Electronic Supplementary Material (ESI) for Organic & Biomolecular Chemistry.

Diastereoselective synthesis of (±)-trichodiene and (±)-trichodiene-D_3 as analytical standards for the on-site quantification of trichothecenes

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Content

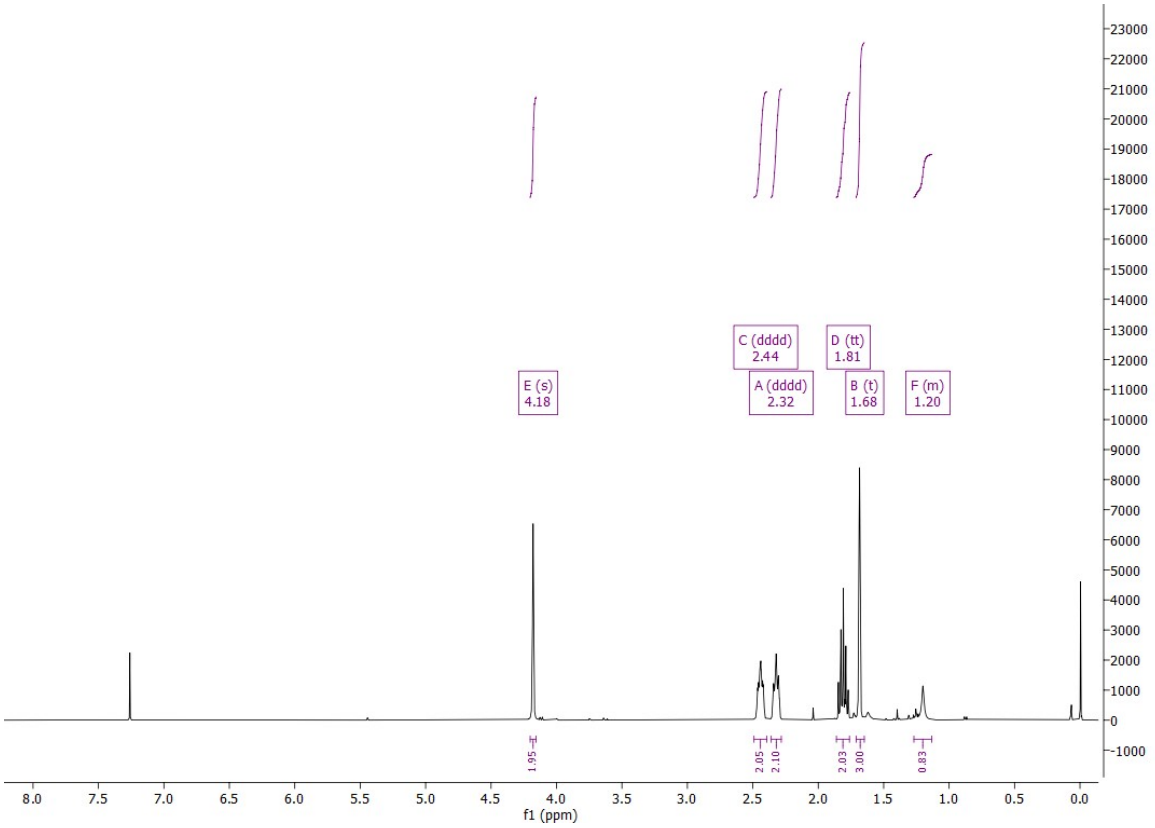
1. MATERIALS AND METHODS

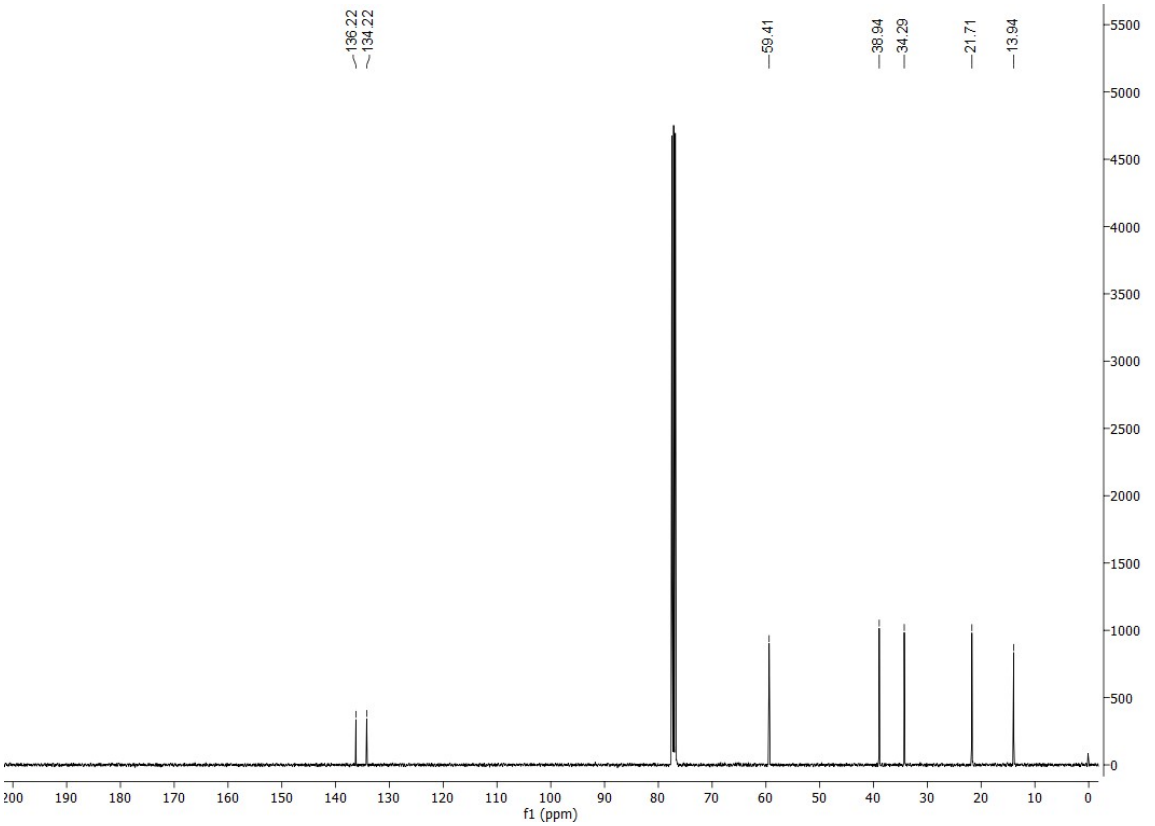
General Methods and Instruments. NMR spectra were either recorded on a Varian Mercury Plus 300 (300.8 MHz), Varian Mercury Plus 400 (399.95 MHz), or a Bruker Avance III HD (400.13 MHz) spectrometer (Varian/Agilent Technologies Inc., Santa Clara, CA, USA; Bruker Corp., Billerica, MA, USA). All signals were referenced to the respective solvent signals reported in the literature[1]. All coupling constants *J* refer to hydrogen–hydrogen interactions unless stated otherwise. The final products (±)-TD-D_3 **3a** and (±)-TD **3b** were analyzed using an Agilent Technologies 6890N Network GC System connected to an Agilent Technologies 5973N Network Mass Selective Detector (Agilent Technologies Inc., Santa Clara, CA, USA). Separation was performed with a SGE Analytical Science column (50 m x 0.22 mm, ID BPX5 x 0.25 µm, Trajan Scientific, Ridgewood, Victoria, Australia). The diastereomeric ratio of the final products was determined by comparison of the integrals of the vinylic protons of the endocyclic double bond.

