

A facile synthesis of monodisperse cobalt-ruthenium alloy nanoparticles as catalysts for the dehydrogenation of morpholine borane and the hydrogenation of various organic compounds

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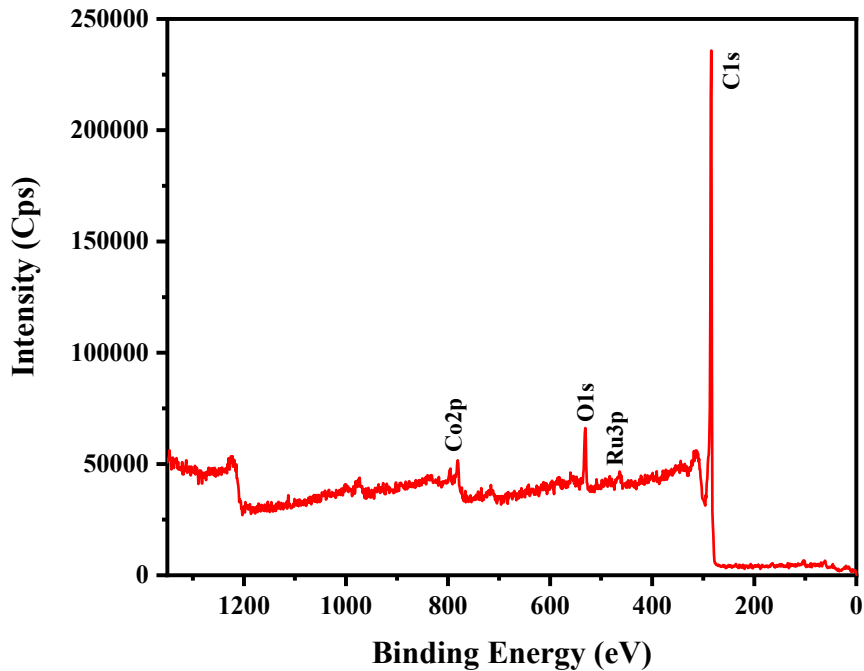


Figure S1. XPS survey spectrum of VC-Co₇₀Ru₃₀ nanocatalysts

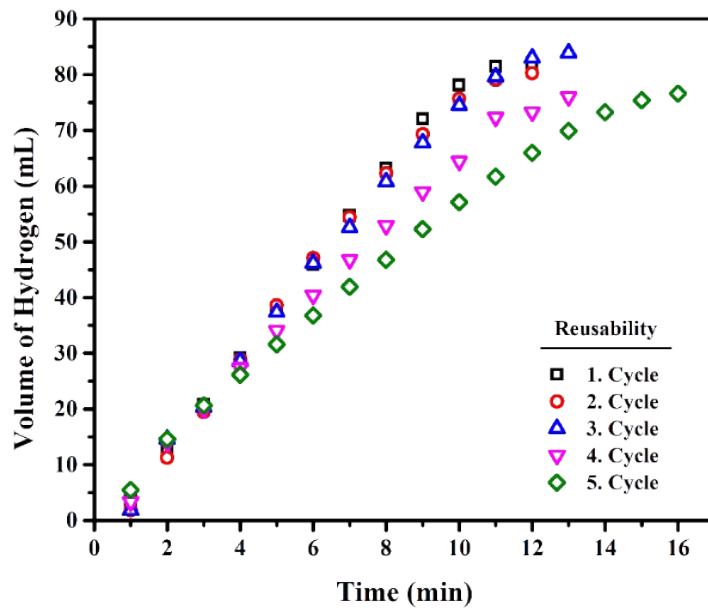


Figure S2. The volume of hydrogen gas released during the 5-cycle reusability test in the hydrolysis of MB of the VC-Co₇₀Ru₃₀ nanocatalysts

Table S1. The amount of metal precursors used in the synthesis of three different compositions of $\text{Co}_x\text{Ru}_{1-x}$ alloy nanoparticles

$\text{Co}_2(\text{CO})_8$ (mmol)	$\text{Ru}(\text{acac})_3$ (mmol)	$\text{Co}_x\text{Ru}_{1-x}$
0.20	0.20	$\text{Co}_{70}\text{Ru}_{30}$
0.15	0.25	$\text{Co}_{60}\text{Ru}_{40}$
0.30	0.10	$\text{Co}_{80}\text{Ru}_{20}$

APPENDIX

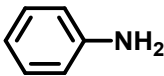
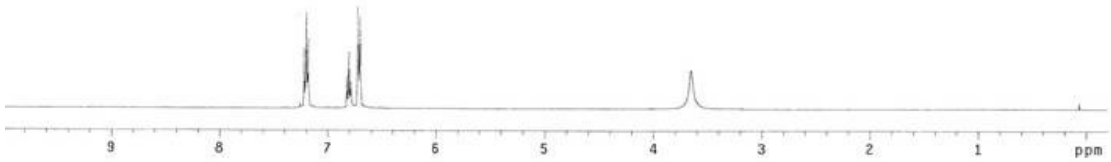

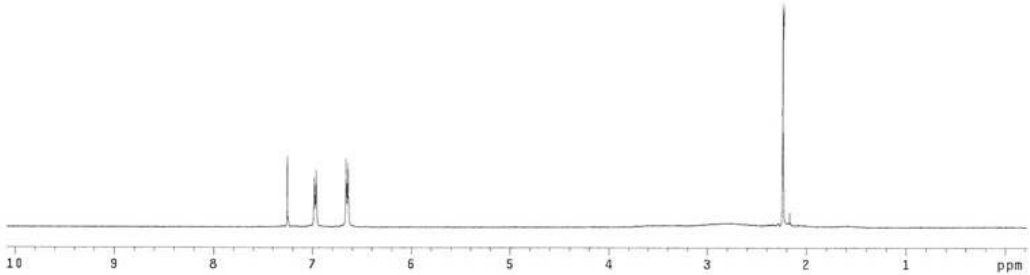
Table 2 Entry 1	 <chem>Nc1ccccc1</chem>
 <p>The 1H NMR spectrum of aniline shows a multiplet in the aromatic region between 6.5 and 7.5 ppm, and a singlet at approximately 3.4 ppm. The x-axis is labeled from 9 to 0 ppm.</p>	
Table 2 Entry 2	 <chem>Cc1ccc(N)cc1</chem>
 <p>The 1H NMR spectrum of p-toluidine shows a multiplet in the aromatic region between 6.5 and 7.5 ppm, a singlet at approximately 2.8 ppm, and a sharp singlet at approximately 2.3 ppm. The x-axis is labeled from 10 to 0 ppm.</p>	

