

*Electronic Supplementary Information for*

**Simple, Versatile, and Chemoselective Reduction of Secondary Amides and Lactams to Amines with  $\text{Ti}_2\text{O}$  -  $\text{NaBH}_4$  or  $\text{Cp}_2\text{ZrHCl}$  -  $\text{NaBH}_4$  System**

Pei-Qiang Huang<sup>\*a,b</sup> and Hui Geng<sup>a</sup>

<sup>a</sup> *Department of Chemistry and Fujian Provincial Key Laboratory of Chemical Biology, Collaborative Innovation Centre of Chemistry for Energy Materials, College of Chemistry and Chemical Engineering, Xiamen University, Xiamen, Fujian 361005, PR China*

<sup>b</sup> *State Key Laboratory of Applied Organic Chemistry, Lanzhou University, Lanzhou 730000, PR China*

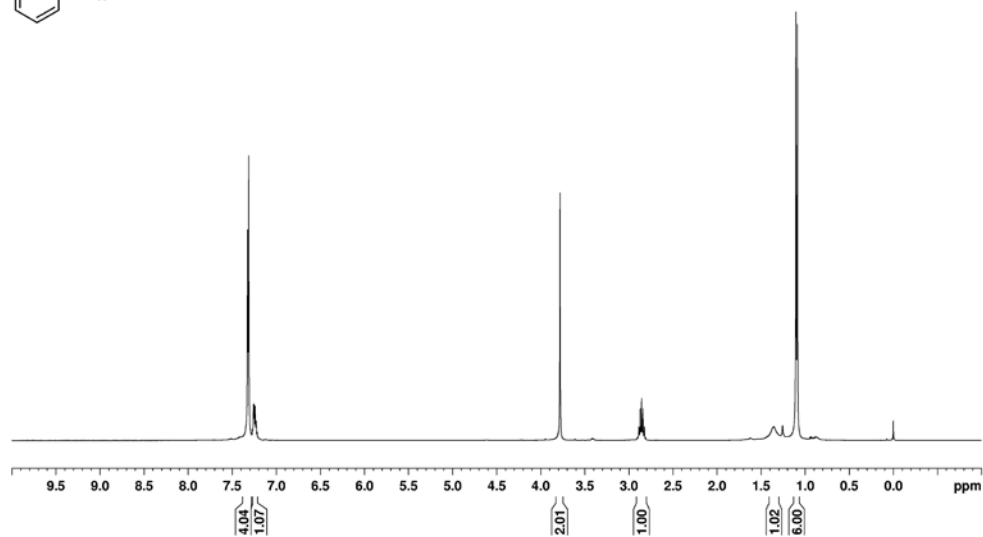
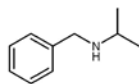
E-mail: [pqhuang@xmu.edu.cn](mailto:pqhuang@xmu.edu.cn)

**Contents (29 pages):**

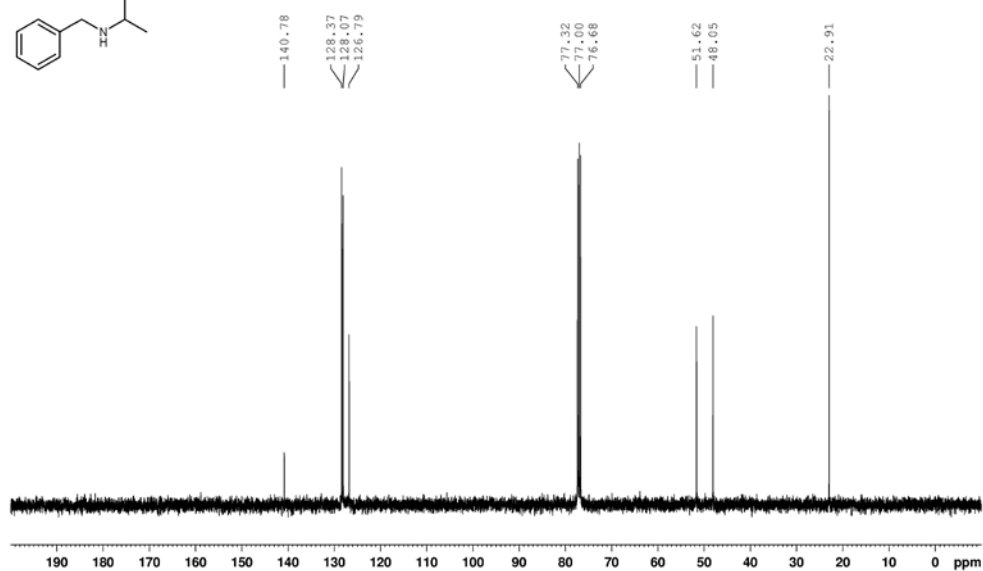
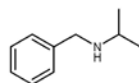
- <sup>1</sup>H and <sup>13</sup>C NMR spectra of compounds **2a~2x**, **6**, **8**, **10**, **12**, **14** (pp. 2-30)

$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2a**:

GHB-134-H  
2013/02/26

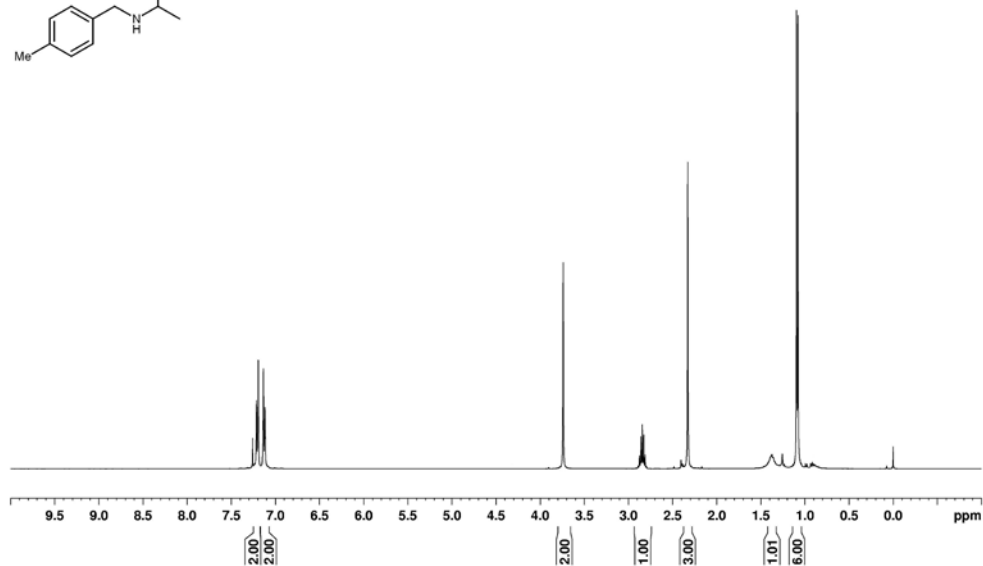
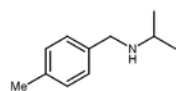


GHB-134-C  
2013/02/26

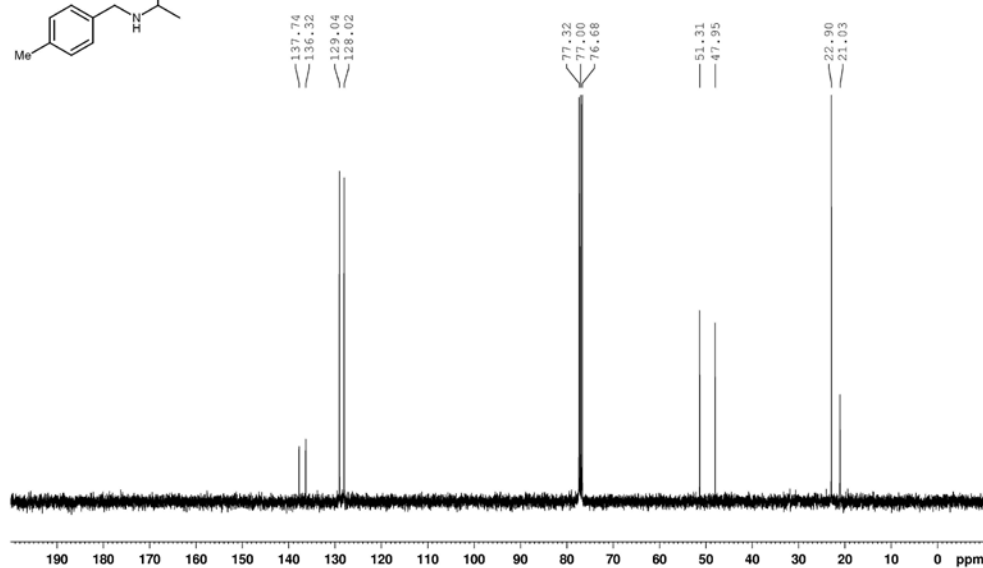
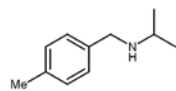


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2b**:

GHC-17-NMR-H  
CDCl<sub>3</sub>  
20134/04/04

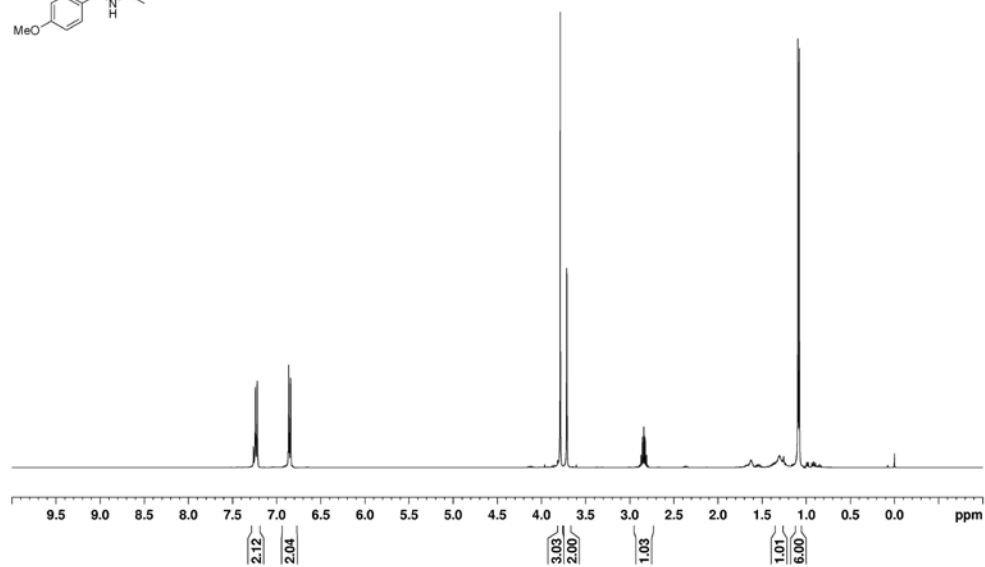
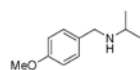


GHC-17-NMR-C  
CDCl<sub>3</sub>  
20134/04/04

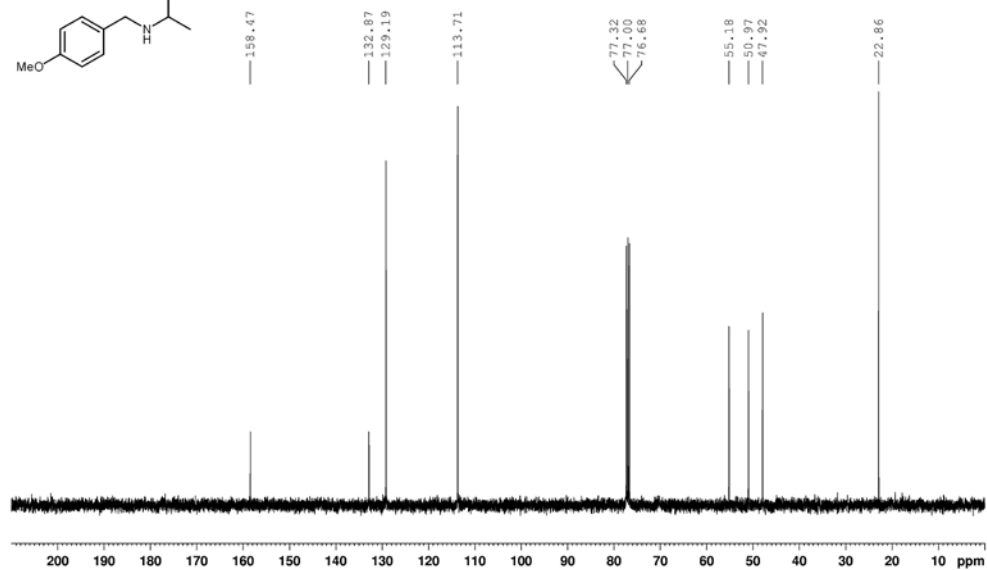
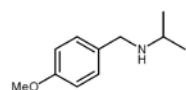


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2c**:

GHB-81-PURE-H  
CDCl<sub>3</sub>  
2013/12/04

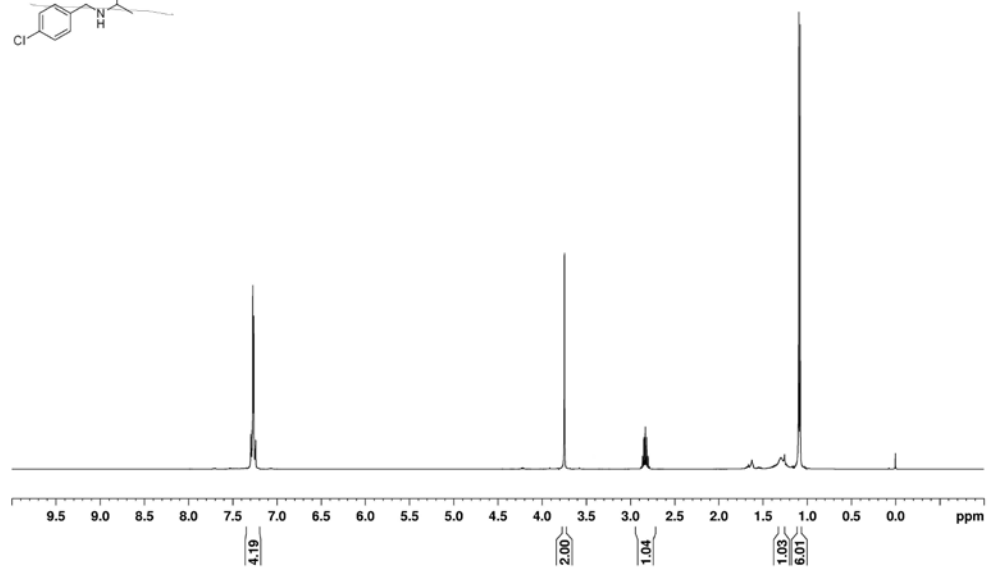
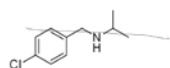


