υ_{max} (neat): 3024, 2935, 2862, 1597, 1573, 989, 742 cm^{-1}.

^1H NMR (500 MHz, $CDCl_3$) δ: 7.31 (t, 2H, *J* = 6.0 Hz), 7.20-7.25 (m, 5H), 6.68-6.71 (m, 3H), 3.36 (t, 2H, *J* = 5.6 Hz), 2.94 (s, 3H), 2.68 (t, 2H, *J* = 6.4 Hz), 1.94 (pent, 2H, *J* = 6.0 Hz).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 149.7, 142.2, 129.5, 128.7, 128.7, 126.2, 116.4, 112.6, 52.6, 38.6, 33.7, 28.5.

HRMS ($C_{16}H_{19}N$) [M+H^+] requires 226.1590, [M+H^+] found 226.1590.

Compound 7: *N*-Benzyl-1-(2-methoxyphenyl)-*N*-methylmethanamine



N-Benzyl-1-(2-methoxyphenyl)-*N*-methylmethanamine
Chemical Formula: $C_{16}H_{19}NO$
Molecular Weight: 241.3282

Appearance: Yellow oil.

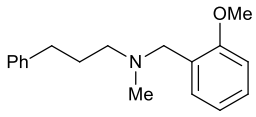
υ_{max} (neat): 3026, 2933, 2833, 1490, 1238, 1026 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 7.45 (dd, 1H, *J* = 7.2, 1.6 Hz), 7.39 (d, 2H, *J* = 7.2 Hz), 7.31-7.35 (m, 2H), 7.22-7.27 (m, 2H), 6.96 (td, 1H, *J* = 7.2, 0.8 Hz), 6.87 (d, 1H, *J* = 8.4 Hz), 3.82 (s, 3H), 3.60 (br s, 4H), 2.24 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 158.2, 130.7, 129.4, 128.5, 128.2, 127.2, 120.7, 110.8, 62.6, 55.7, 55.5, 42.7. Two aromatic C coincident with other signals.

HRMS ($C_{16}H_{19}NO$) [M+H^+] requires 242.1539, [M+H^+] found 242.1540.

Compound 8: *N*-(2-Methoxybenzyl)-*N*-methyl-3-phenylpropan-1-amine



N-(2-Methoxybenzyl)-*N*-methyl-3-phenylpropan-1-amine
Chemical Formula: $C_{18}H_{23}NO$
Molecular Weight: 269.3813

Appearance: Colourless oil.

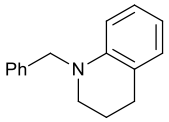
υ_{max} (neat): 2935, 2835, 2787, 1490, 1454, 1238, 1028 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.34 (dd, 1H, *J* = 7.2, 1.6 Hz), 7.25-7.30 (m, 3H), 7.17-7.23 (m, 3H), 6.94 (td, 1H, 7.2, 0.8 Hz), 6.88 (d, 1H, *J* = 8.0 Hz), 3.83 (s, 3H), 3.54 (s, 2H), 2.67 (t, 2H, *J* = 7.6 Hz), 2.48 (t, 2H, *J* = 7.2 Hz), 2.24 (s, 3H), 1.89 (pent, 2H, *J* = 7.2 Hz).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 169.0, 158.3, 142.4, 131.6, 128.9, 128.8, 128.7, 126.1, 120.8, 110.8, 56.9, 55.7, 5.1, 42.0, 33.9, 28.8.

HRMS ($C_{18}H_{23}NO$) [M+H^+] requires 270.1852, [M+H^+] found 270.1855.

Compound 9: 1-Benzyl-1,2,3,4-tetrahydroquinoline



1-Benzyl-1,2,3,4-tetrahydroquinoline
Chemical Formula: $C_{16}H_{17}N$
Molecular Weight: 223.3129

Appearance: Pink oil.

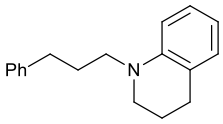
υ_{max} (neat): 3022, 2924, 2839, 1504, 1494, 1344, 986 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.23-7.35 (m, 5H), 6.97-7.00 (m, 2H), 6.59 (t, 1H, *J* = 7.6 Hz), 6.52 (d, 1H, *J* = 8.4 Hz), 4.50 (s, 2H), 3.38 (t, 2H, *J* = 6.0 Hz), 2.84 (t, 2H, *J* = 6.4 Hz), 2.03 (pent, 2H, *J* = 5.6 Hz).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.9, 139.2, 129.3, 128.9, 127.5, 127.1, 126.9, 122.6, 116.2, 111.3, 55.5, 50.2, 28.5, 22.7.

HRMS ($C_{16}H_{17}N$) [M+H^+] requires 224.1434, [M+H^+] found 224.1434.

Compound 10: 1-(3-Phenylpropyl)-1,2,3,4-tetrahydroquinoline



1-(3-Phenylpropyl)-1,2,3,4-tetrahydroquinoline
Chemical Formula: $C_{18}H_{21}N$
Molecular Weight: 251.3660

Appearance: Orange crystals.

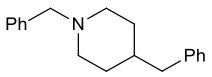
υ_{max} (neat): 3408, 3024, 2926, 2839, 1494, 1307 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.29-7.33 (m, 2H), 7.20-7.24 (m, 3H), 6.96-7.00 (m, 2H), 6.65 (t, 1H, *J* = 7.2 Hz), 6.53 (d, 1H, *J* = 7.6 Hz), 3.41 (t, 2H, *J* = 6.8 Hz), 3.32 (t, 2H, *J* = 5.6 Hz), 2.76-2.81 (m, 4H), 2.15-2.22 (m, 2H), 1.94-2.00 (m, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 145.6, 142.2, 129.5, 128.7, 128.7, 127.4, 126.2, 122.6, 115.7, 110.8, 51.3, 49.8, 33.7, 28.5, 28.0, 22.6.

HRMS ($C_{18}H_{21}N$) [M+H^+] requires 252.1702, [M+H^+] found 252.1749.

Compound 11: 1,4-Dibenzylpiperidine



1,4-Dibenzylpiperidine
Chemical Formula: $C_{19}H_{23}N$
Molecular Weight: 265.3926

Appearance: White solid.

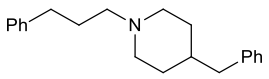
υ_{max} (neat): 3061, 3024, 927, 2906, 2794, 2746, 1573, 1560, 970, 736 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 7.21-7.33 (m, 7H), 7.12-7.16 (m, 1H), 7.08 (d, 2H, *J* = 6.8 Hz), 3.55 (s, 2H), 2.92 (d, 2H, *J* = 11.6 Hz), 2.49 (d, 2H, *J* = 6.8 Hz), 1.96 (t, 2H, *J* = 10.0 Hz, 1.59 (d, 2H, *J* = 13.2 Hz), 1.39-1.49 (m, 1H), 1.33-1.37 (m, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 141.1, 138.7, 129.6, 129.5, 128.5, 127.2, 126.1, 63.7, 54.1, 43.6, 38.2, 32.5. One aromatic C coincident with another signal.

HRMS ($C_{19}H_{23}N$) [M+H^+] requires 266.1903, [M+H^+] found 266.1905.

Compound 12: 4-Benzyl-1-(3-phenylpropyl)piperidine



4-Benzyl-1-(3-phenylpropyl)piperidine
Chemical Formula: $C_{21}H_{27}N$
Molecular Weight: 293.4458

Appearance: Colourless oil.

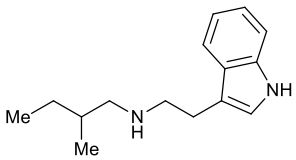
υ_{max} (neat): 3024, 2914, 2800, 2765, 1494, 1452, 742 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 7.27-7.31 (m, 4H), 7.15-7.22 (m, 6H), 2.92 (d, 2H, *J* = 11.6 Hz), 2.64 (t, 2H, *J* = 7.6 Hz), 2.50 (d, 2H, *J* = 6.8 Hz), 2.35 (t, 2H, *J* = 7.6 Hz), 1.80-1.90 (m, 4H), 1.65 (d, 2H, *J* = 13.2 Hz), 1.51-1.55 (m, 1H), 1.28-1.36 (m, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 142.6, 141.1, 129.5, 128.7, 128.6, 128.5, 126.1, 126.0, 58.8, 54.3, 43.6, 38.3, 34.2, 32.6, 29.1.

HRMS ($C_{21}H_{27}N$) [M+H^+] requires 294.2216, [M+H^+] found 294.2219.

Compound 13: *N*-(2-(1*H*-Indol-3-yl)ethyl)-2-methylbutan-1-amine



N-(2-(1*H*-Indol-3-yl)ethyl)-2-methylbutan-1-amine
Chemical Formula: $C_{15}H_{22}N_2$
Molecular Weight: 230.3486

Appearance: Orange oil.

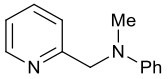
υ_{max} (neat): 3410, 2956, 2918, 2850, 2362, 1454 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 8.05 (br s, 1H), 7.65 (d, 1H, *J* = 6.4 Hz), 7.37 (d, 1H, *J* = 6.8 Hz), 7.19-7.22 (m, 1H), 7.11-7.14 (m, 1H), 7.06 (d, 1H, *J* = 1.2 Hz), 2.97-3.05 (m, 4H), 2.59-2.63 (m, 1H), 2.43-2.47 (m, 1H), 2.09 (br s, 1H), 1.55-1.59 (m, 1H), 1.36-1.40 (m, 1H), 1.09-1.15 (m, 1H), 0.85-0.88 (m, 6H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 136.8, 127.8, 122.4, 122.2, 119.7, 119.3, 114.3, 111.5, 56.1, 50.4, 34.9, 27.9, 25.8, 18.0, 11.6.

HRMS ($C_{15}H_{22}N_2$) [M+H^+] requires 231.1856, [M+H^+] found 231.1856.

Compound 14: *N*-Methyl-*N*-(pyridin-2-ylmethyl)aniline



N-Methyl-*N*-(pyridin-2-ylmethyl)aniline
Chemical Formula: $C_{13}H_{14}N_2$
Molecular Weight: 198.2637

Appearance: Off-white solid.

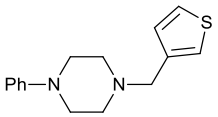
υ_{max} (neat): 2980, 2920, 2363, 1598, 1585, 1504 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 8.60 (d, 1H, *J* = 4.0 Hz), 7.62 (dt, 1H, *J* = 7.6, 1.6 Hz), 7.17-7.25 (m, 4H), 6.72-6.75 (m, 3H), 4.68 (s, 2H), 3.13 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 159.7, 149.7, 149.5, 137.3, 129.6, 122.3, 121.2, 117.1, 112.5, 59.1, 39.4.

HRMS ($C_{13}H_{14}N_2$) [M+H^+] requires 199.1230, [M+H^+] found 199.1224.

Compound 15: 1-Phenyl-4-(thiophen-3-ylmethyl)piperazine



1-Phenyl-4-(thiophen-3-ylmethyl)piperazine
Chemical Formula: $C_{15}H_{18}N_2S$
Molecular Weight: 258.3818

Appearance: White solid.

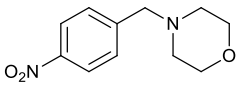
υ_{max} (neat): 3082, 2933, 2845, 2802, 2362, 1597, 1502, 1334, 1238 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 7.25-7.31 (m, 3H), 7.17 (d, 1H, *J* = 2.0 Hz), 7.11 (dd, 1H, *J* = 3.6, 1.2 Hz), 6.92-6.95 (m, 2H), 6.86 (tt, 1H, *J* = 7.2, 0.8 Hz), 3.62 (s, 2H), 3.22 (t, 4H, *J* = 5.2 Hz), 2.63 (t, 4H, *J* = 5.2 Hz).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 151.7, 139.2, 129.4, 128.9, 125.8, 123.3, 120.0, 116.4, 58.0, 53.4, 49.5.

HRMS ($C_{15}H_{18}N_2S$) [M+H^+] requires 259.1263, [M+H^+] found 259.1266.

Compound 16: 4-(4-Nitrobenzyl)morpholine



4-(4-Nitrobenzyl)morpholine
Chemical Formula: $C_{11}H_{14}N_2O_3$
Molecular Weight: 222.2405

Appearance: Yellow solid.

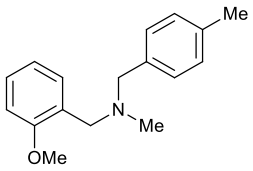
υ_{max} (neat): 2960, 2852, 2806, 2362, 1516, 1340, 1114 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 8.17 (dt, 2H, *J* = 6.8, 2.0 Hz), 7.52 (d, 2H, *J* = 8.4 Hz), 3.72 (t, 4H, *J* = 4.4 Hz), 3.59 (s, 2H), 2.47 (t, 4H, *J* = 4.8 Hz).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 147.5, 146.1, 129.8, 123.8, 67.2, 62.8, 53.9.

HRMS ($C_{11}H_{14}N_2O_3$) [M+H^+] requires 223.1077, [M+H^+] found 223.1077.

Compound 17: *N*-(3-Methoxybenzyl)-*N*-methyl-1-(*p*-tolyl)methanamine



N-(2-Methoxybenzyl)-*N*-methyl-1-(*p*-tolyl)methanamine
Chemical Formula: $C_{17}H_{21}NO$
Molecular Weight: 255.3547

Appearance: Colourless oil.

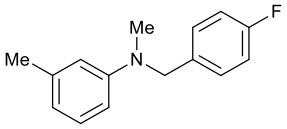
υ_{max} (neat): 2980, 2833, 2787, 2358, 1236, 1029 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 7.47 (dd, 1H, *J* = 7.6, 1.6 Hz), 7.30 (d, 2H, *J* = 7.6 Hz), 7.23-7.27 (m, 1H), 7.16 (d, 2H, *J* = 7.6 Hz), 6.98 (t, 1H, *J* = 7.2 Hz), 6.89 (d, 1H, *J* = 8.0 Hz), 3.84 (s, 3H), 3.66 (s, 2H), 3.58 (s, 2H), 2.37 (s, 3H), 2.24 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 158.1, 136.7, 136.6, 130.7, 129.3, 129.1, 128.1, 127.7, 120.6, 110.7, 62.3, 55.7, 55.4, 42.6, 21.4.

HRMS ($C_{17}H_{21}NO$) [M+H^+] requires 256.1696, [M+H^+] found 256.1698.

Compound 18: *N*-(4-Fluorobenzyl)-*N*,3-dimethylaniline



N-(4-Fluorobenzyl)-*N*,3-dimethylaniline
Chemical Formula: $C_{15}H_{16}FN$
Molecular Weight: 229.2926

Appearance: Yellow oil.

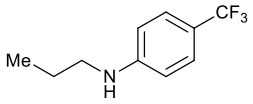
υ_{max} (neat): 3039, 2980, 2891, 2362, 1598, 1492, 1217 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 7.19-7.23 (m, 2H), 7.11-7.15 (m, 1H), 6.99-7.03 (m, 2H), 6.57-6.59 (m, 3H), 4.49 (s, 2H), 2.98 (s, 3H), 2.32 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 162.3 (d, $^1J_{C\text{-}F}$ = 244.6 Hz), 150.2, 139.3, 135.1, 129.4, 128.7 (d, $^3J_{C\text{-}F}$ = 8.0 Hz), 118.2, 115.7 (d, $^2J_{C\text{-}F}$ = 21.3 Hz), 113.6, 110.1, 56.4, 38.7, 22.2.

HRMS ($C_{15}H_{16}FN$) [M+H^+] requires 230.1340, [M+H^+] found 230.1339.

Compound 19: *N*-Propyl-4-(trifluoromethyl)aniline



N-Propyl-4-(trifluoromethyl)aniline
Chemical Formula: $C_{10}H_{12}F_3N$
Molecular Weight: 203.2042

Appearance: Brown oil.

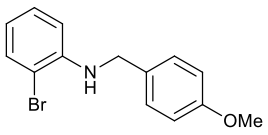
υ_{max} (neat): 3425, 2964, 2877, 1616, 1553, 1317, 1101, 1060 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$) δ: 7.40 (d, 2H, *J* = 8.4 Hz), 6.60 (d, 2H, *J* = 8.4 Hz), 4.10 (br s, 1H), 3.12 (t, 2H, *J* = 6.8 Hz), 1.60 (sextet, 2H, *J* = 7.2 Hz), 1.02 (t, 2H, *J* = 7.6 Hz).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 151.07, 126.9 (q, $^3J_{C\text{-}F}$ = 3.6 Hz), 125.4 (q, $^1J_{C\text{-}F}$ = 270 Hz), 119.0 (q, $^2J_{C\text{-}F}$ = 32.9 Hz), 112.2, 45.8, 22.8, 11.9.

HRMS ($C_{10}H_{12}F_3N$) [M+H^+] requires 204.0995, [M+H^+] found 204.0996.

Compound 20: 2-Bromo-*N*-(4-methoxybenzyl)aniline



2-Bromo-*N*-(4-methoxybenzyl)aniline
Chemical Formula: $C_{14}H_{14}BrNO$
Molecular Weight: 292.1711

Appearance: White crystalline solid.

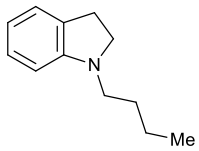
υ_{max} (neat): 3450, 2980, 2870, 2357, 1583, 1083 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.44 (dd, 1H, *J* = 8.0, 1.6 Hz), 7.30 (d, 2H, *J* = 8.8 Hz), 7.13-7.17 (m, 1H), 6.90 (dt, 2H, *J* = 8.8, 2.8 Hz), 6.64, (dd, 1H, *J* = 8.0, 1.2 Hz), 6.59 (td, 1H, *J* = 7.6, 1.6 Hz), 4.71 (br s, 1H), 4.34 (s, 2H), 3.82 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ: 159.3, 145.2, 132.7, 130.9, 128.9, 128.8, 118.3, 114.5, 112.0, 110.0, 55.6, 47.9.

HRMS ($C_{14}H_{14}BrNO$) [$M+H^+$] requires 292.0332, [$M+H^+$] found 292.0324.

Compound 21: 1-Butylindoline



1-Butylindoline
Chemical Formula: $C_{12}H_{17}N$
Molecular Weight: 175.2701

Appearance: Clear oil.

υ_{max} (neat): 2954, 2927, 1608, 1487, 1458, 1265 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.10-7.13 (m, 2H), 6.69 (td, 1H, *J* = 7.2, 0.8 Hz), 6.52 (d, 1H, *J* = 7.6 Hz), 3.39 (t, 2H, *J* = 8.4 Hz), 3.11 (t, 2H, *J* = 7.6 Hz), 3.01 (t, 2H, *J* = 8.4 Hz), 1.62-1.69 (m, 2H), 1.48 (sextet, 2H, *J* = 7.4 Hz), 1.03 (t, 3H, *J* = 7.6 Hz).

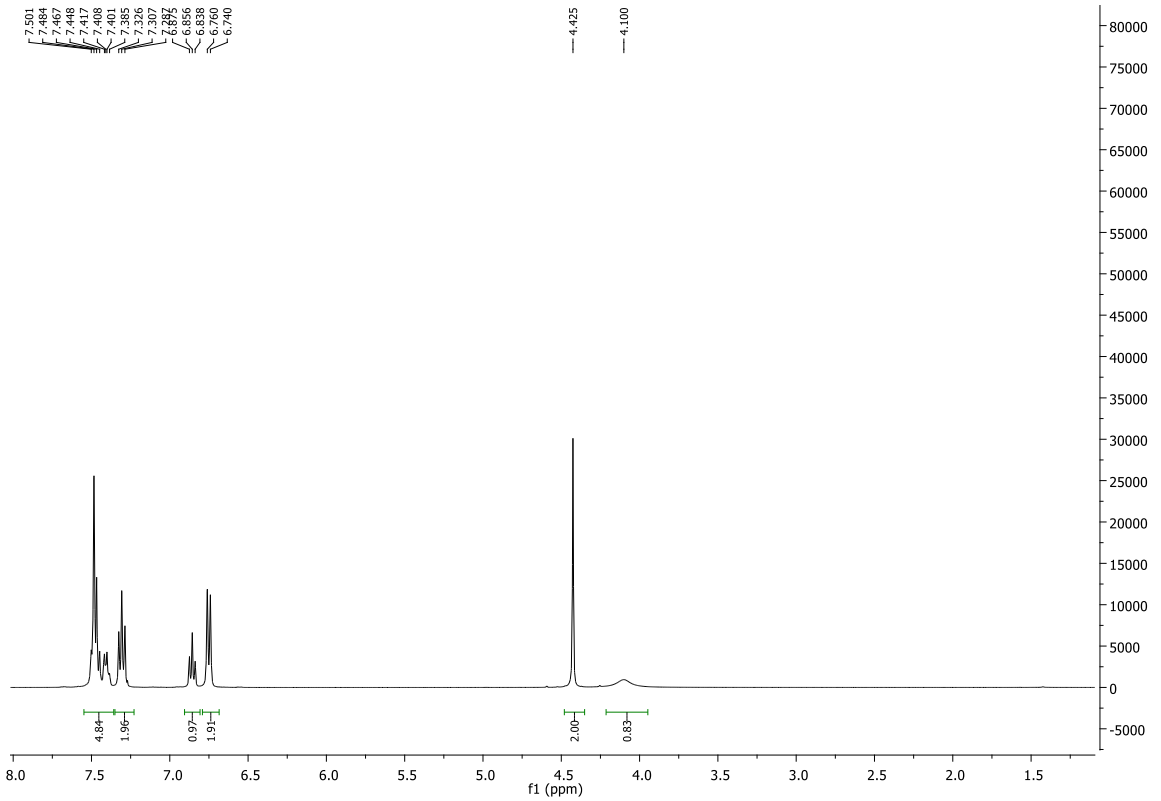
^{13}C NMR (100 MHz, $CDCl_3$) δ: 153.1, 130.3, 127.6, 125.6, 117.5, 107.1, 53.4, 49.3, 29.8, 28.9, 20.7, 14.3.

HRMS ($C_{12}H_{17}N$) [$M+H^+$] requires 176.1434, [$M+H^+$] found 176.1432.

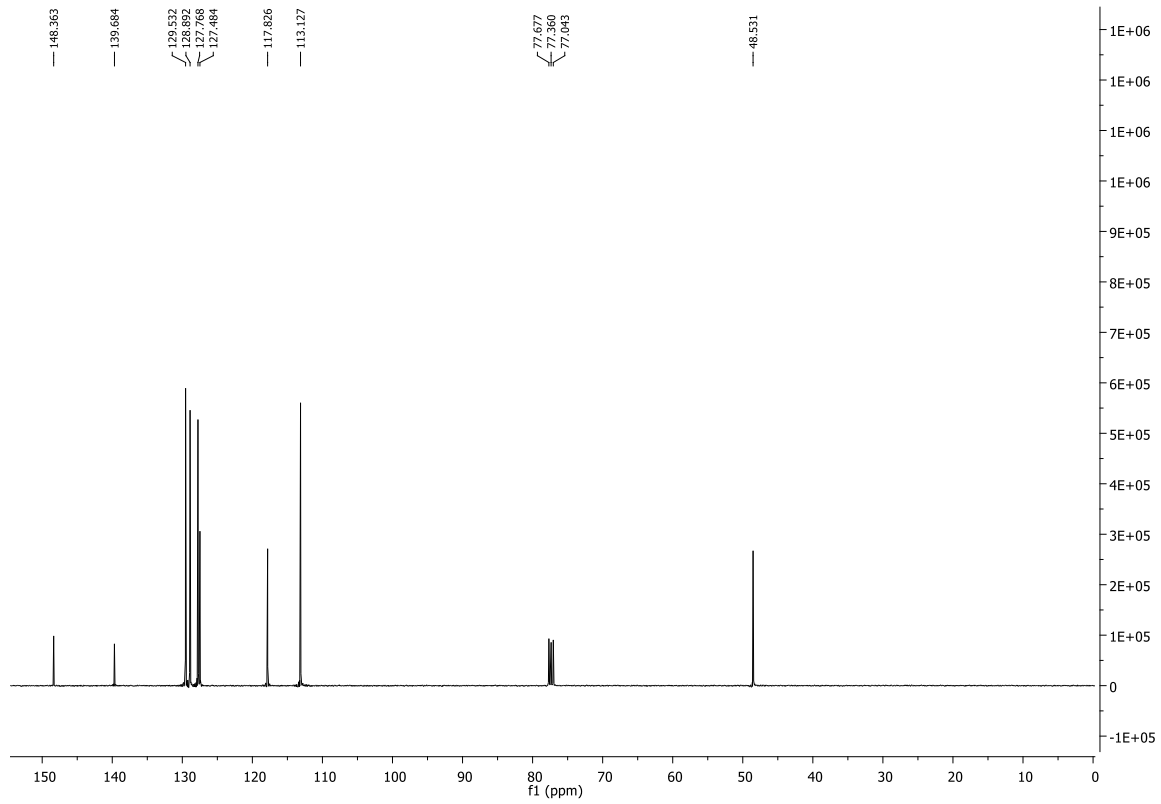
3.5 IR, ^{1}H NMR, ^{13}C NMR, HRMS, IR and HPLC Spectra for Compounds 1-21

Compound 1: *N*-Benzylaniline

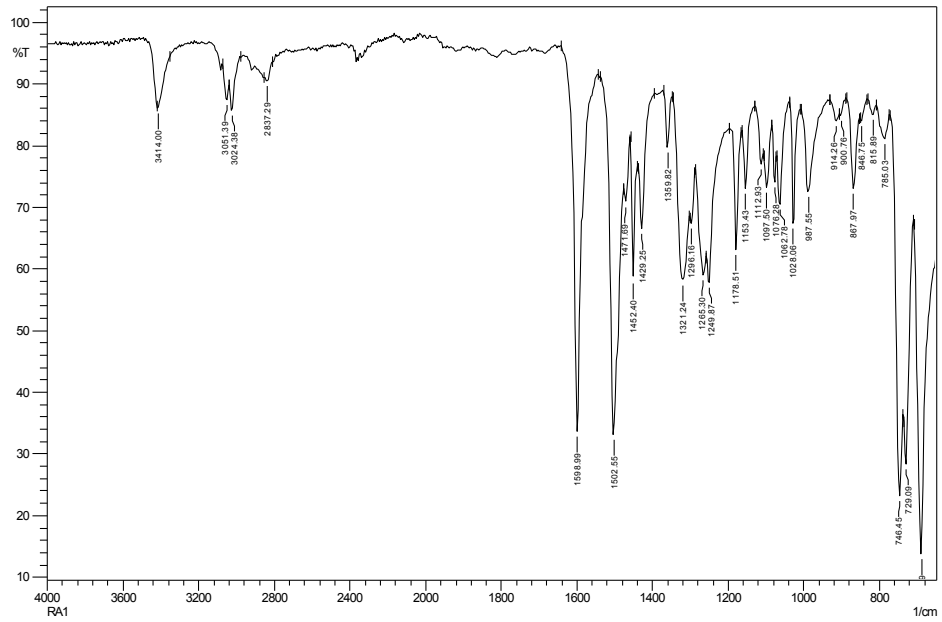
^{1}H NMR:



^{13}C NMR:



FTIR:



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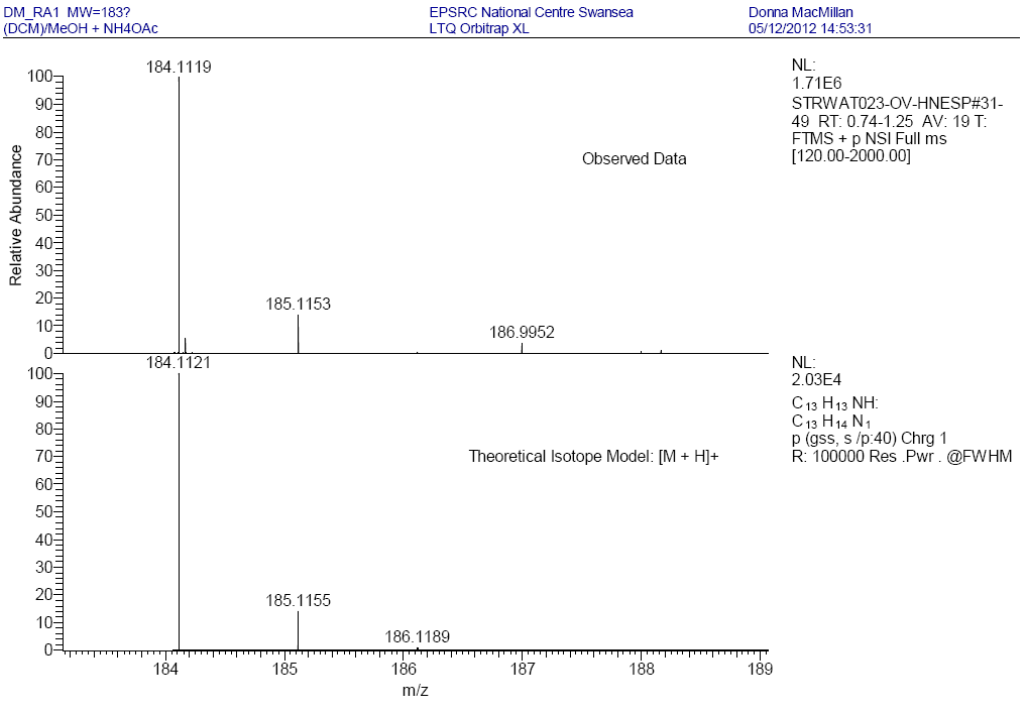
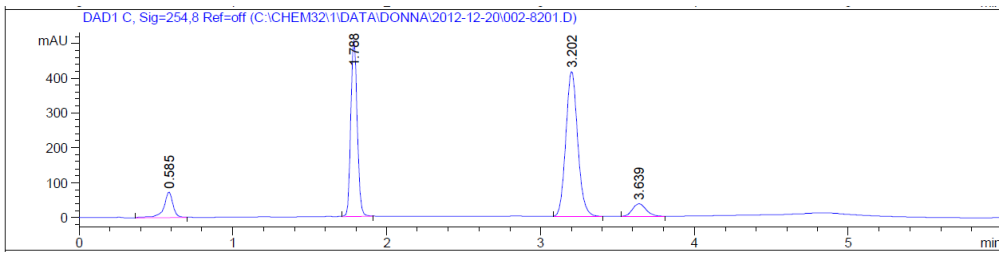