Table 2
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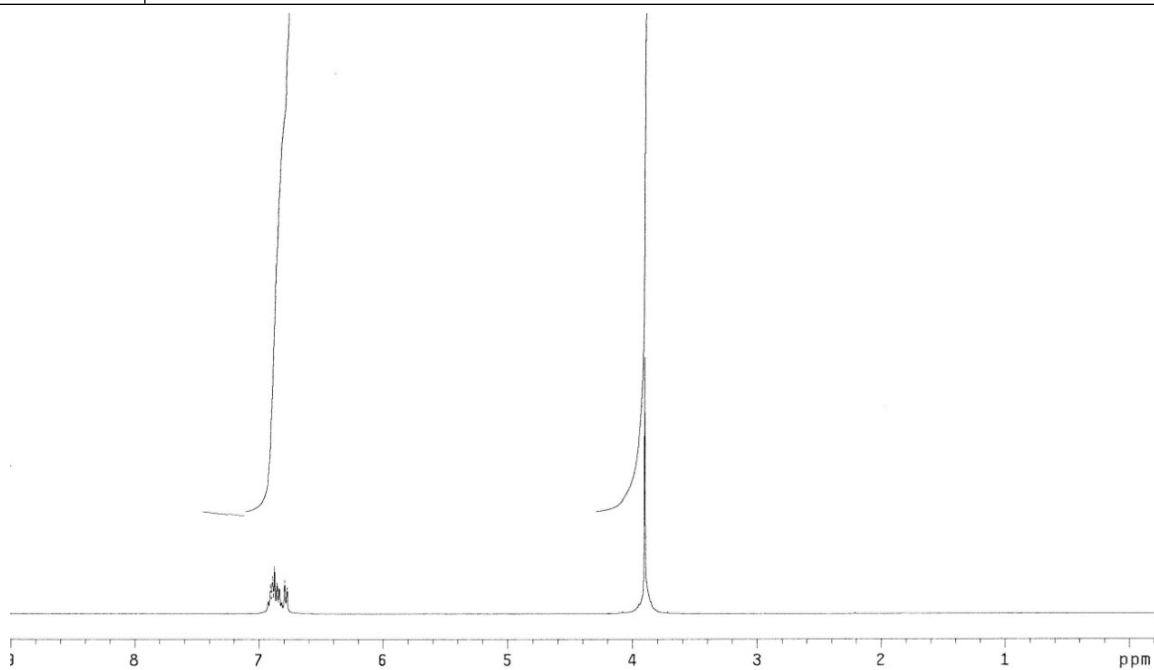
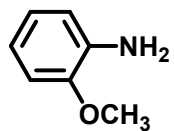


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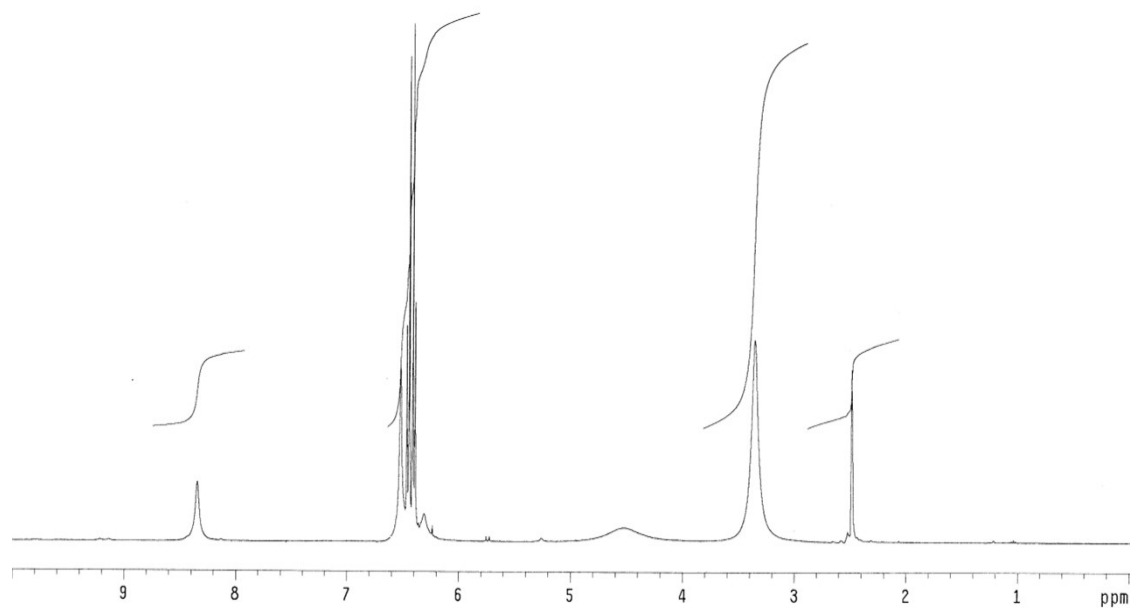
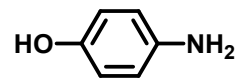
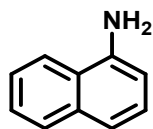


Table 2
Entry 5



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1	3187.324	7.973	10.7
2	3184.758	7.967	7.7
3	3182.425	7.962	8.3
4	3180.726	7.957	12.1
5	3177.426	7.948	12.8
6	3095.308	7.743	13.4
7	3092.375	7.736	16.5
8	3090.175	7.730	11.9
9	3088.342	7.725	12.0
10	3085.776	7.719	16.6
11	3083.210	7.713	5.9
12	2964.065	7.415	5.3
13	2962.965	7.412	5.4
14	2960.032	7.404	42.2
15	2957.100	7.397	22.1
16	2956.368	7.395	27.5
17	2954.167	7.390	22.3
18	2953.067	7.387	25.6
19	2950.501	7.381	38.3
20	2947.568	7.373	8.8
21	2946.468	7.371	8.6
22	2888.912	7.227	48.0
23	2884.146	7.215	72.2
24	2725.042	6.817	18.1
25	2721.009	6.807	23.9
26	2716.610	6.796	17.6
27	1835.386	4.851	137.0
28	1832.453	4.834	19.7
29	1829.887	3.312	7.5
30	1825.064	3.307	15.6
31	1820.598	3.303	24.5
32	1816.765	3.298	19.6
33	1817.288	3.295	13.9