GHB-81-PURE-C  
CDCl<sub>3</sub>  
2013/12/04

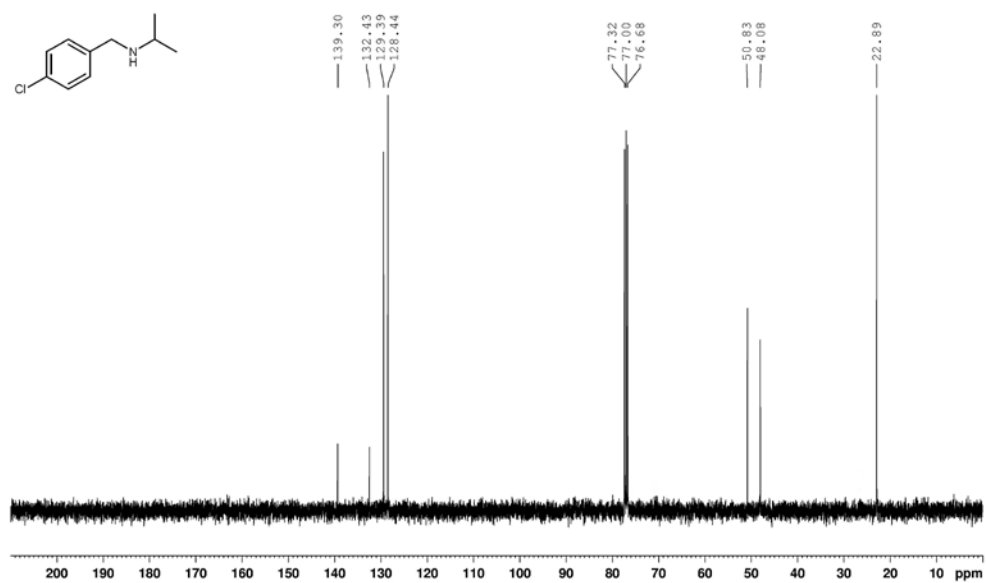
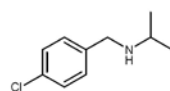


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2d**:

GHB-112-NMR-H  
CDCl<sub>3</sub>  
2013/01/10

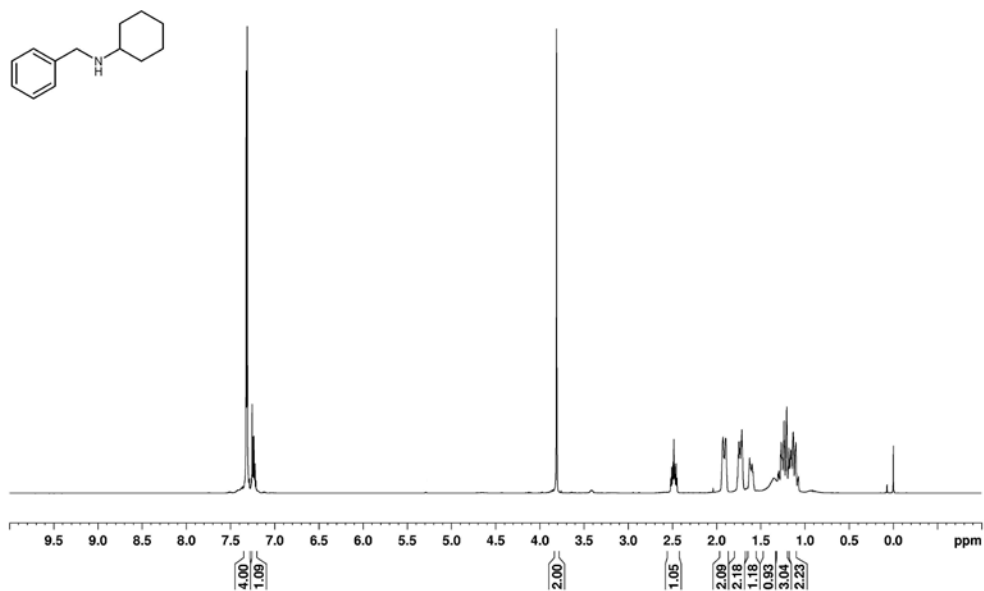


GHB-112-NMR-C  
CDCl<sub>3</sub>  
2013/01/10

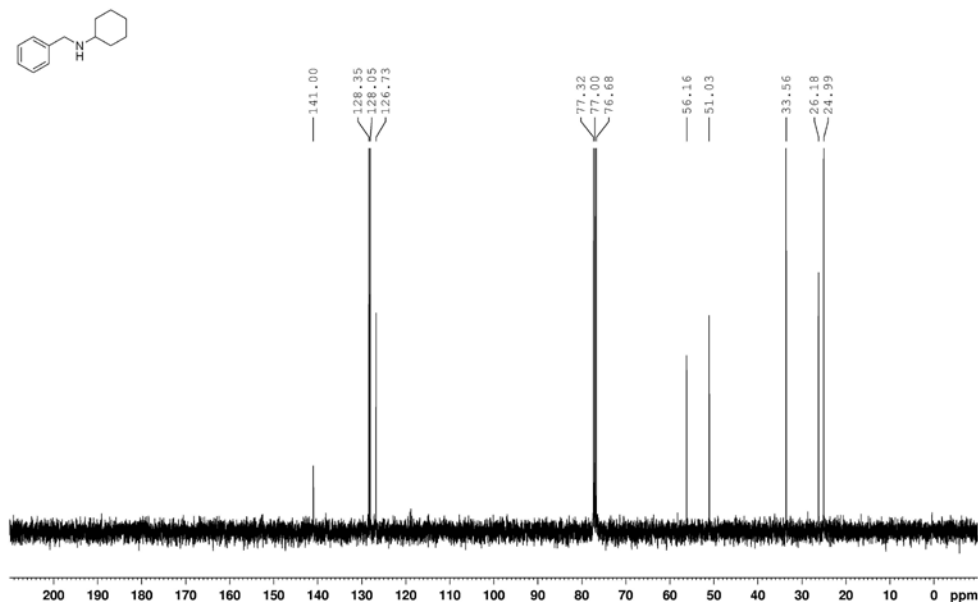


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2e**:

GHB-43-PURE-H  
CDC13  
2013/10/28

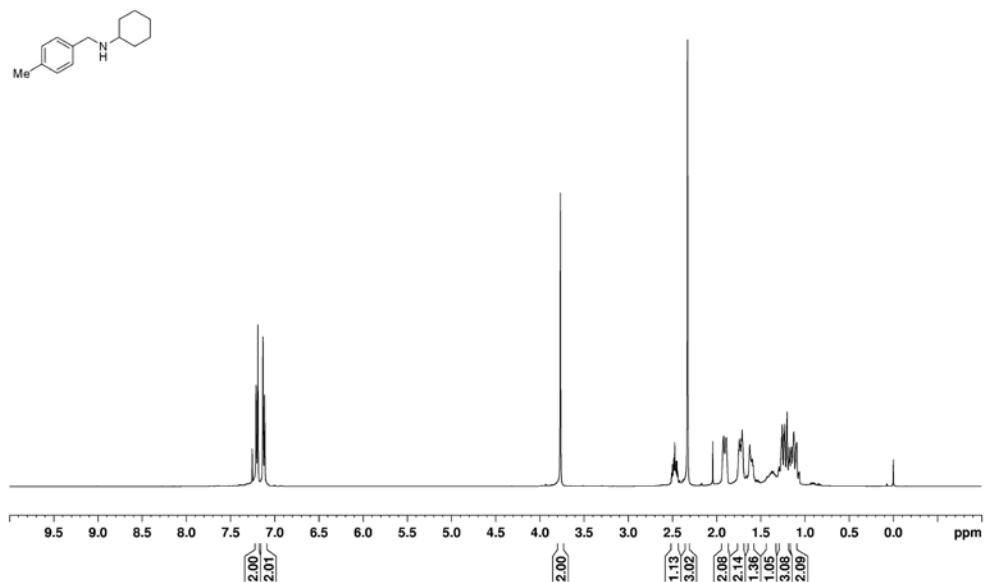


GHB-43-PURE-C  
CDC13  
2013/10/28

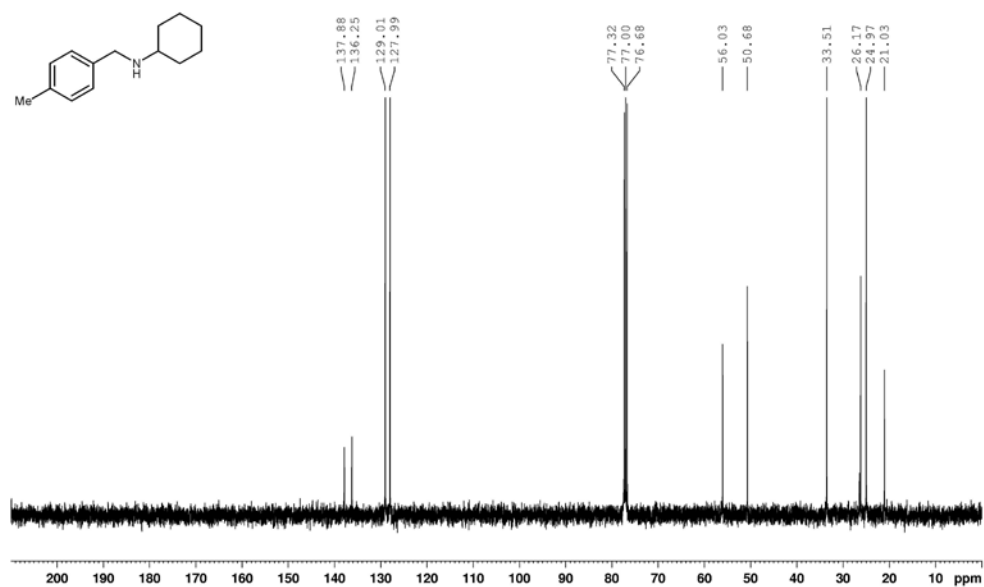


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2f**:

GHB-98-pure-H  
CDCl<sub>3</sub>  
2013/12/17

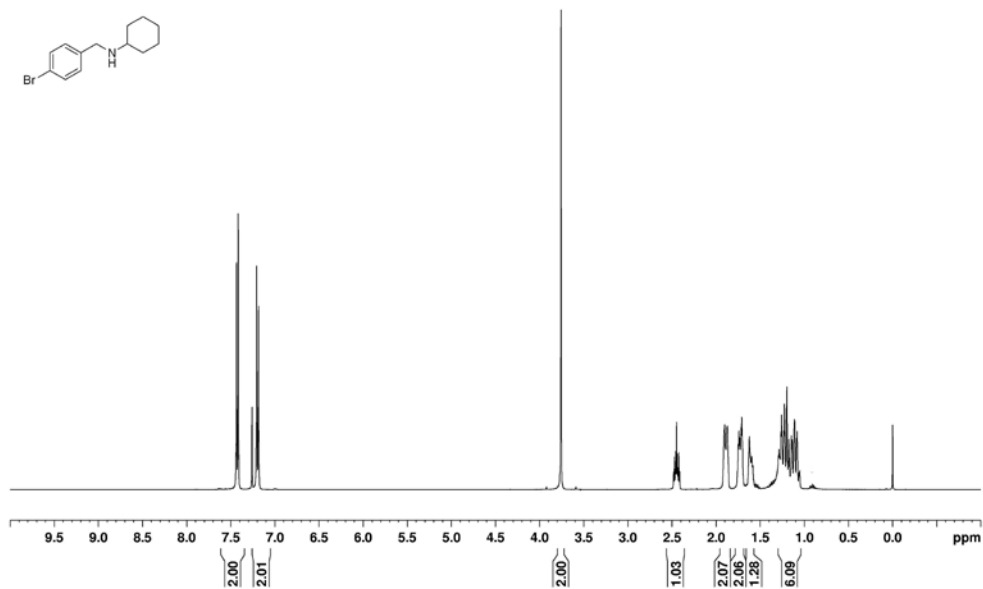


GHB-98-pure-C  
CDCl<sub>3</sub>  
2013/12/17

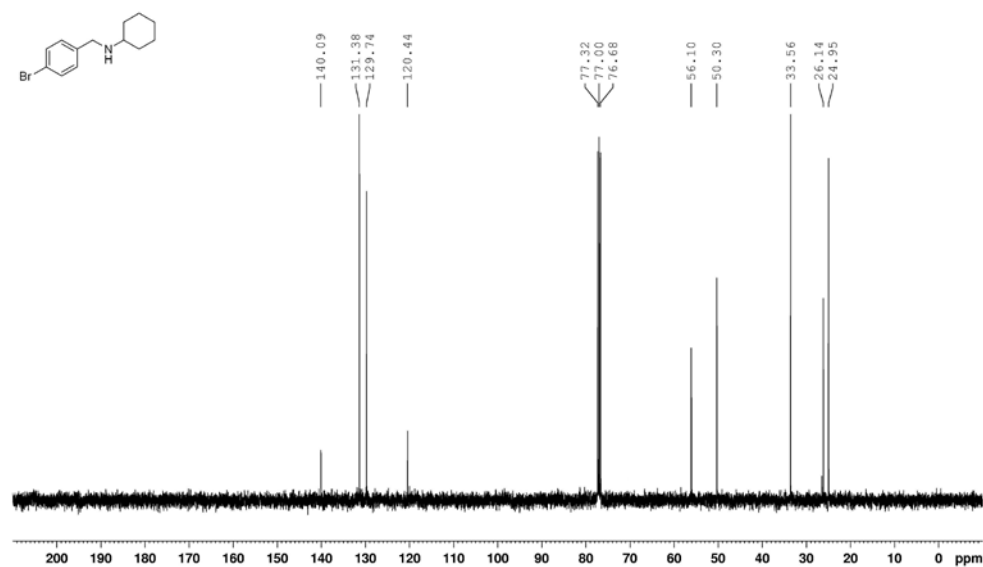


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2g**:

GHB-58-H-2  
CDCl<sub>3</sub>  
2013/11/12

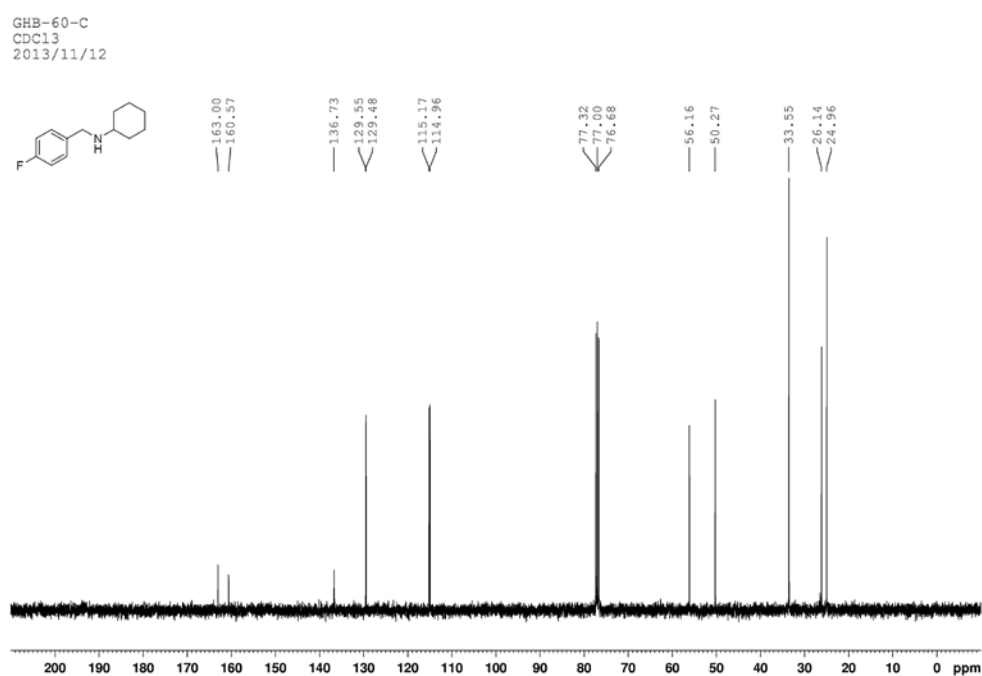
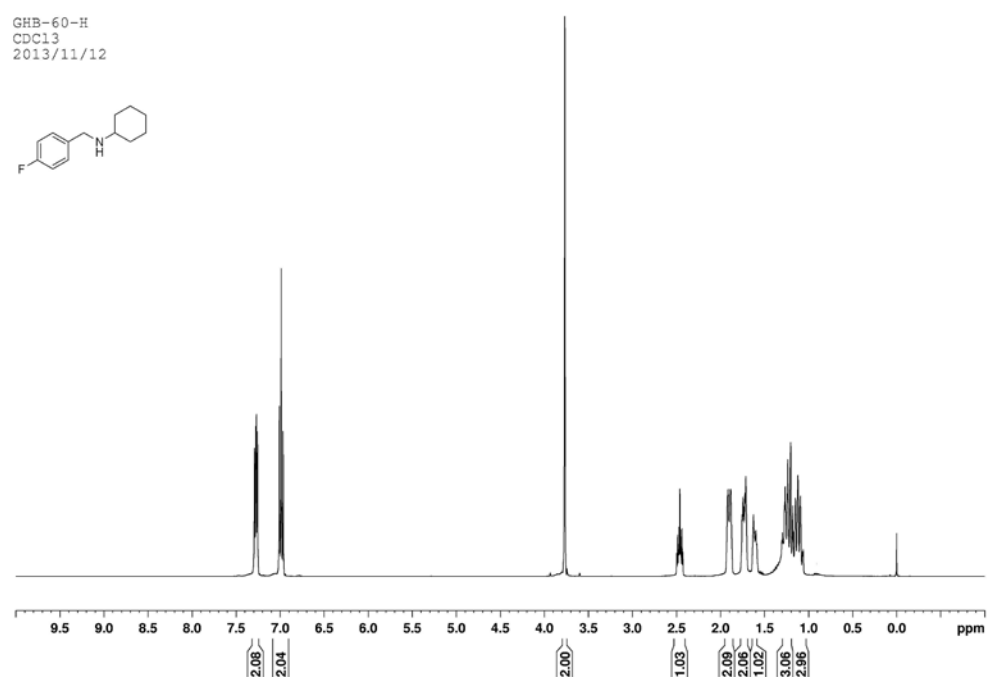


GHB-58-C-2  
CDCl<sub>3</sub>  
2013/11/12



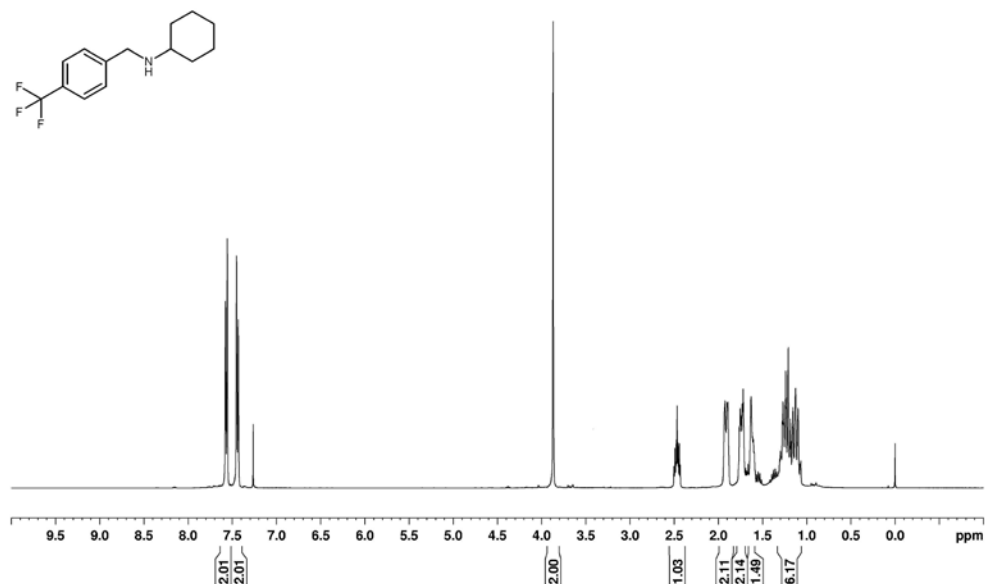


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2h**:

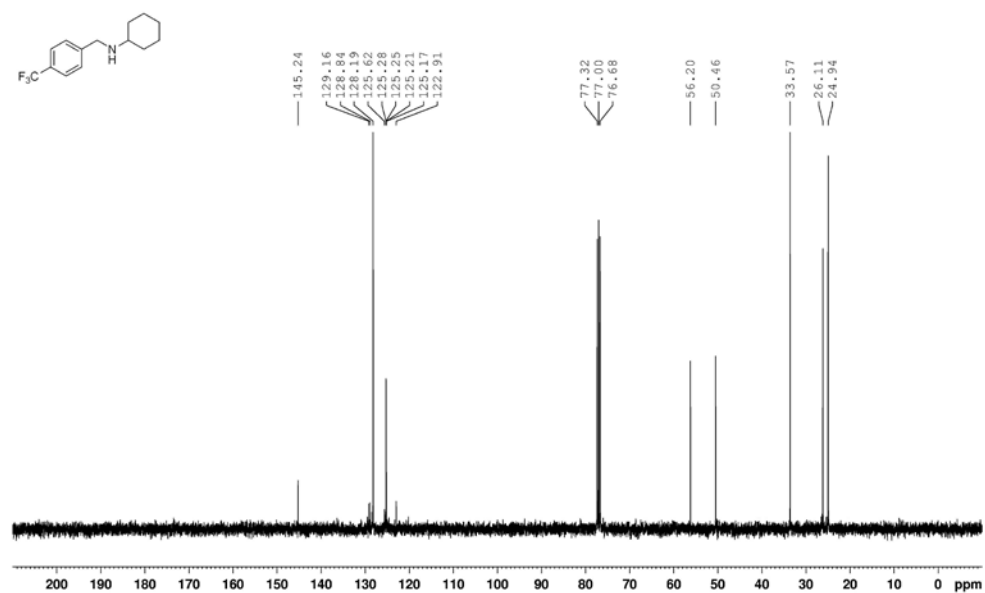


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2i**:

GHB-113-NMR-H  
CDCl<sub>3</sub>  
2013/01/11

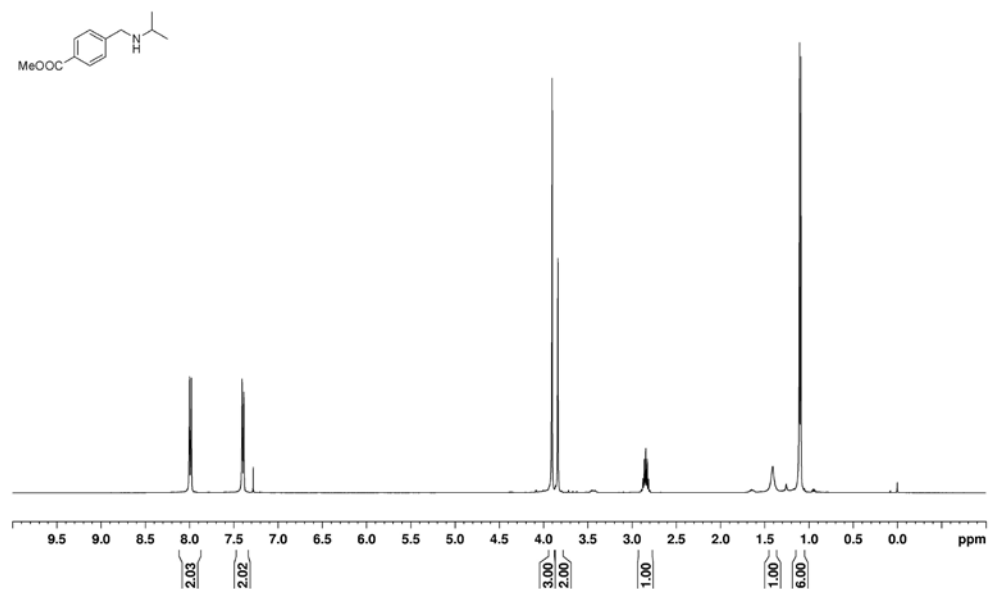


GHB-113-NMR-C  
CDCl<sub>3</sub>  
2013/01/11

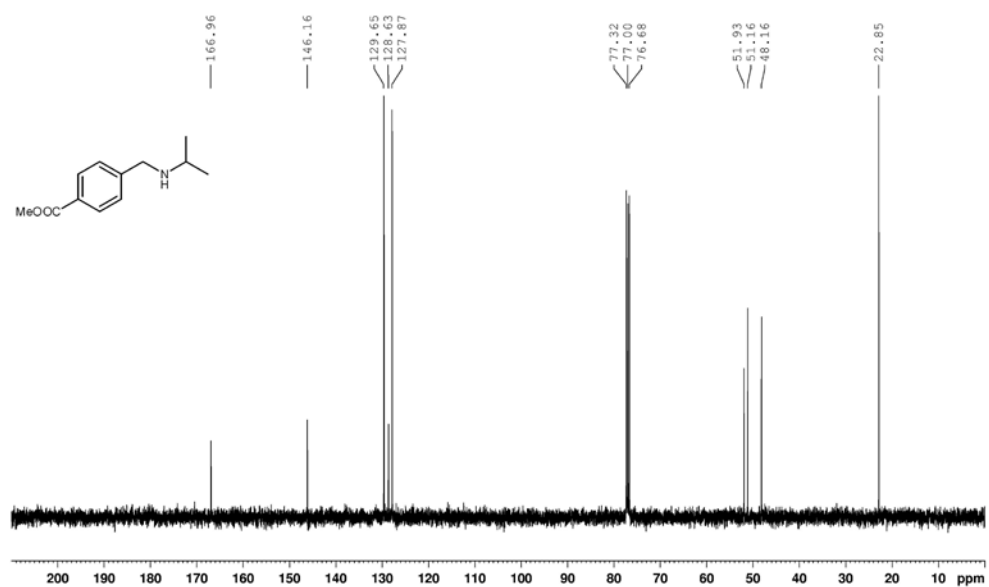


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2j**:

GHB-107-H  
CDCl<sub>3</sub>  
2013/12/25

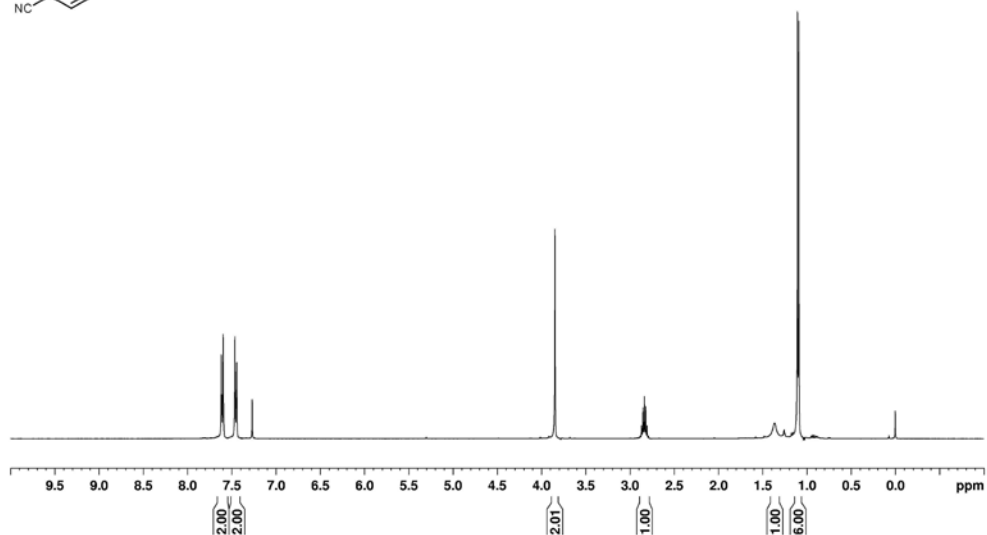
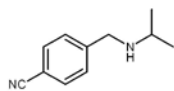