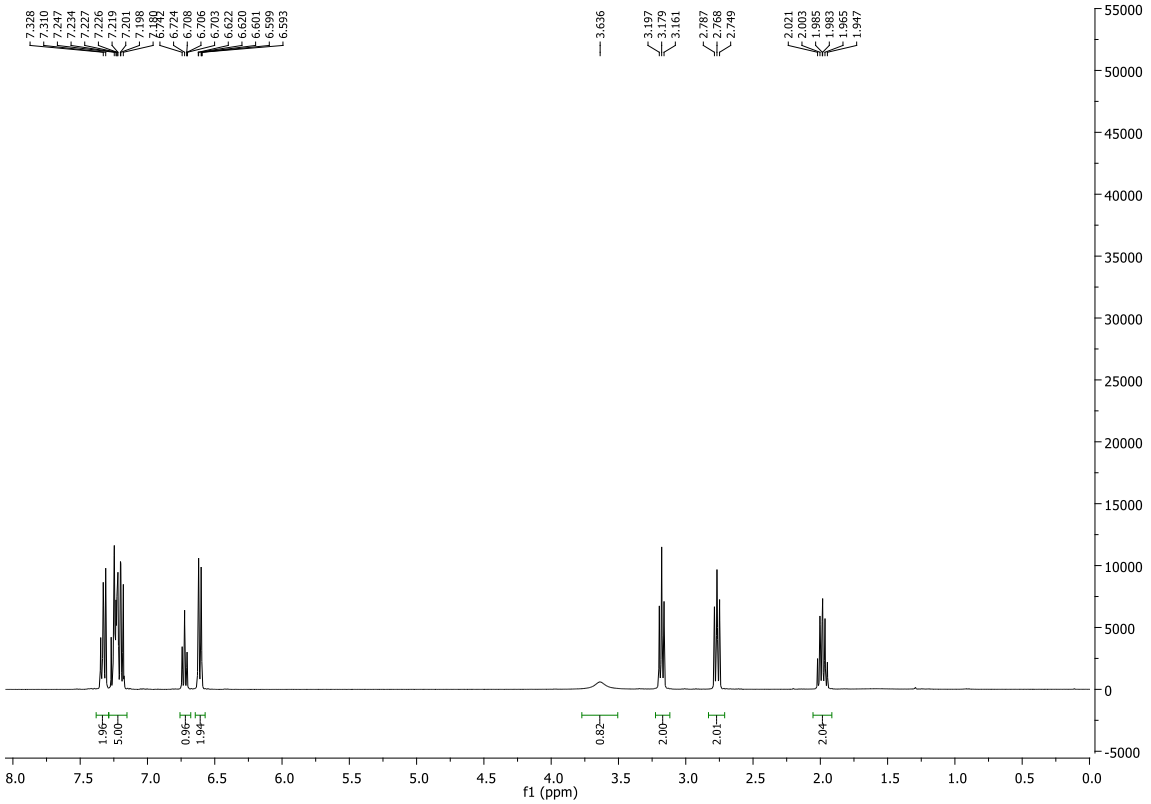
HPLC assay:



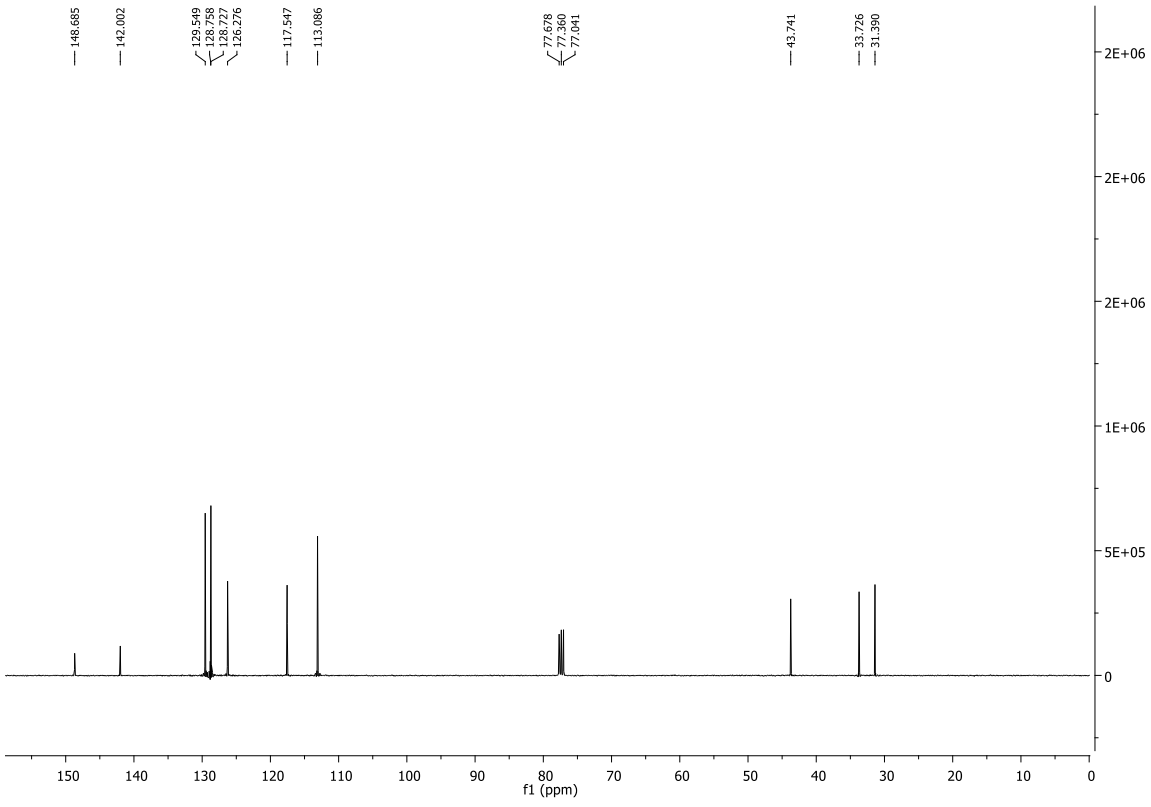
Substrate	R_t (min)
Compound 1: *N*-Benzylamine	3.20
Iodobenzene (standard)	3.64

Compound 2: *N*-(3-Phenylpropyl)aniline

^{1}H NMR:



^{13}C NMR:



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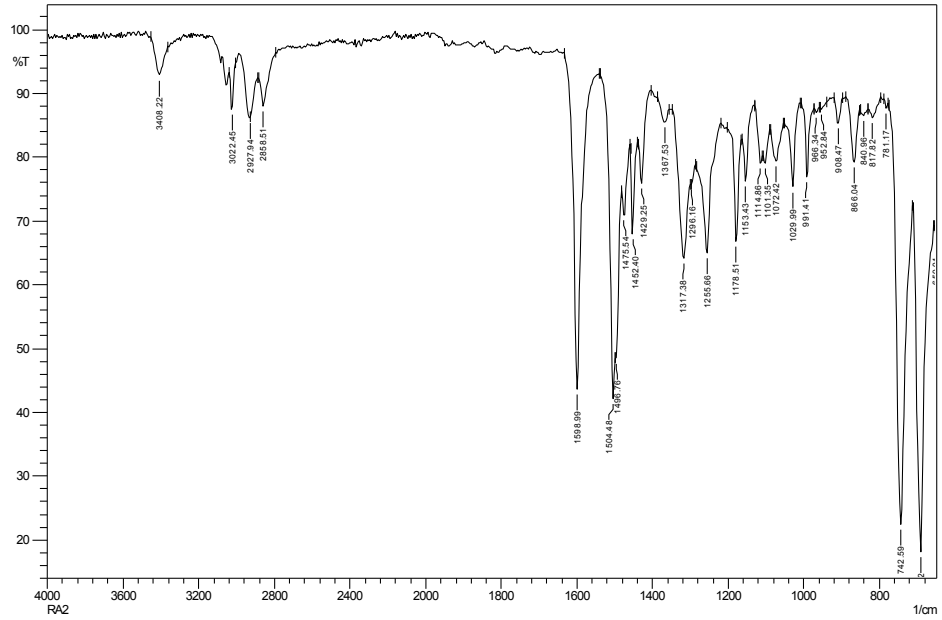
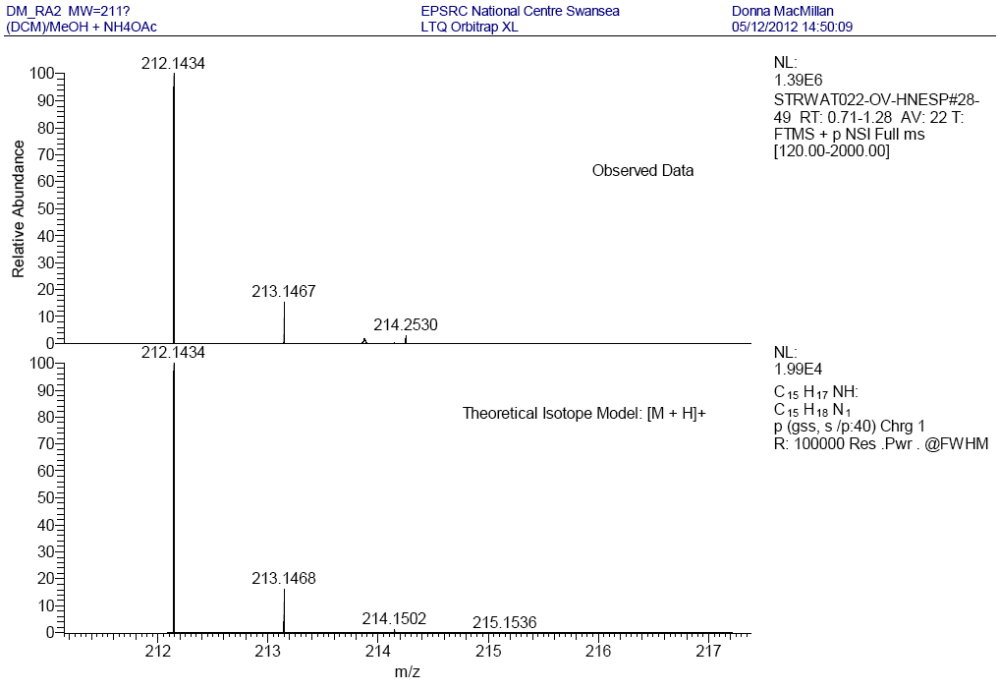
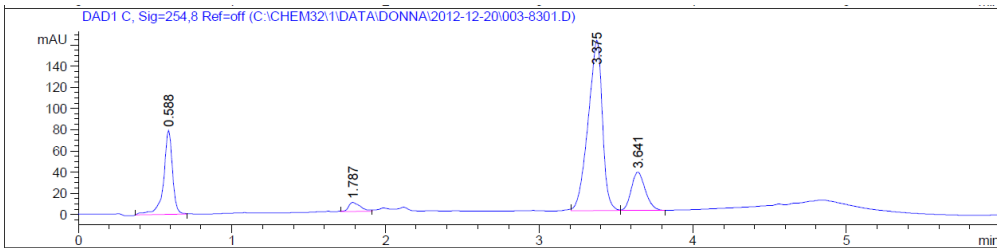


HRMS:



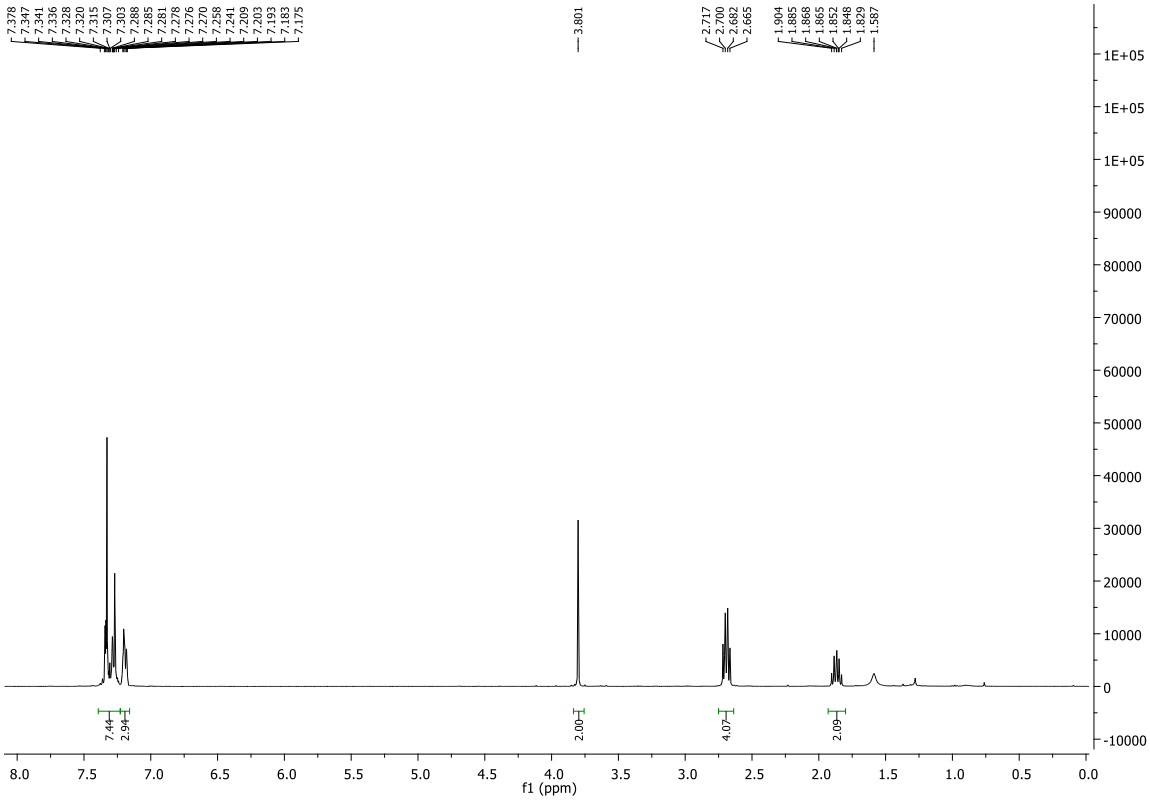
HPLC assay:



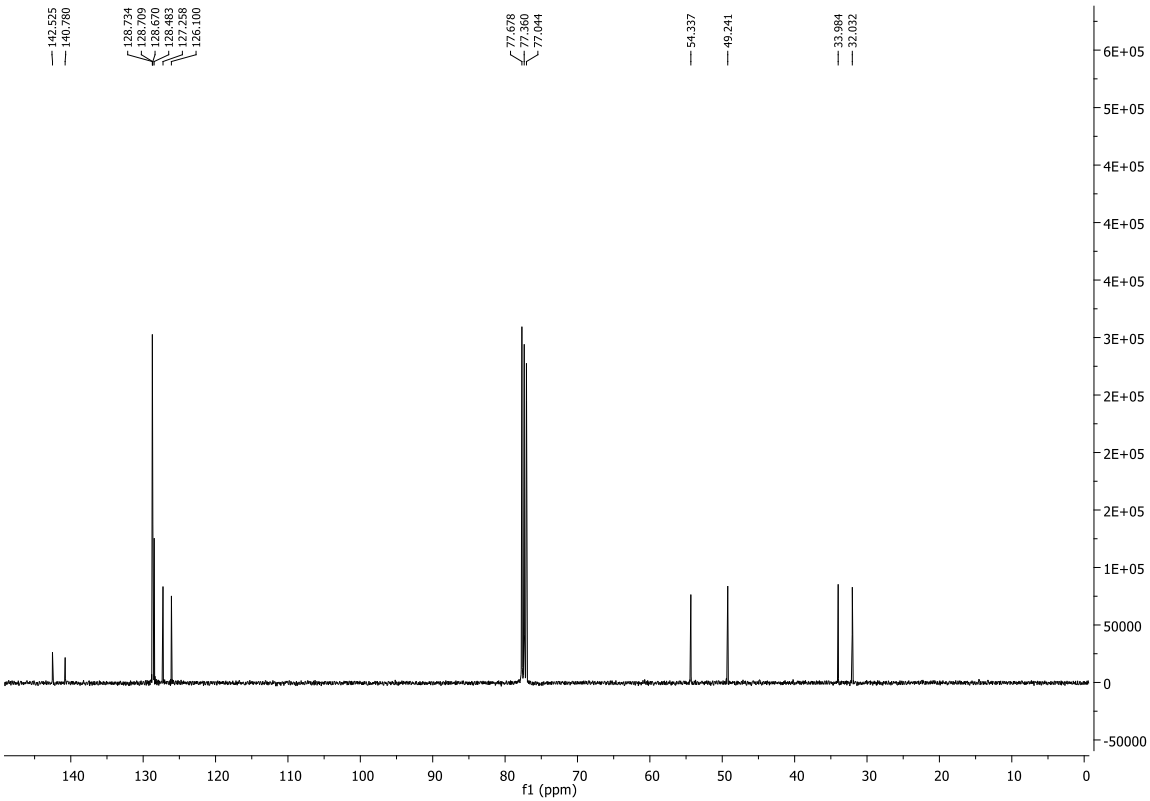
Substrate	R_t (min)
Compound 2: *N*-(3-phenylpropyl)aniline	3.38
Iodobenzene (standard)	3.64

Compound 3: *N*-Benzyl-3-phenylpropan-1-amine

^{1}H NMR:



^{13}C NMR:



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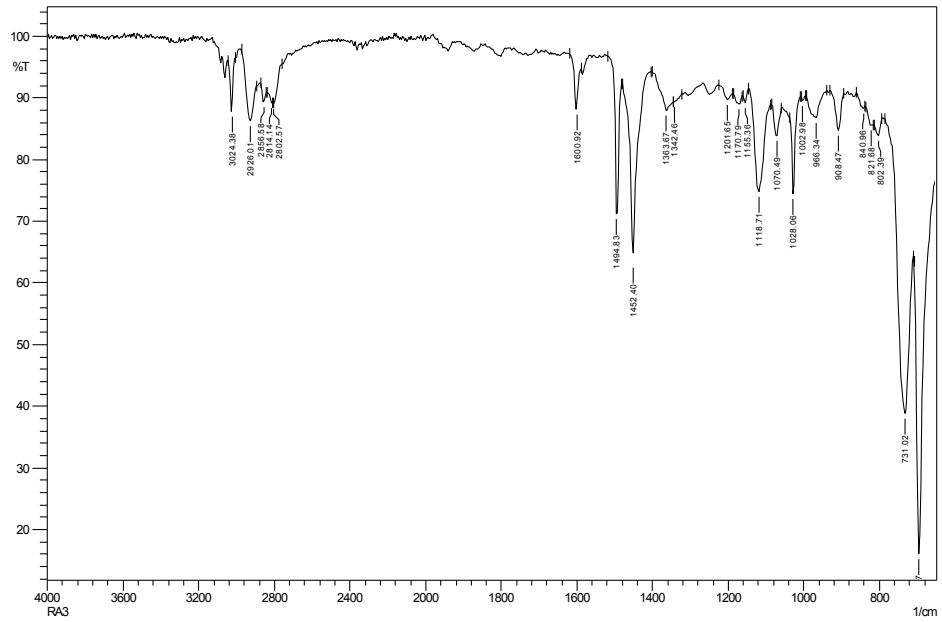

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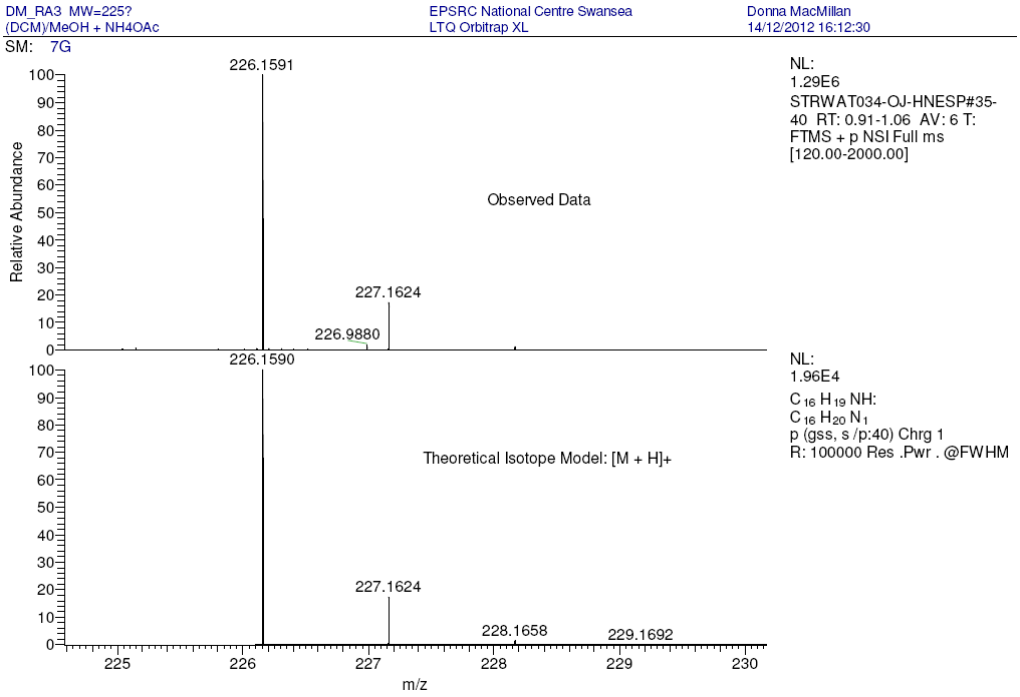
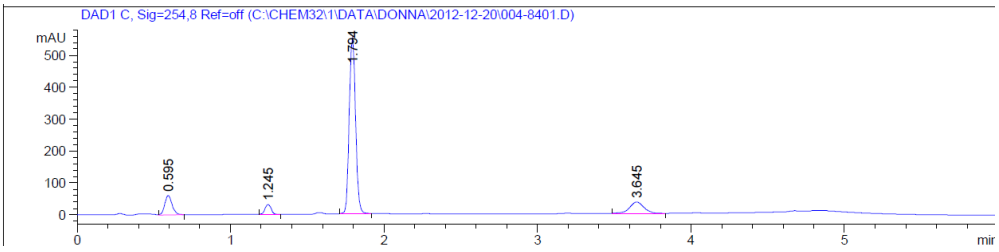


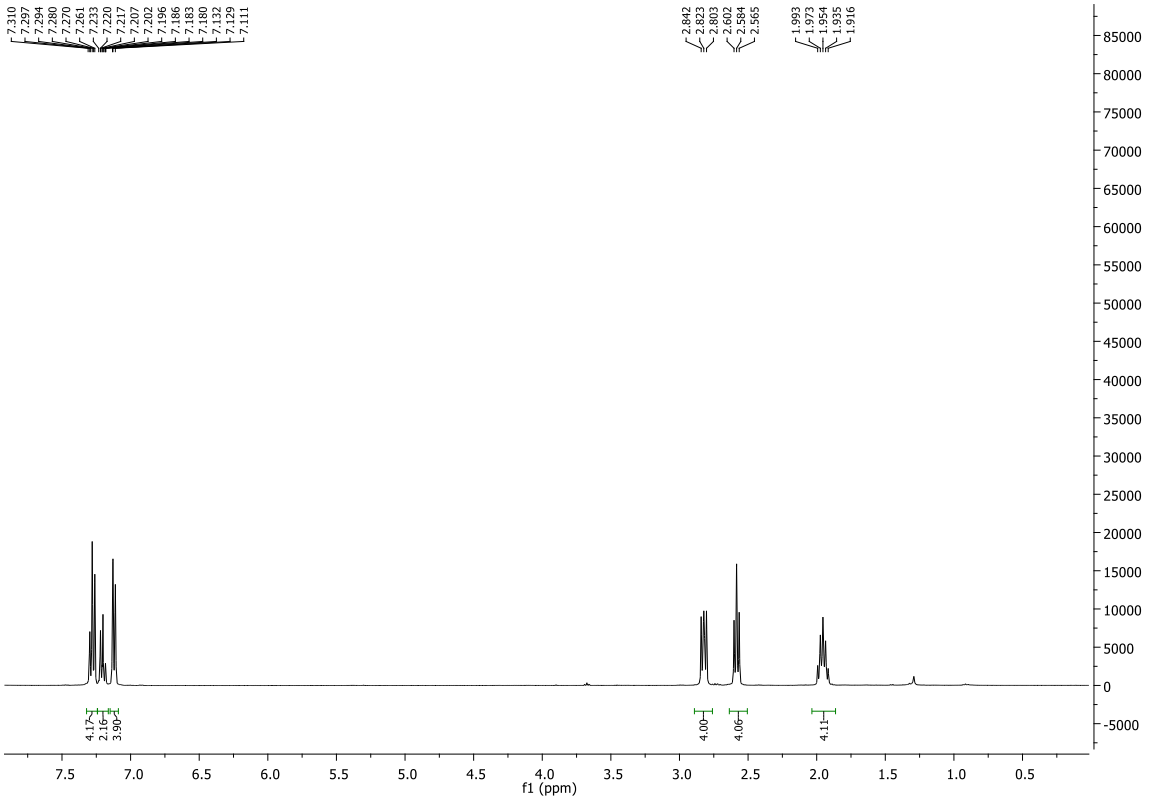
HPLC assay:



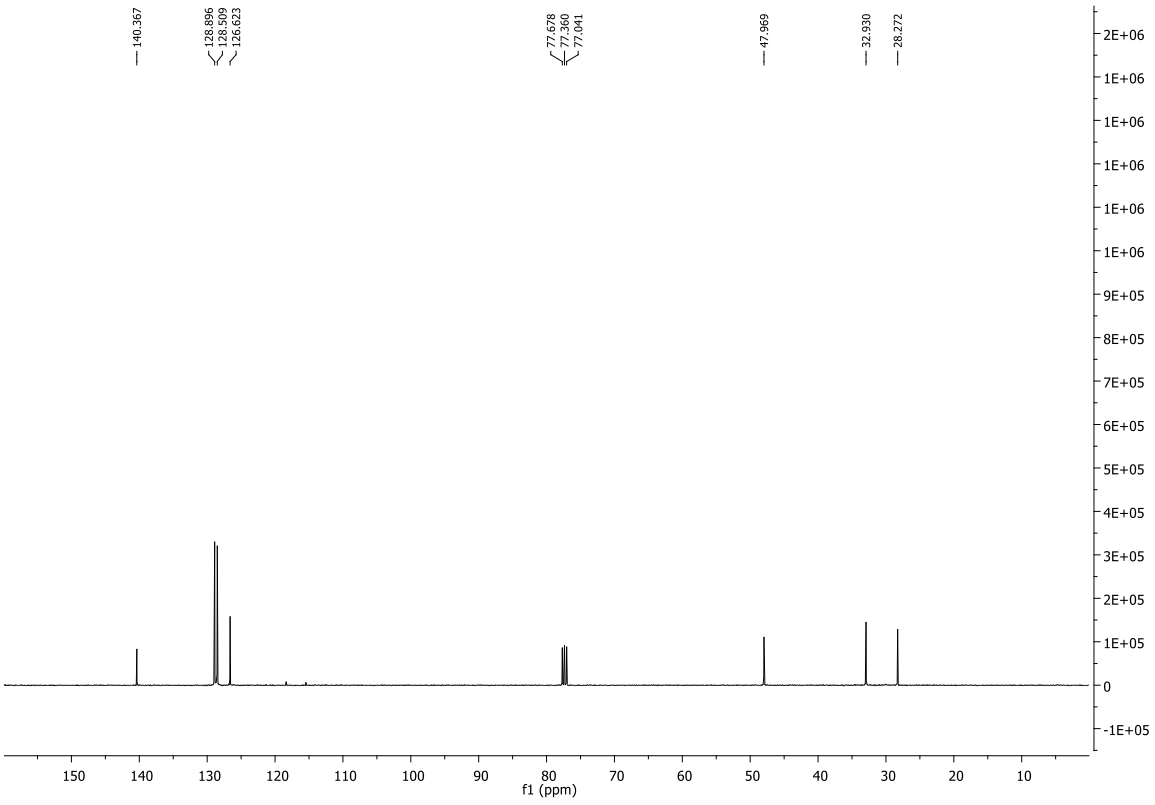
Substrate	R_t (min)
Compound 3: *N*-benzyl-3-phenylpropan-1-amine	1.25
Iodobenzene (standard)	3.64

Compound 4: Bis(3-phenylpropyl)amine

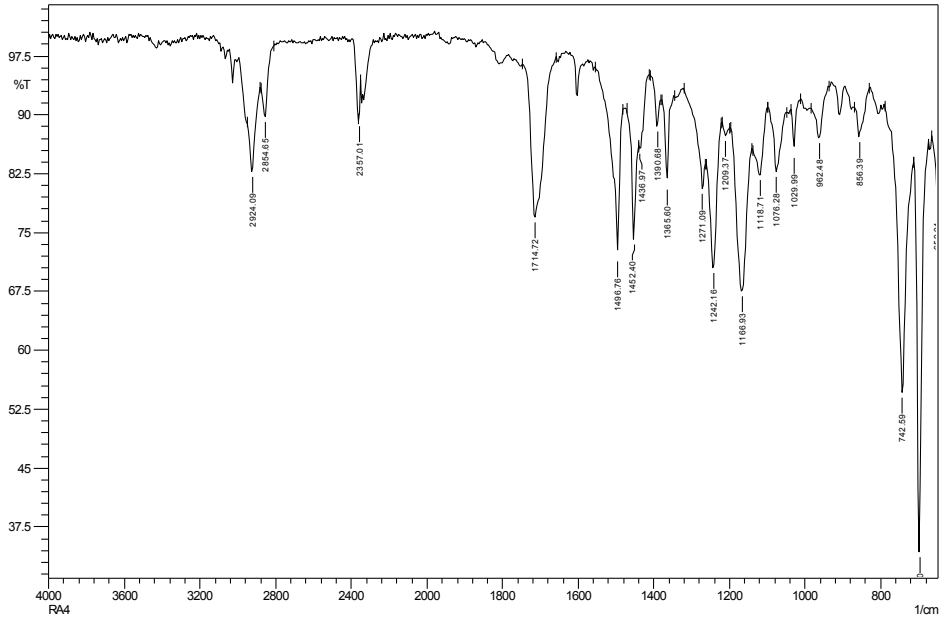
^{1}H NMR:



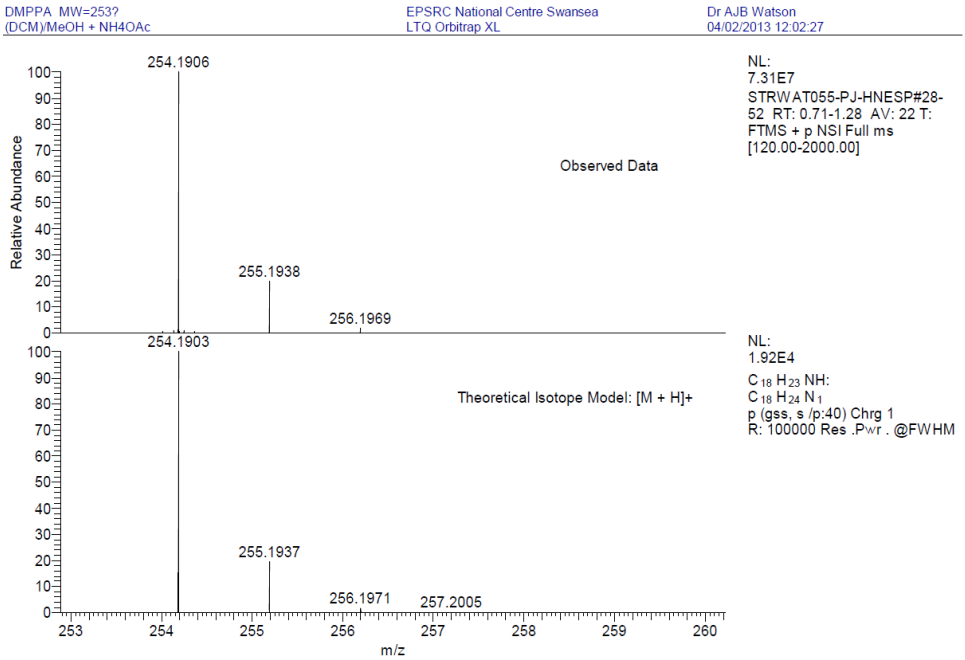
^{13}C NMR:



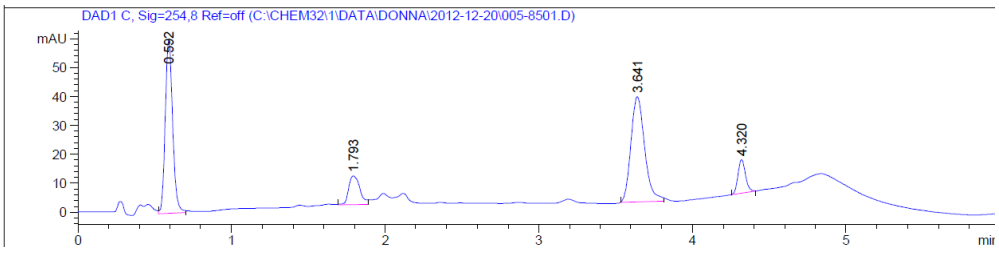
FTIR:



HRMS:



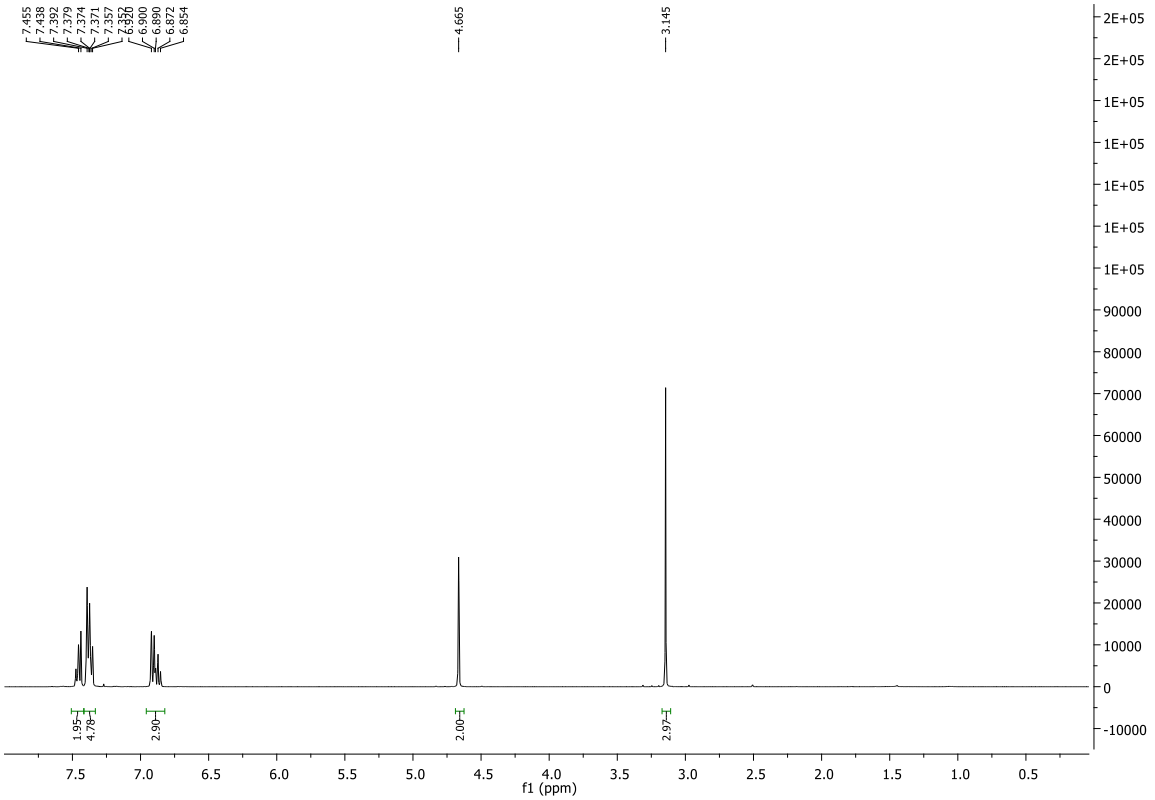
HPLC assay:



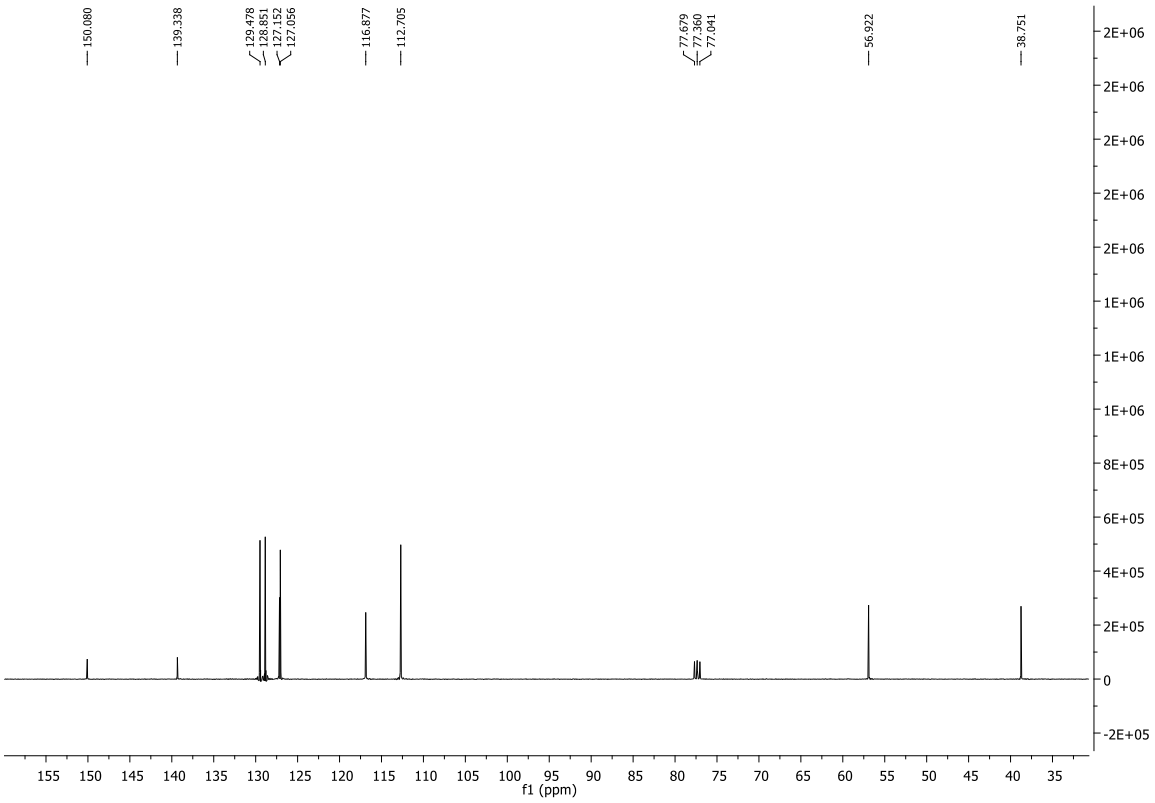
Substrate	R_t (min)
Compound 4: Bis(3-phenylpropyl)amine	4.30
Iodobenzene (standard)	3.64

Compound 5: *N*-Benzyl-*N*-methylaniline

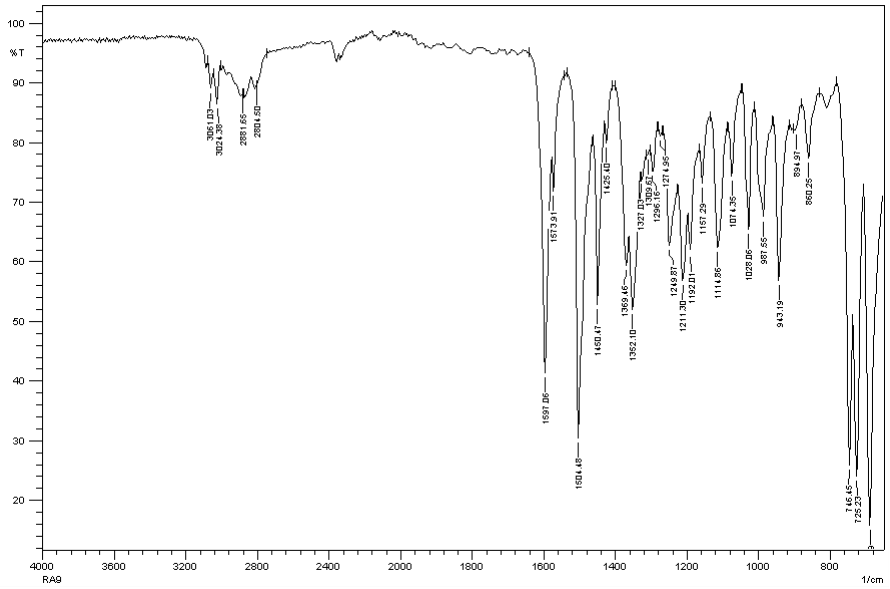
^{1}H NMR:



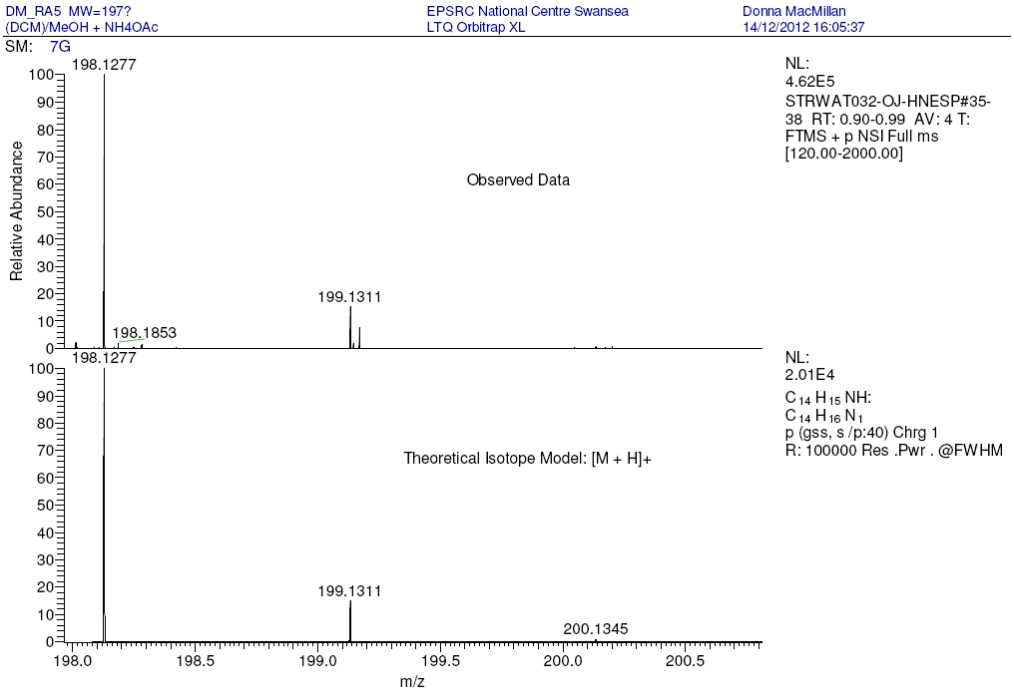
^{13}C NMR:



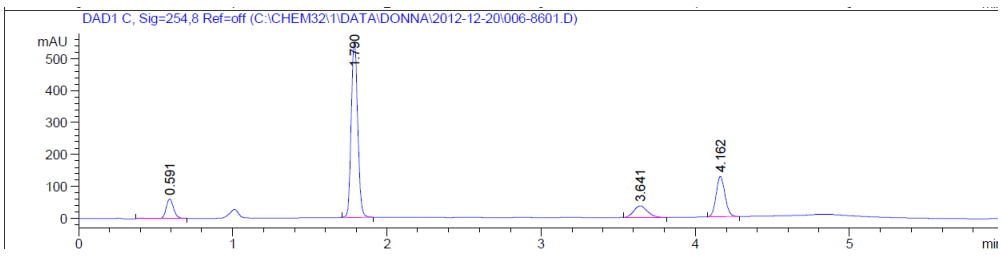
FTIR:



HRMS:



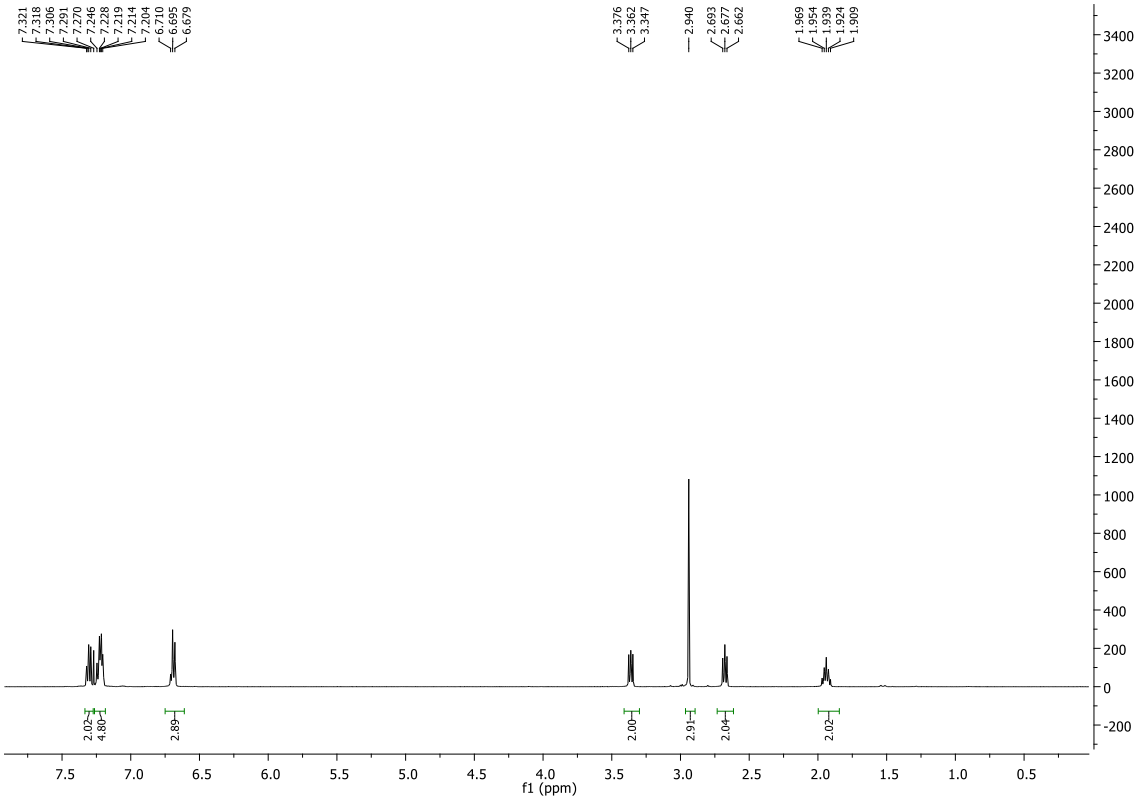
HPLC assay:



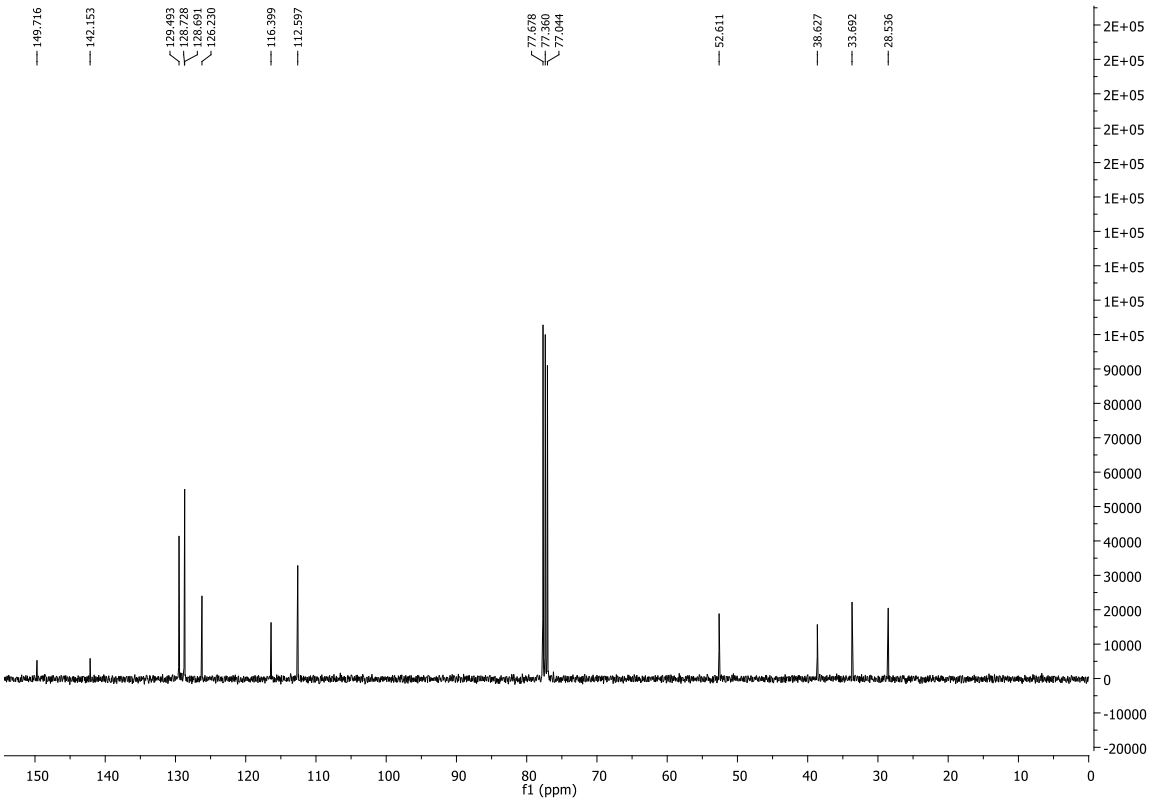
Substrate	R_t (min)
Compound 5: *N*-benzyl-*N*-methylaniline	4.16
Iodobenzene (standard)	3.64

Compound 6: *N*-Methyl-*N*-(3-phenylpropyl)aniline

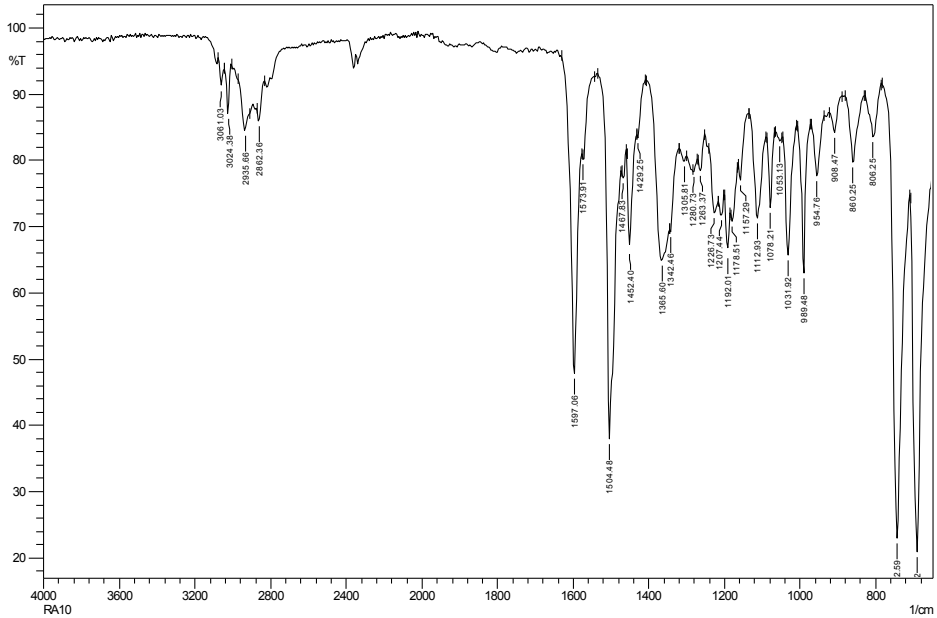
^{1}H NMR:



^{13}C NMR:



FTIR:



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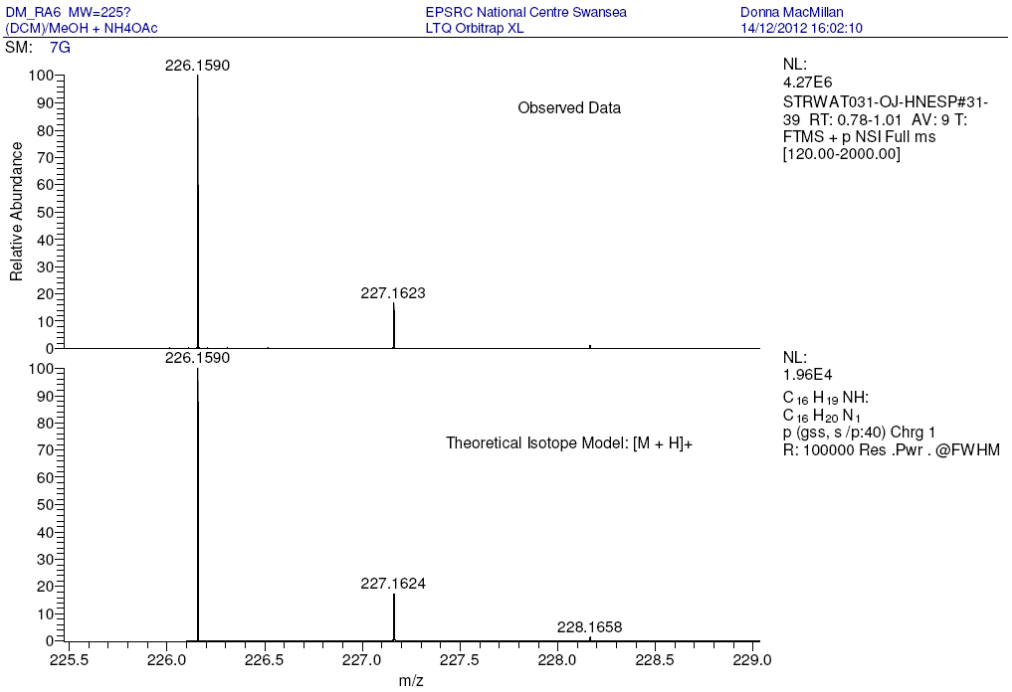
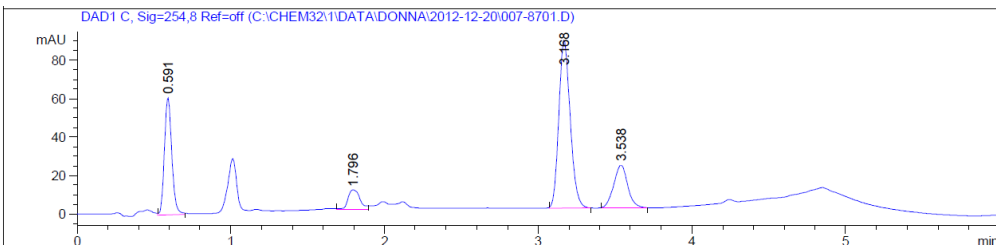


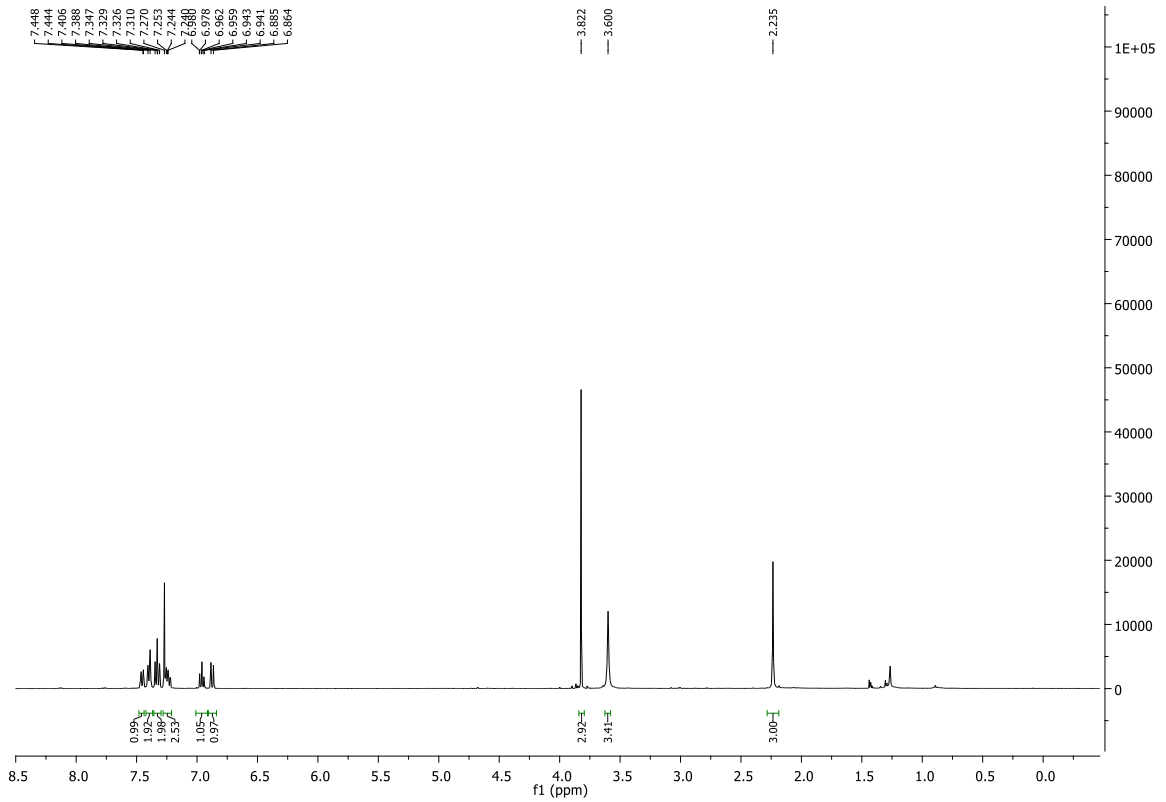
HPLC assay:



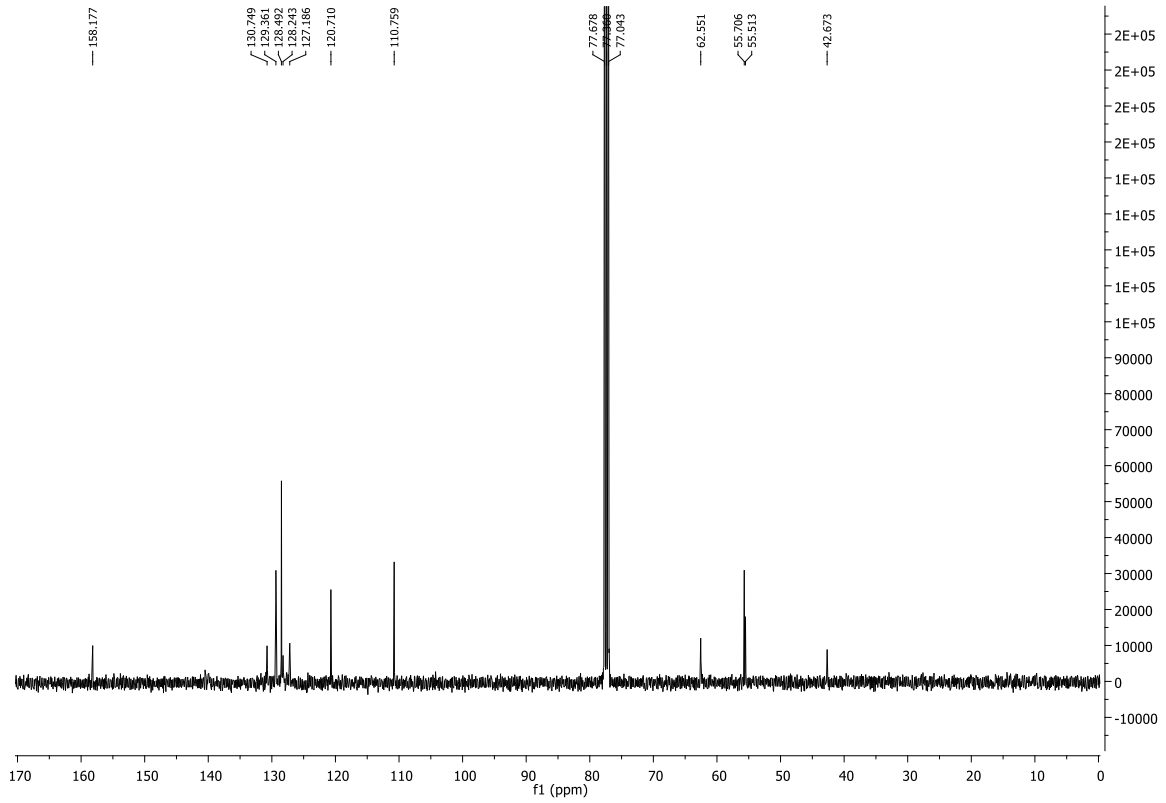
Substrate	R_t (min)
Compound 6: *N*-methyl-*N*-(3-phenylpropyl)aniline	3.54
Bromobenzene (standard)	3.17

Compound 7: *N*-Benzyl-1-(2-methoxyphenyl)-*N*-methylmethanamine

^{1}H NMR:



^{13}C NMR:



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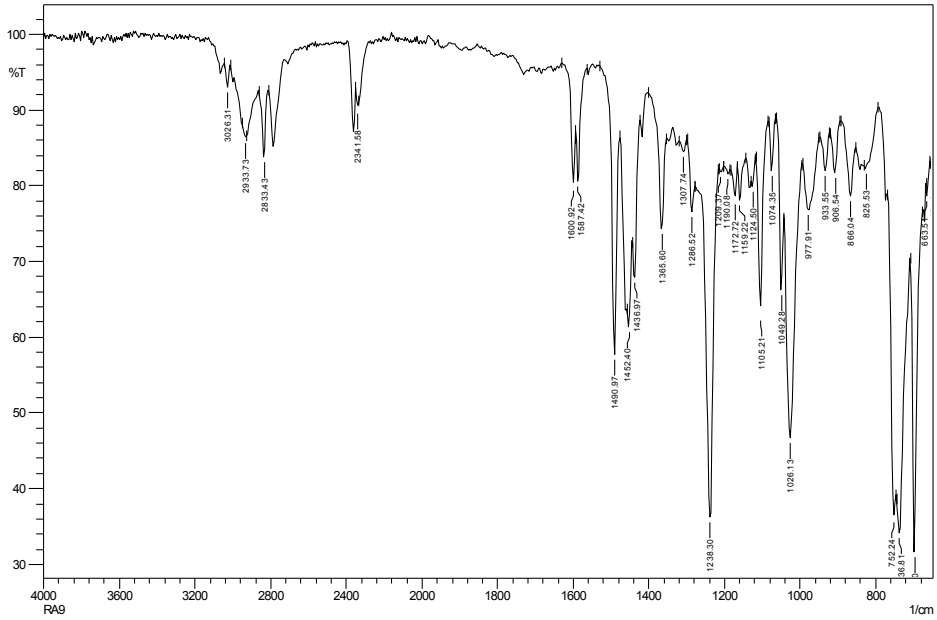