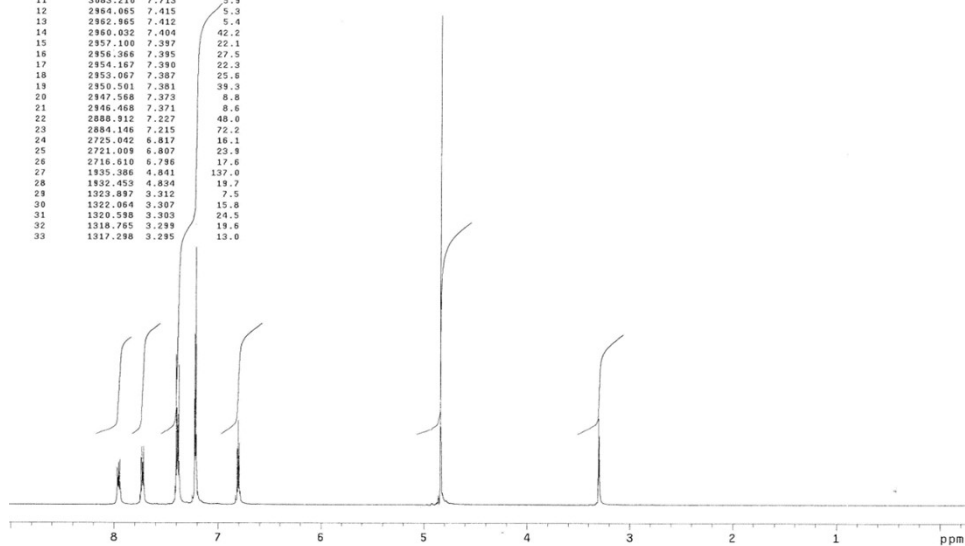


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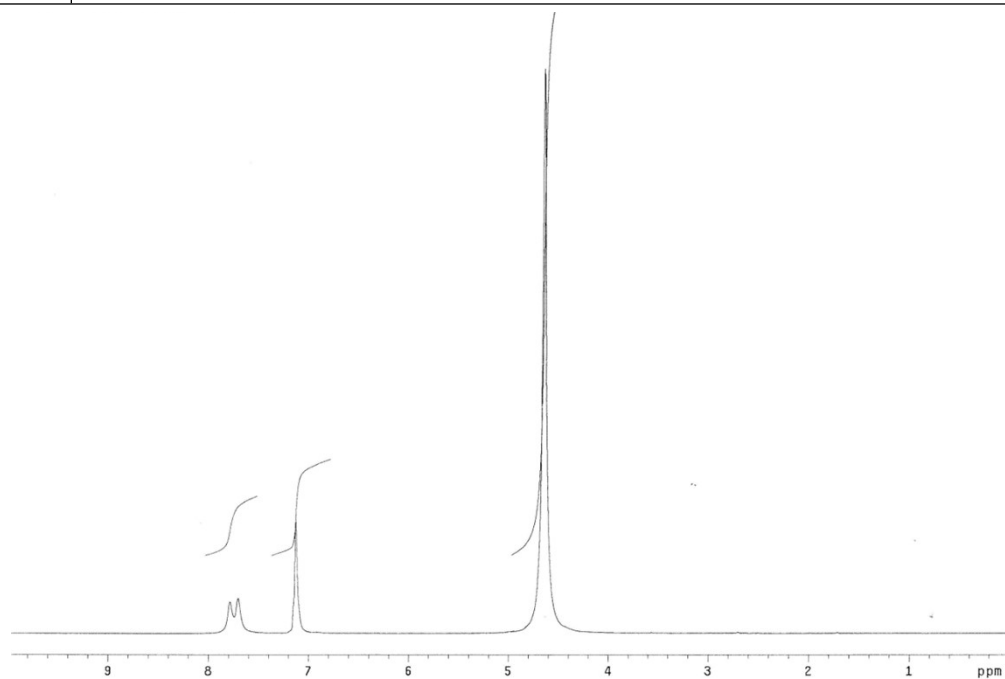
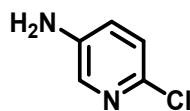


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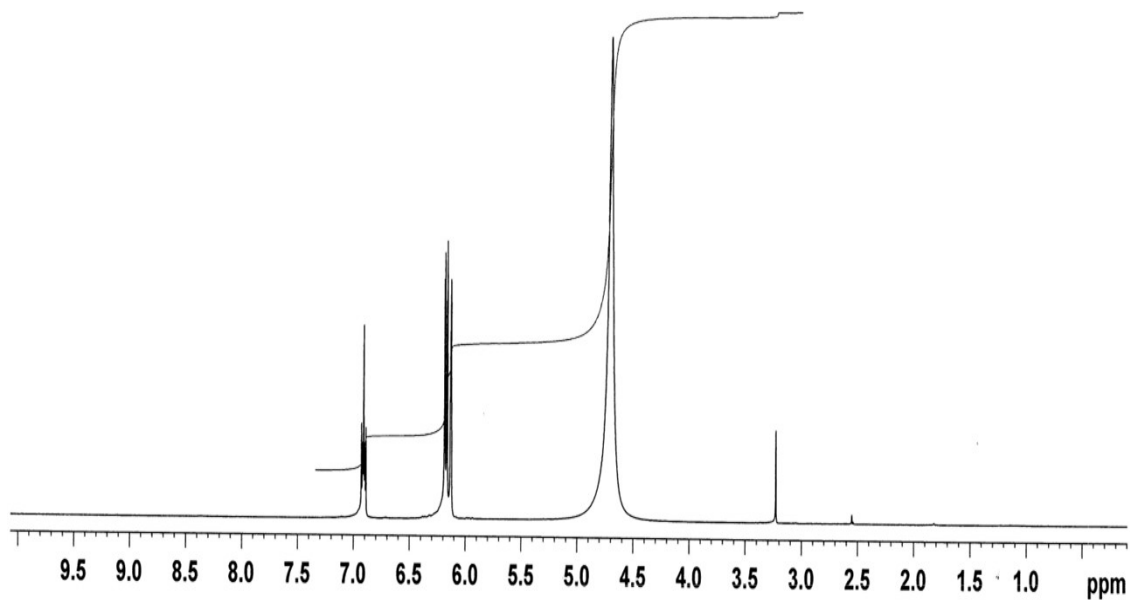
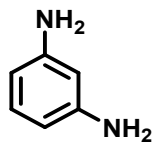
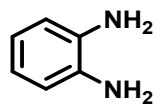


Table 2
Entry 8



INDEX	FREQUENCY	PPM	HEIGHT
1	2688.381	6.725	4.8
2	2684.715	6.718	7.9
3	2683.982	6.714	6.3
4	2679.216	6.702	11.7
5	2677.383	6.697	3.3
6	2675.550	6.693	4.2
7	2674.450	6.690	3.6
8	2672.617	6.686	4.6
9	2669.318	6.677	13.7
10	2666.018	6.669	8.2
11	2664.919	6.666	8.3
12	2663.452	6.660	7.1
13	2659.786	6.653	5.6
14	1875.629	4.692	3.7
15	1856.199	4.643	168.6
16	1835.670	4.592	3.4