GHB-107-C  
CDCl<sub>3</sub>  
2013/12/25

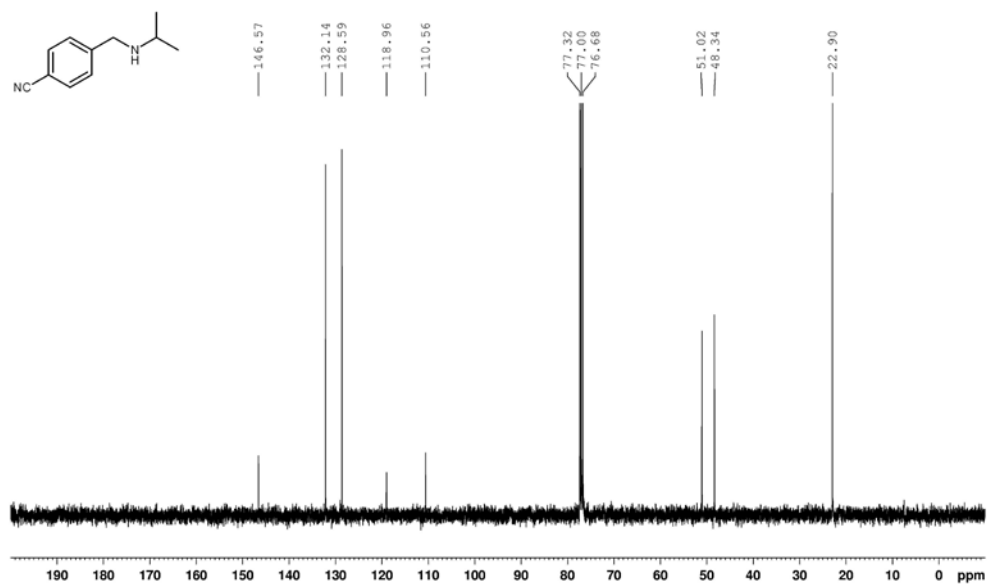
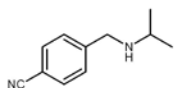


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2k**:

GHB-137-(29,30)-H  
2013/03/06

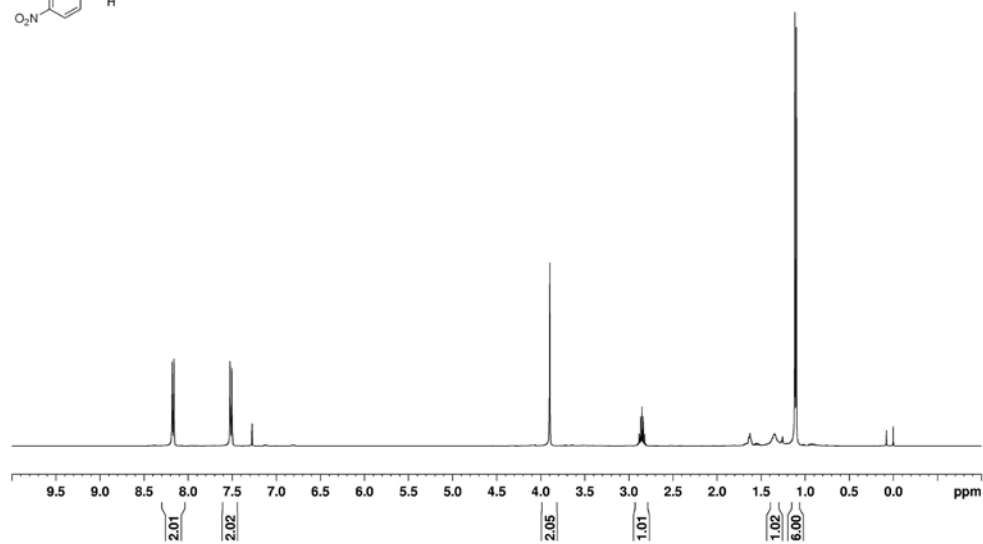
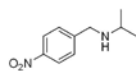


GHB-137-C  
2013/03/07

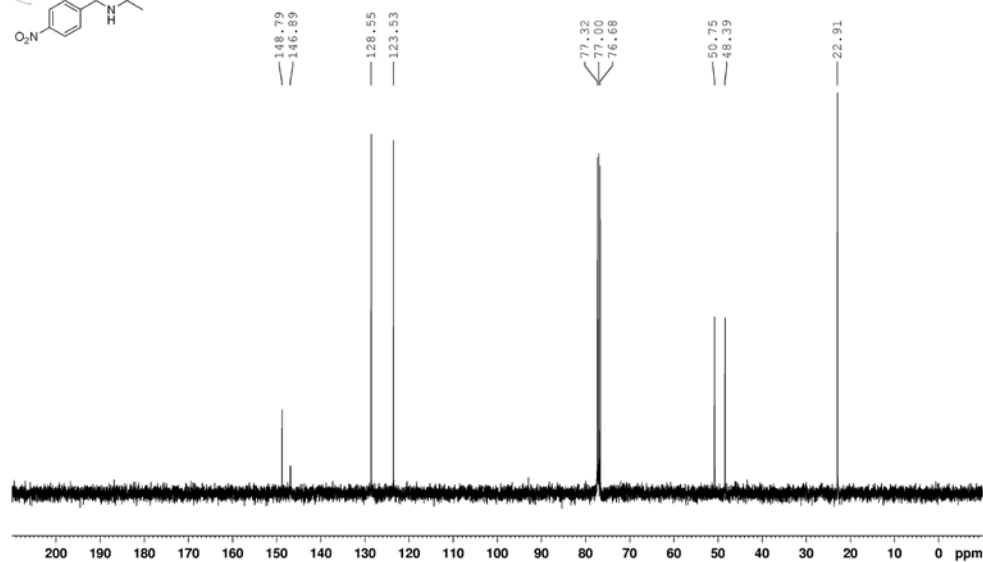
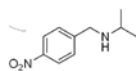


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **21**:

GHB-82-PURE-H  
CDCl<sub>3</sub>  
2013/12/04

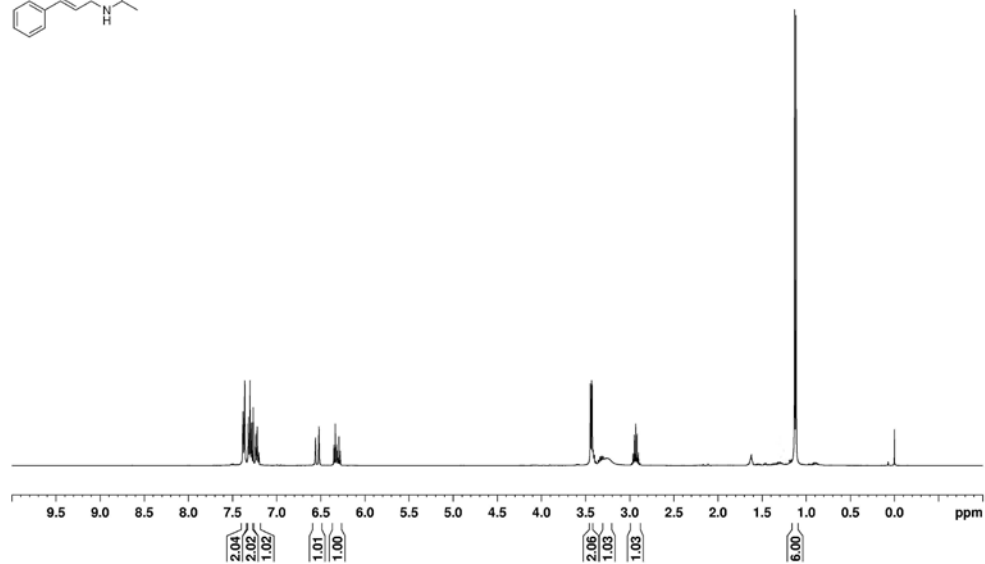
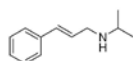


GHB-82-PURE-C  
CDCl<sub>3</sub>  
2013/12/04

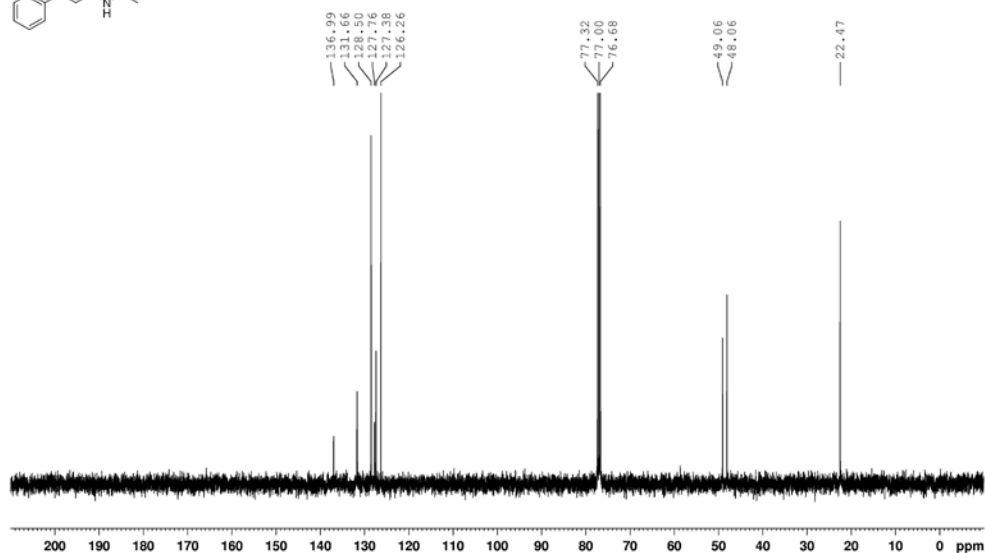
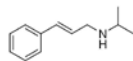


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2m**:

GHB-104-H  
CDCl<sub>3</sub>  
2013/12/25

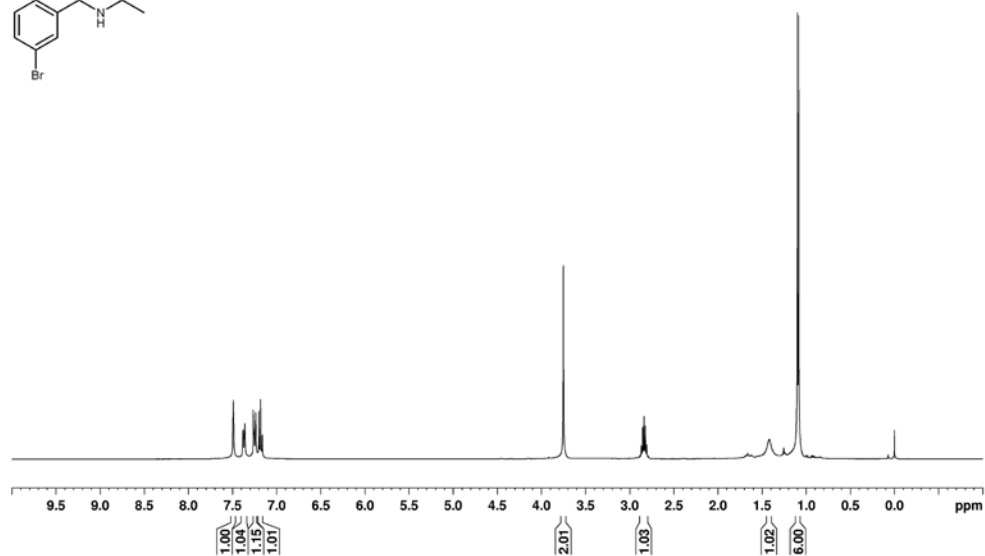
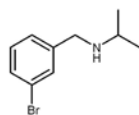


GHB-104-C  
CDCl<sub>3</sub>  
2013/12/25

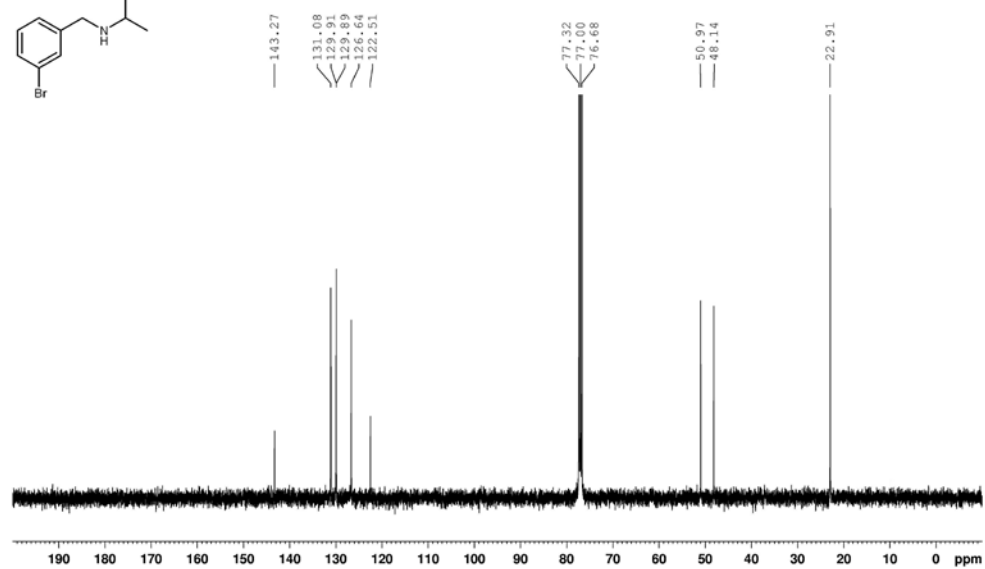
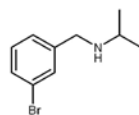