2. ANALYTICAL DATA

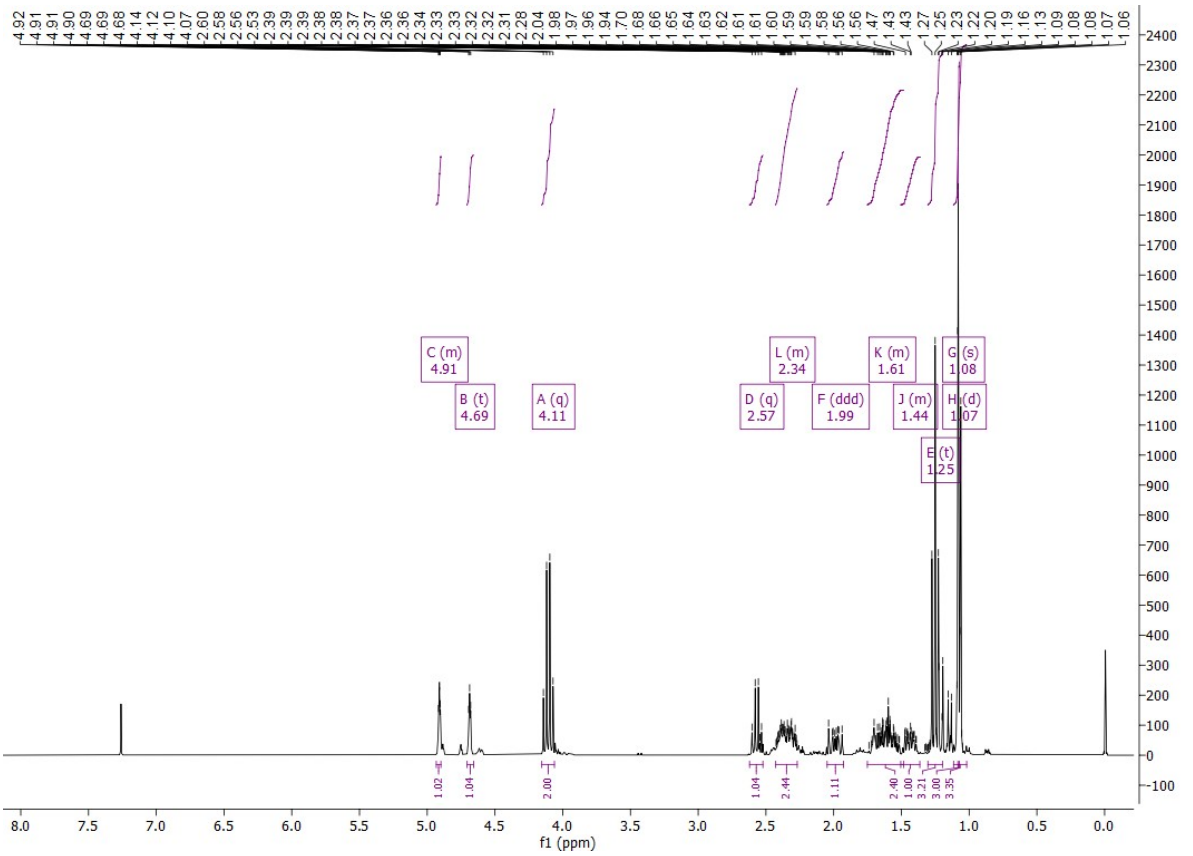
^{1}H- and ^{13}C-NMR spectra of all isolated compounds

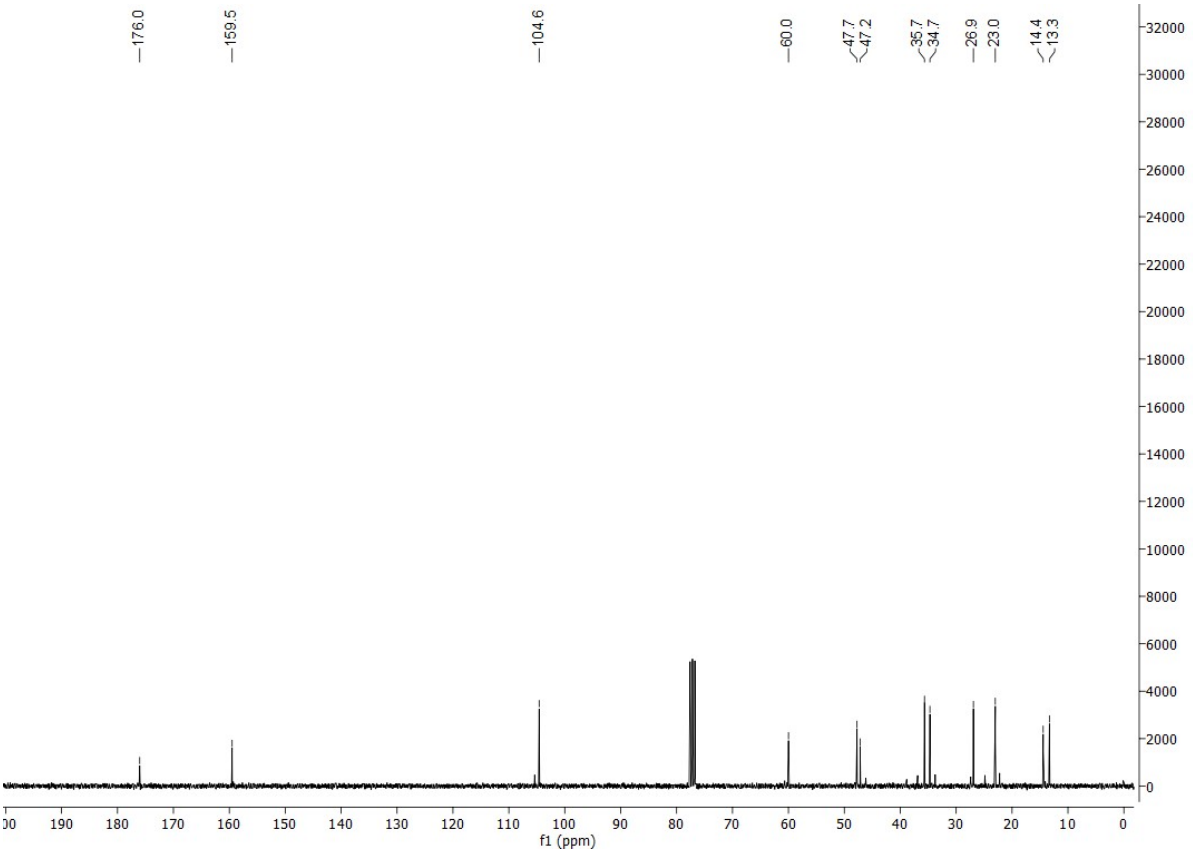
(2-methylcyclopent-1-en-1-yl) methanol (**7**)