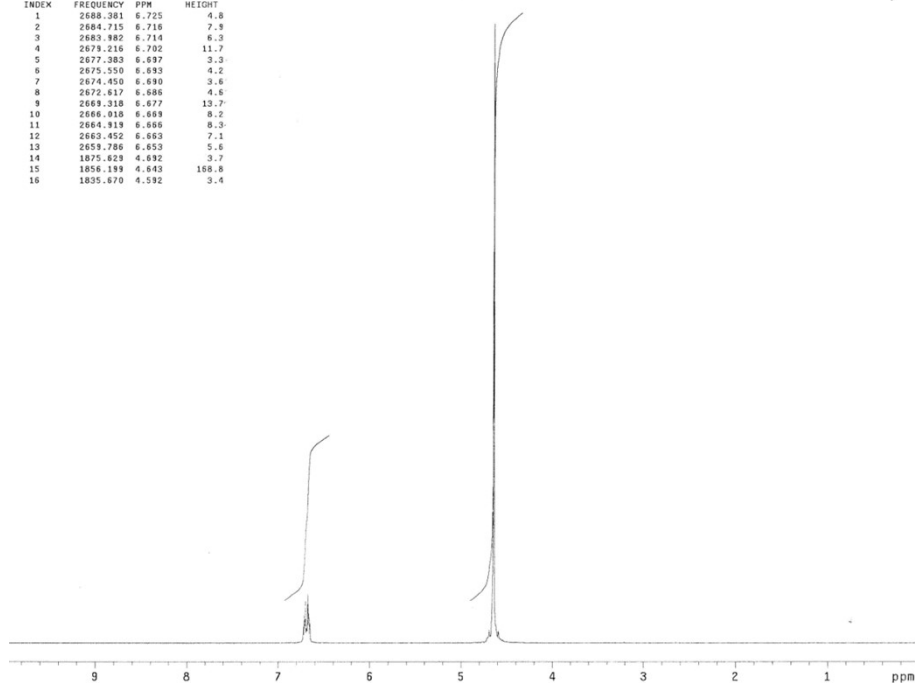


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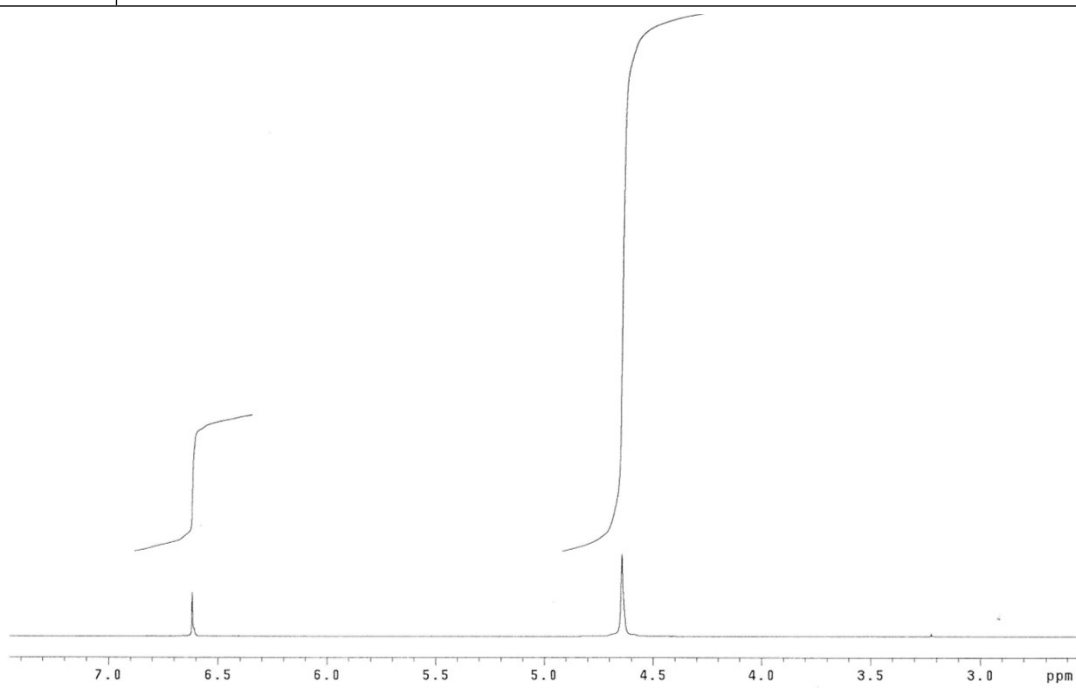
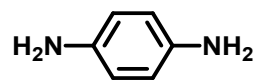


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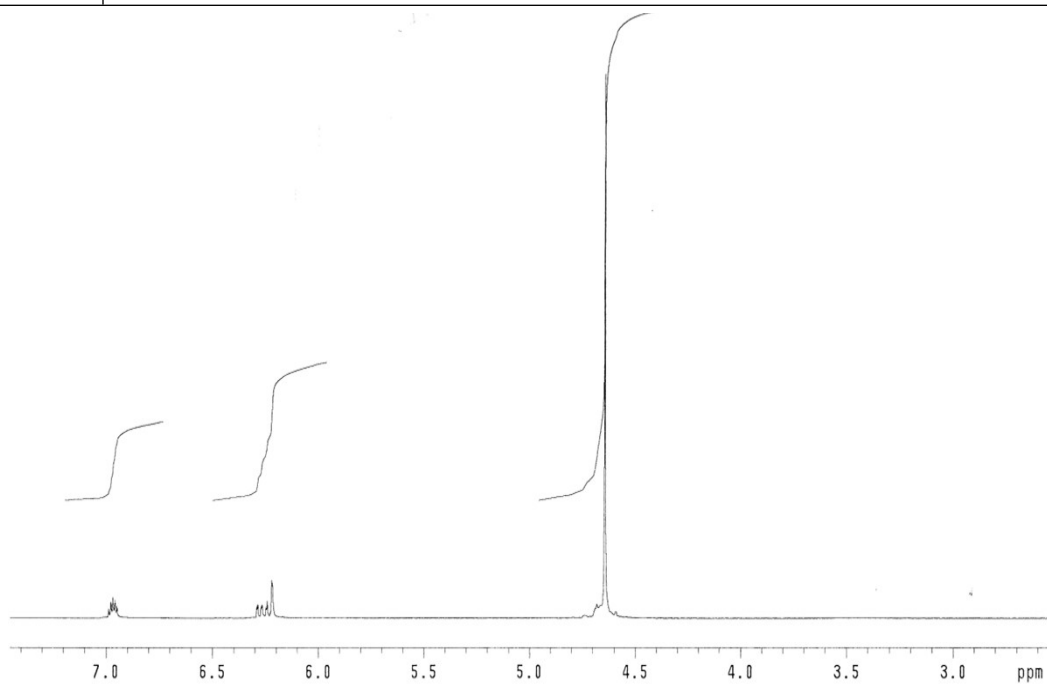
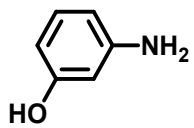


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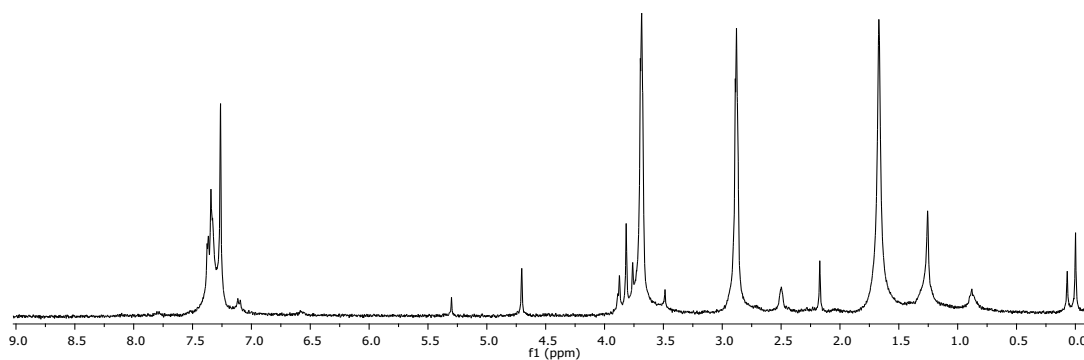
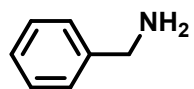