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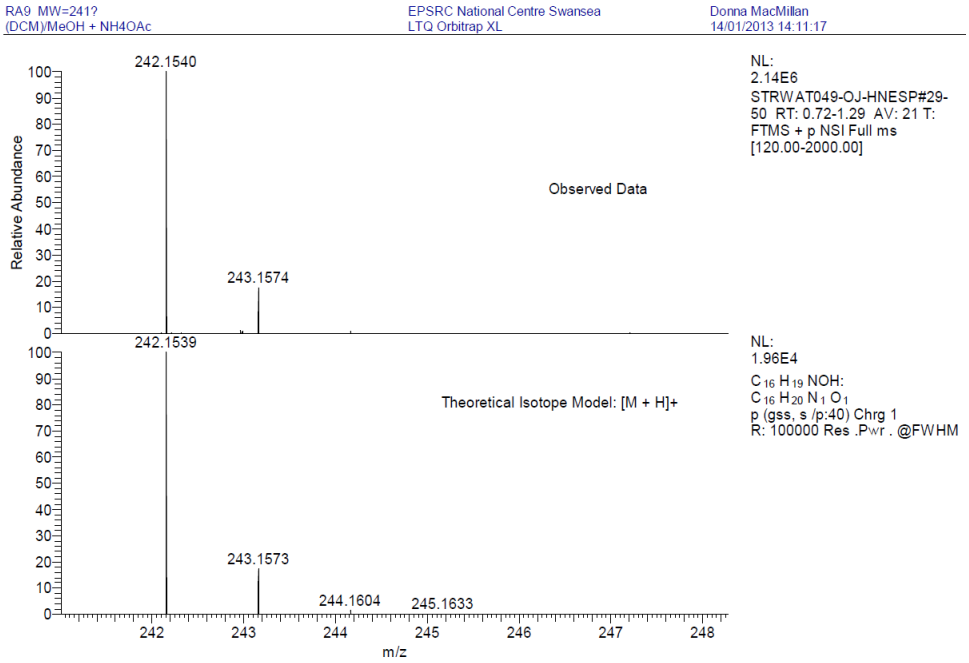
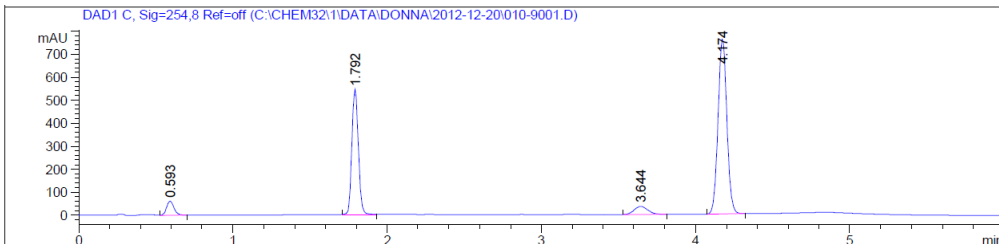


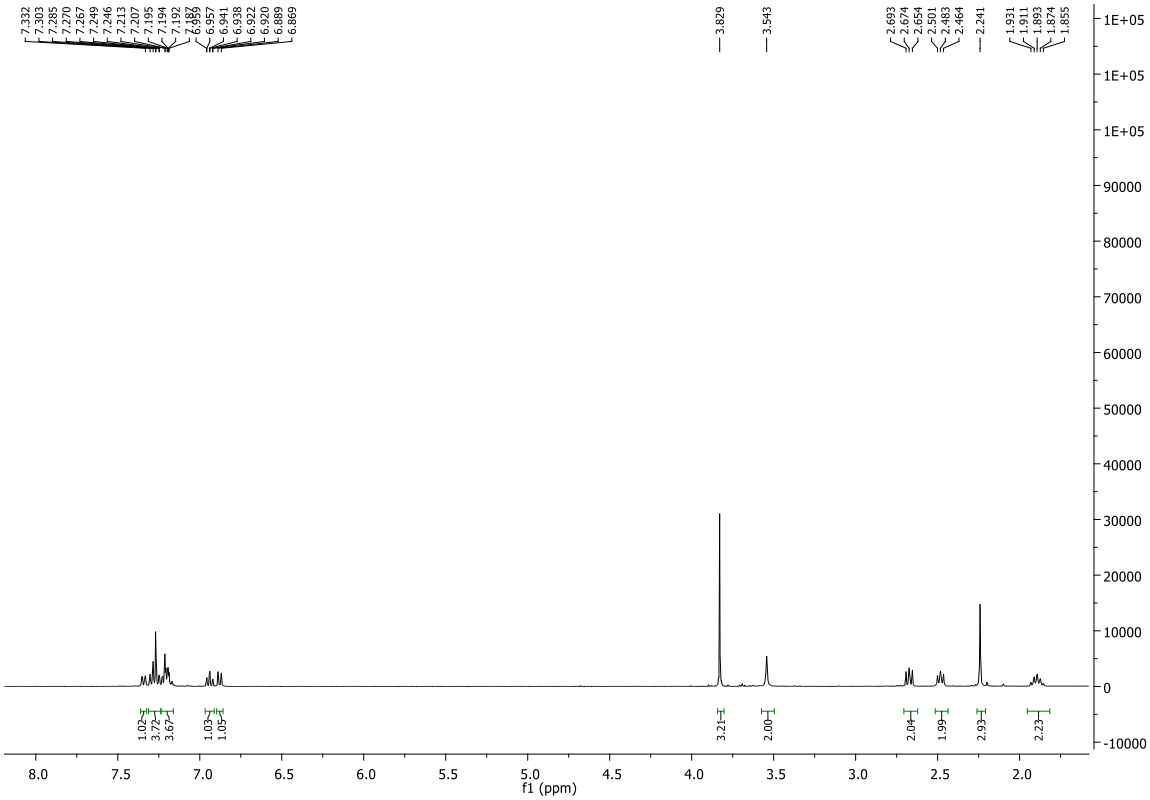
HPLC assay:



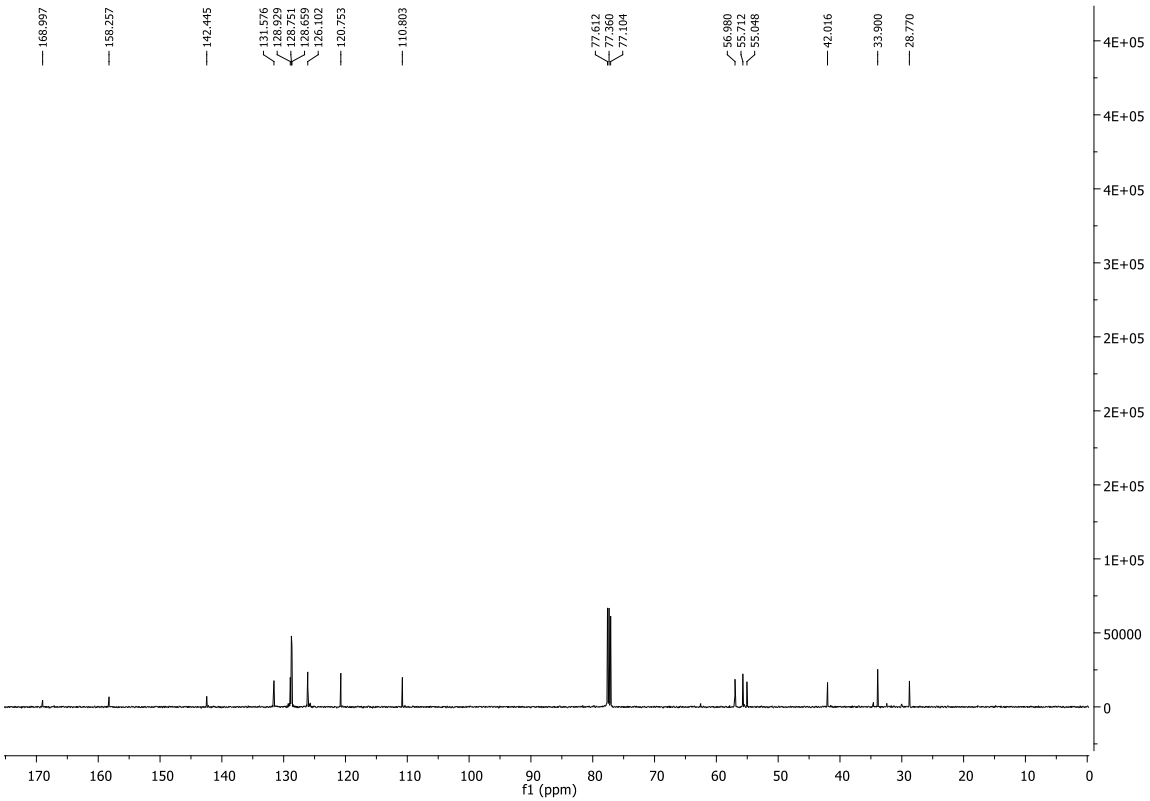
Substrate	R_t (min)
Compound 9: *N*-benzyl-1-(2-methoxyphenyl)-*N*-methylmethanamine	4.17
Iodobenzene (standard)	3.64

Compound 8: *N*-(2-Methoxybenzyl)-*N*-methyl-3-phenylpropan-1-amine

^{1}H NMR:



^{13}C NMR:



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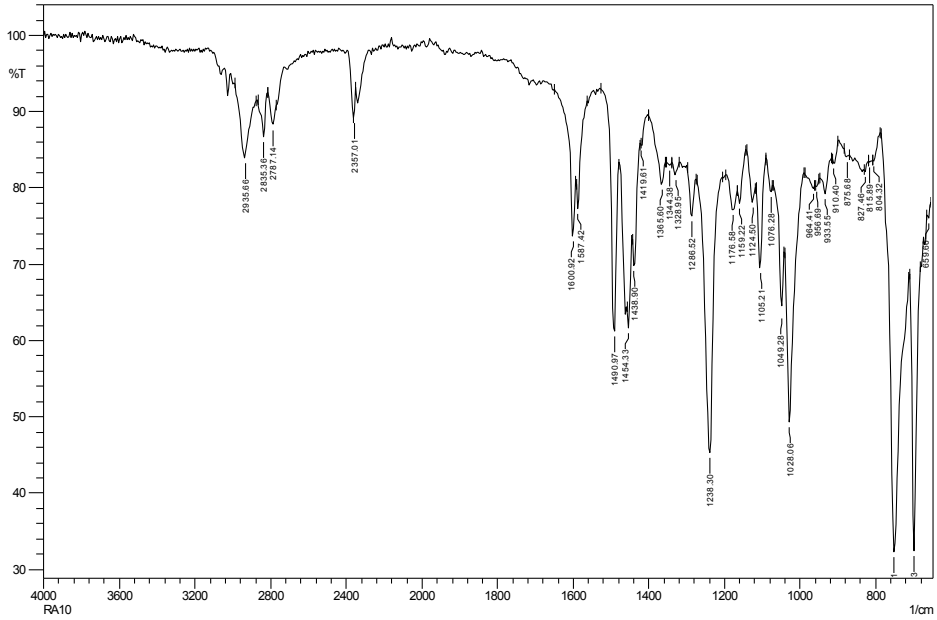

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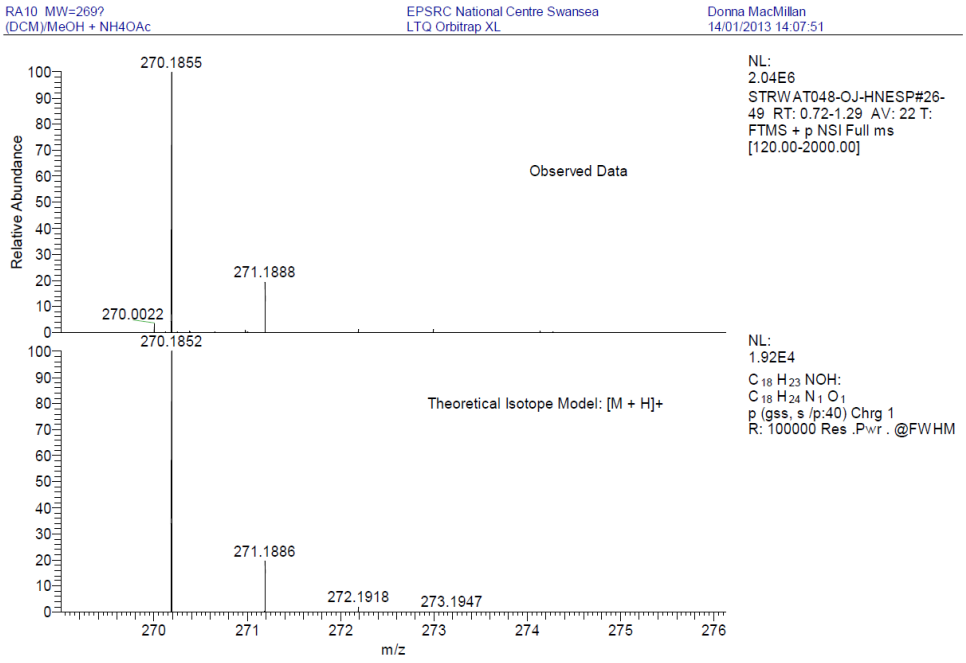
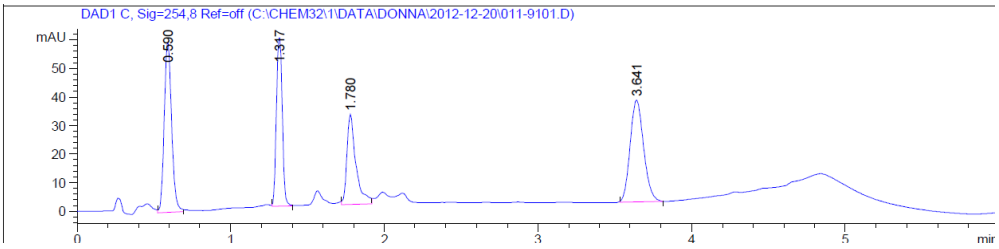


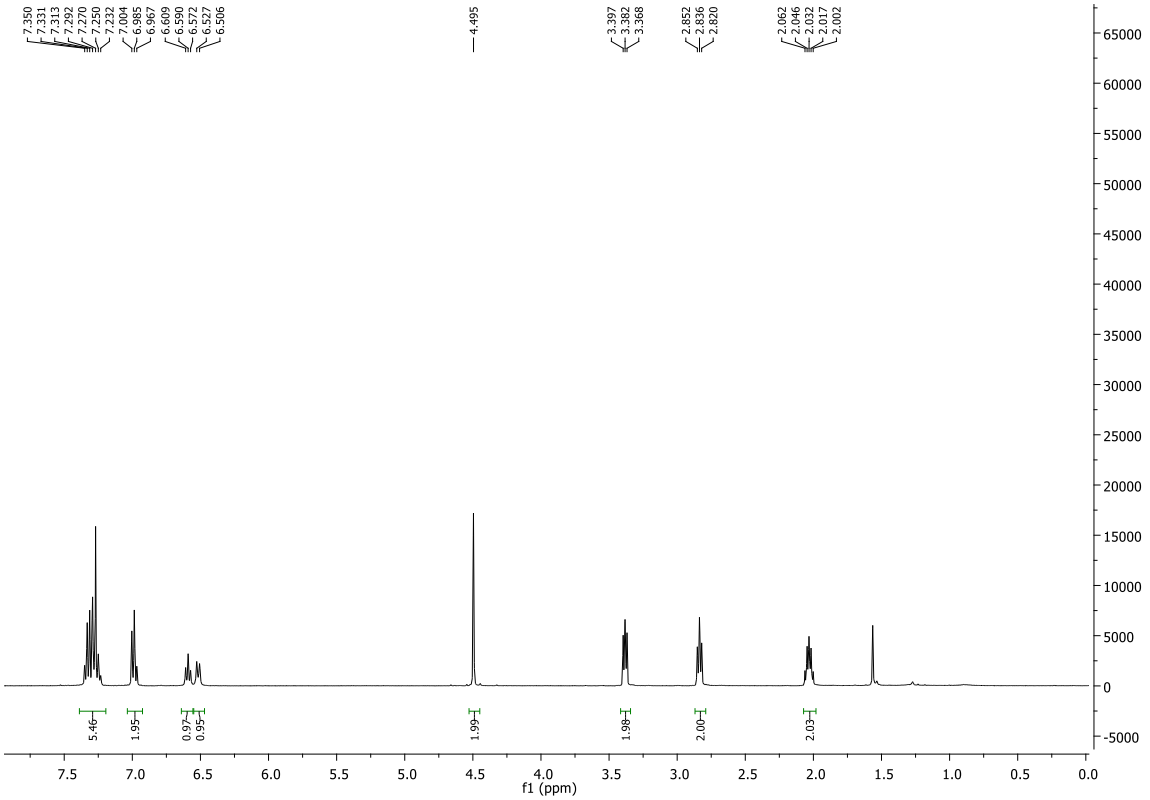
HPLC assay:



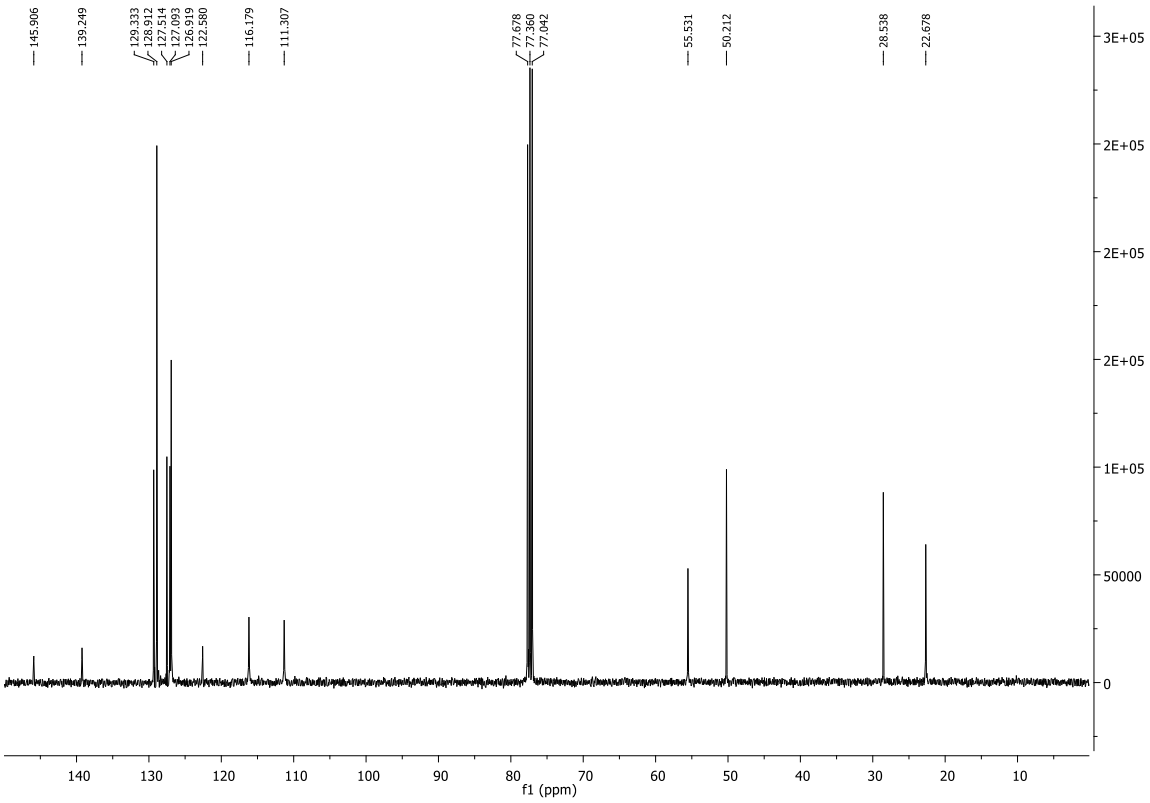
Substrate	R_t (min)
Compound 10: *N*-(2-methoxybenzyl)-*N*-methyl-3-phenylpropan-1-amine	1.32
Iodobenzene (standard)	3.64

Compound 9: 1-Benzyl-1,2,3,4-tetrahydroquinoline

^{1}H NMR:



^{13}C NMR:



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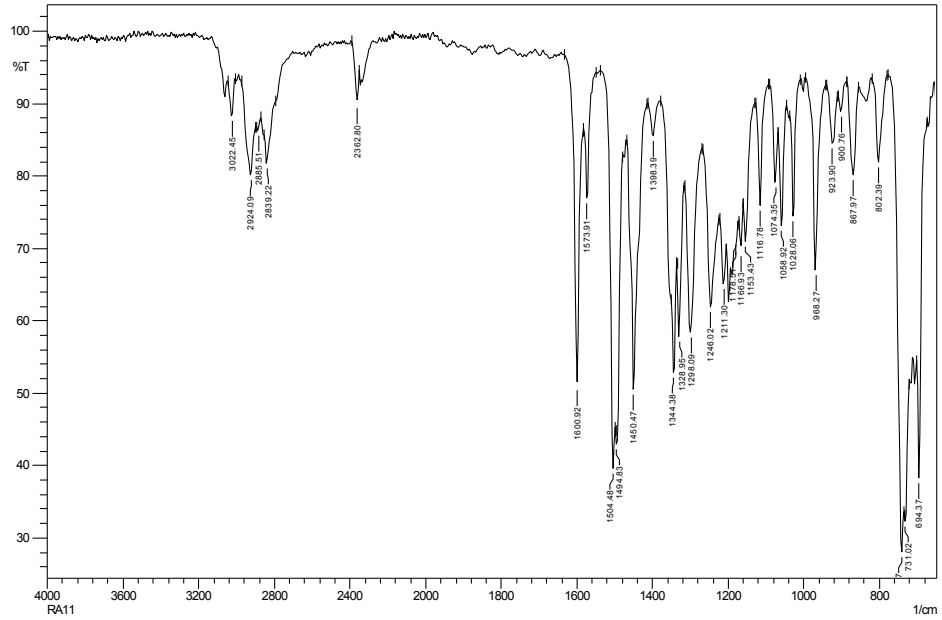

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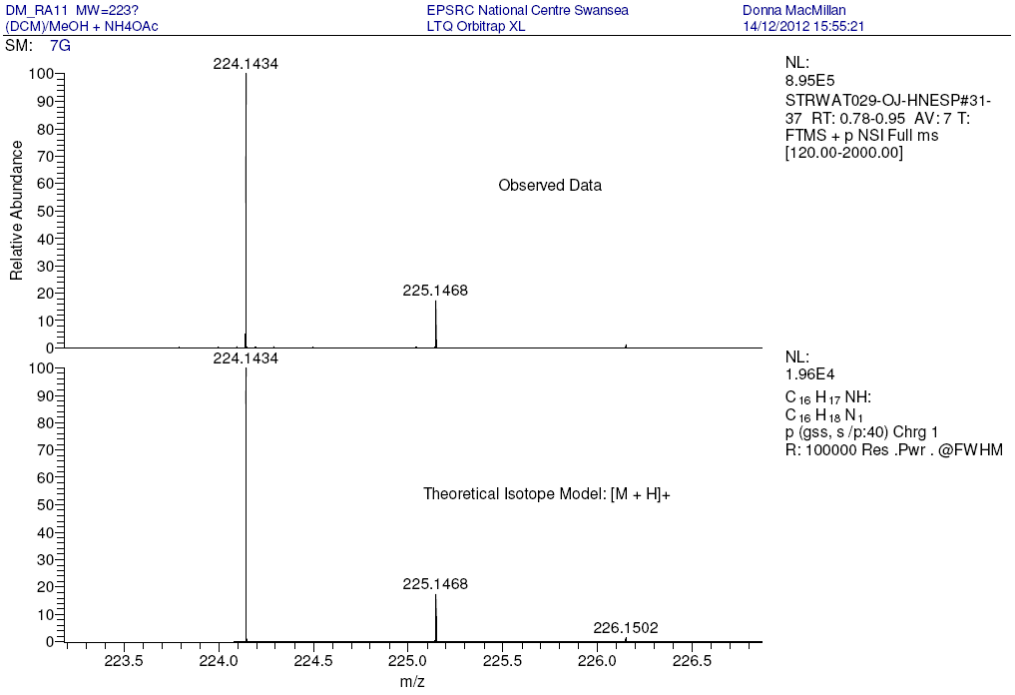
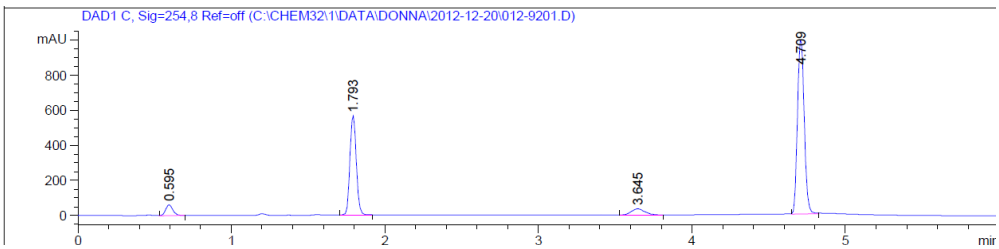


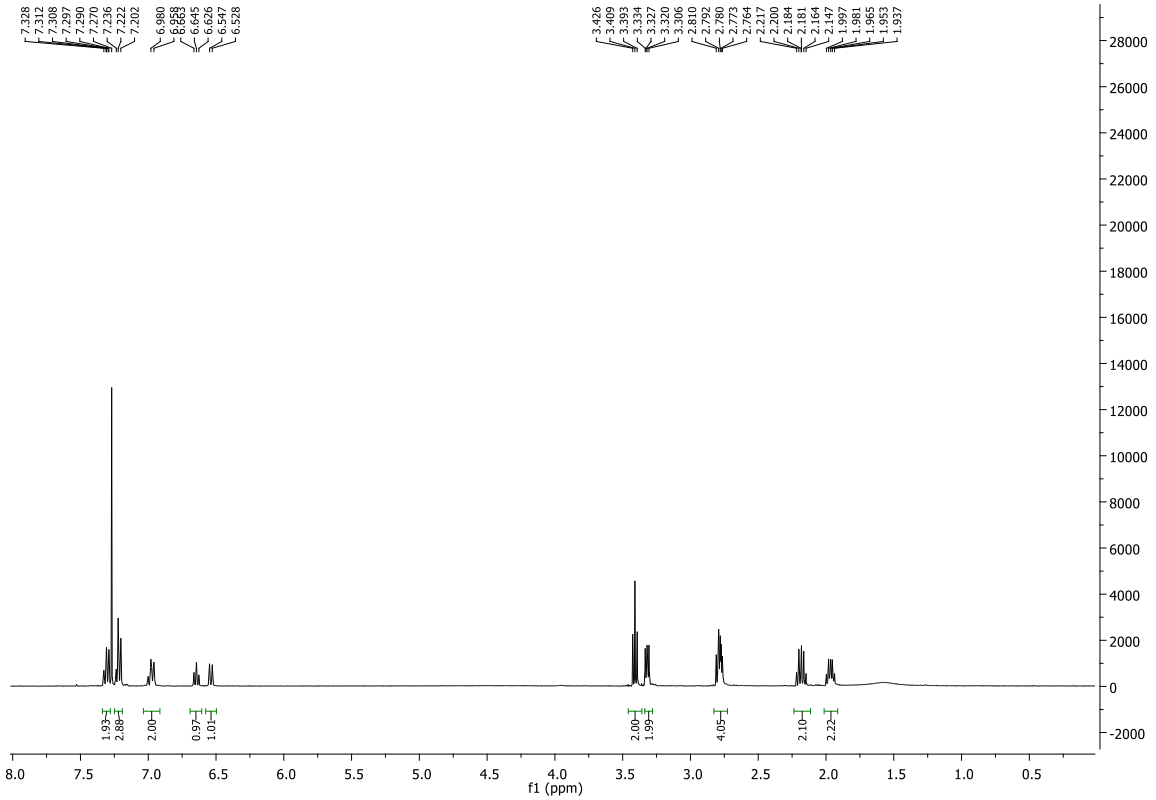
HPLC assay:



Substrate	R_t (min)
Compound 11: 1-Benzyl-1,2,3,4-tetrahydroquinoline	4.71
Iodobenzene (standard)	3.64

Compound 10: 1-(3-Phenylpropyl)-1,2,3,4-tetrahydroquinoline

^{1}H NMR:



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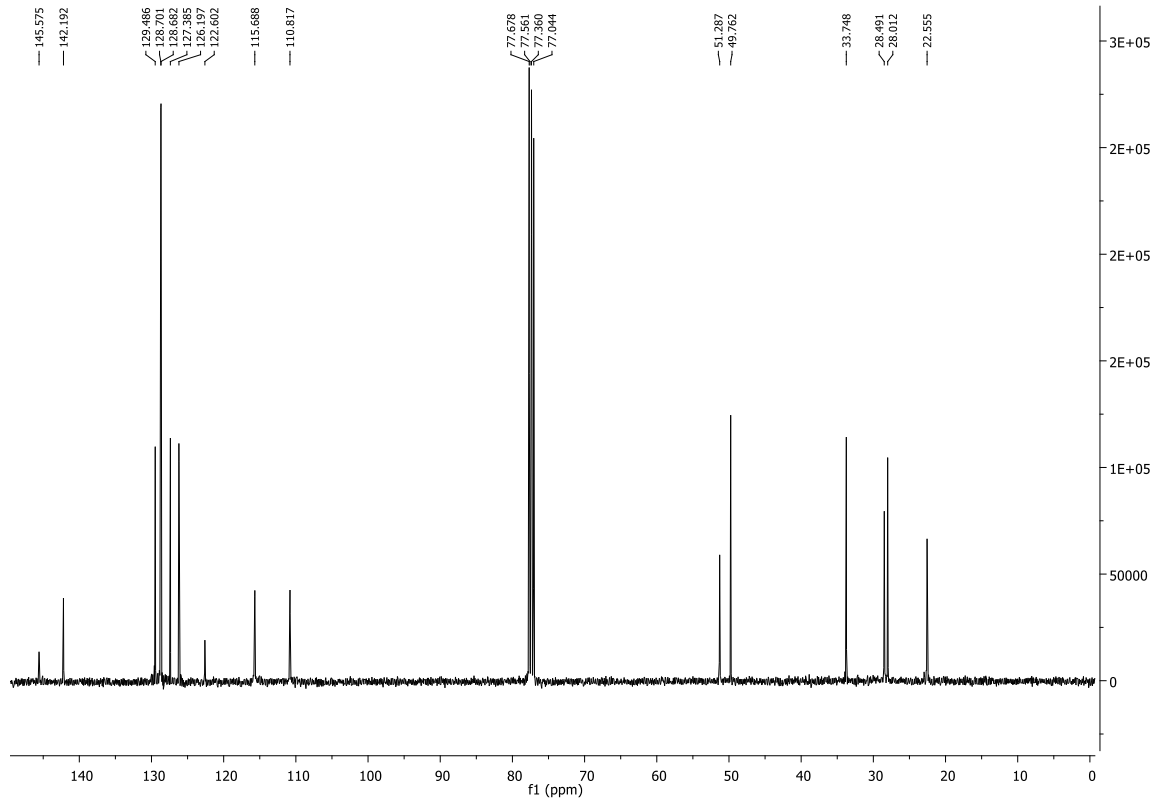