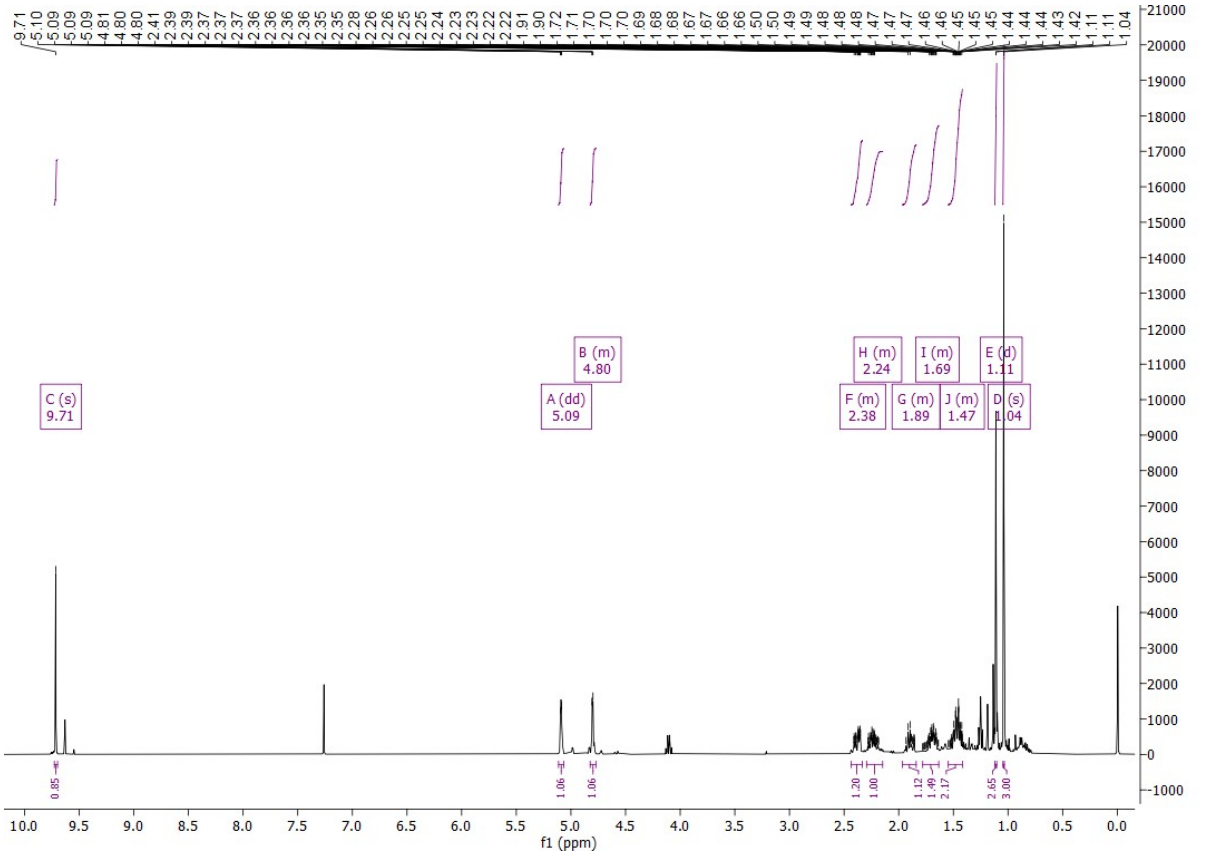


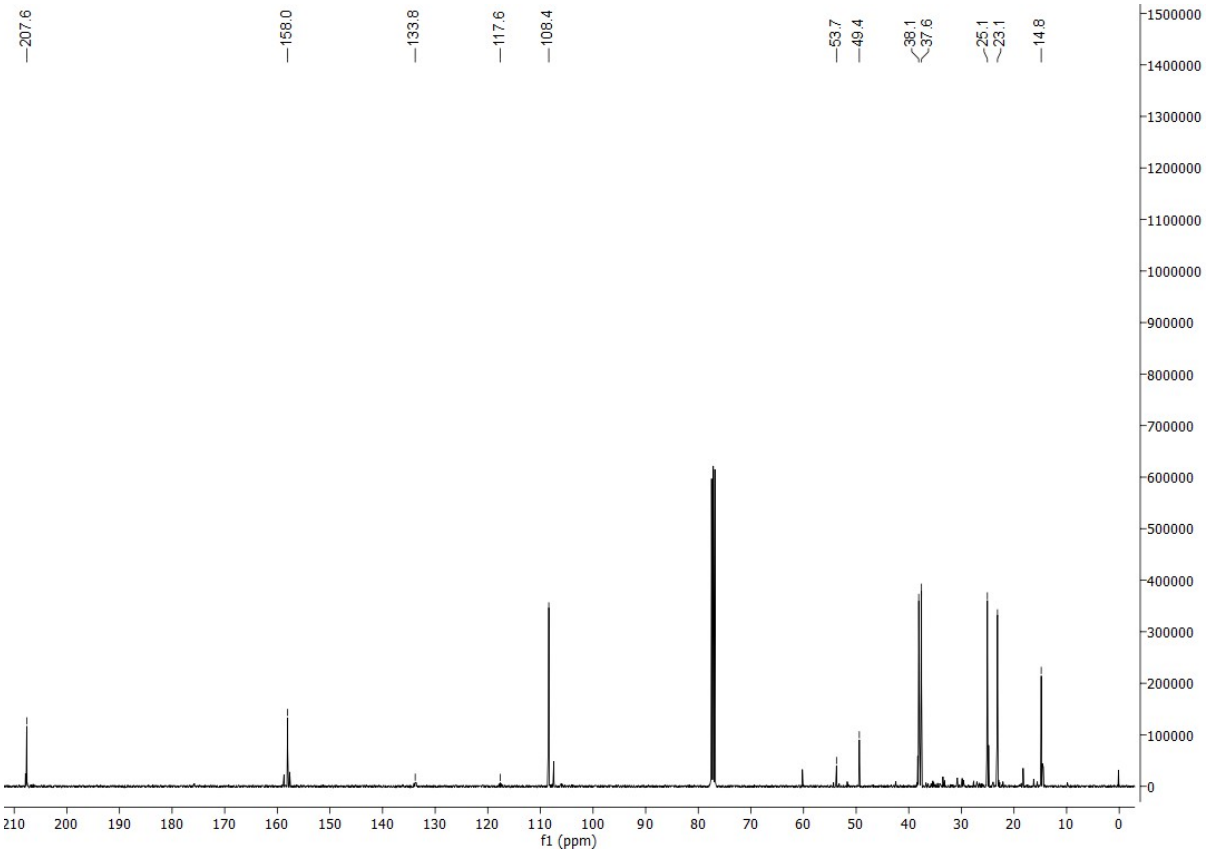
ethyl 2-(1-methyl-2-methylenecyclopentyl) propanoate (**5**)