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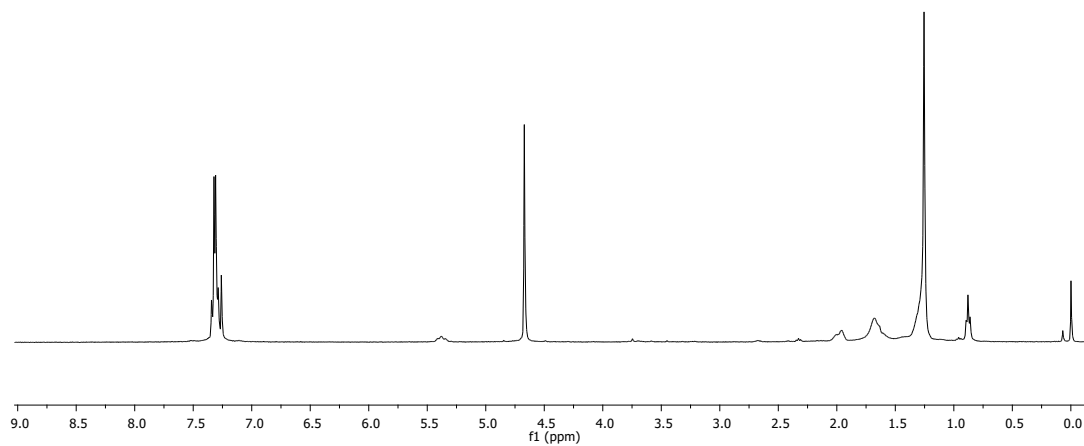
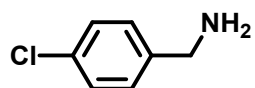


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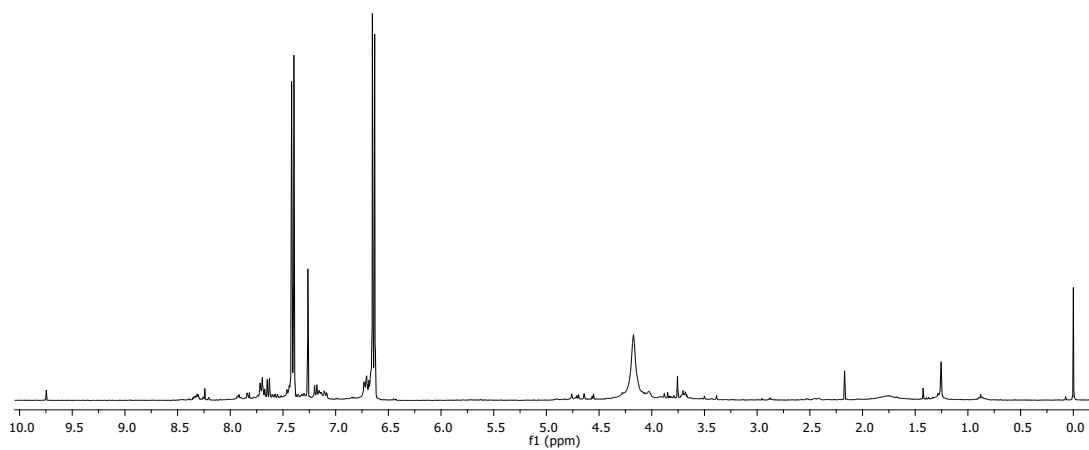
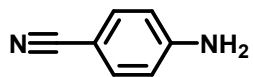


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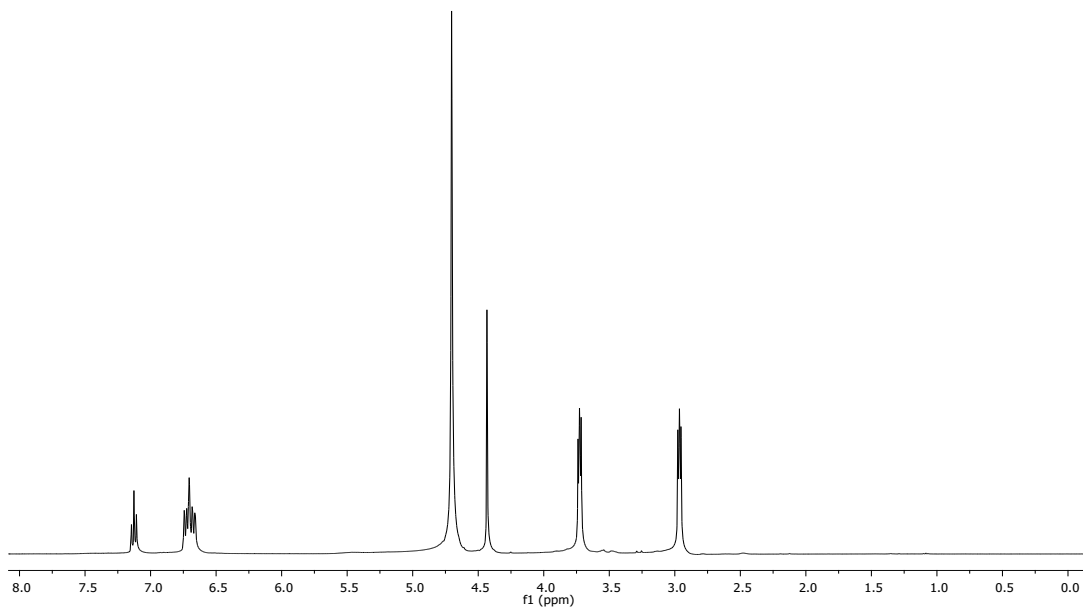
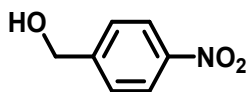


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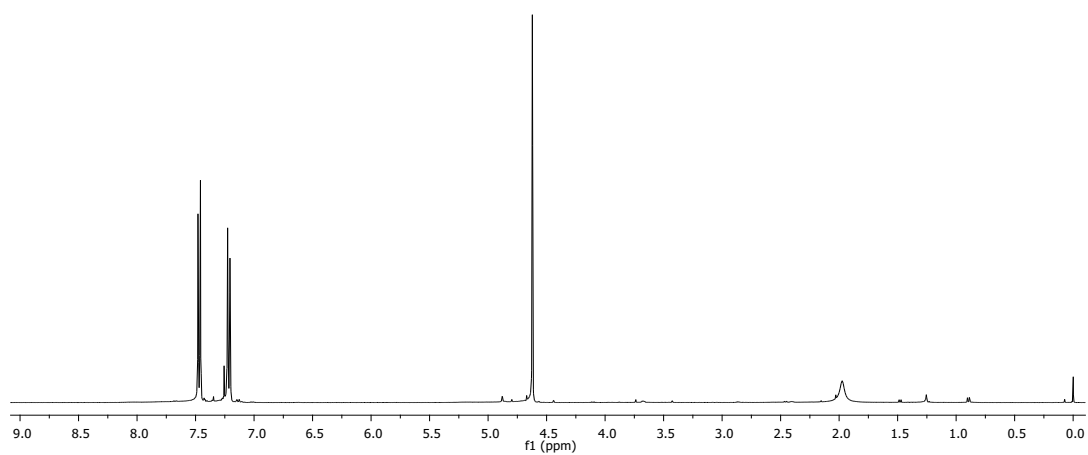
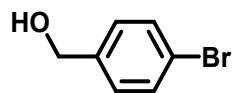