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2n**:

GHC-5-H  
CDCl<sub>3</sub>  
20134/03/18

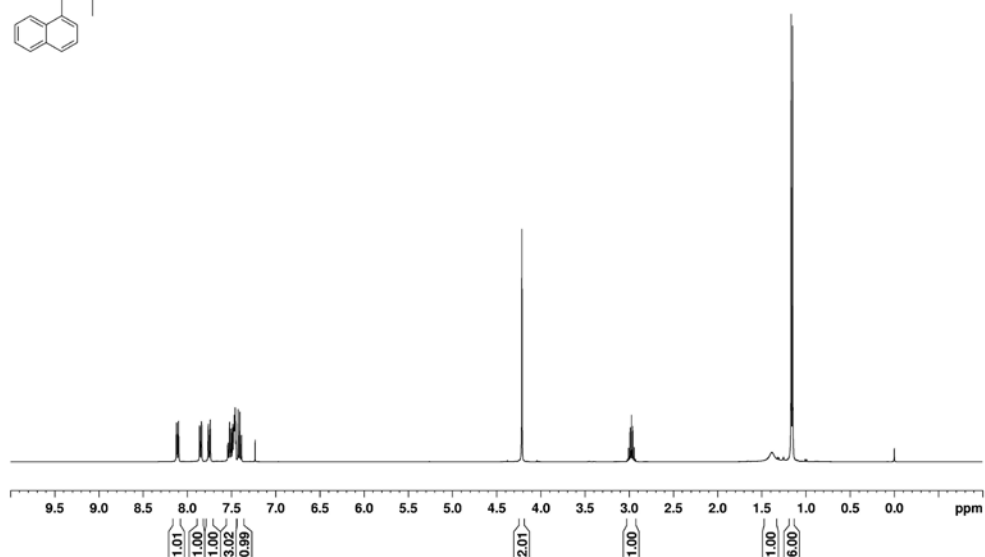
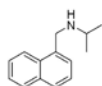


GHC-5-C  
CDCl<sub>3</sub>  
20134/03/18

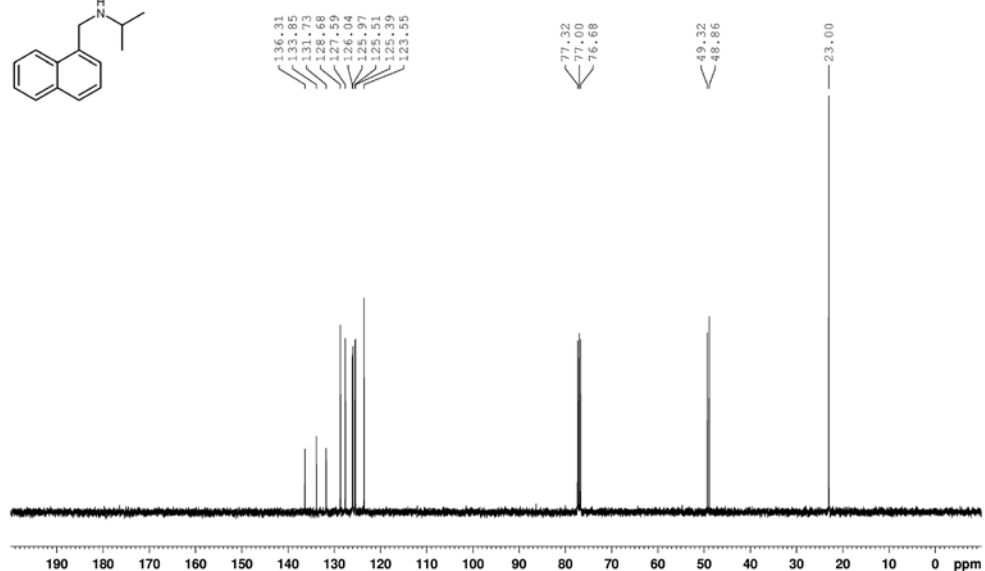
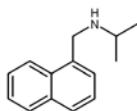


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2o**:

GHC-12-nmr-H  
CDCl<sub>3</sub>  
20134/03/19



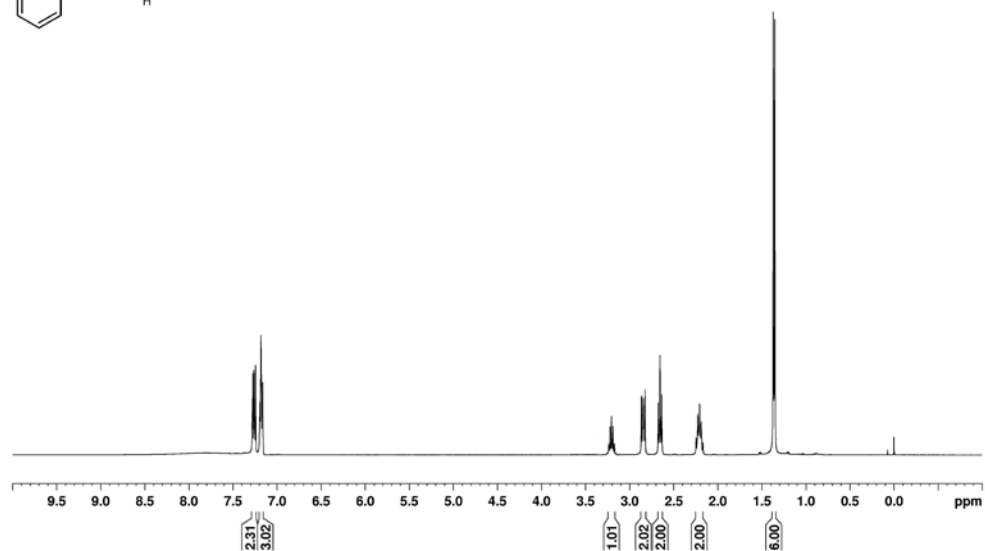
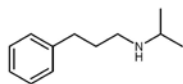
GHC-12-C  
CDCl<sub>3</sub>  
20134/03/18



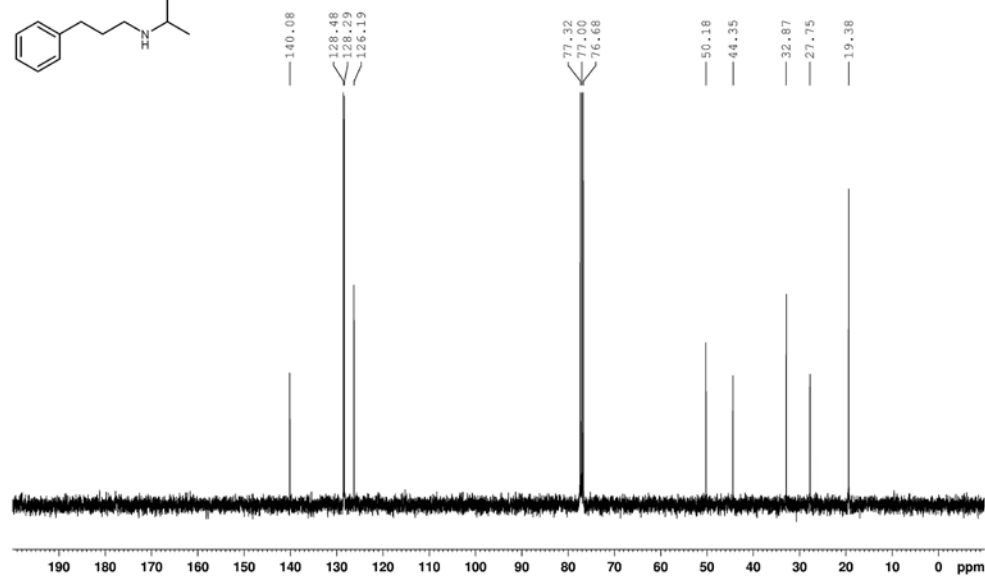
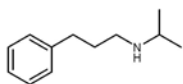


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2p**:

GHB-116-NMR-H  
2013/02/22

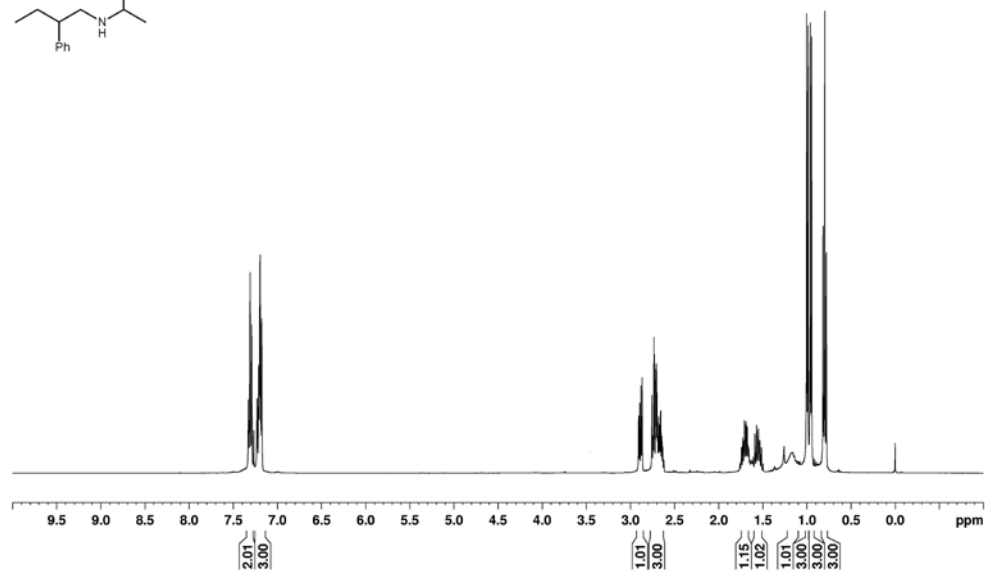
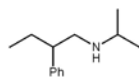


GHB-116-NMR-C  
2013/02/22

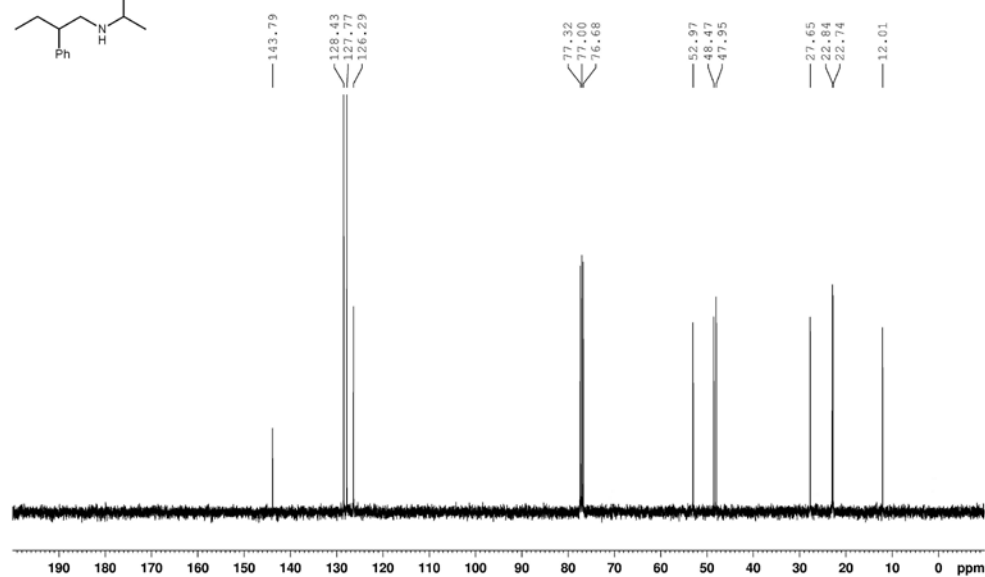
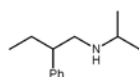


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2q**:

GHC-19B-H  
CDC13  
20134/04/07

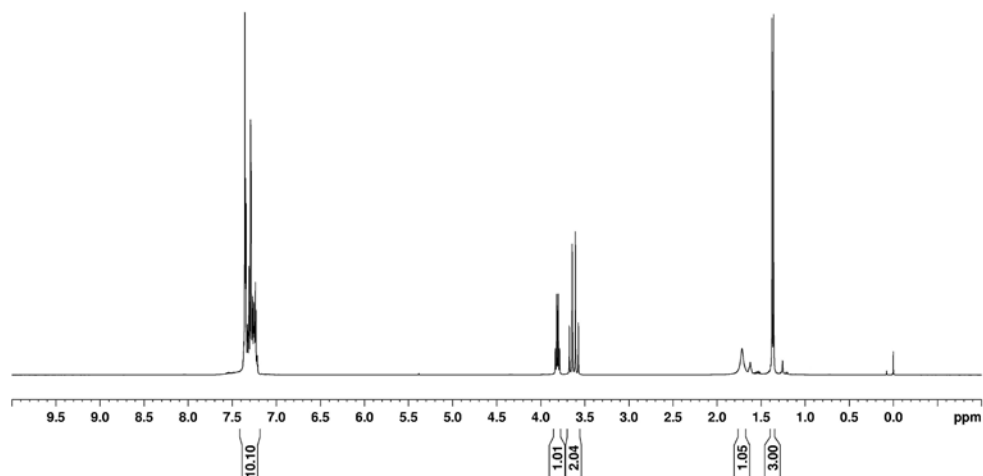
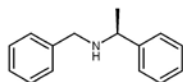