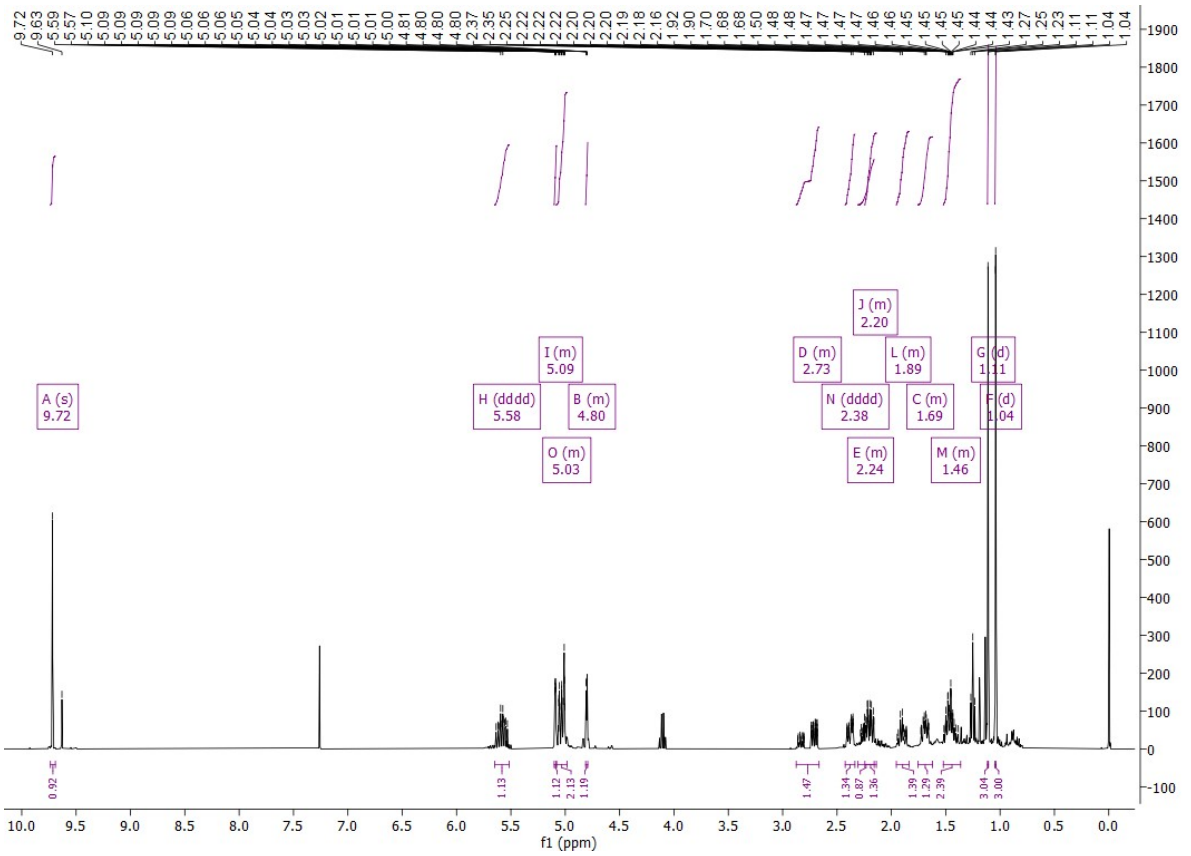


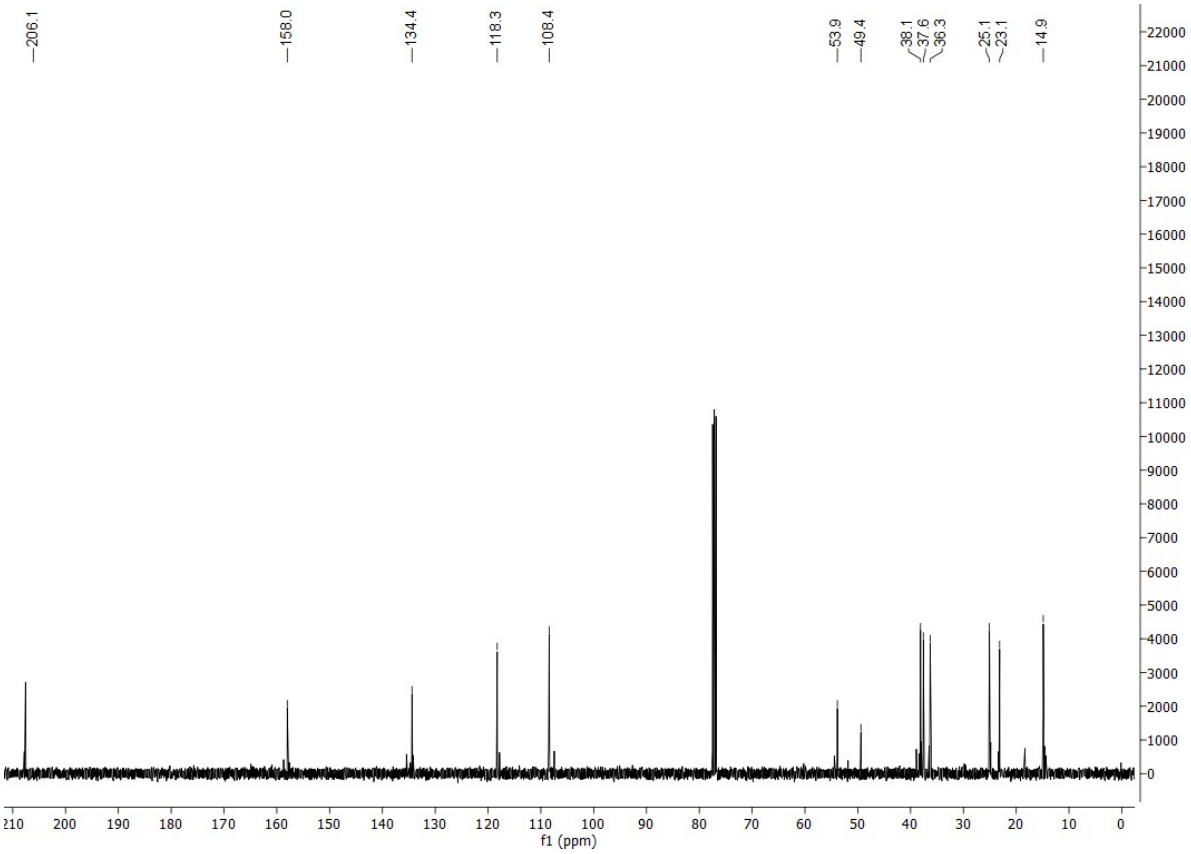
2-methyl-2-(1-methyl-2-methylenecyclopentyl) pent-4-enal-3,3,4,5,5-d_5 (**8a**)