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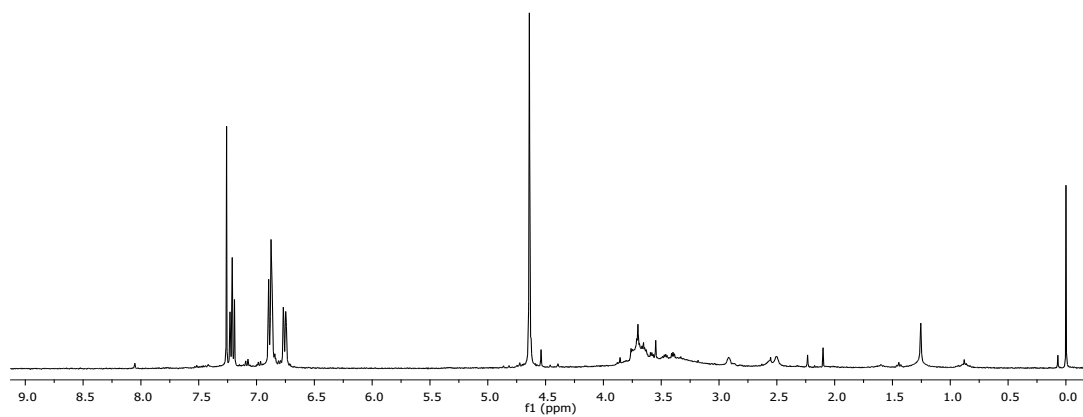
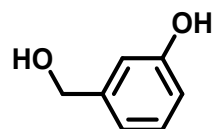


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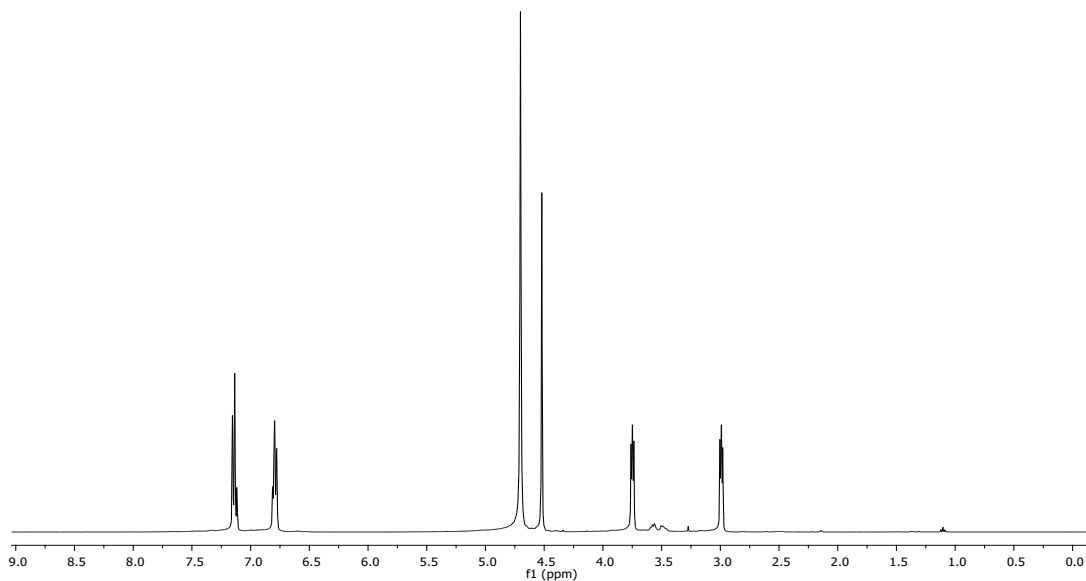
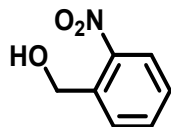


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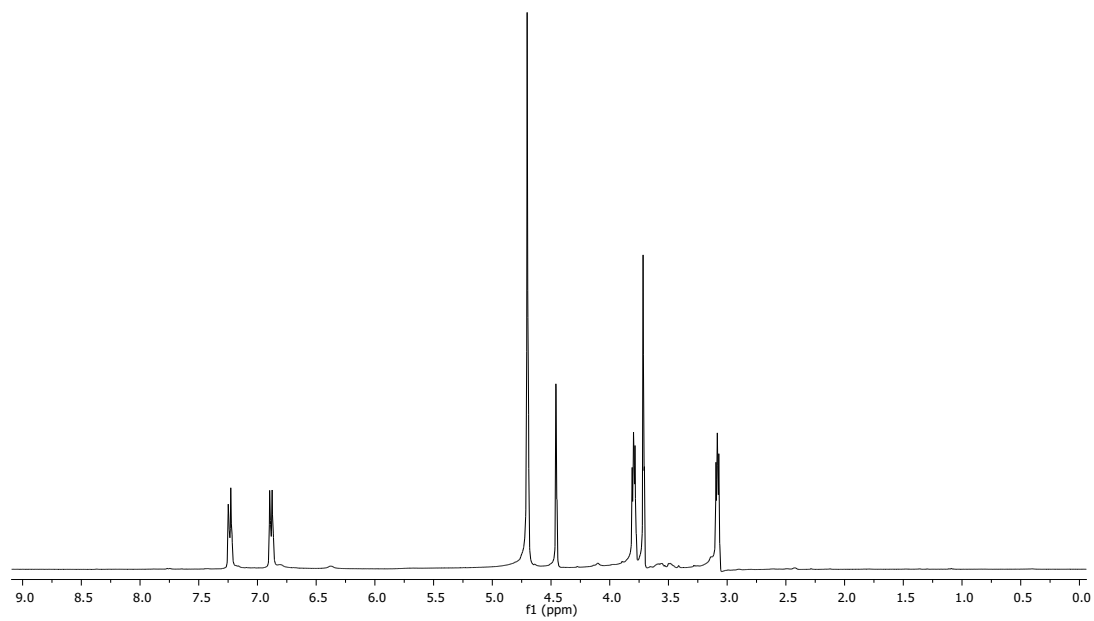
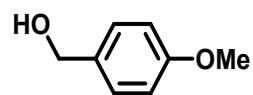


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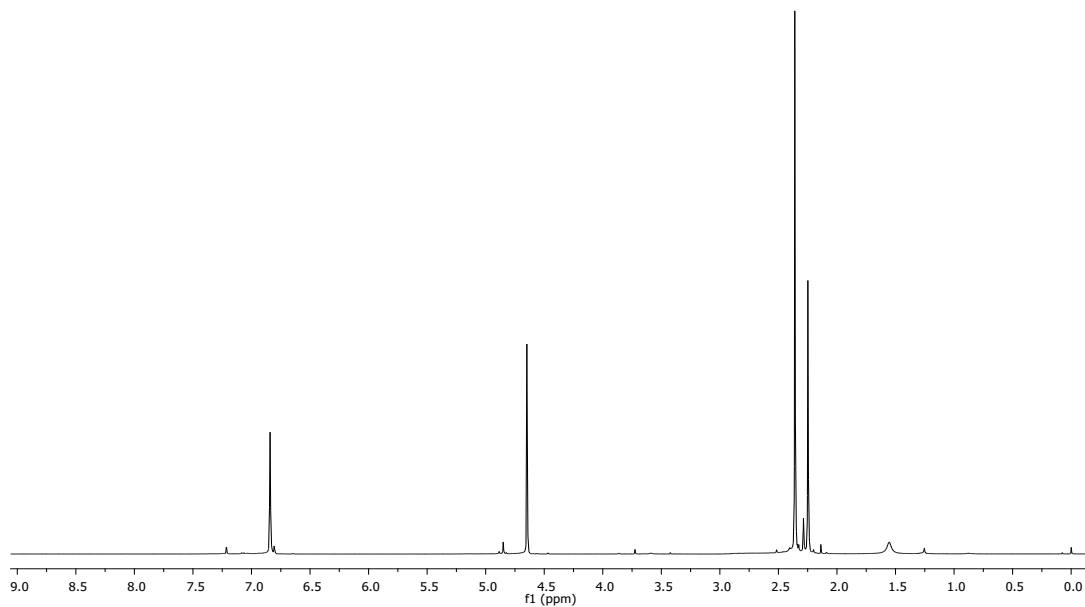
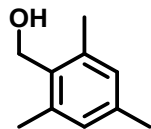