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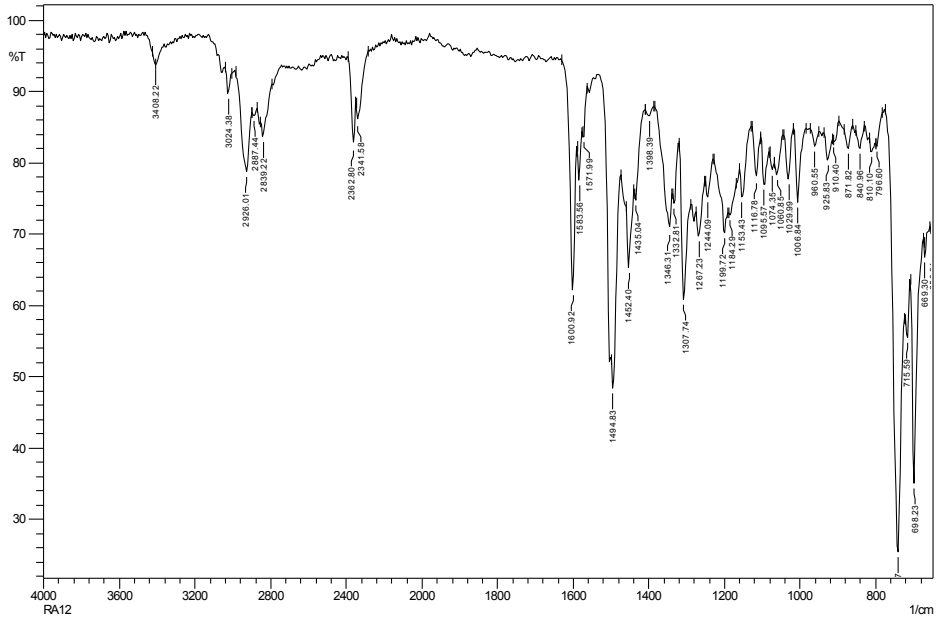

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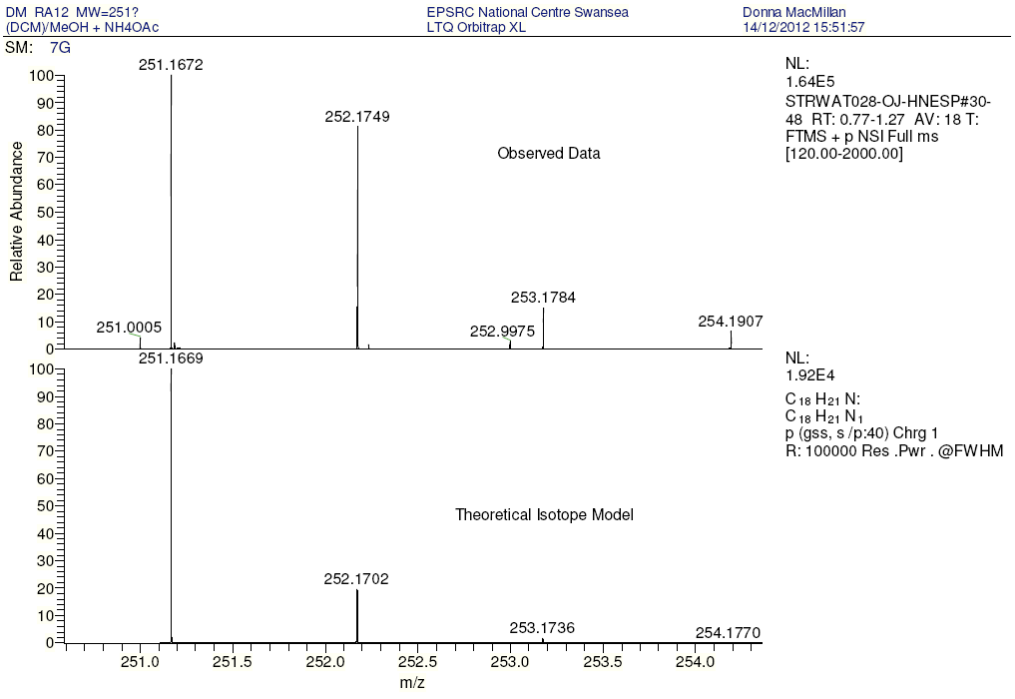
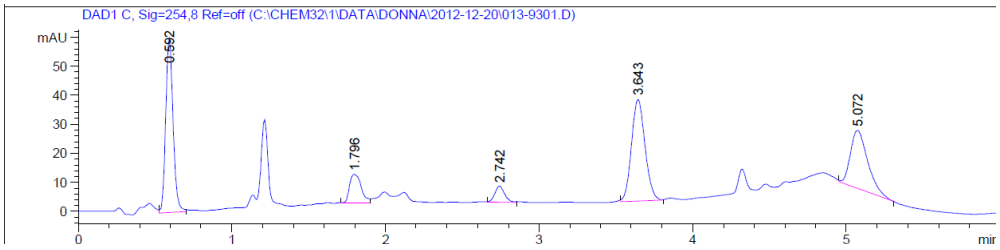


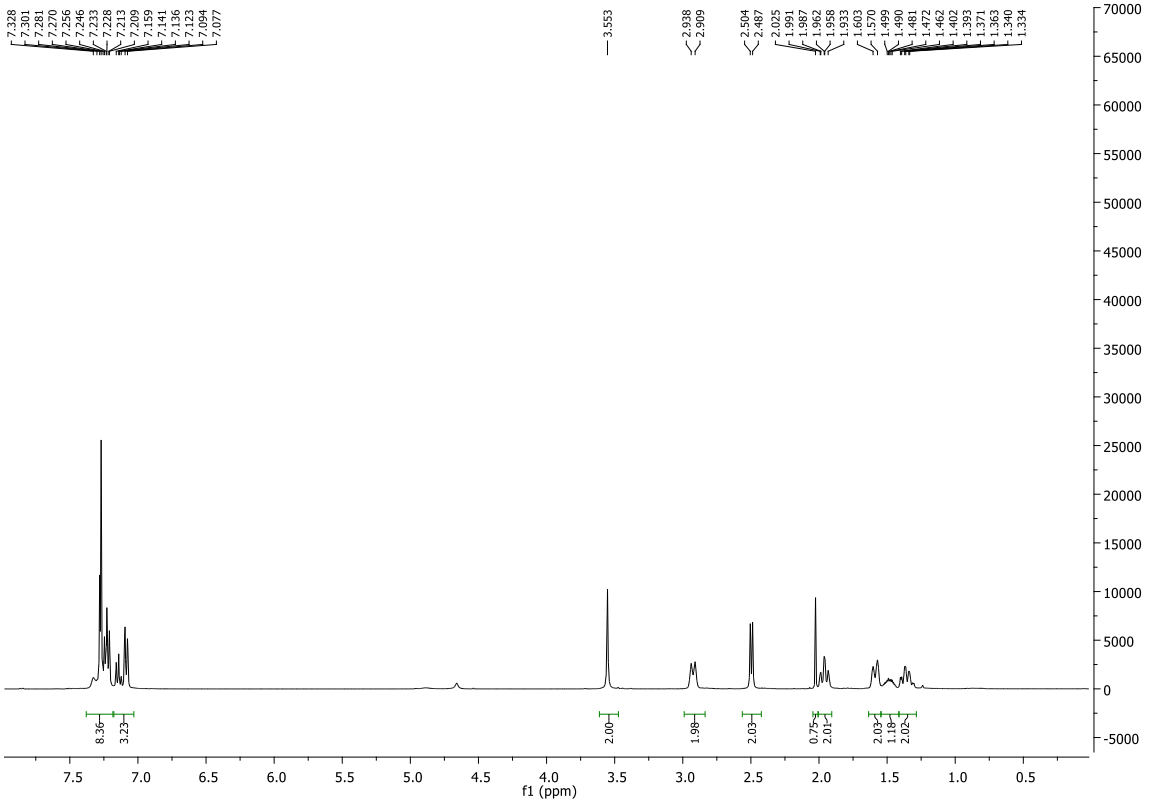
HPLC assay:



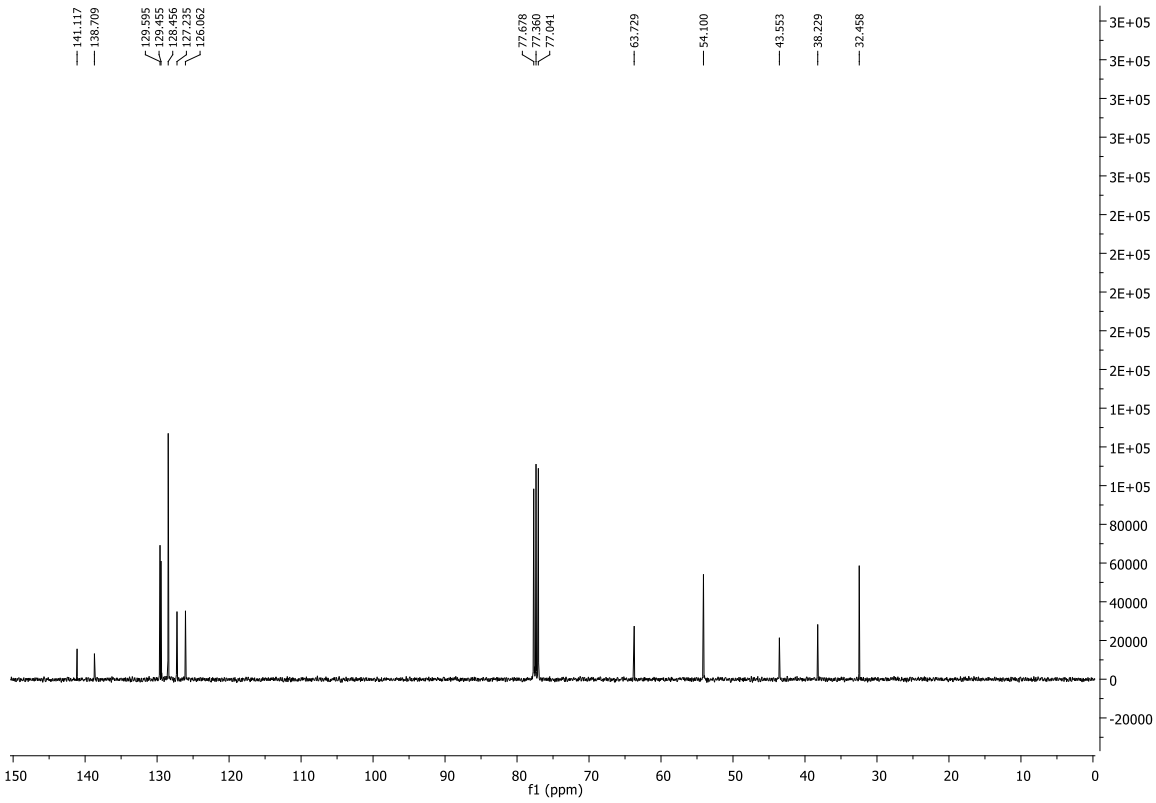
Substrate	R_t (min)
Compound 12: 1-(3-Phenylpropyl)-1,2,3,4-tetrahydroquinoline	2.74
Iodobenzene (standard)	3.64

Compound 11: 1,4-Dibenzylpiperidine

^{1}H NMR:



^{13}C NMR:



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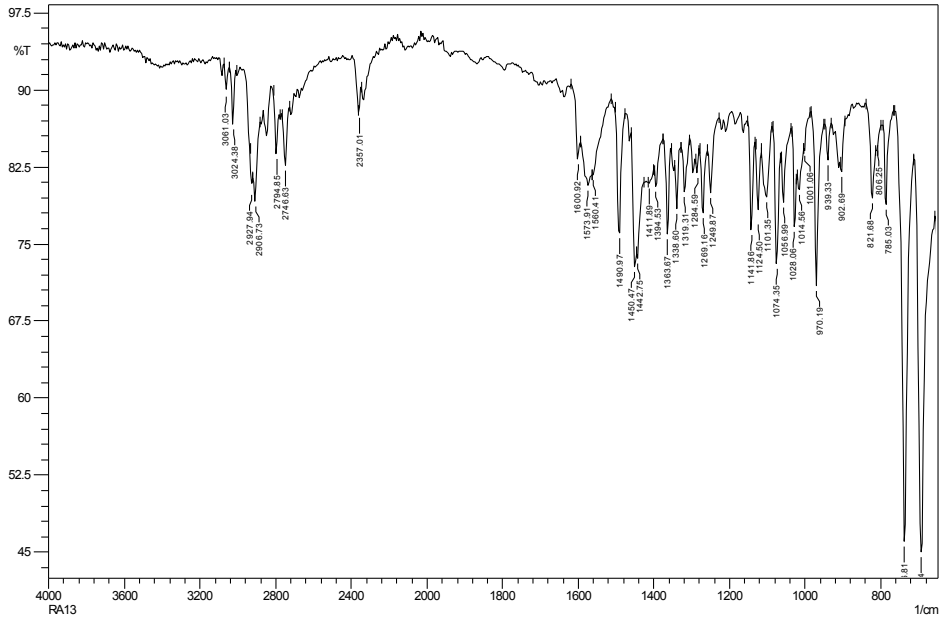
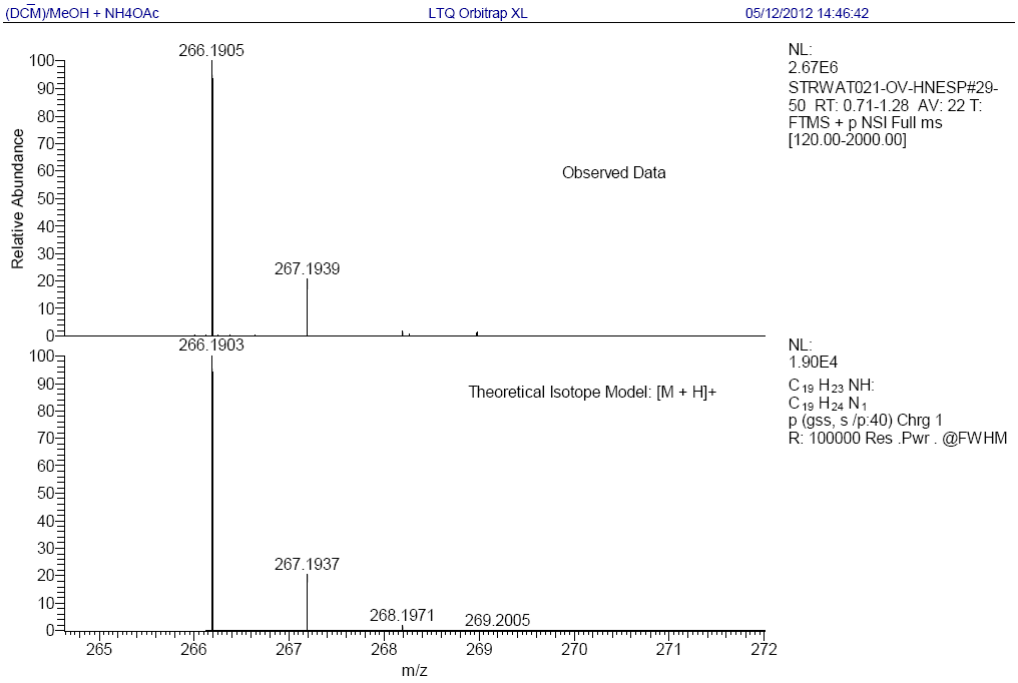
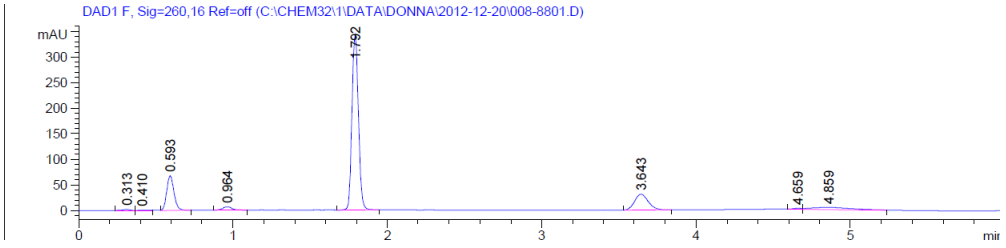


HRMS:



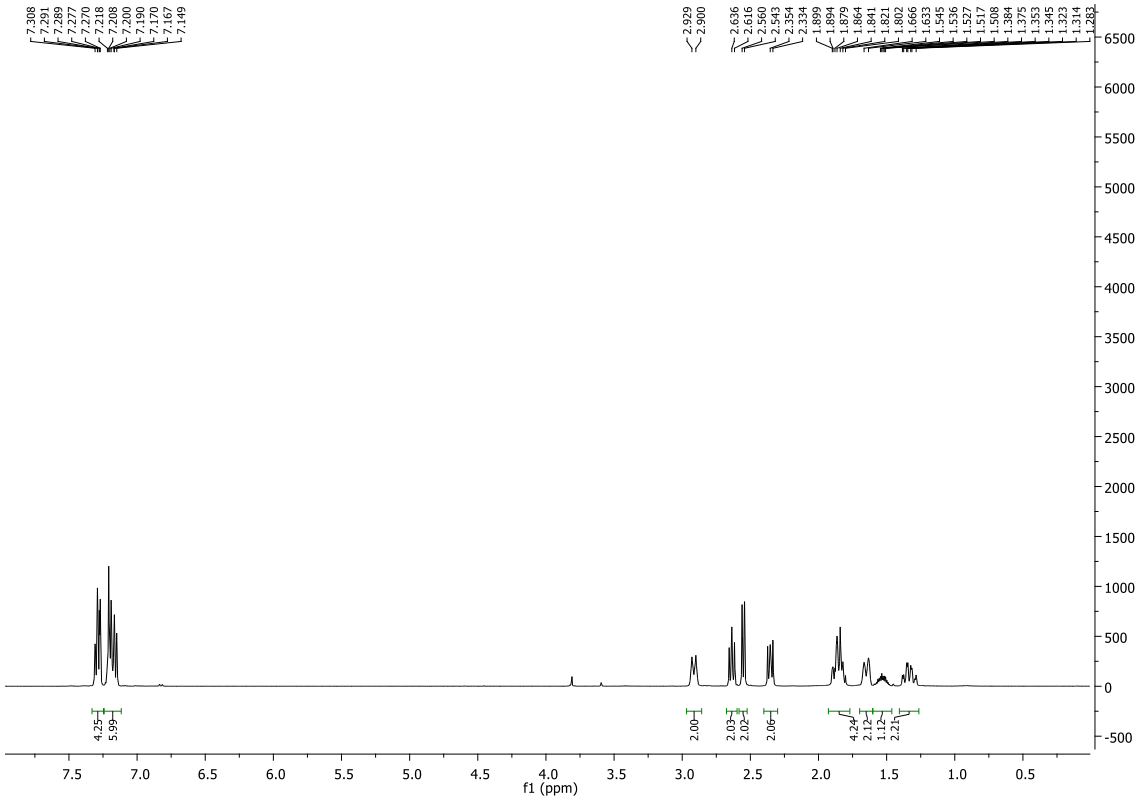
HPLC assay:



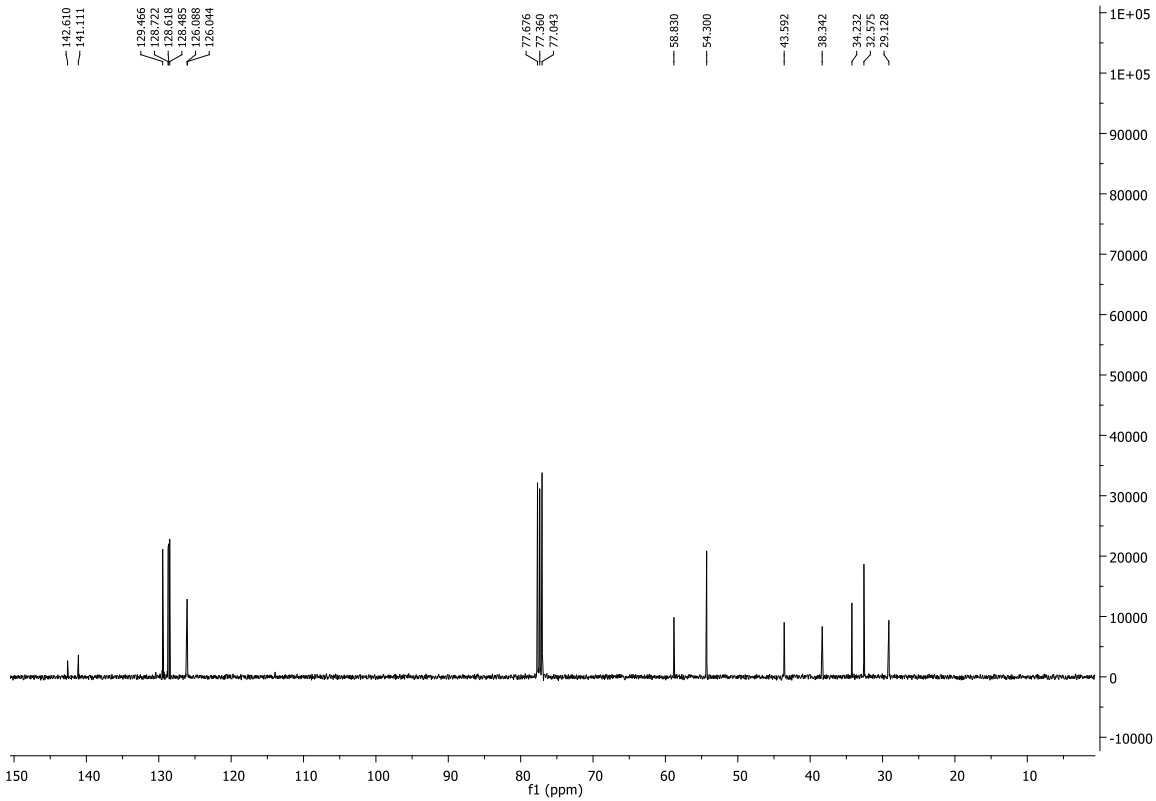
Substrate	R_t (min)
Compound 7: 1,4-Dibenzylpiperidine	0.96
Iodobenzene (standard)	3.64

Compound 12: 4-Benzyl-1-(3-phenylpropyl)piperidine

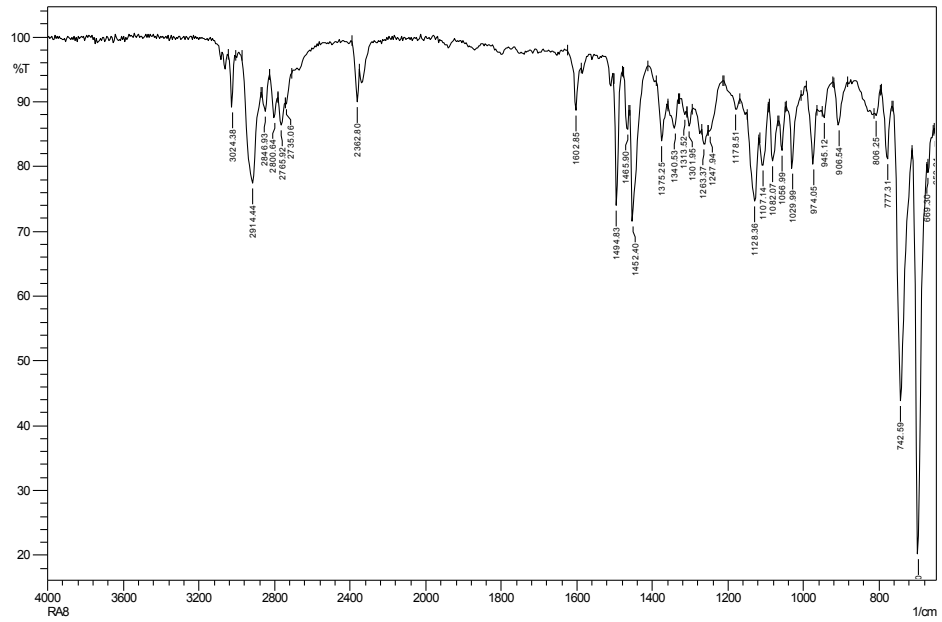
^{1}H NMR:



^{13}C NMR:



FTIR:



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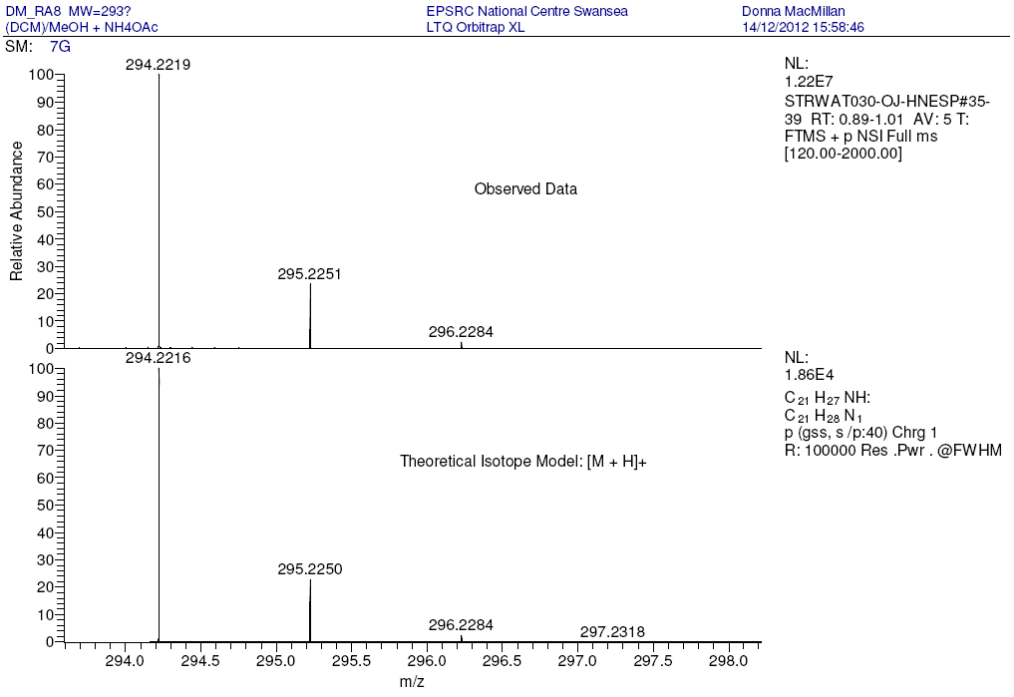
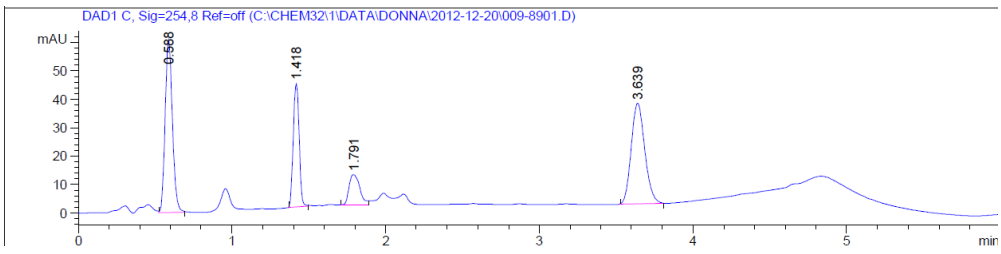


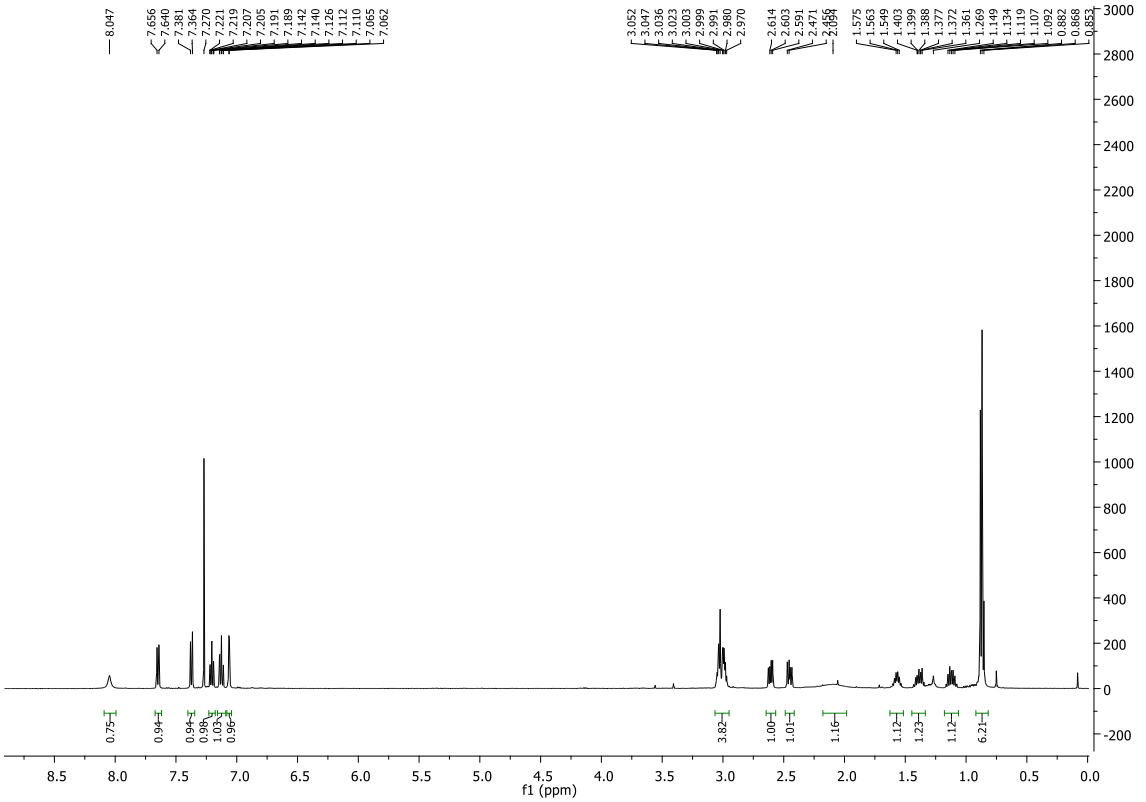
HPLC assay:



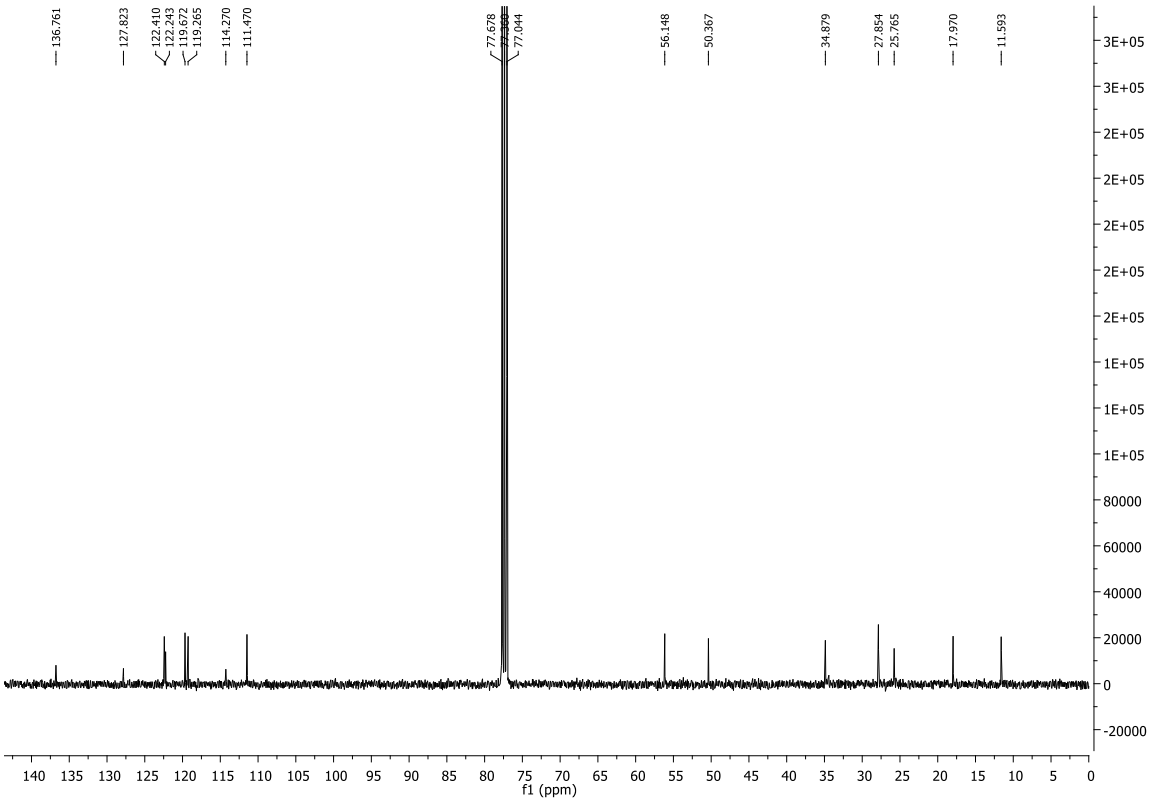
Substrate	R_t (min)
Compound 8: 4-Benzyl-1-(3-phenylpropyl)piperidine	1.42
Iodobenzene (standard)	3.64

Compound 13: *N*-(2-(1*H*-Indol-3-yl)ethyl)-2-methylbutan-1-amine

^{1}H NMR:



^{13}C NMR:



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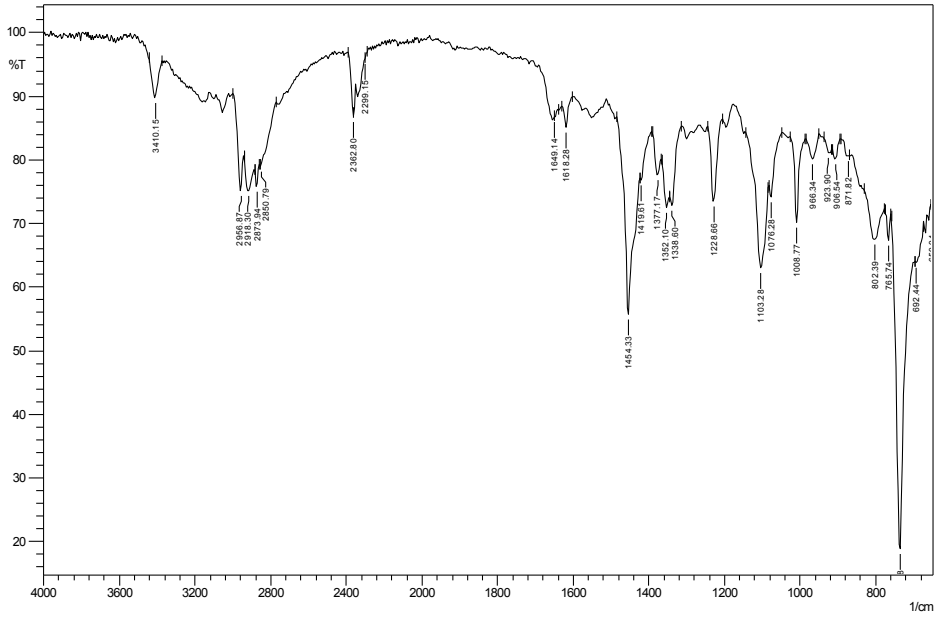

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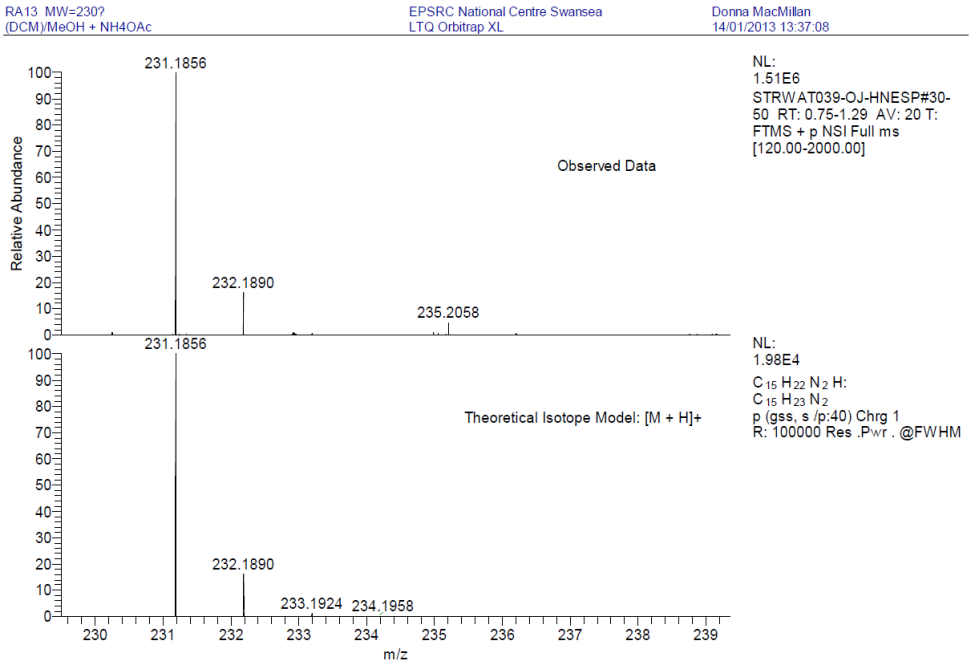
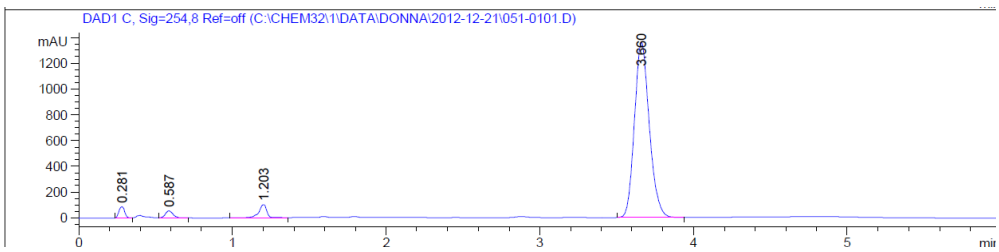


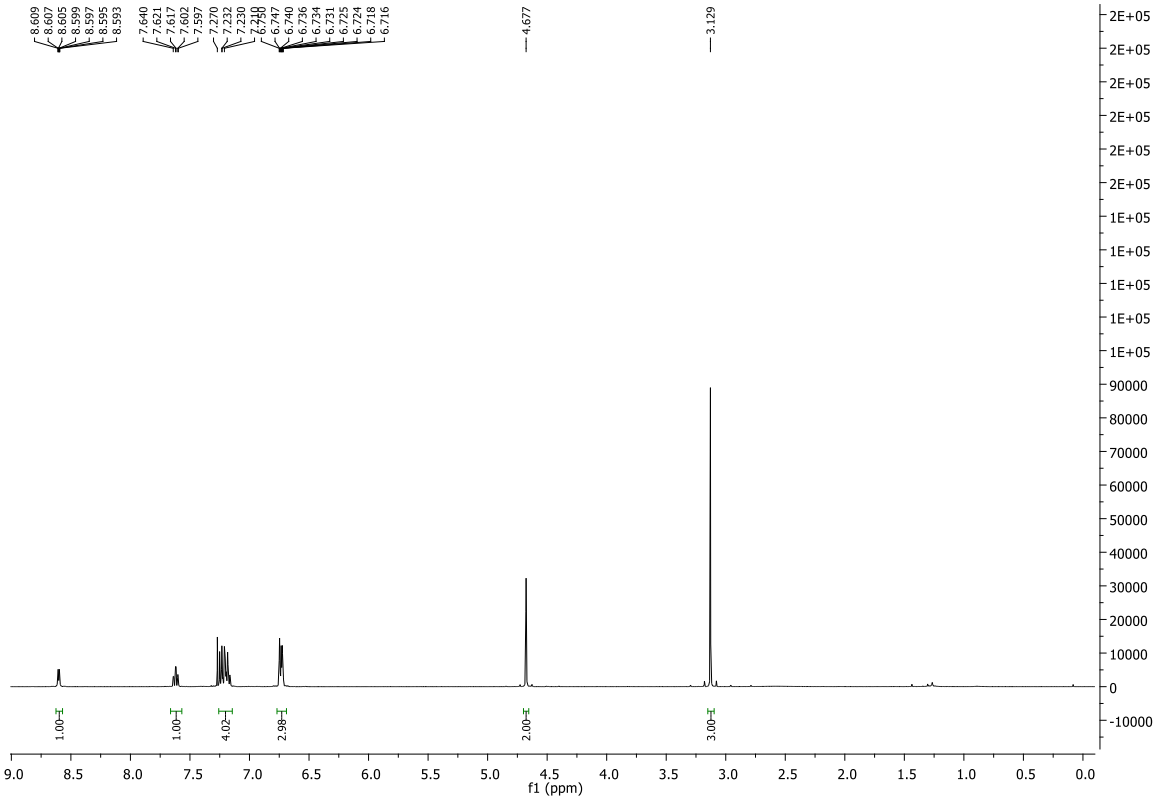
HPLC assay:



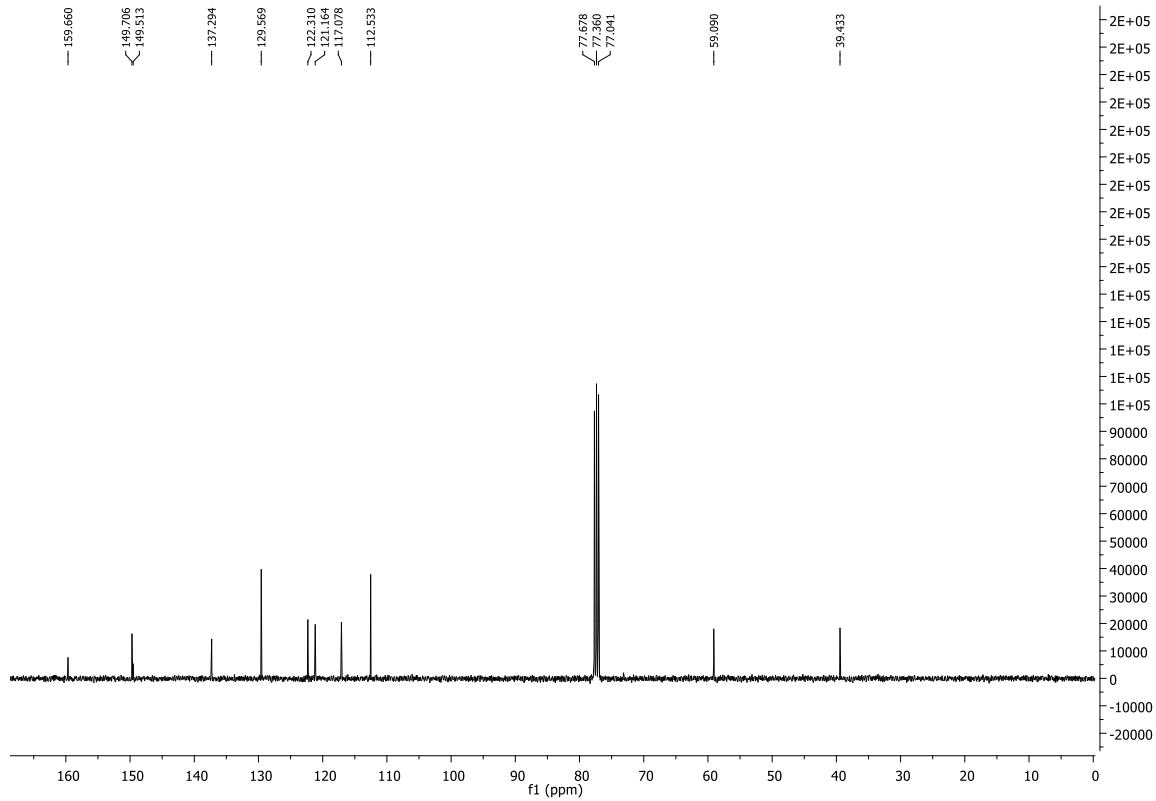
Substrate	R_t (min)
Compound 13: *N*-(2-(1*H*-indol-3-yl)ethyl)-2-methylbutan-1-amine	1.20
Iodobenzene (standard)	3.66

Compound 14: *N*-Methyl-*N*-(pyridin-2-ylmethyl)aniline

^{1}H NMR:



^{13}C NMR:



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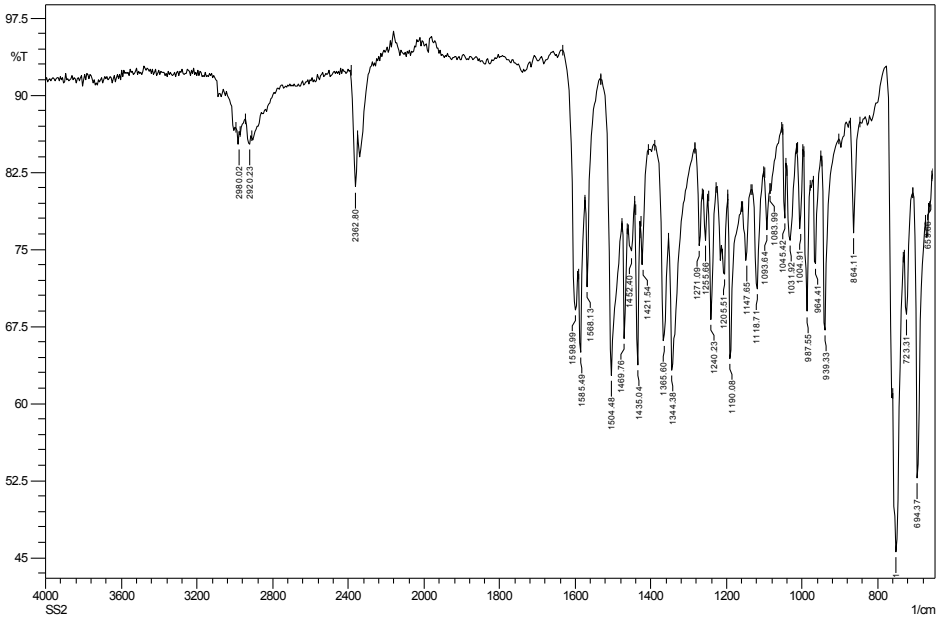

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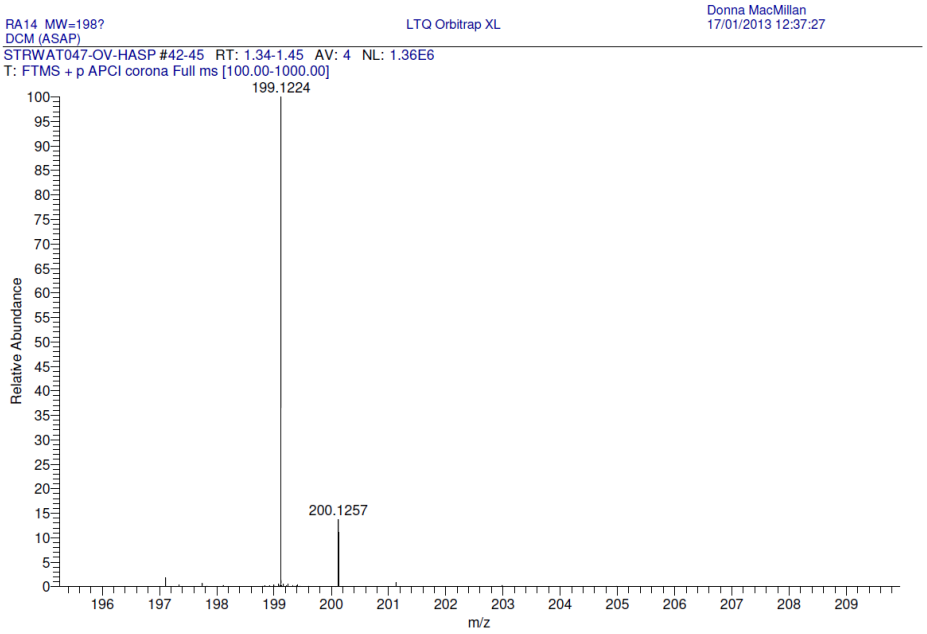
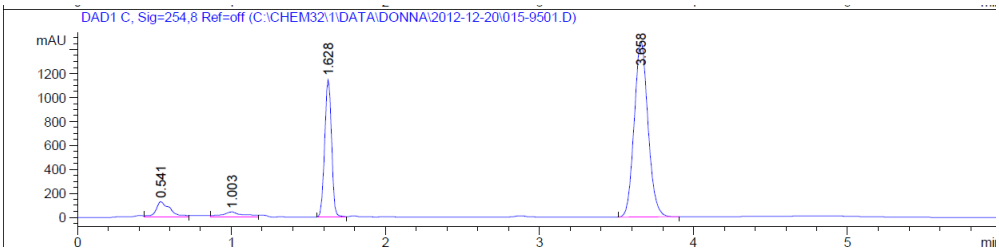


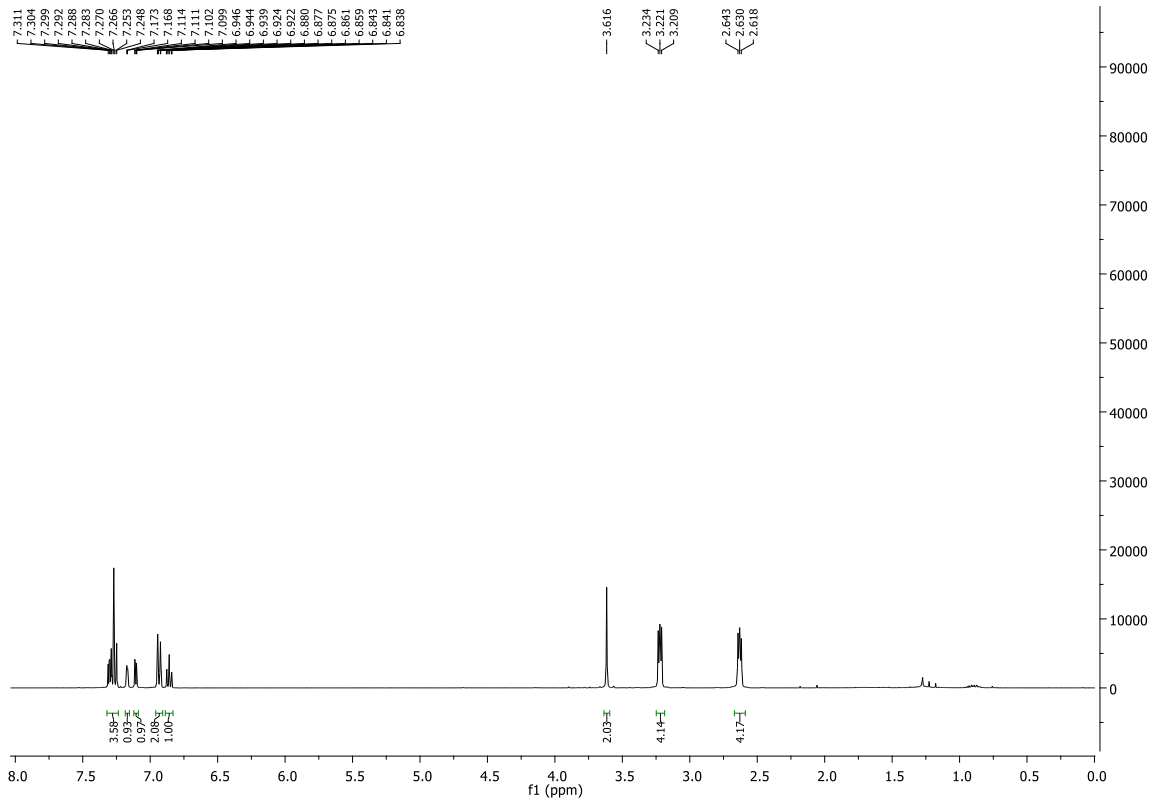
HPLC assay:



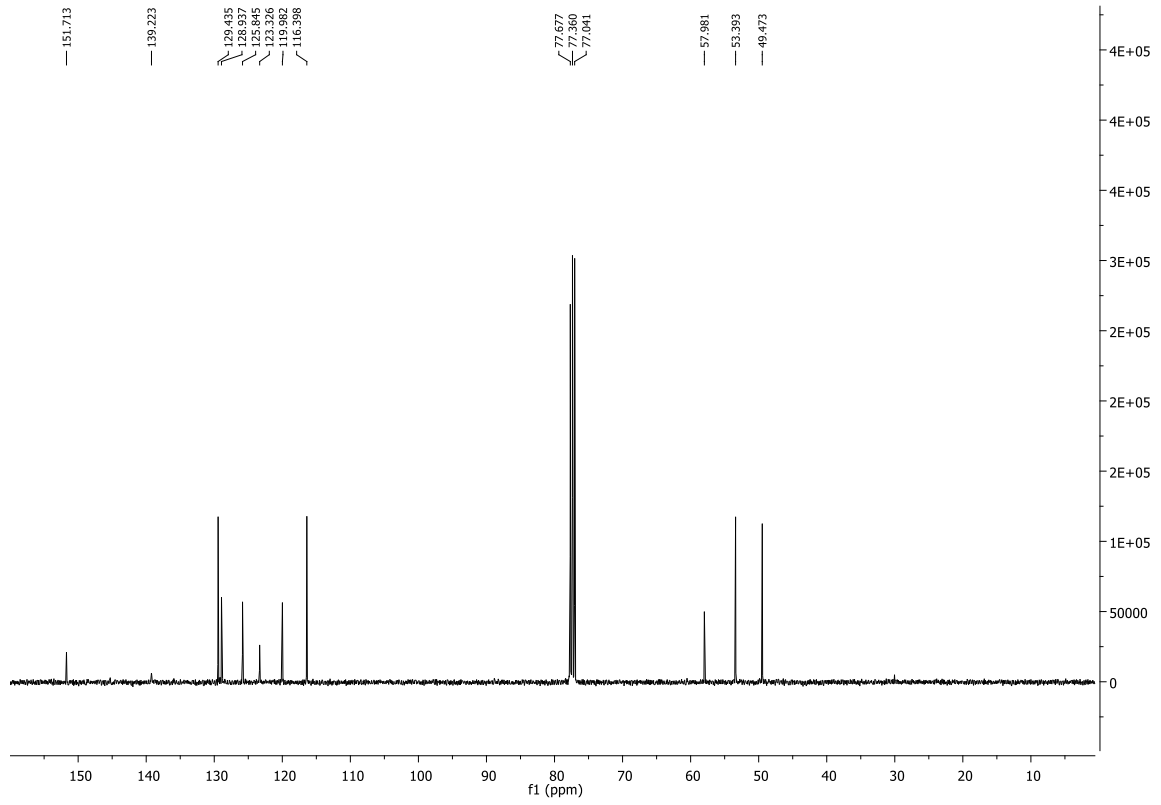
Substrate	R_t (min)
Compound 14: *N*-methyl-*N*-(pyridin-2-ylmethyl)aniline	1.63
Iodobenzene (standard)	3.66

Compound 15: 1-Phenyl-4-(thiophen-3-ylmethyl)piperazine

^{1}H NMR:



^{13}C NMR:



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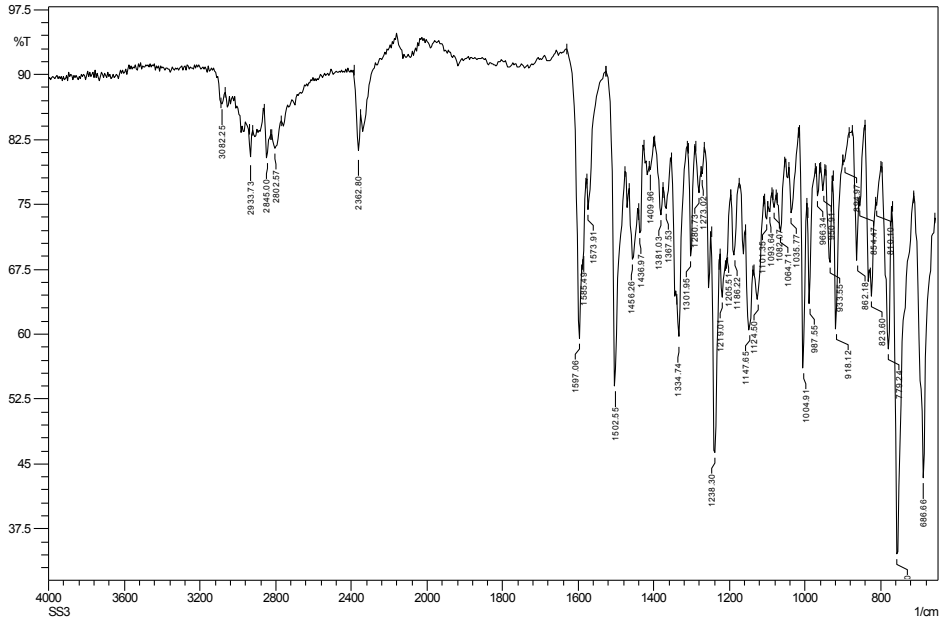

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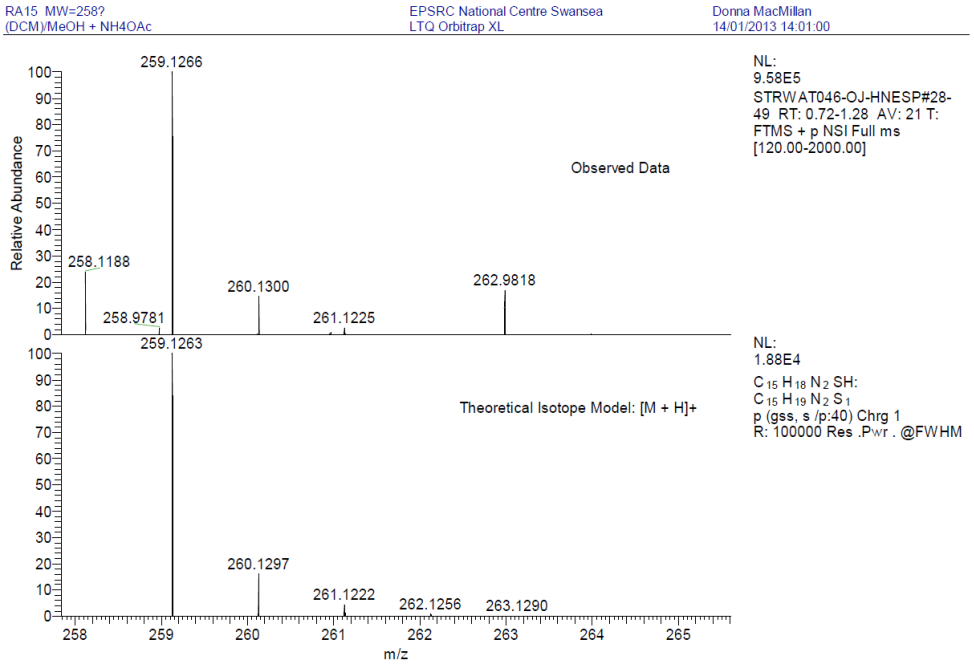
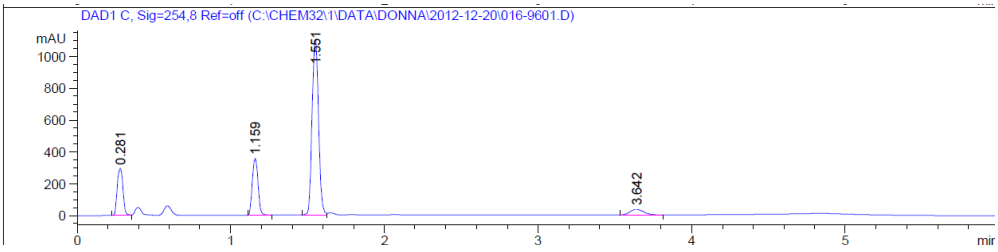


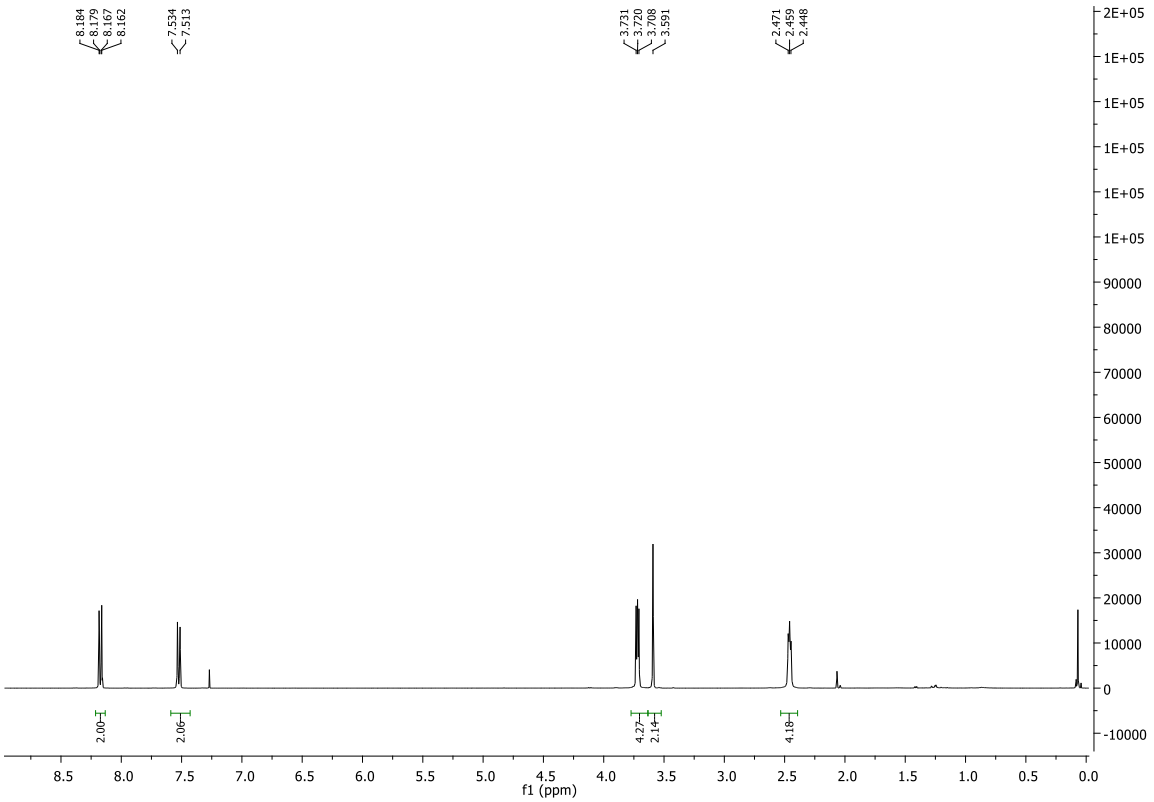
HPLC assay:



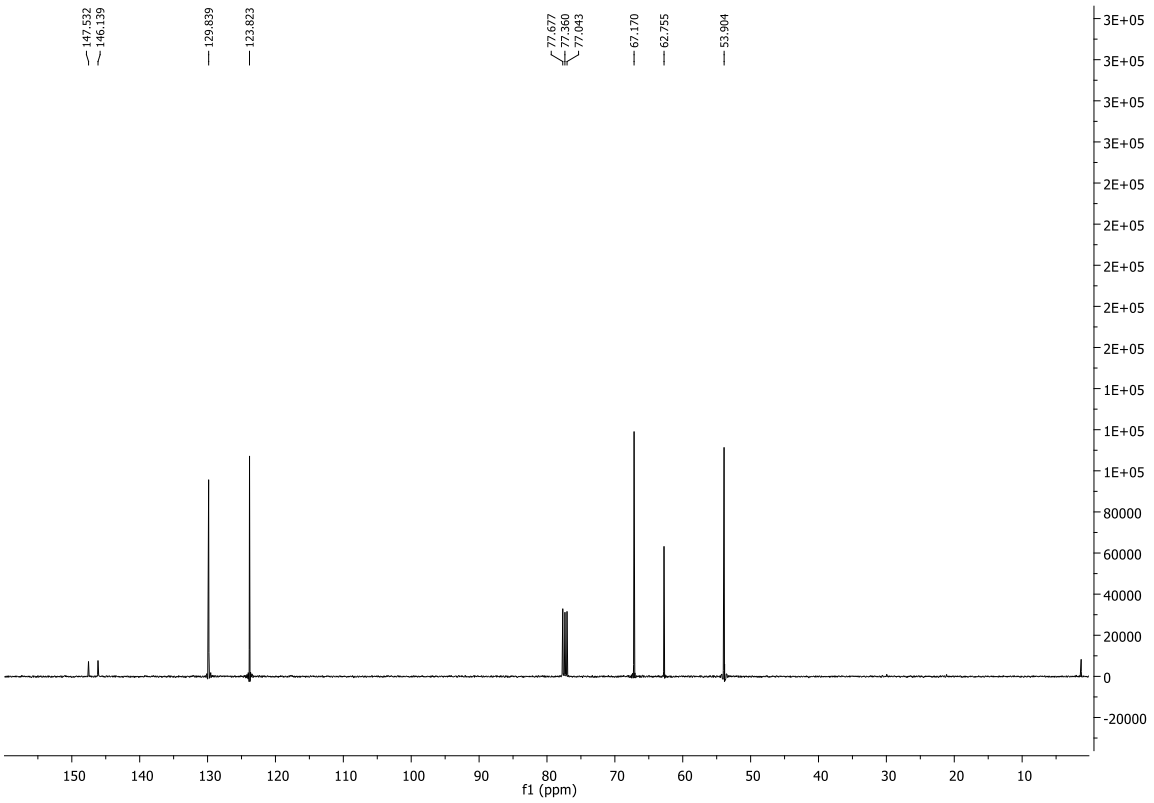
Substrate	R_t (min)
Compound 15: 1-Phenyl-4-(thiophen-3-ylmethyl)piperazine	1.56
Iodobenzene (standard)	3.64

Compound 16: 4-(4-Nitrobenzyl)morpholine

^{1}H NMR:



^{13}C NMR:



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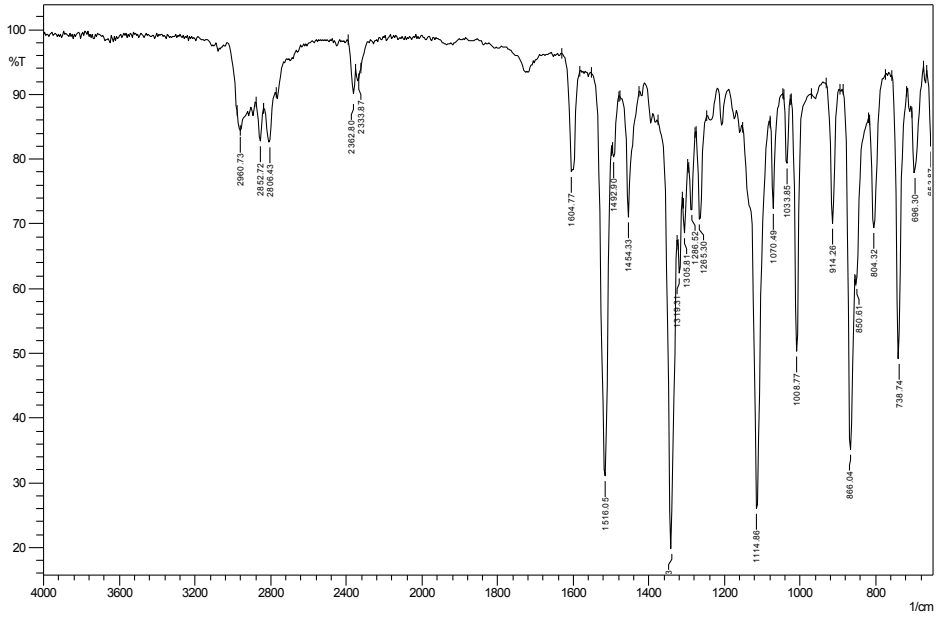

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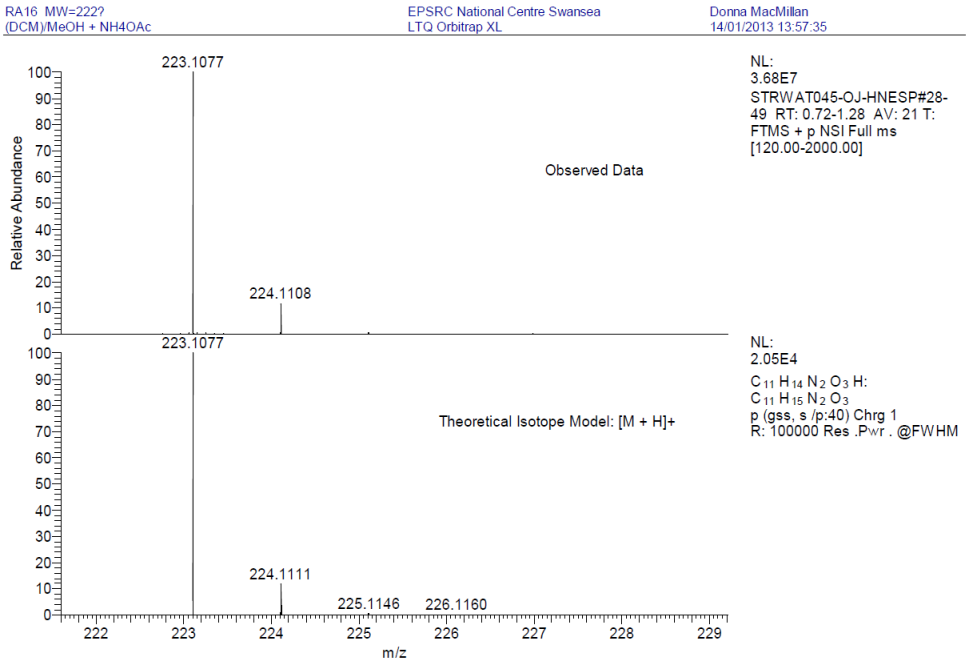
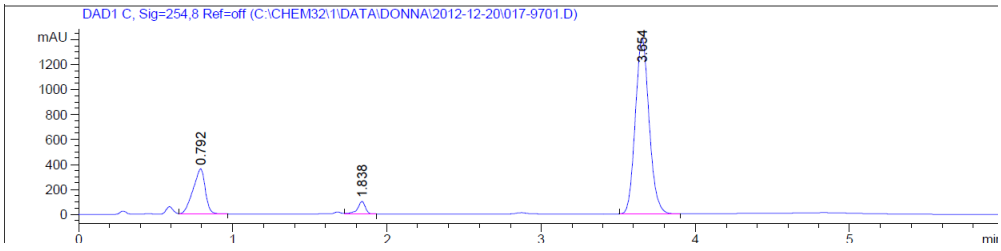


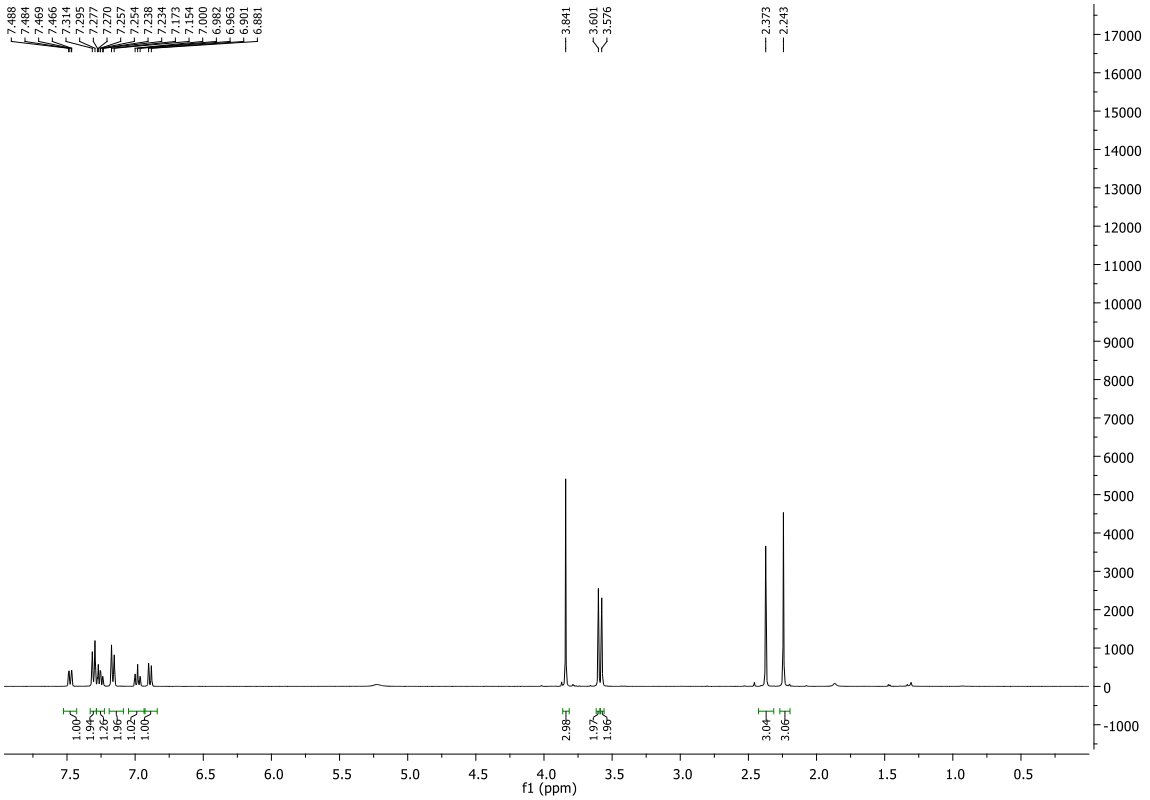
HPLC assay:



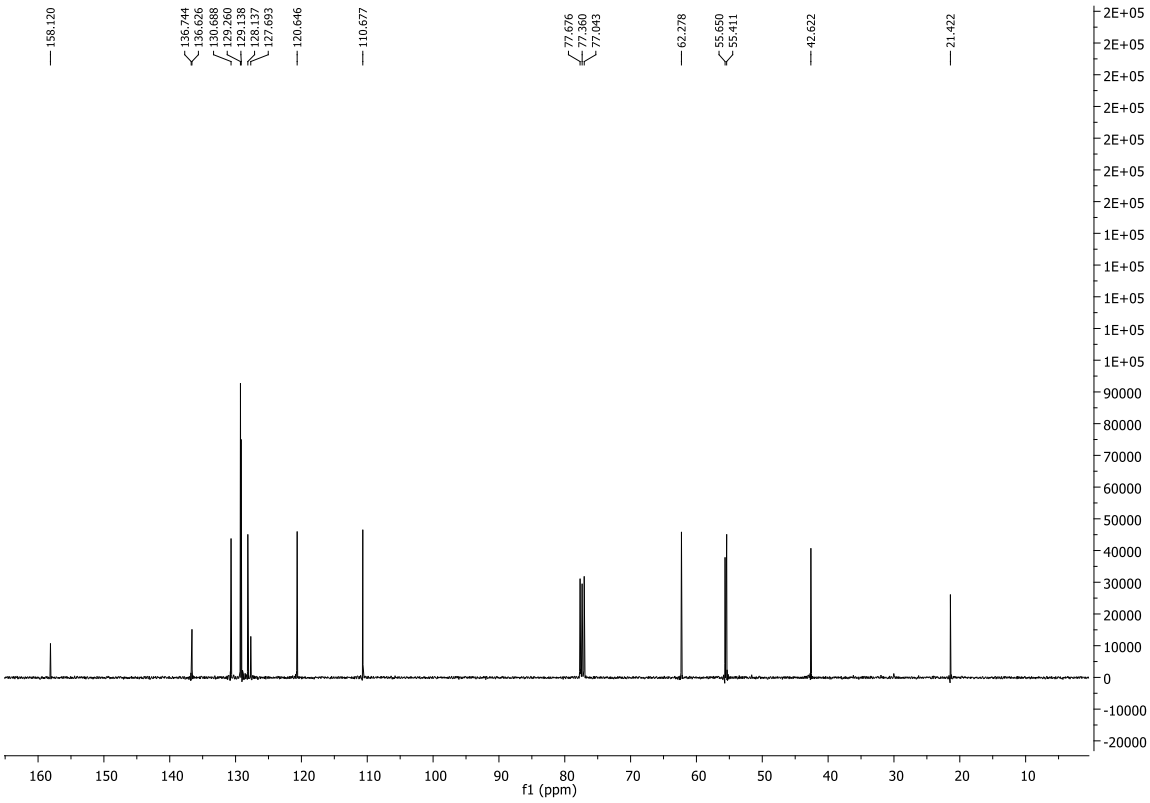
Substrate	R_t (min)
Compound 16: 4-(4-Nitrobenzyl)morpholine	0.79
Iodobenzene (standard)	3.65

Compound 17: *N*-(3-Methoxybenzyl)-*N*-methyl-1-(*p*-tolyl)methanamine

^{1}H NMR:



^{13}C NMR:



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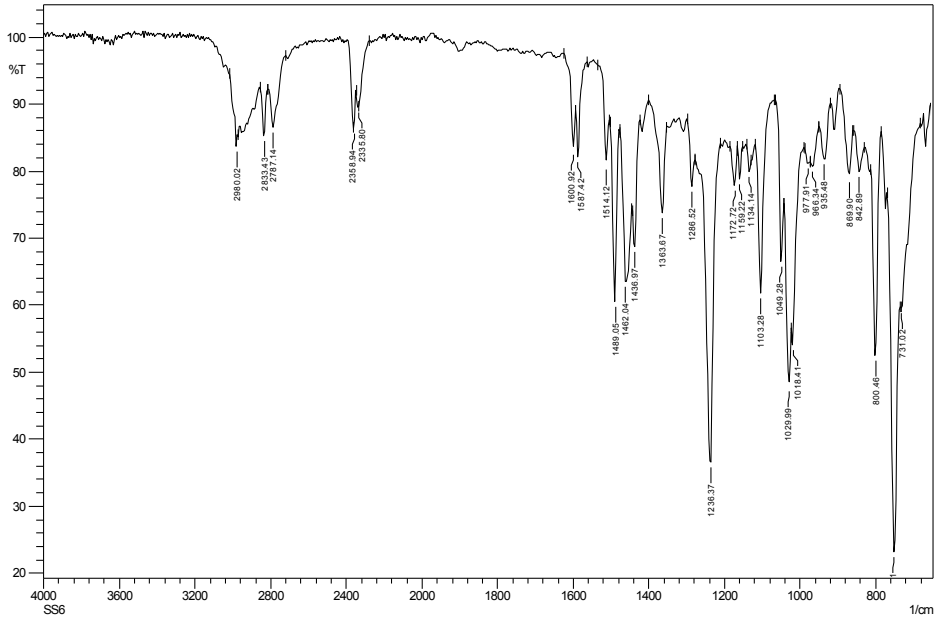

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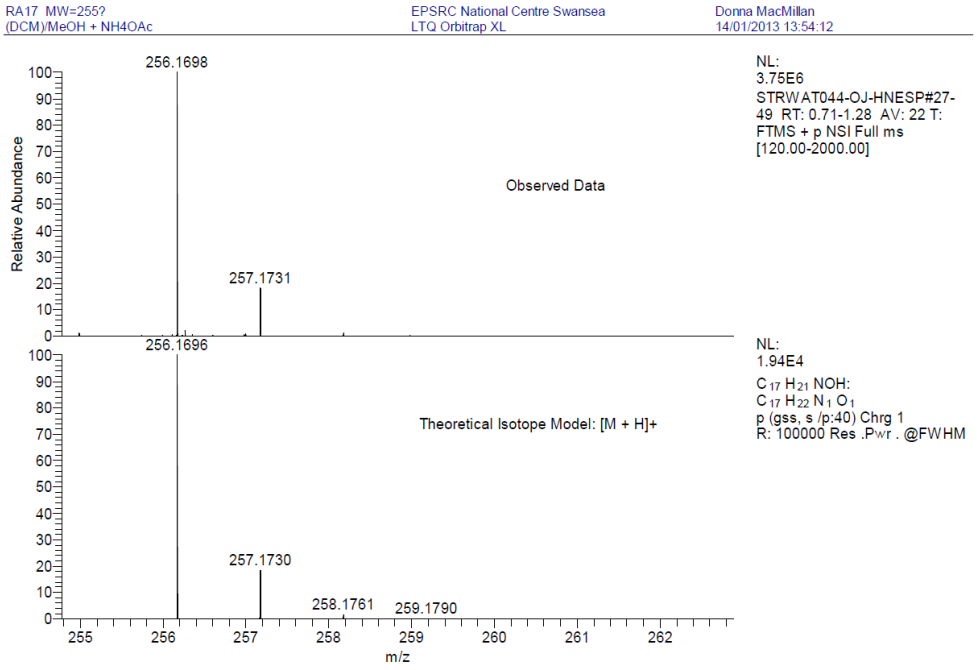
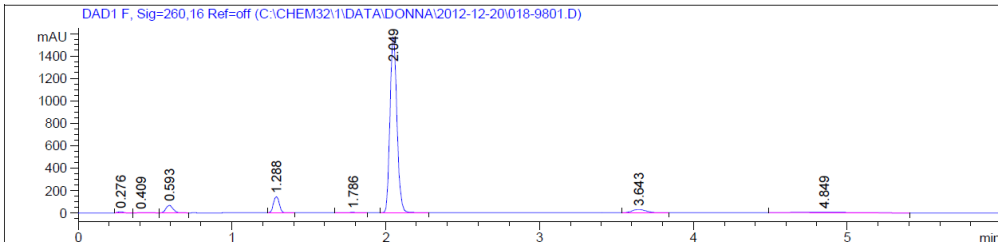


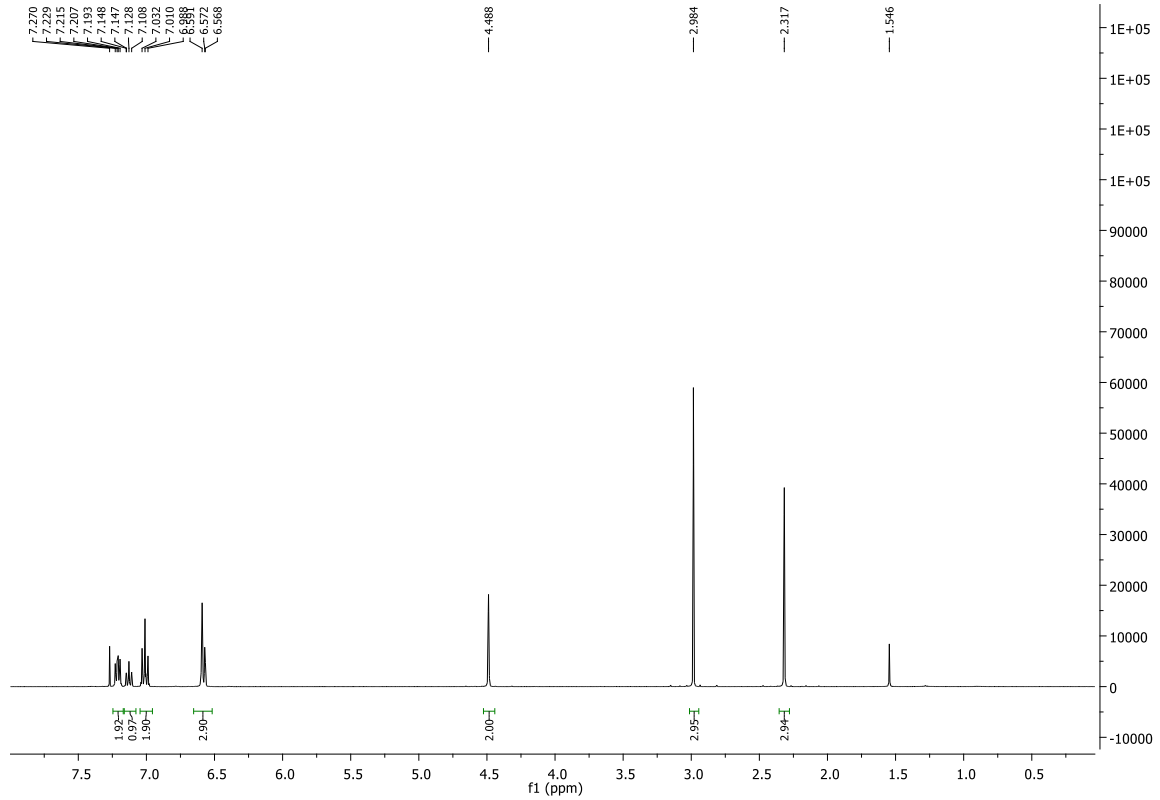
HPLC assay:



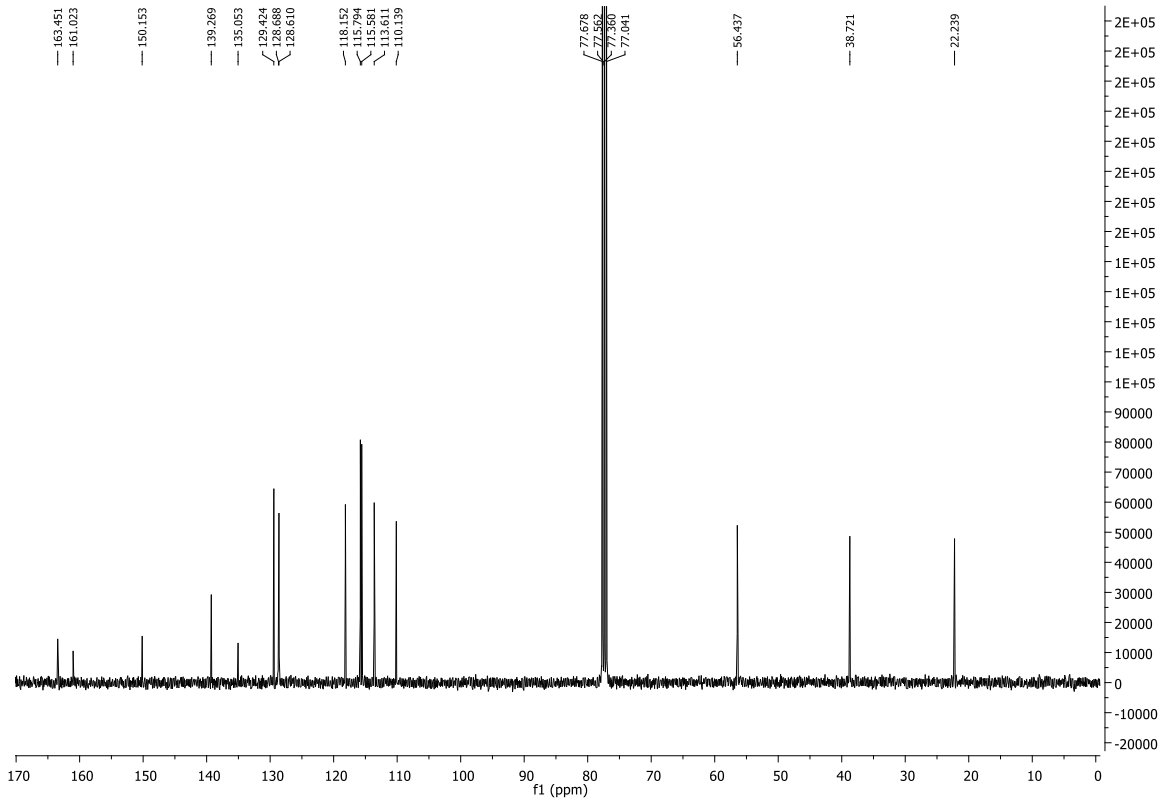
Substrate	R_t (min)
Compound 17: *N*-(3-methoxybenzyl)-*N*-methyl-1-(*p*-tolyl)methanamine	2.05
Iodobenzene (standard)	3.65

Compound 18: *N*-(4-Fluorobenzyl)-*N*,3-dimethylaniline

^{1}H NMR:



^{13}C NMR:



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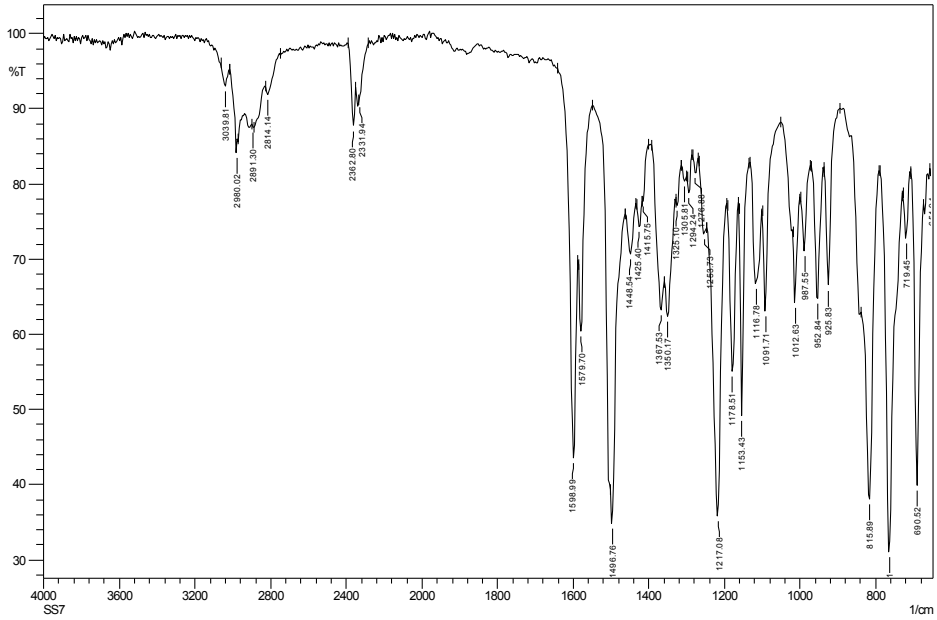

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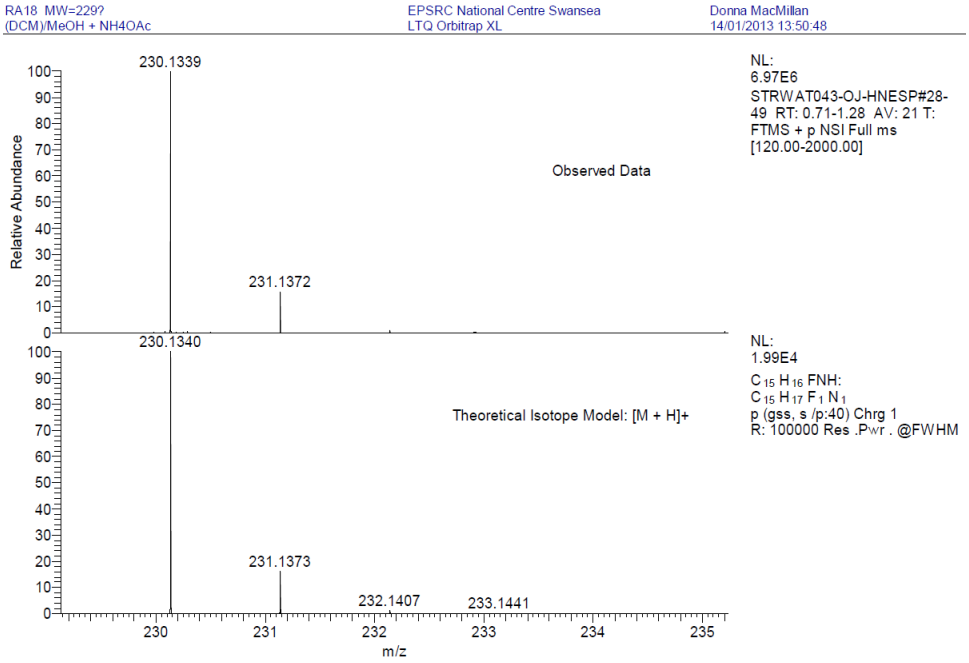
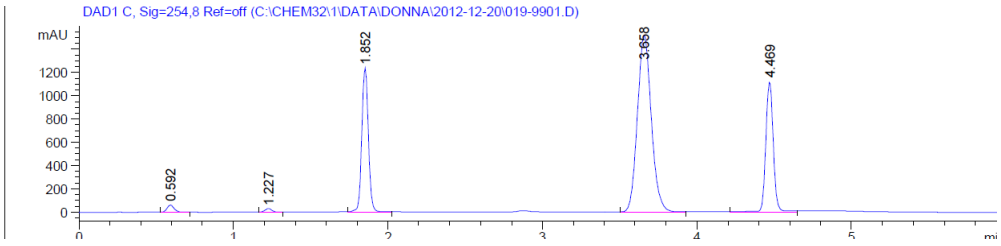