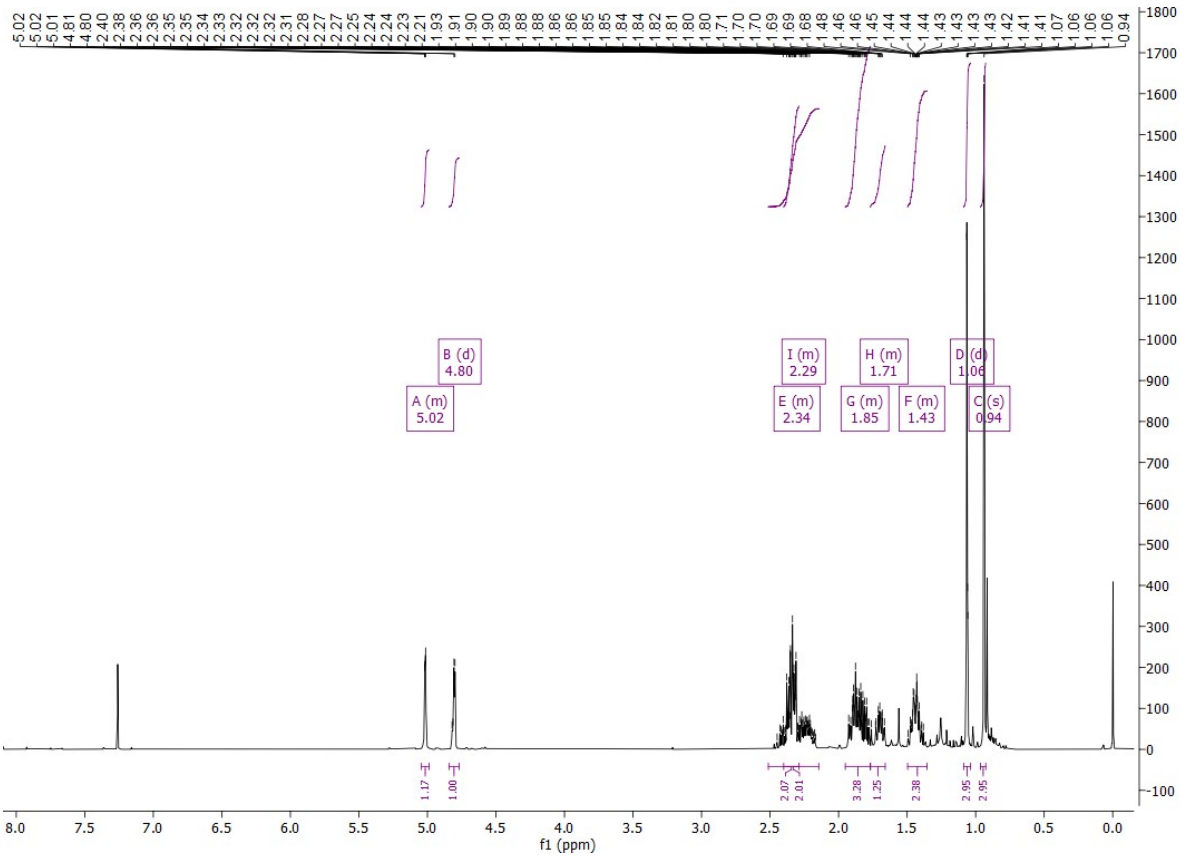


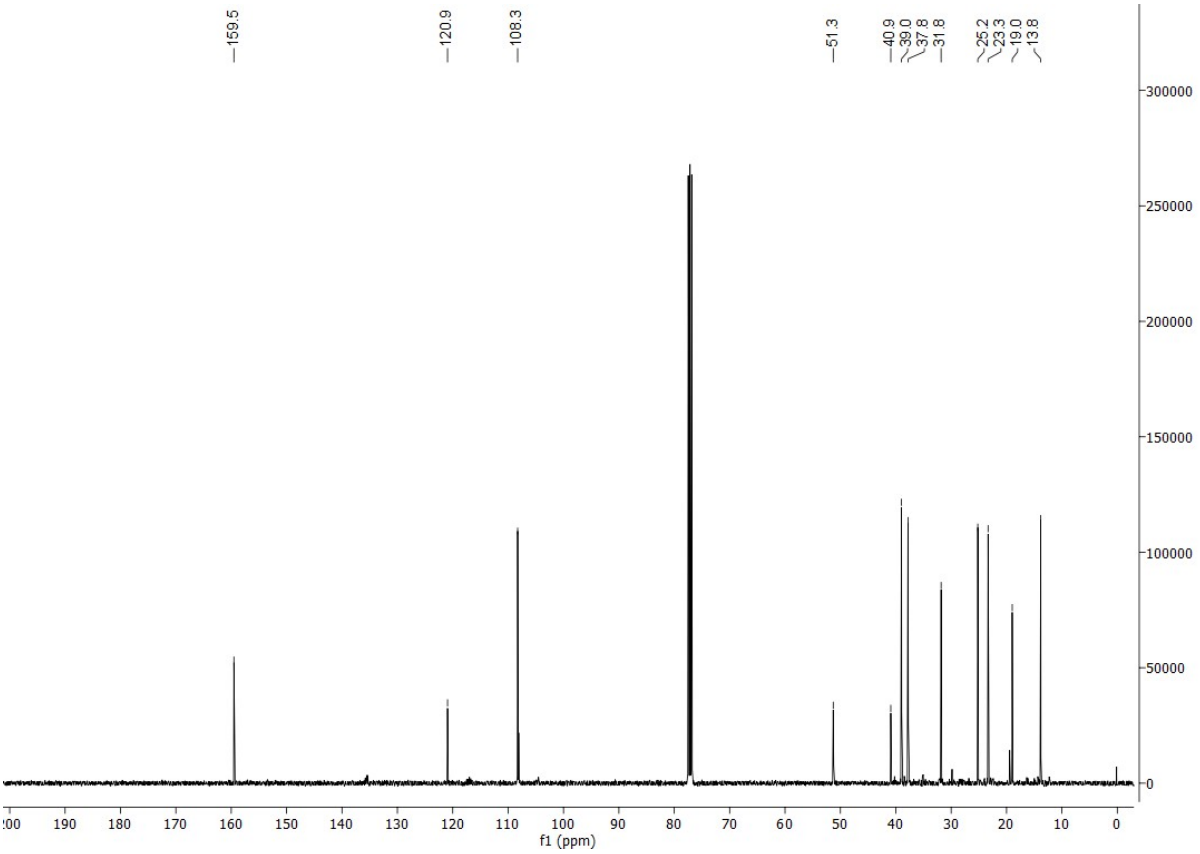
2-methyl-2-(1-methyl-2-methylenecyclopentyl) pent-4-enal (**8b**)