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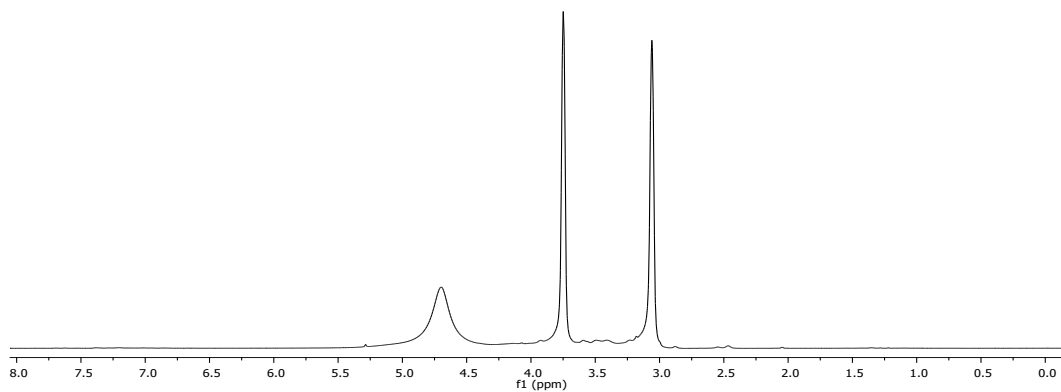
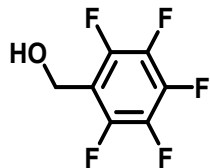


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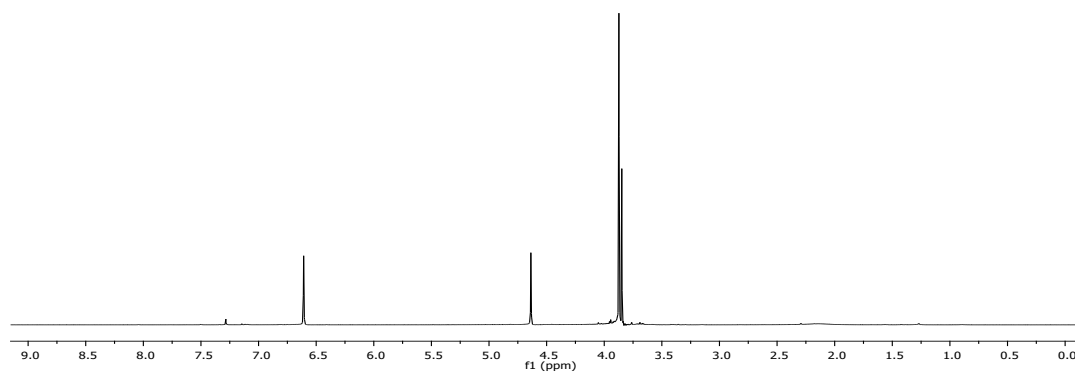
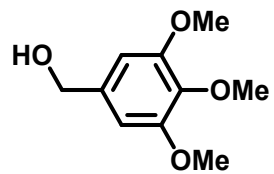


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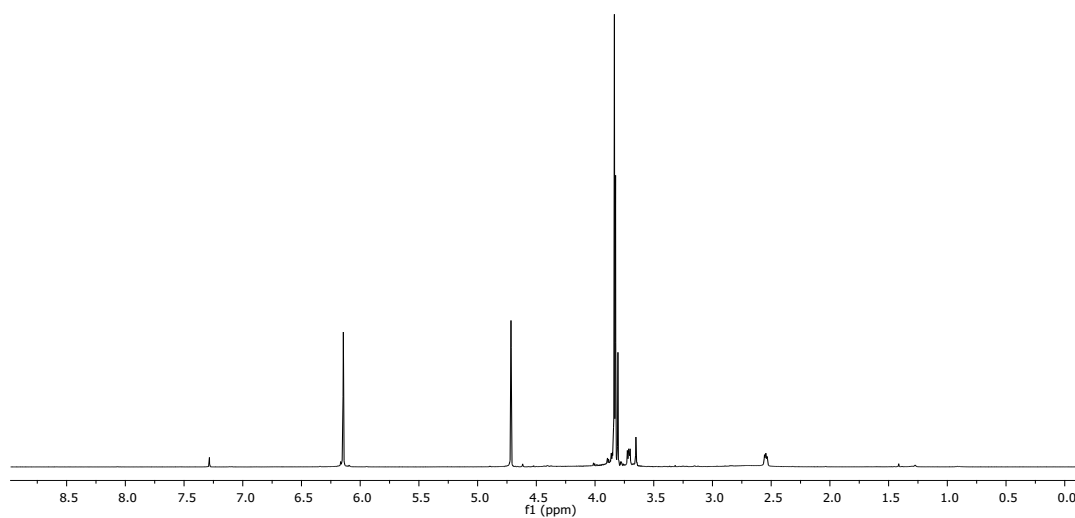
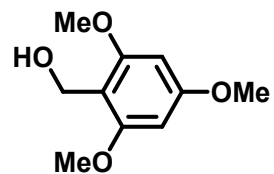


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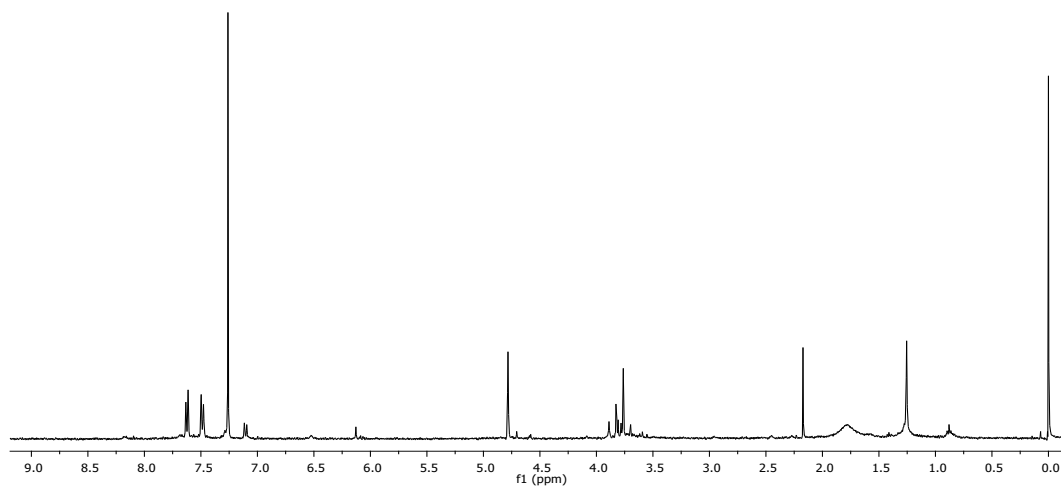
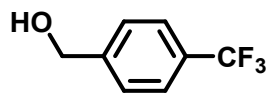