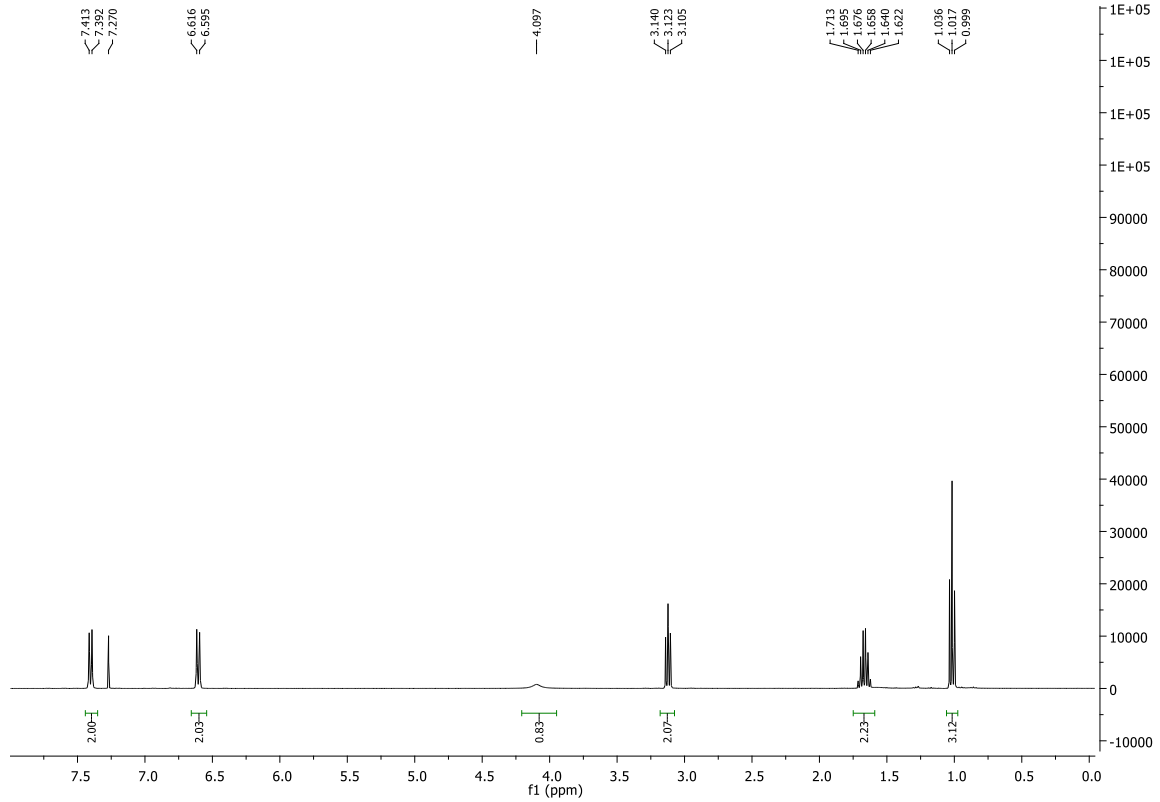
HPLC assay:



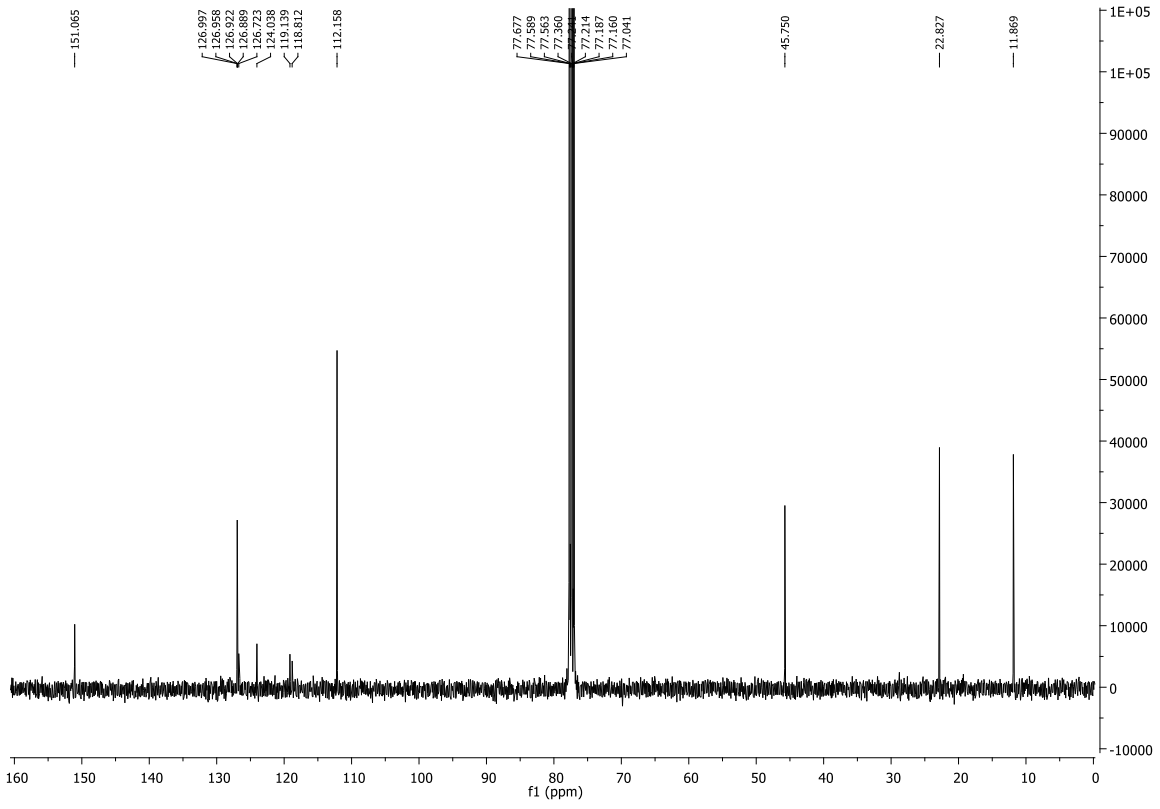
Substrate	R_t (min)
Compound 18: *N*-(4-fluorobenzyl)-*N*,3-dimethylaniline	4.46
Iodobenzene (standard)	3.65

Compound 19: *N*-Propyl-4-(trifluoromethyl)aniline

^{1}H NMR:



^{13}C NMR:



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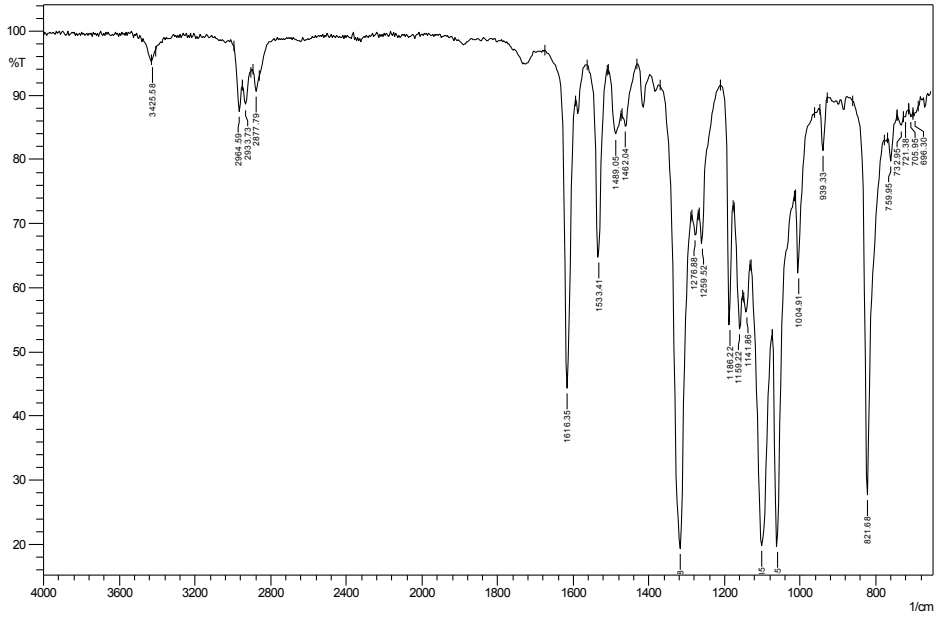

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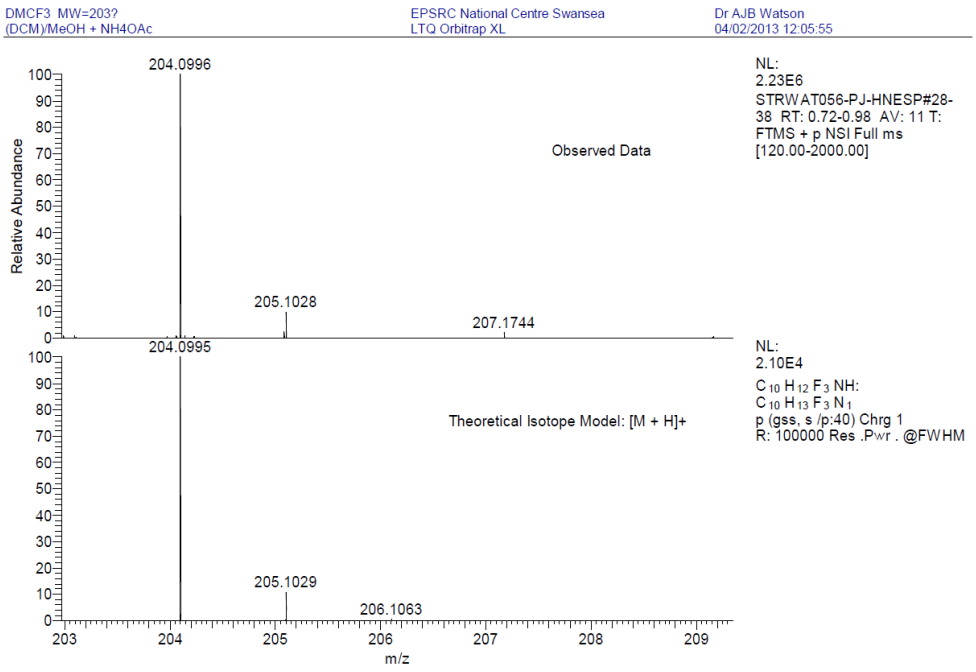
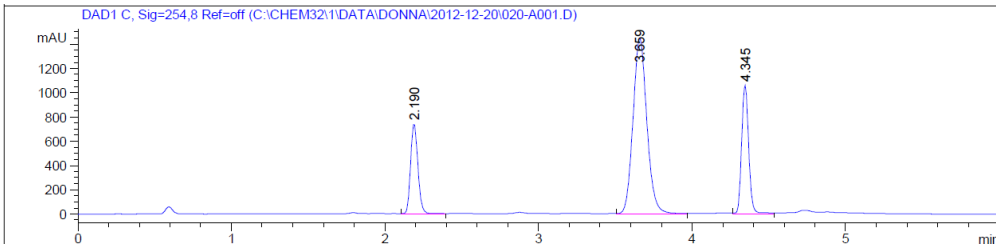


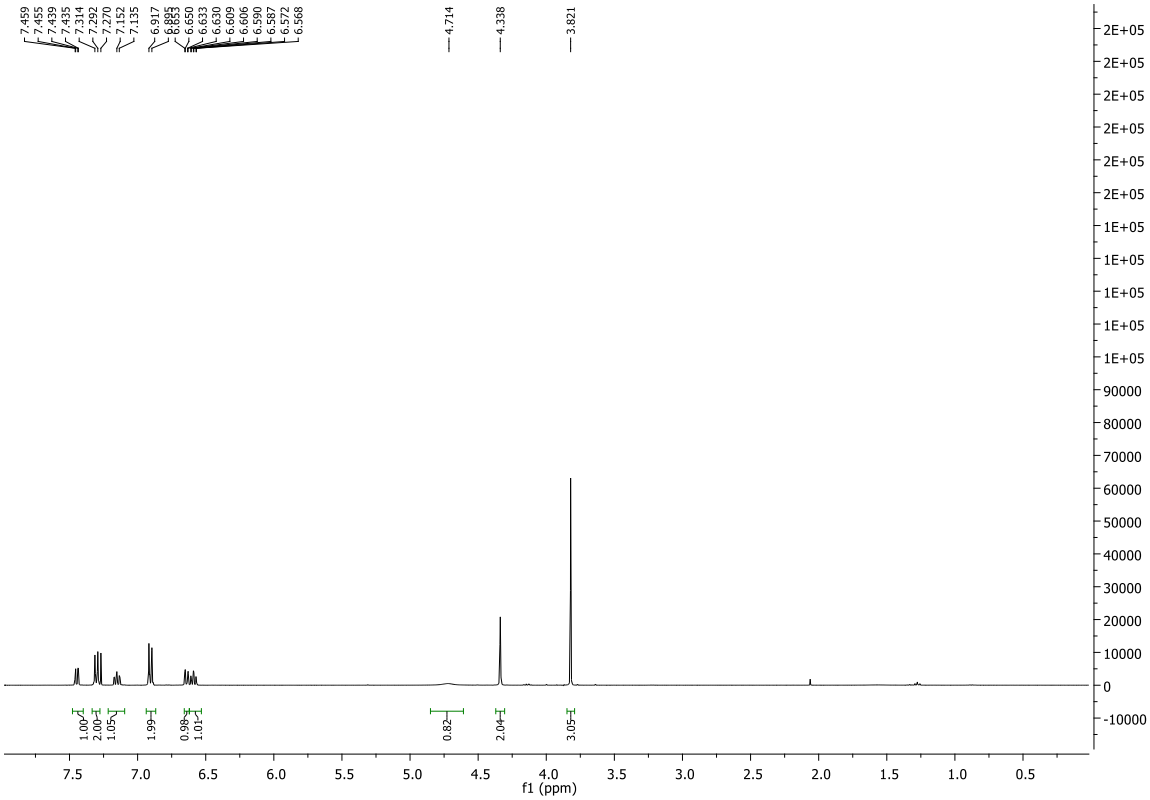
HPLC assay:



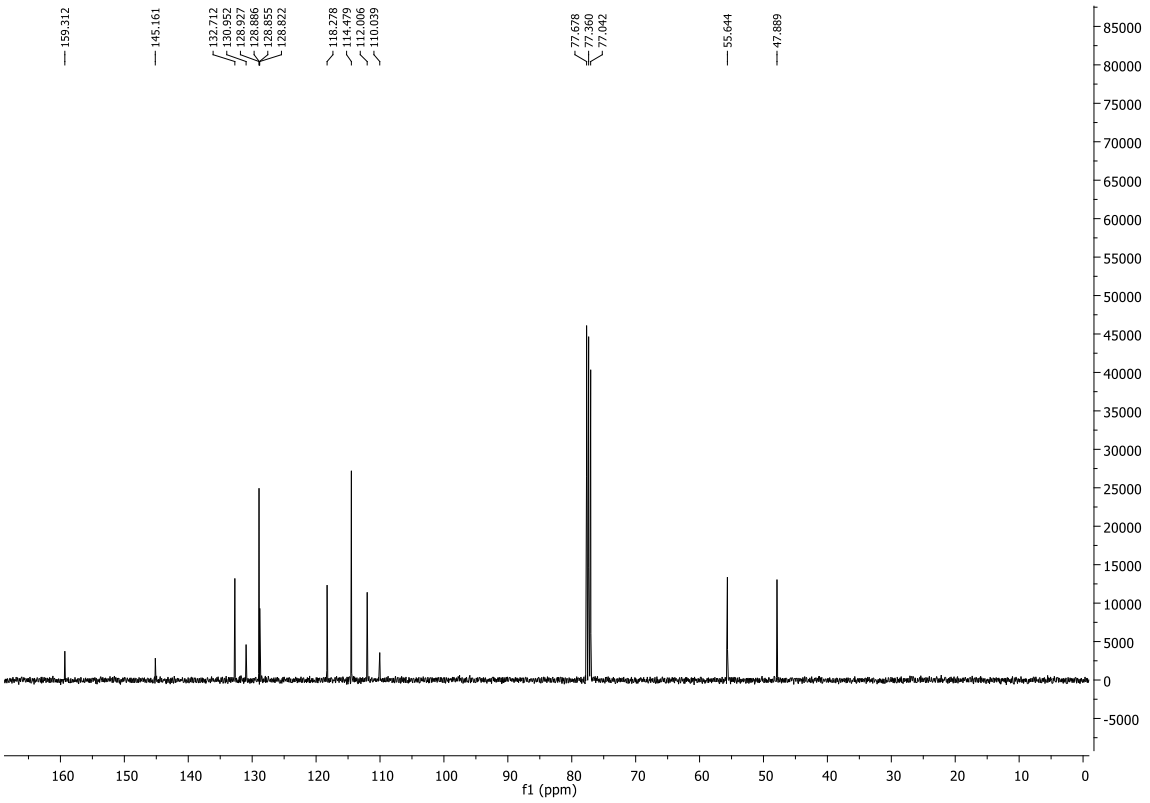
Substrate	R_t (min)
Compound 19: *N*-Propyl-4-(trifluoromethyl)aniline	4.35
Iodobenzene (standard)	3.65

Compound 20: 2-Bromo-*N*-(4-methoxybenzyl)aniline

^{1}H NMR:



^{13}C NMR:



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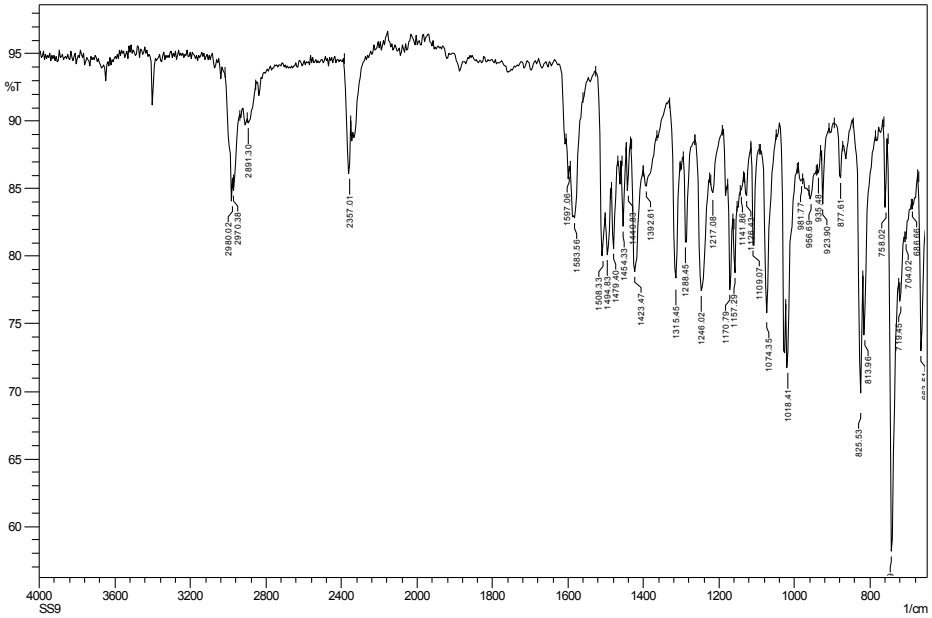

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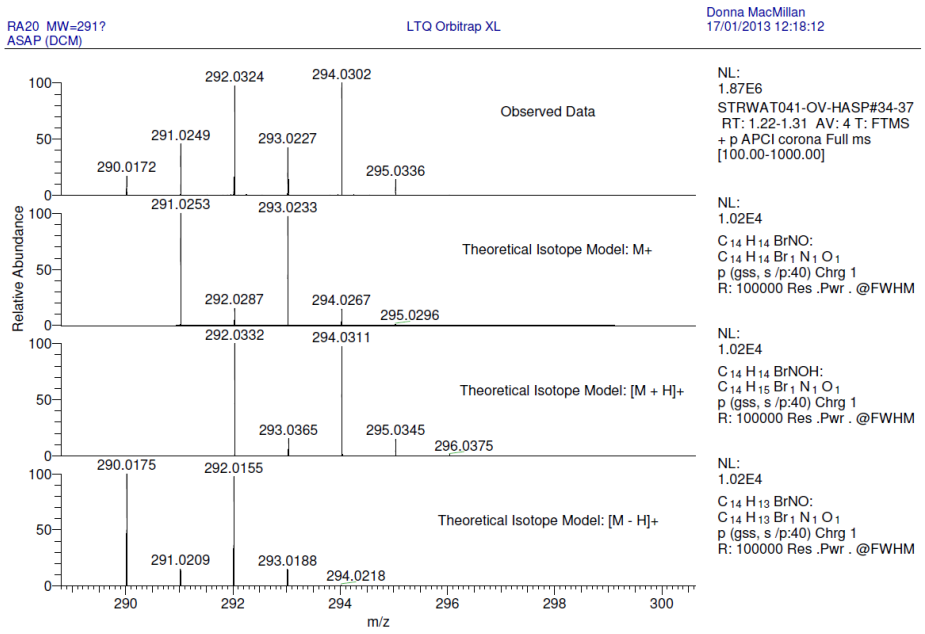
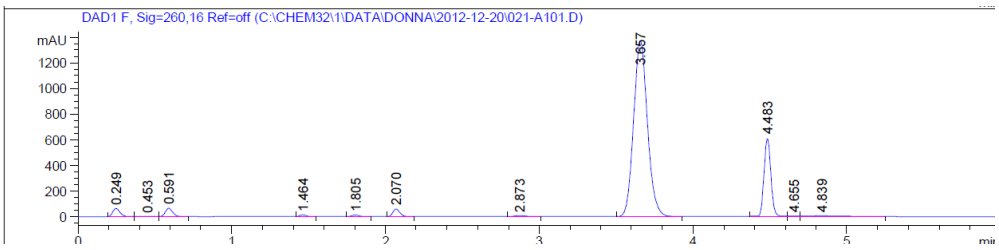


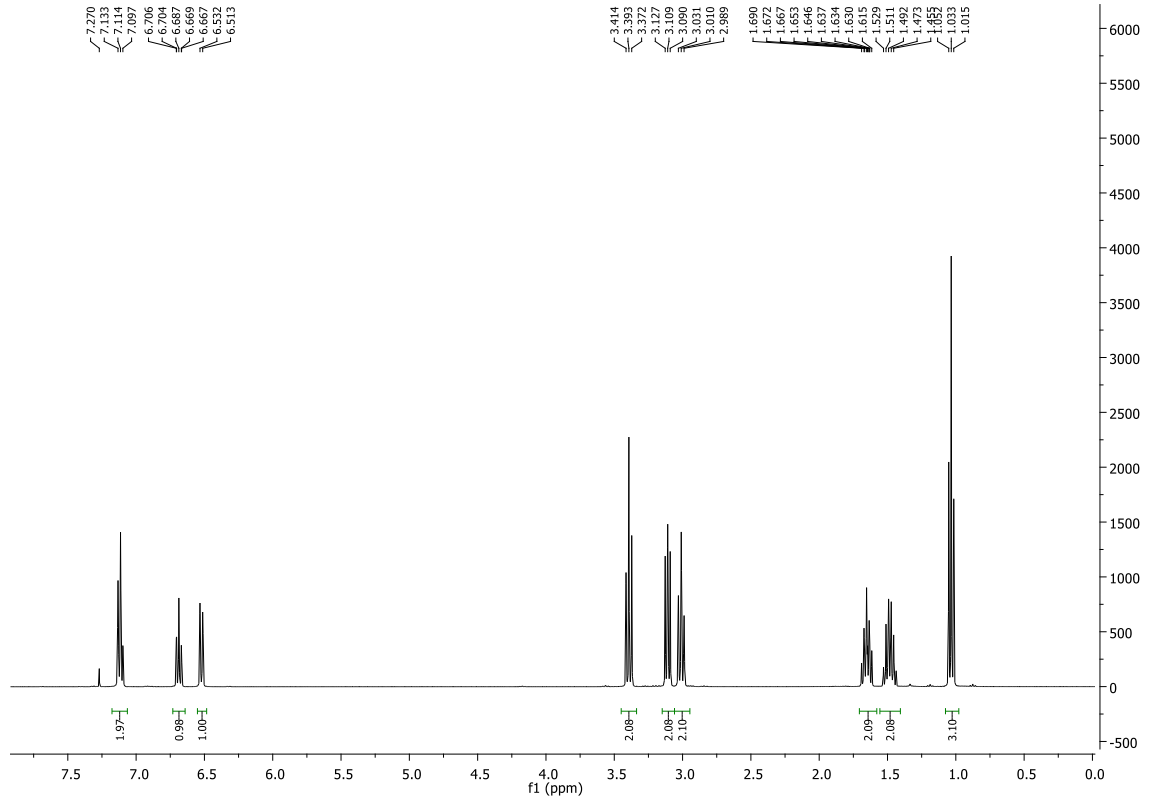
HPLC assay:



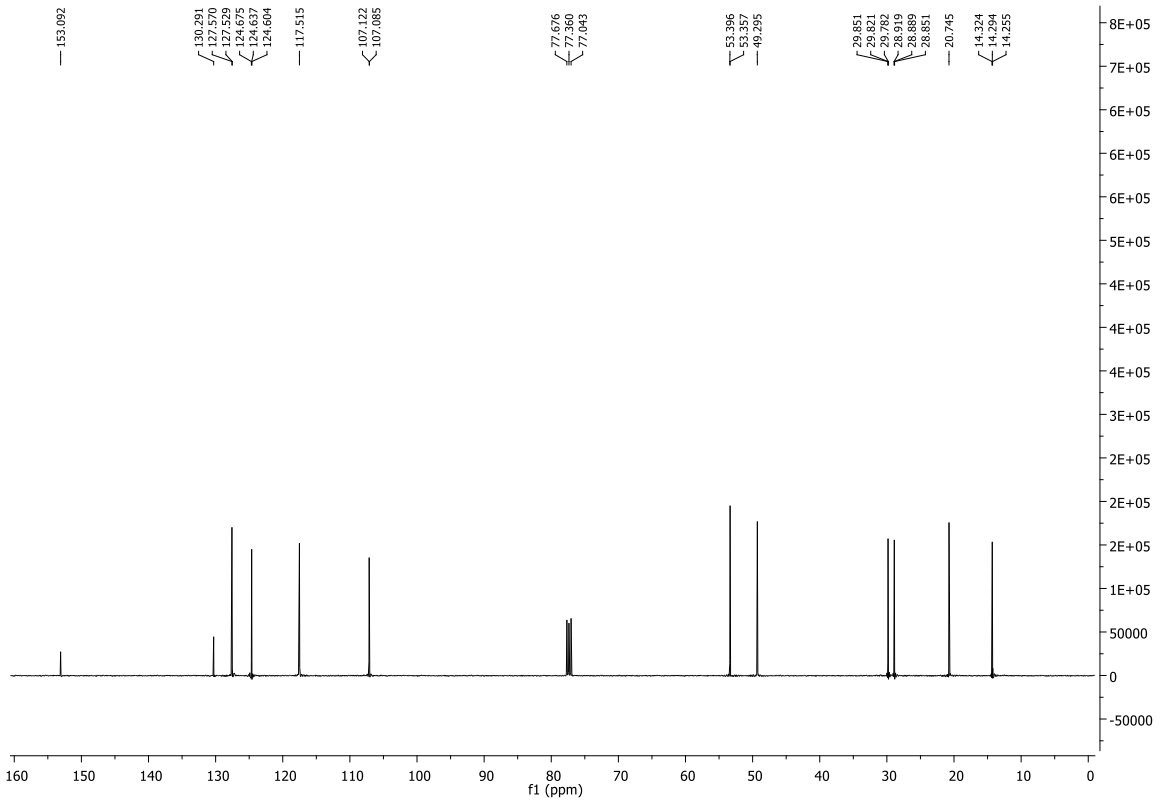
Substrate	R_t (min)
Compound 20: 2-Bromo-*N*-(4-methoxybenzyl)aniline	4.48
Iodobenzene (standard)	3.65

Compound 21: 1-Butylindoline

^{1}H NMR:



^{13}C NMR:



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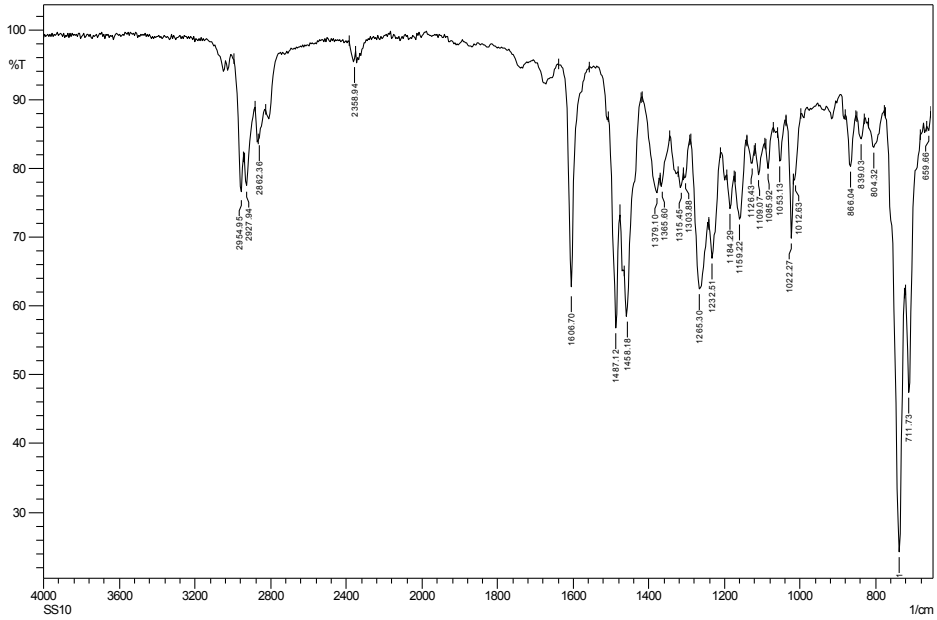

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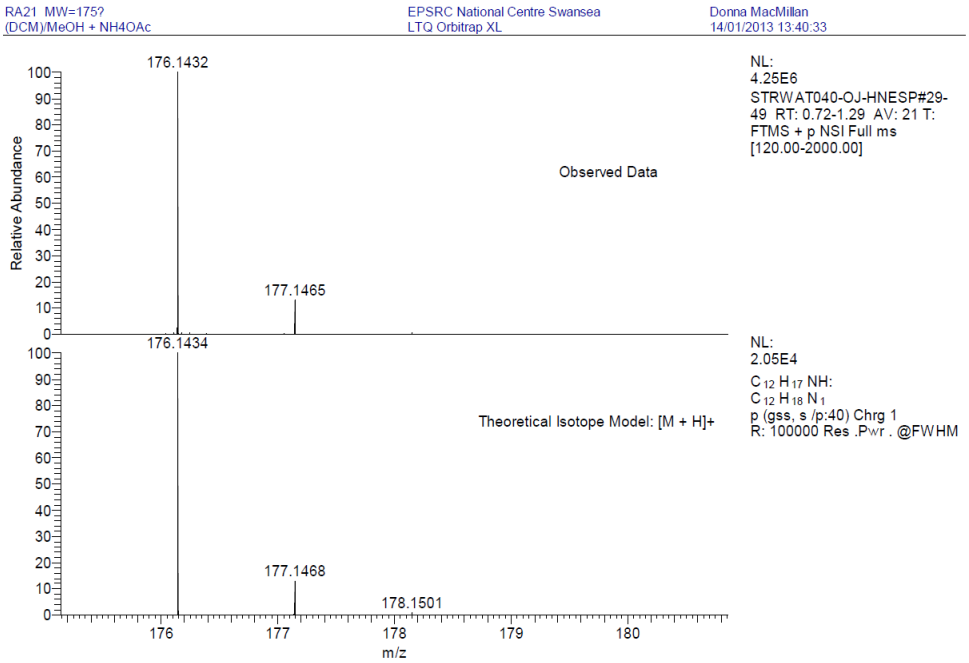
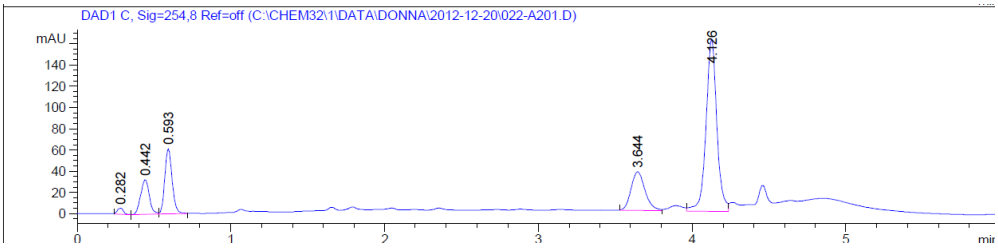


HPLC assay:



Substrate	R_t (min)
Compound 21: 1-Butylindoline	4.13
Iodobenzene (standard)	3.65