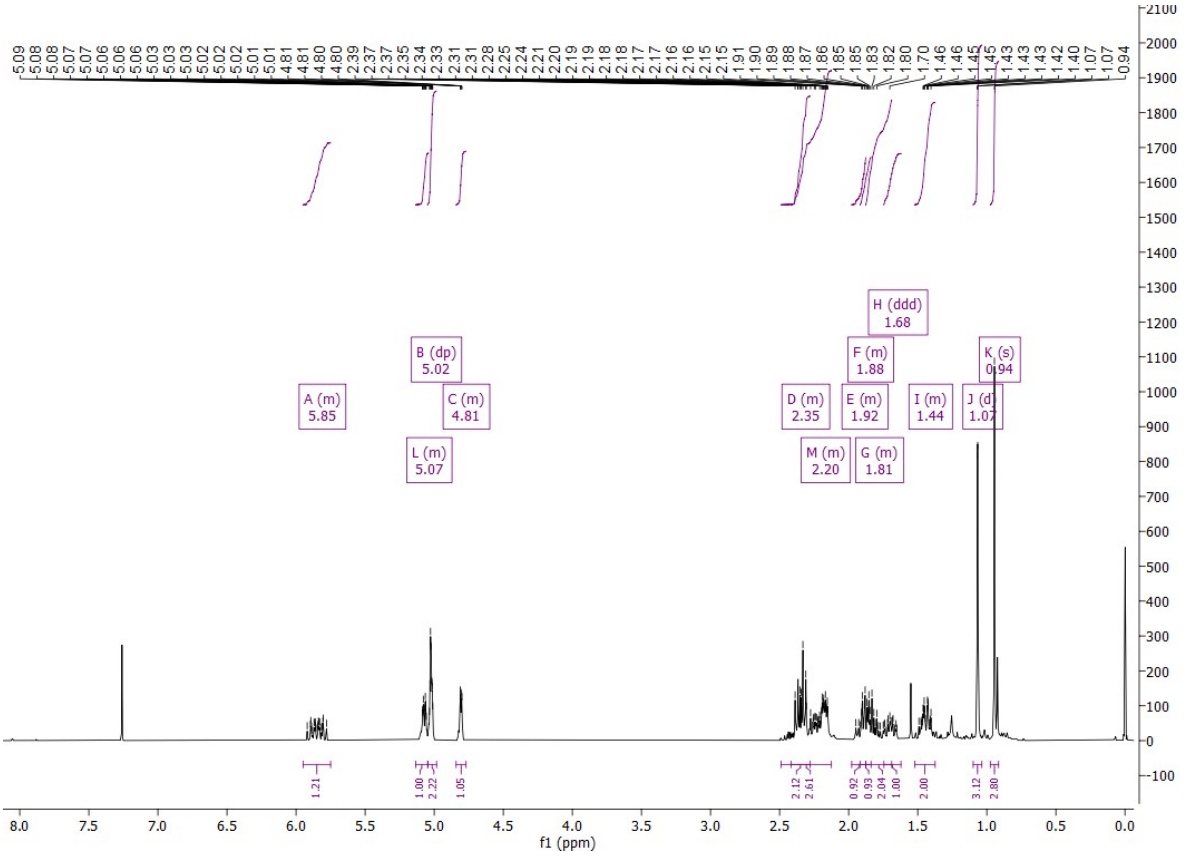


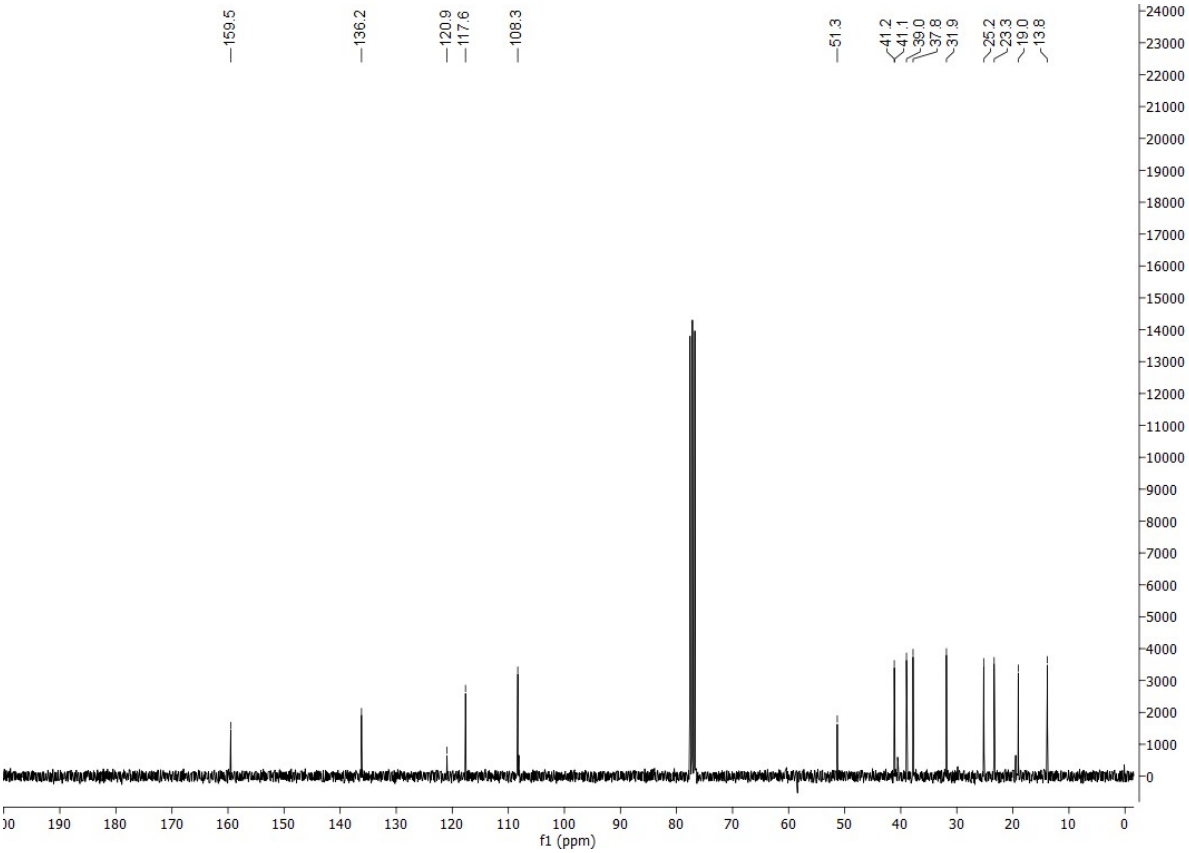
4-methyl-4-(1-methyl-2-methylenecyclopentyl) hept-6-enenitrile-5,5,6,7,7-d_5 (**9a**)