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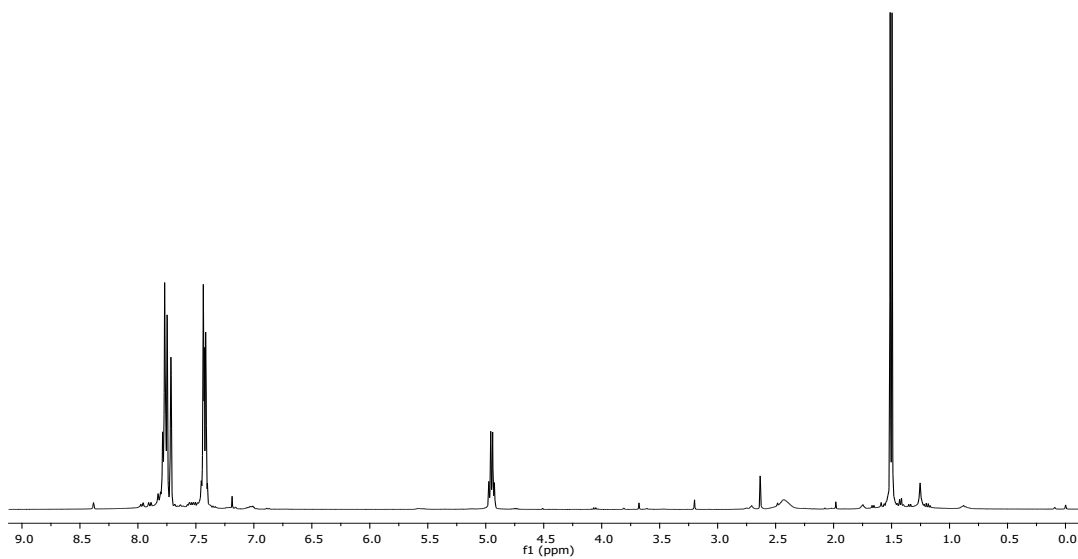
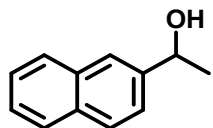


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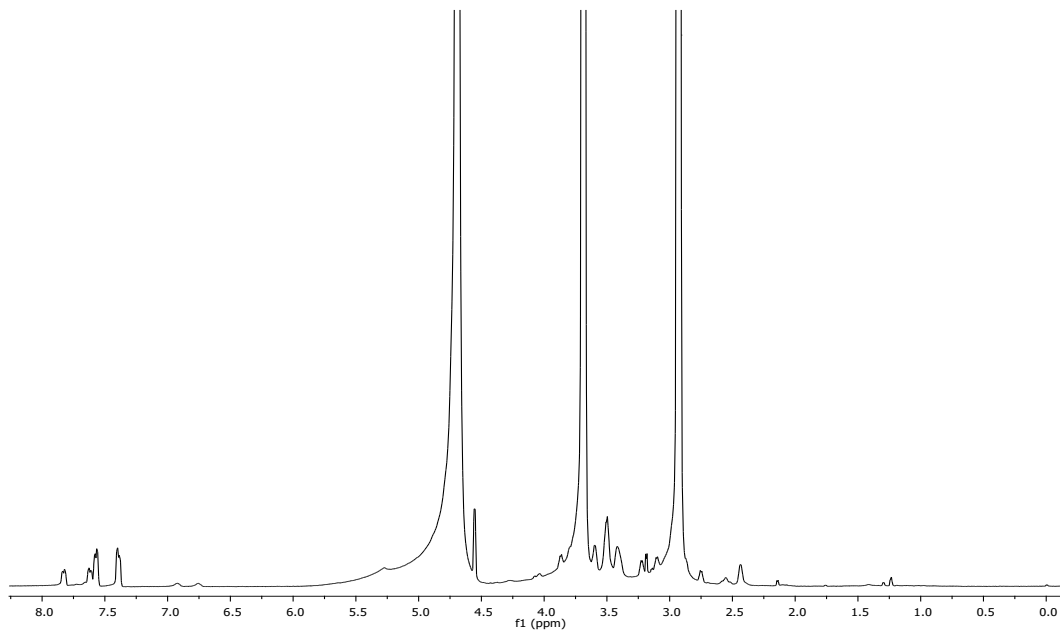
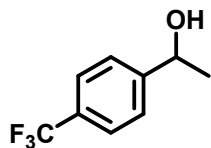


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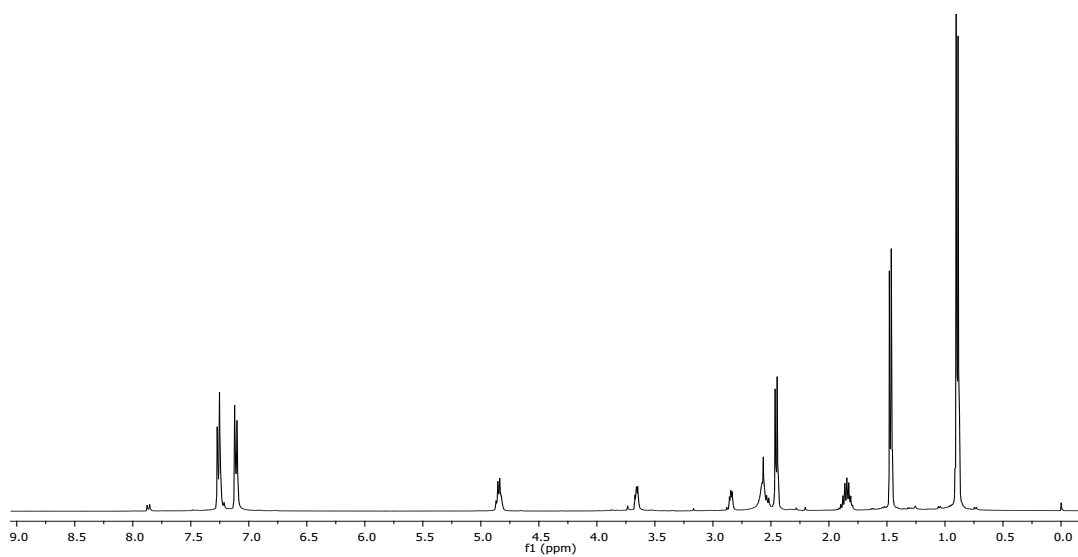
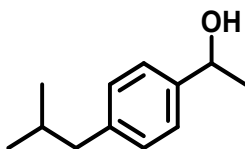


Table 3
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