GHC-19B-C  
CDC13  
20134/04/08

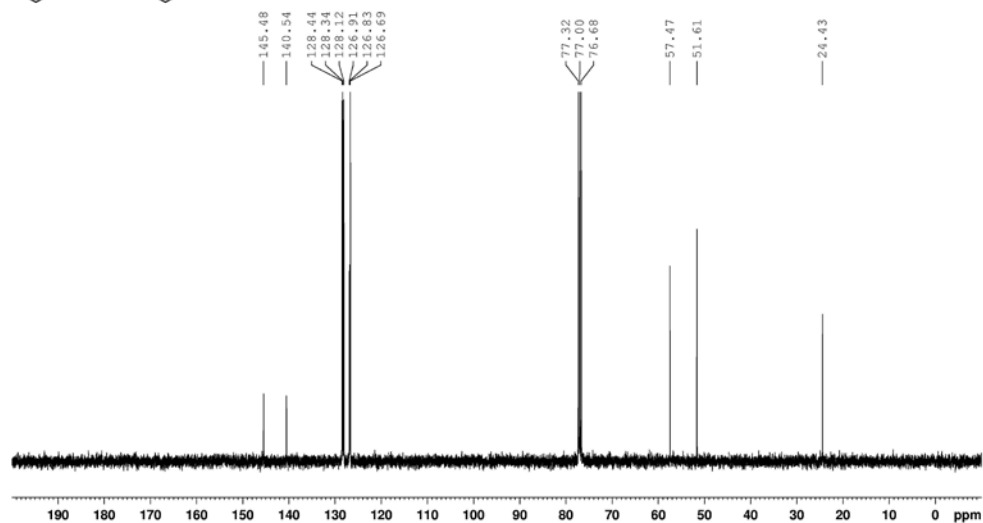
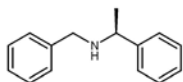


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2r**:

GHB-106--pure-NMR-H  
2013/02/20

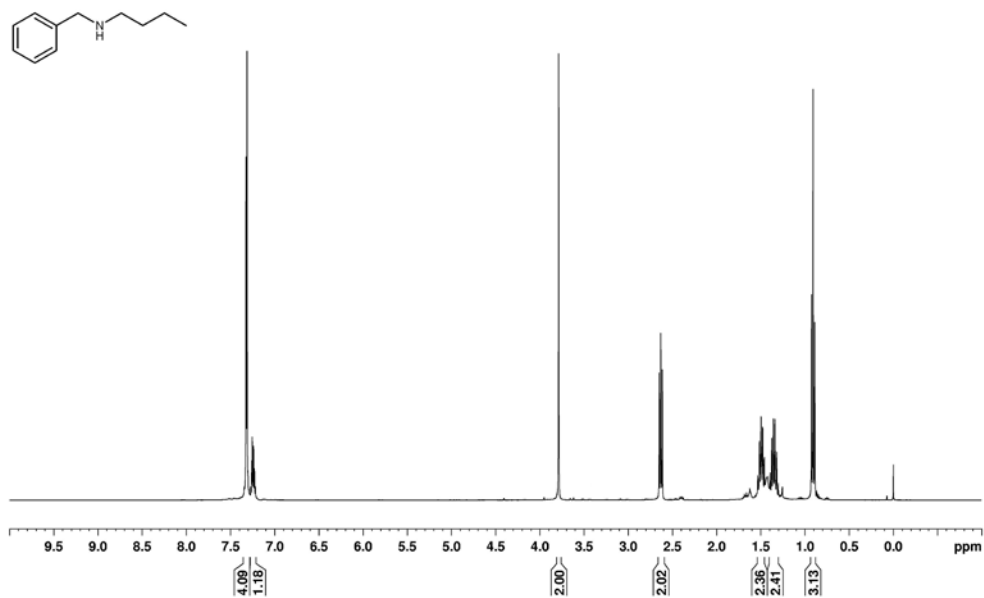


GHB-106--pure-NMR-C  
 $\text{CDCl}_3$   
2013/02/20

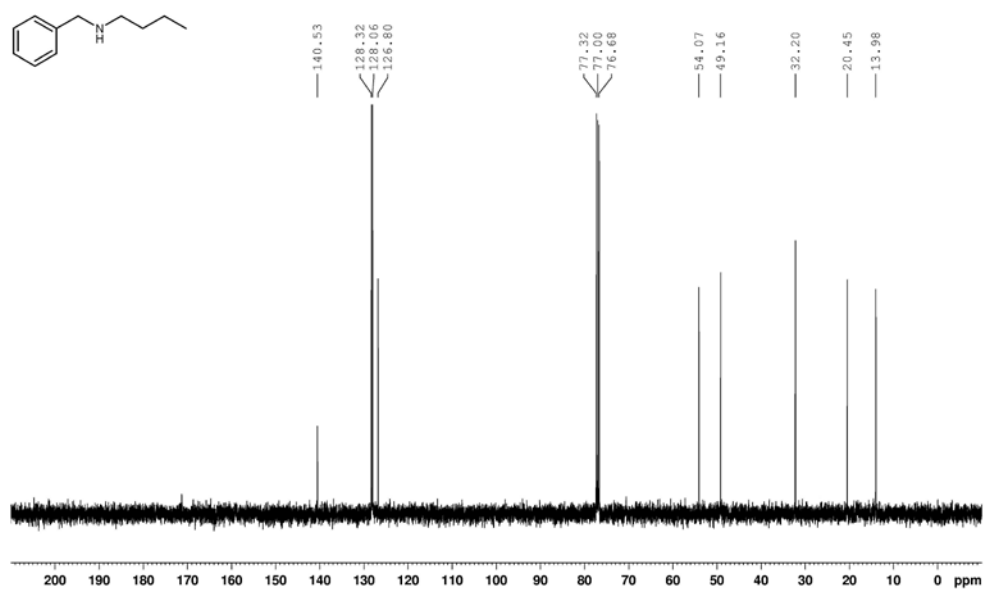


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2s**:

GHB-99-pure-H  
CDCl<sub>3</sub>  
2013/12/17

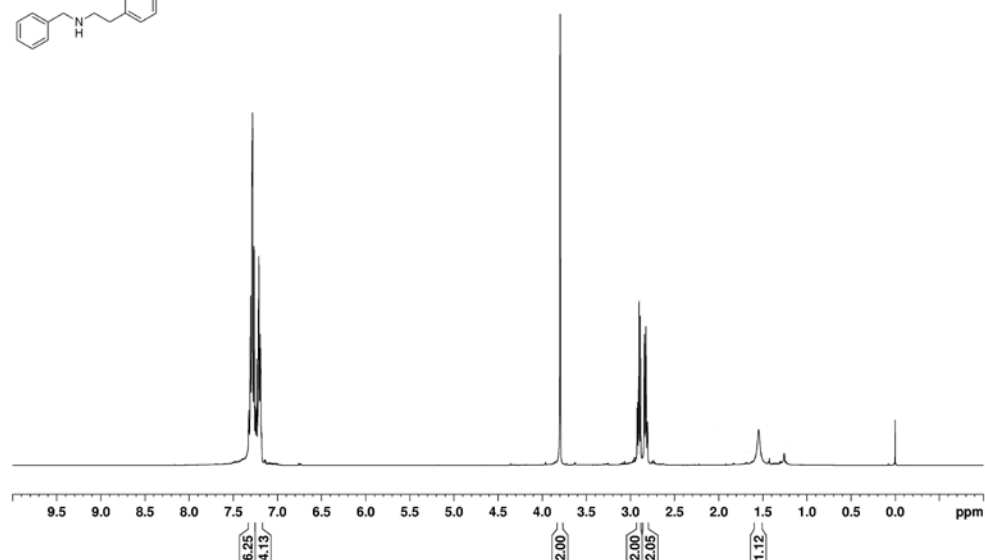
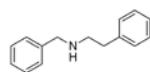


GHB-99-pure-C  
CDCl<sub>3</sub>  
2013/12/17

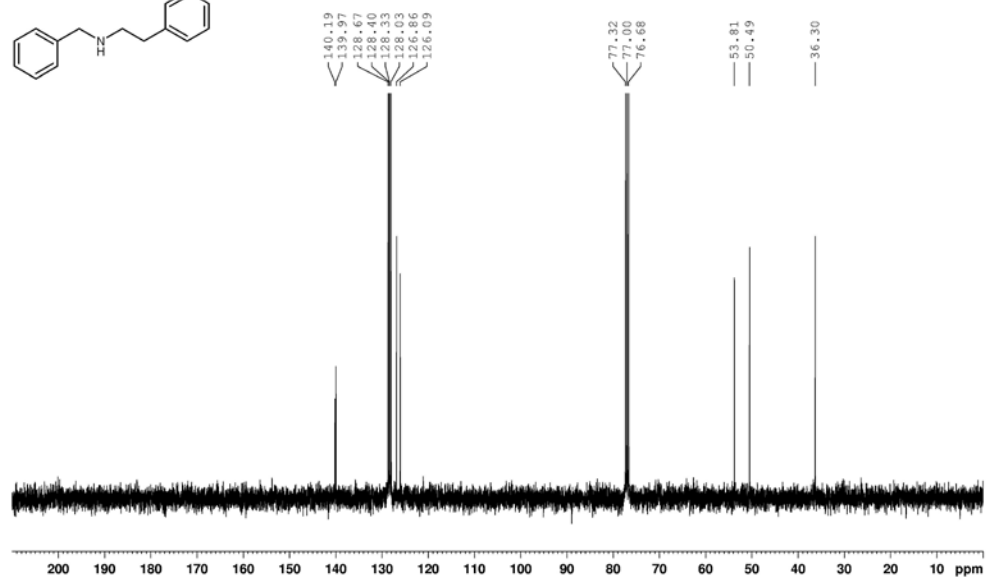
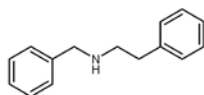


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2t**:

GHB-93-pure-H  
CDCl<sub>3</sub>  
2013/12/17

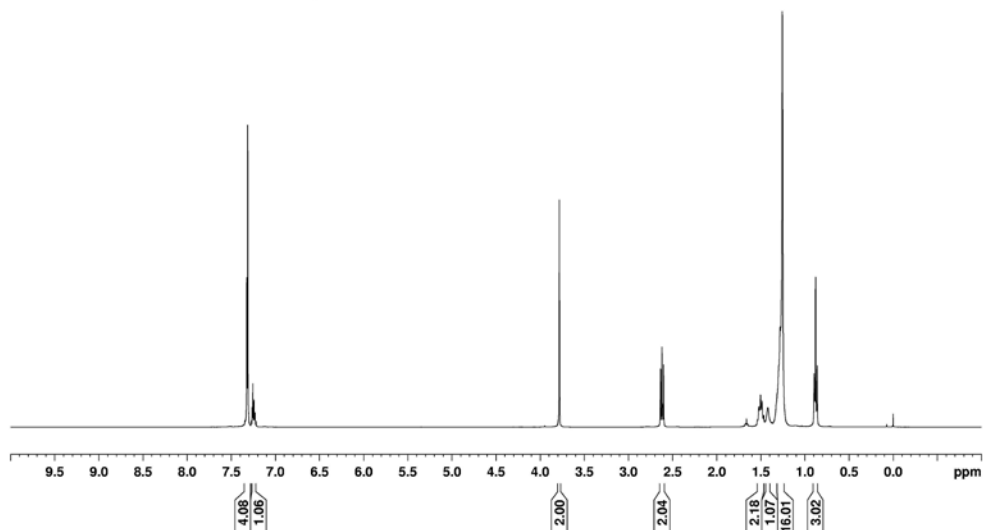
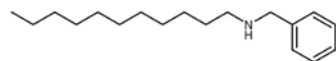


GHB-93-pure-C  
CDCl<sub>3</sub>  
2013/12/17

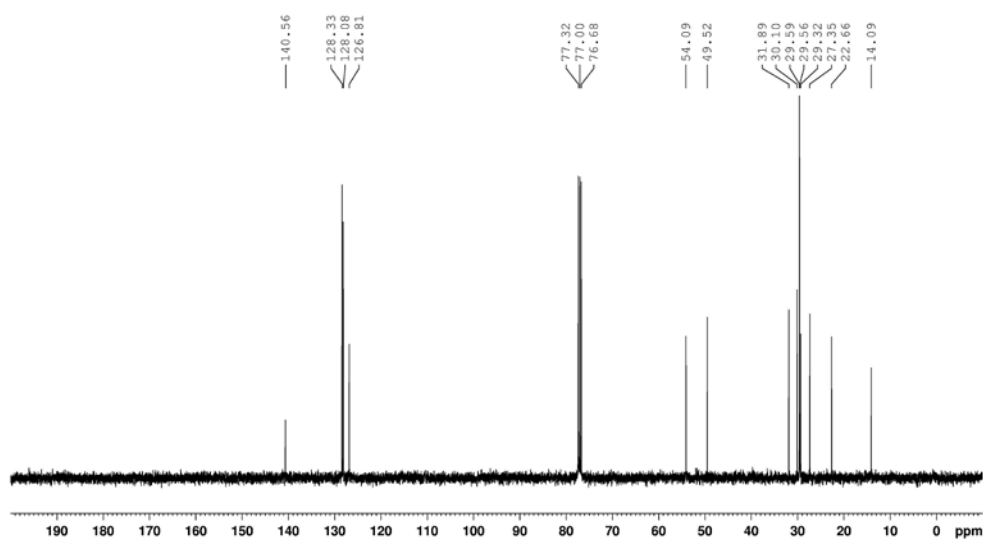
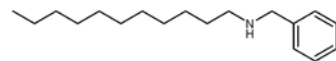


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2u**:

GHB-133--pure-NMR-H  
CDCl<sub>3</sub>  
2013/02/20

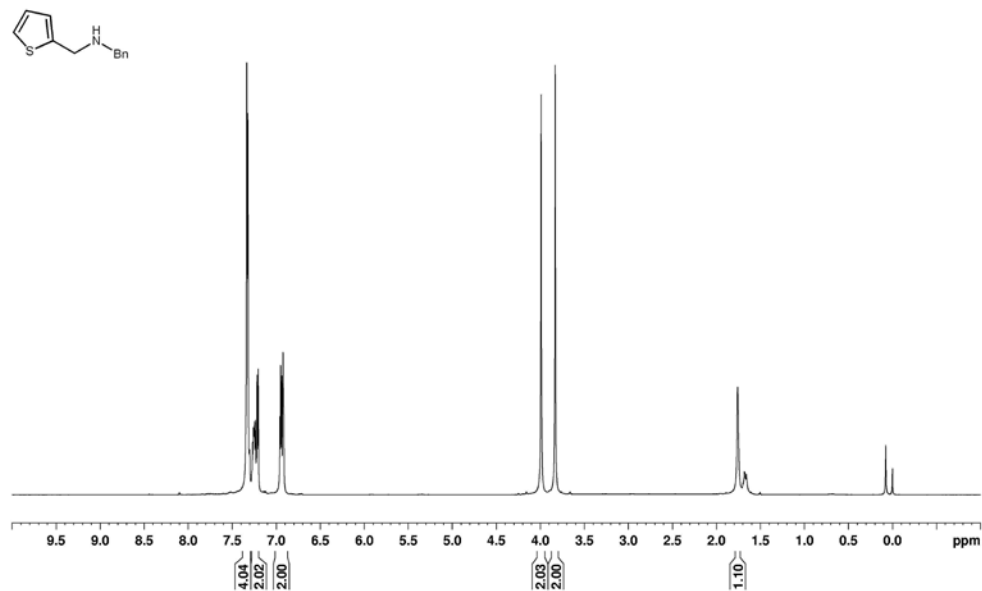


GHB-133--pure-NMR-C  
CDCl<sub>3</sub>  
2013/02/20

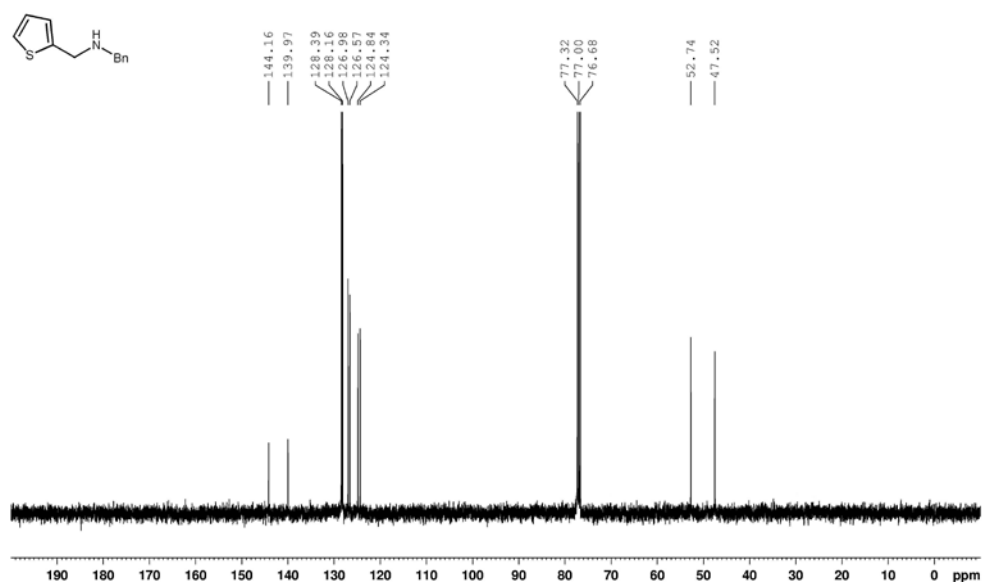


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2v**:

GHB-144-H  
2013/03/15

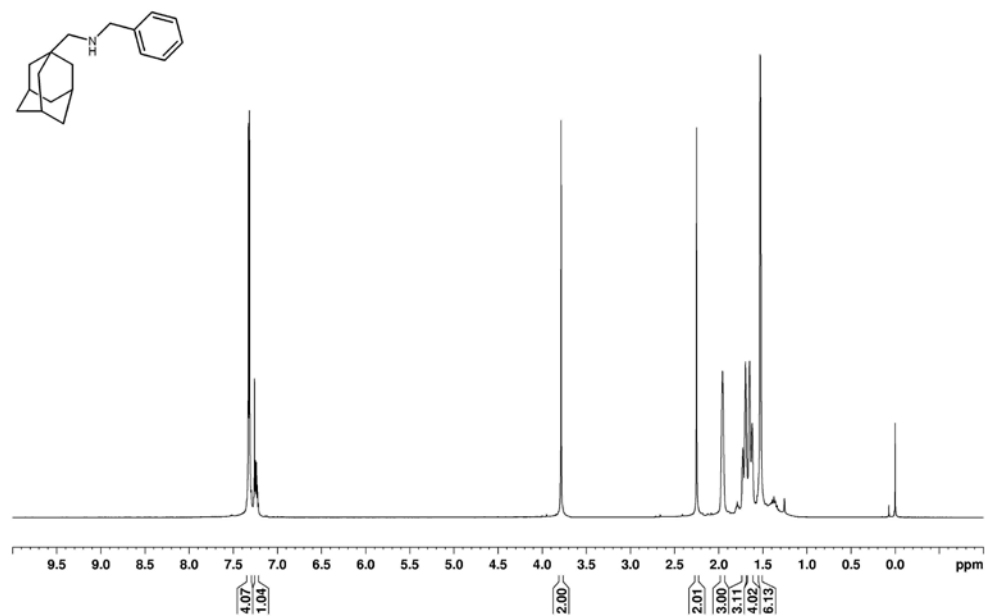


GHB-144-C  
2013/03/15

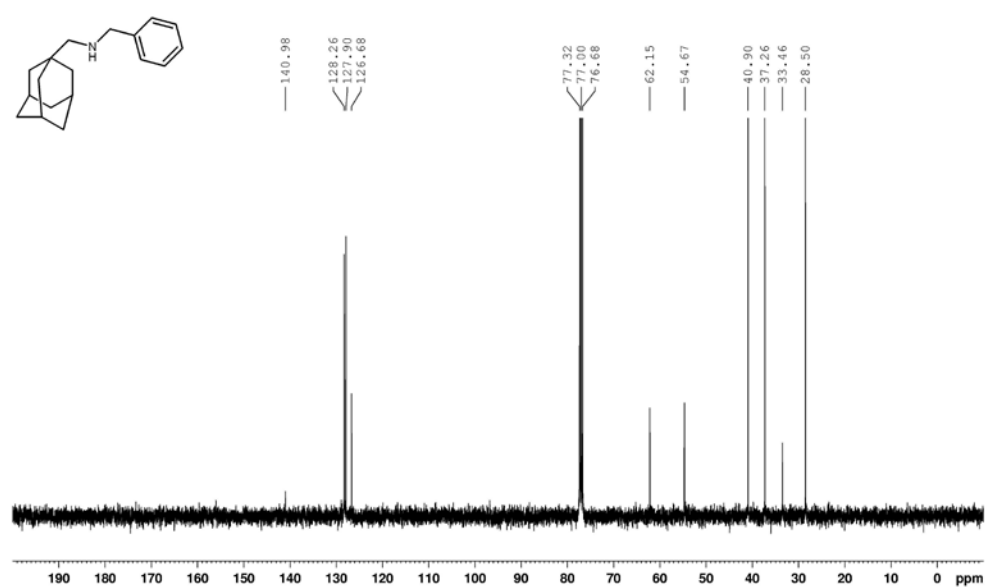


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2w**:

GHB-145-nmr-H  
2013/03/07



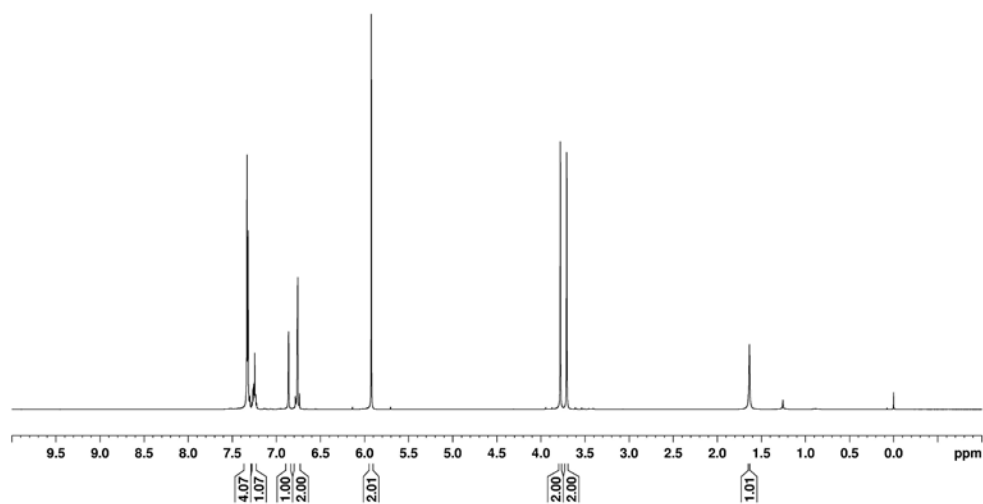
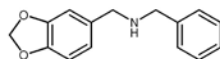
GHB-145-nmr-C  
2013/03/07



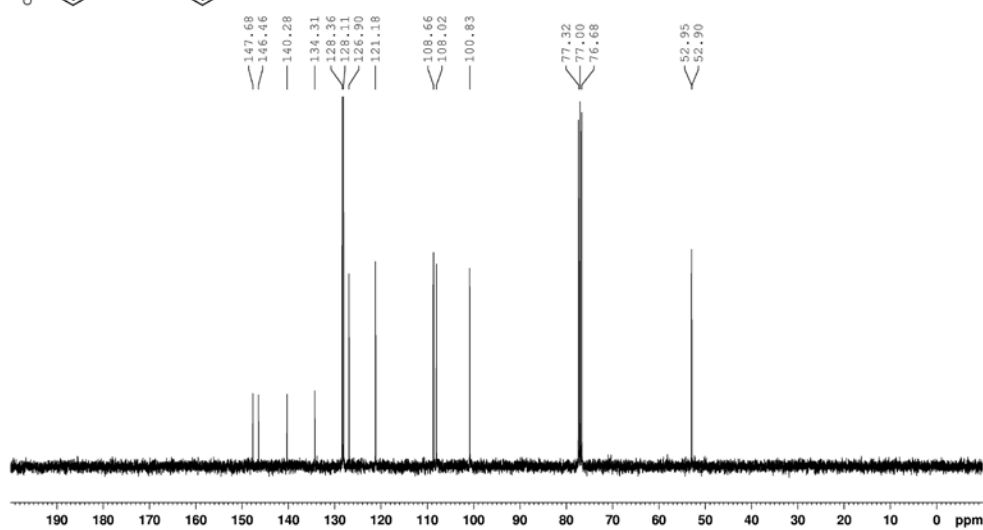
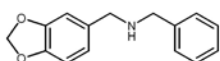


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **2x**:

GHC-3-nmr-H  
CDC13  
20134/03/19

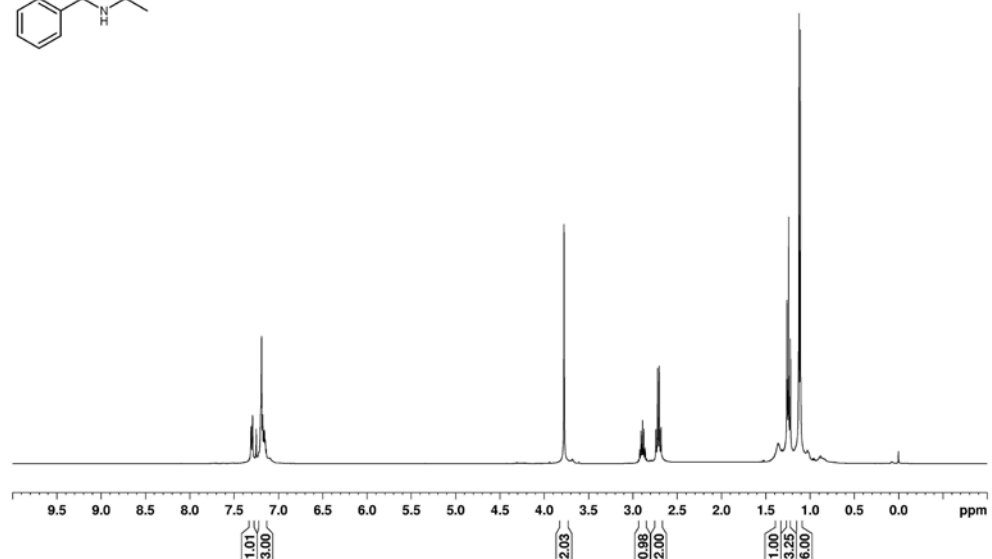
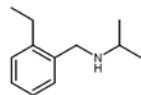


GHC-3-nmr-C  
CDC13  
20134/03/19

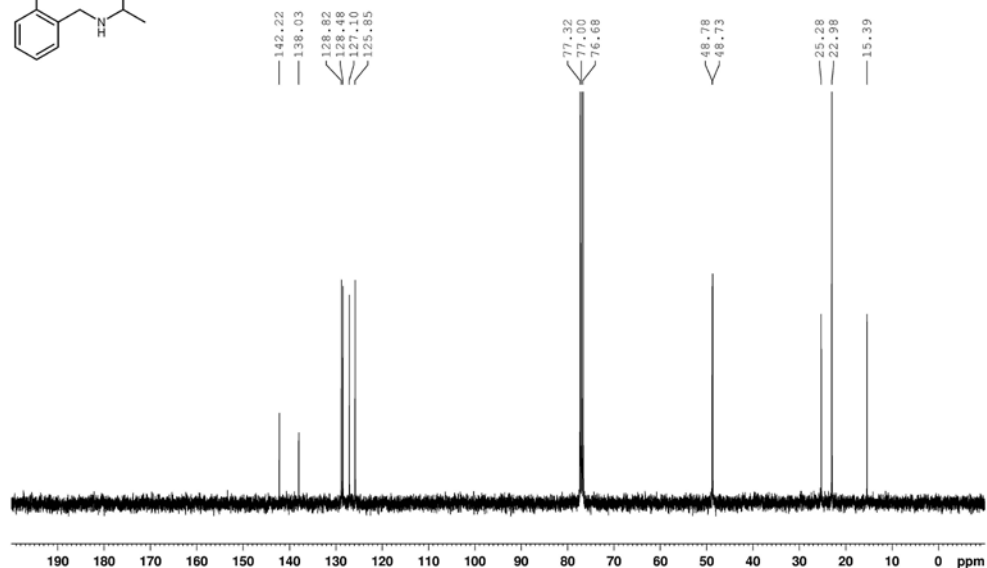
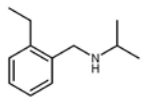


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **6**:

GHB-131-NMR-H  
2013/02/21

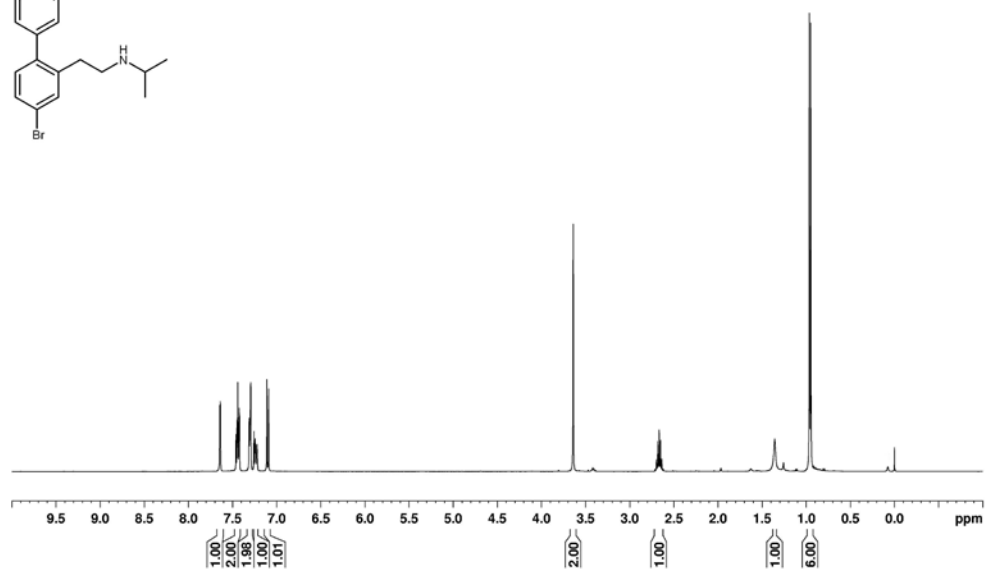
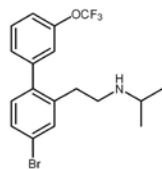


GHB-131-NMR-C  
2013/02/21

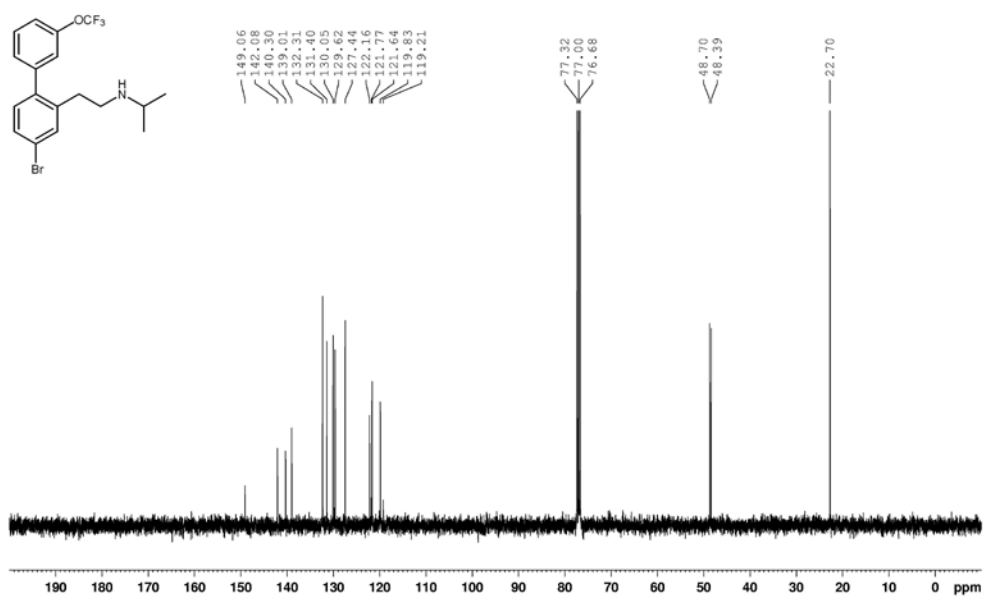
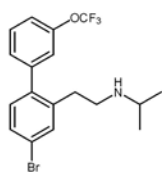


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **8**:

GHC-22-H  
CDCl<sub>3</sub>  
20134/04/02

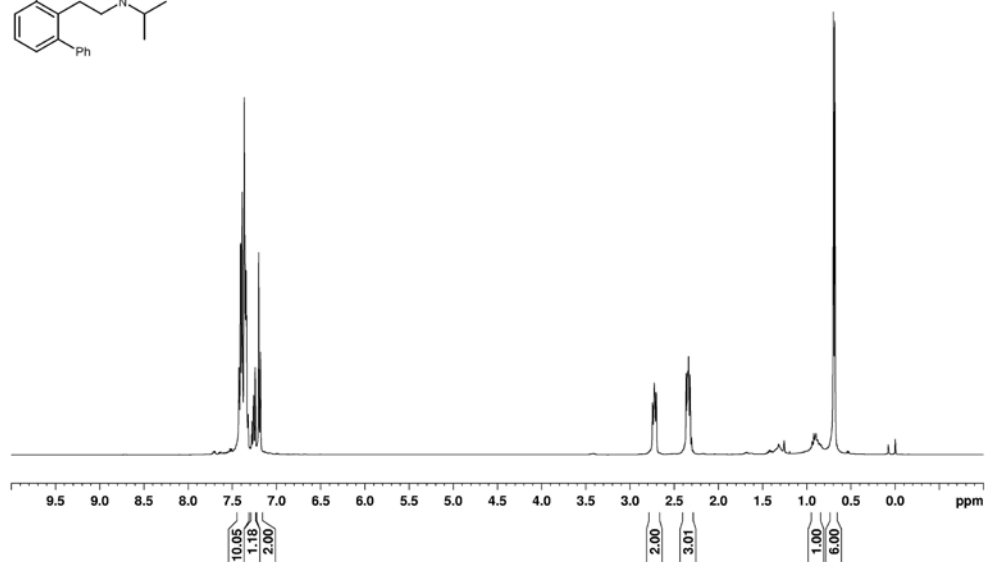
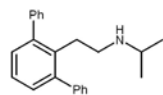


GHC-22-C  
CDCl<sub>3</sub>  
20134/04/02

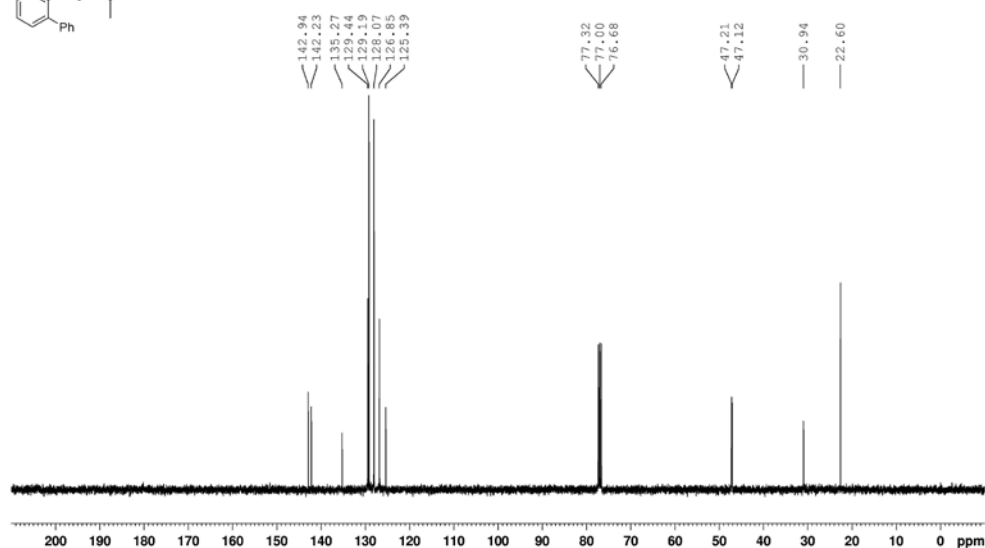
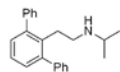


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **10**:

GHC-23-H  
CDCl<sub>3</sub>  
20134/03/25

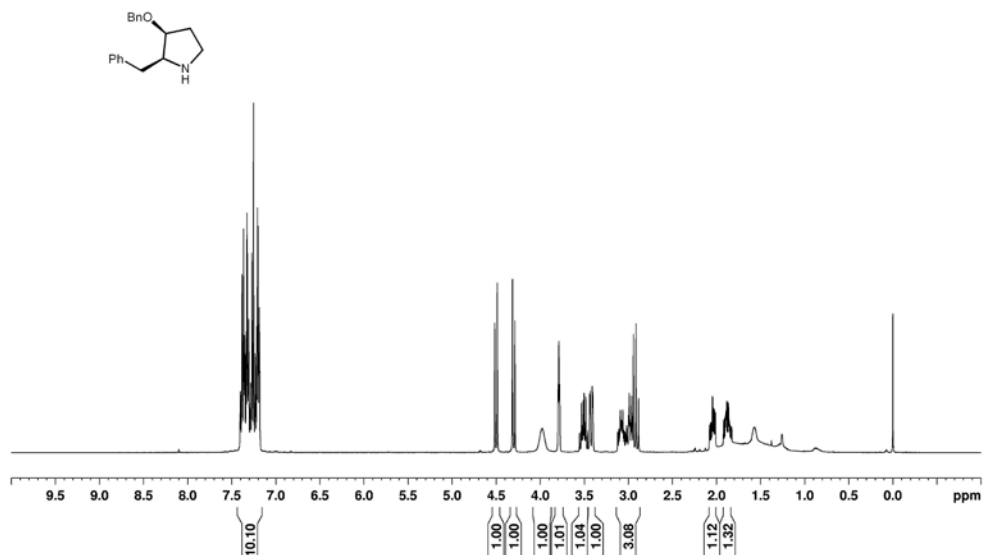


GHC-23-C  
CDCl<sub>3</sub>  
20134/03/25

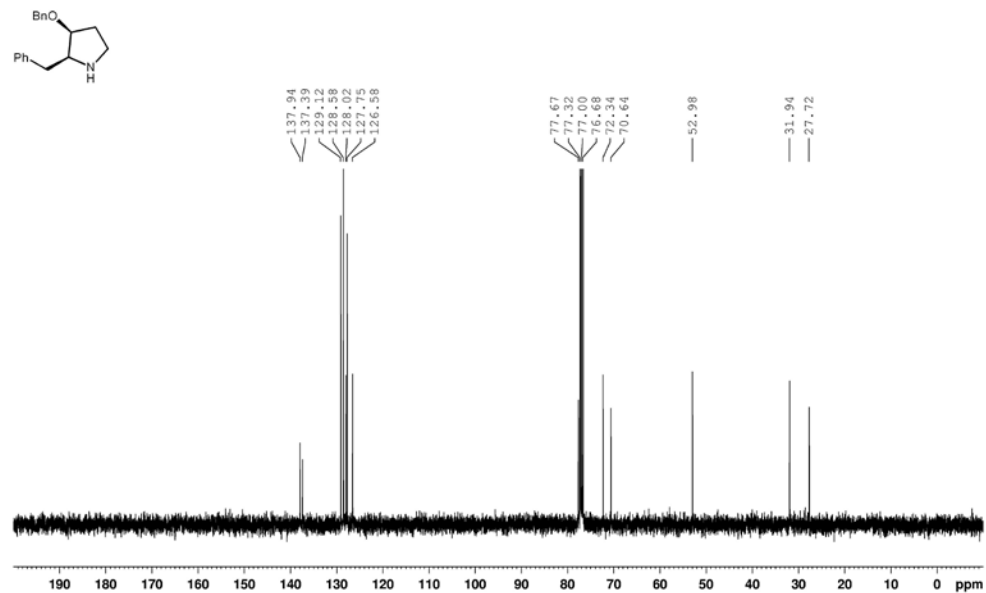


$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **12**:

GH-D-43-TM-PROTON256  
CDCl<sub>3</sub>  
2014/11/27

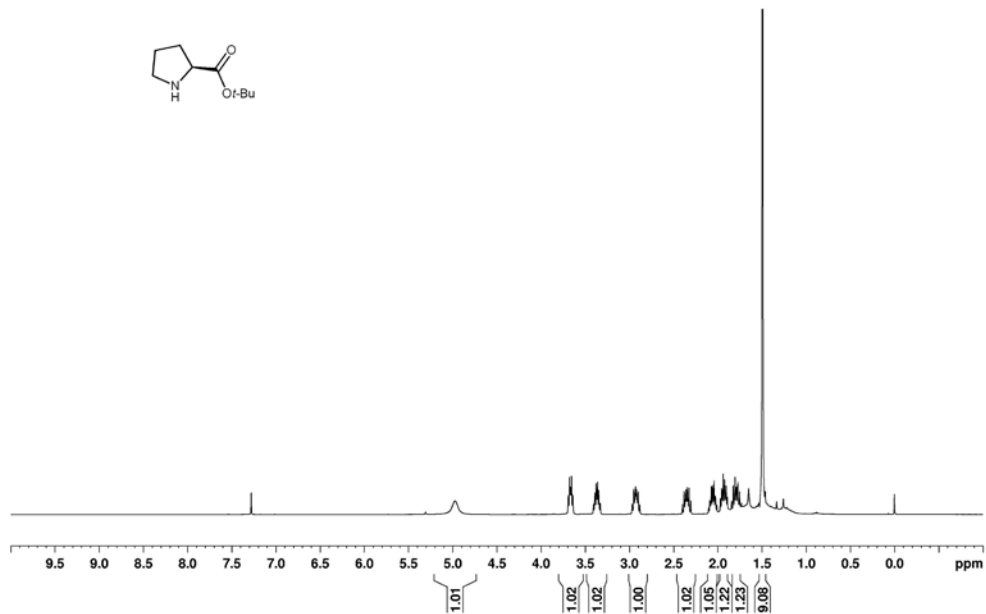
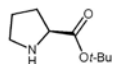


GH-D-43-(18-19)-C13CPD  
CDCl<sub>3</sub>  
2014/11/21



$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of compound **14**:

GH-D-49--PROTON256  
CDCl<sub>3</sub>  
2014/11/25



GH-D-49--C13CPD  
CDCl<sub>3</sub>  
2014/11/25