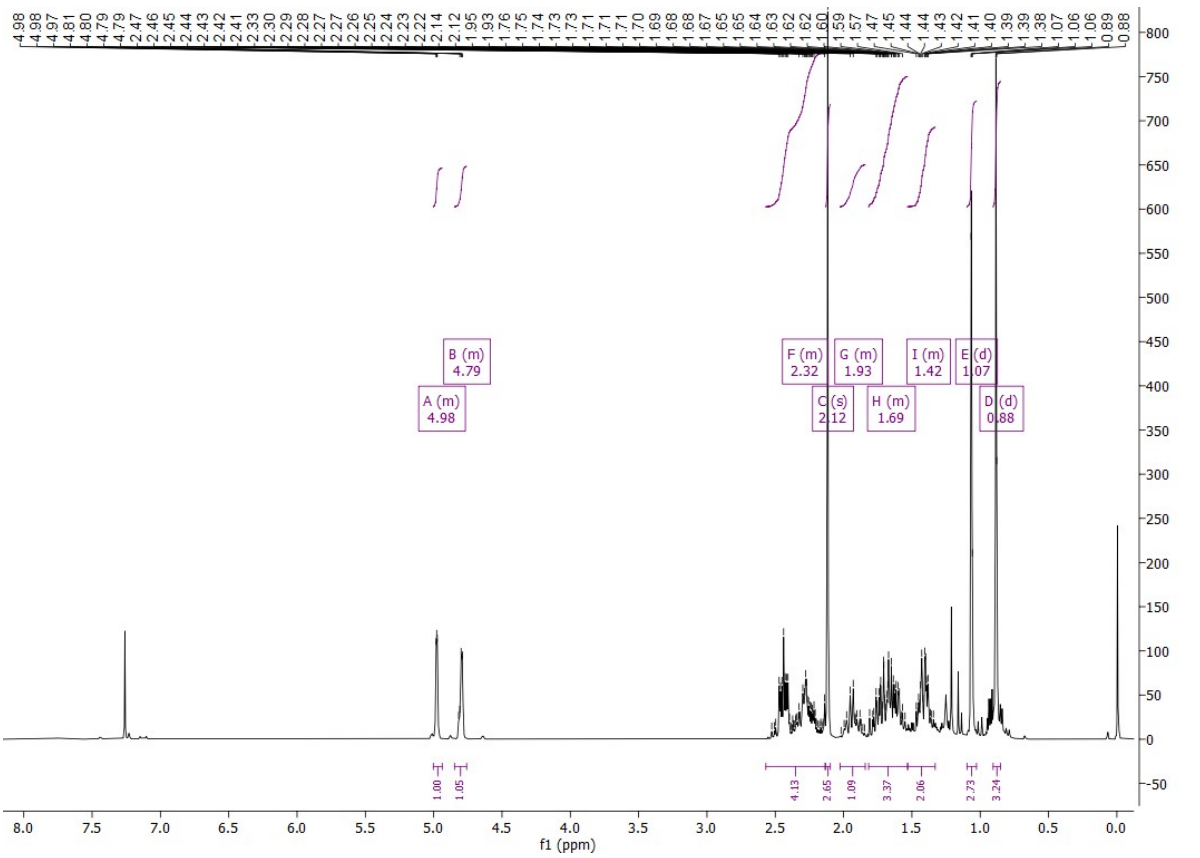


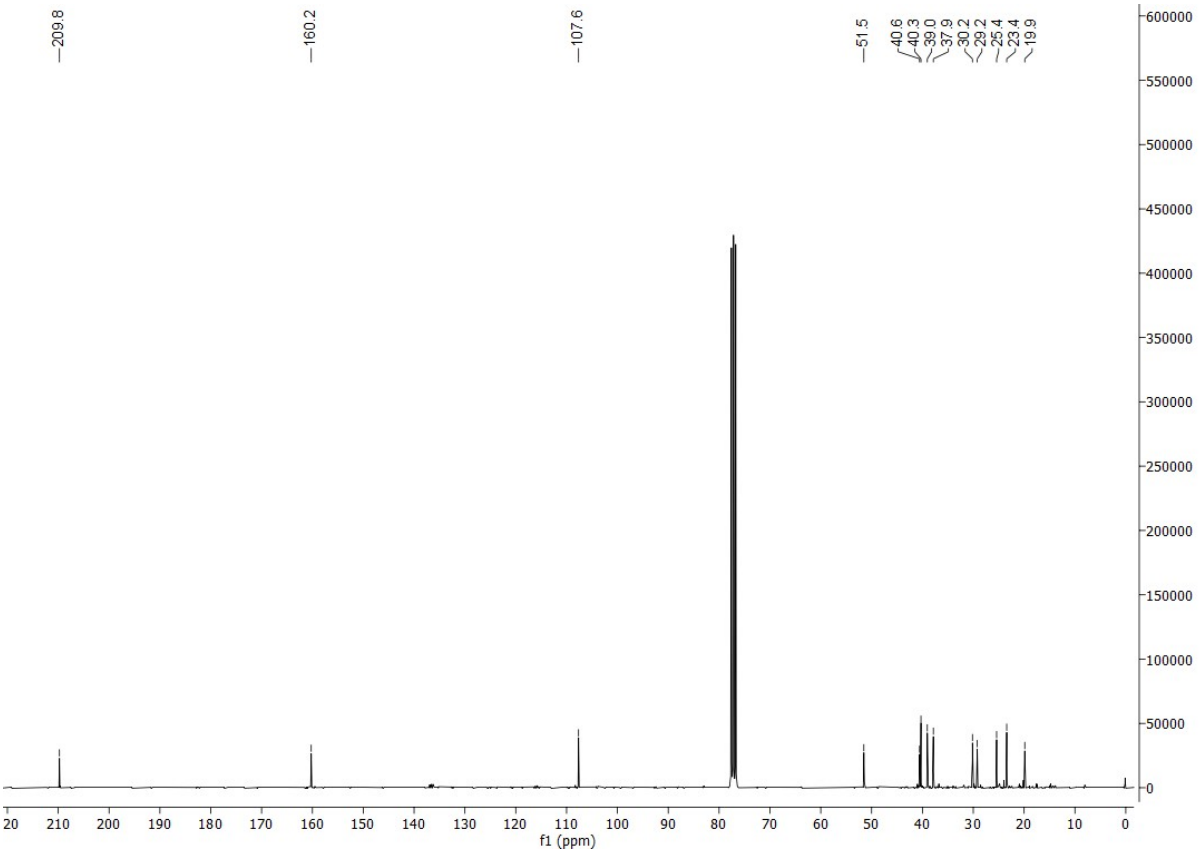
4-methyl-4-(1-methyl-2-methylenecyclopentyl) hept-6-enenitrile (**9b**)



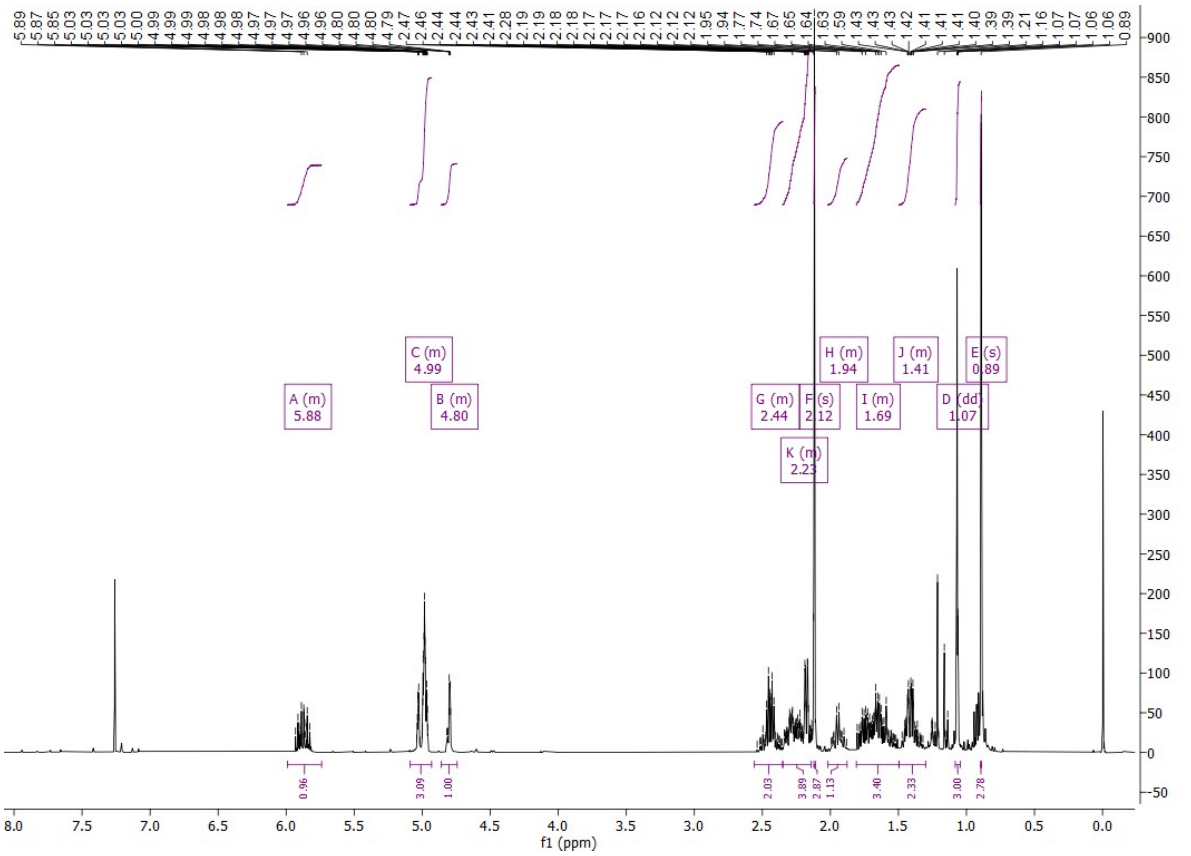


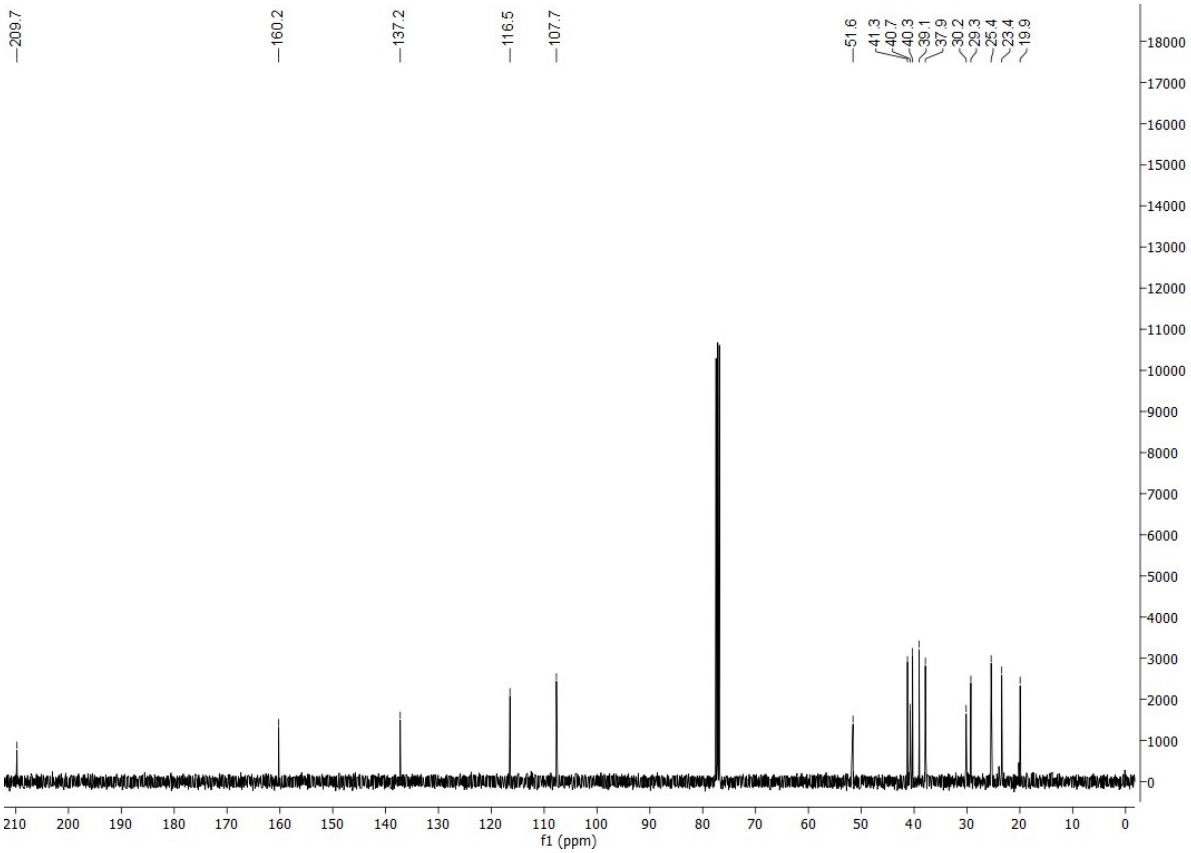
5-methyl-5-(1-methyl-2-methylenecyclopentyl) oct-7-en-2-one-6,6,7,8,8-d_5 (**4a**)



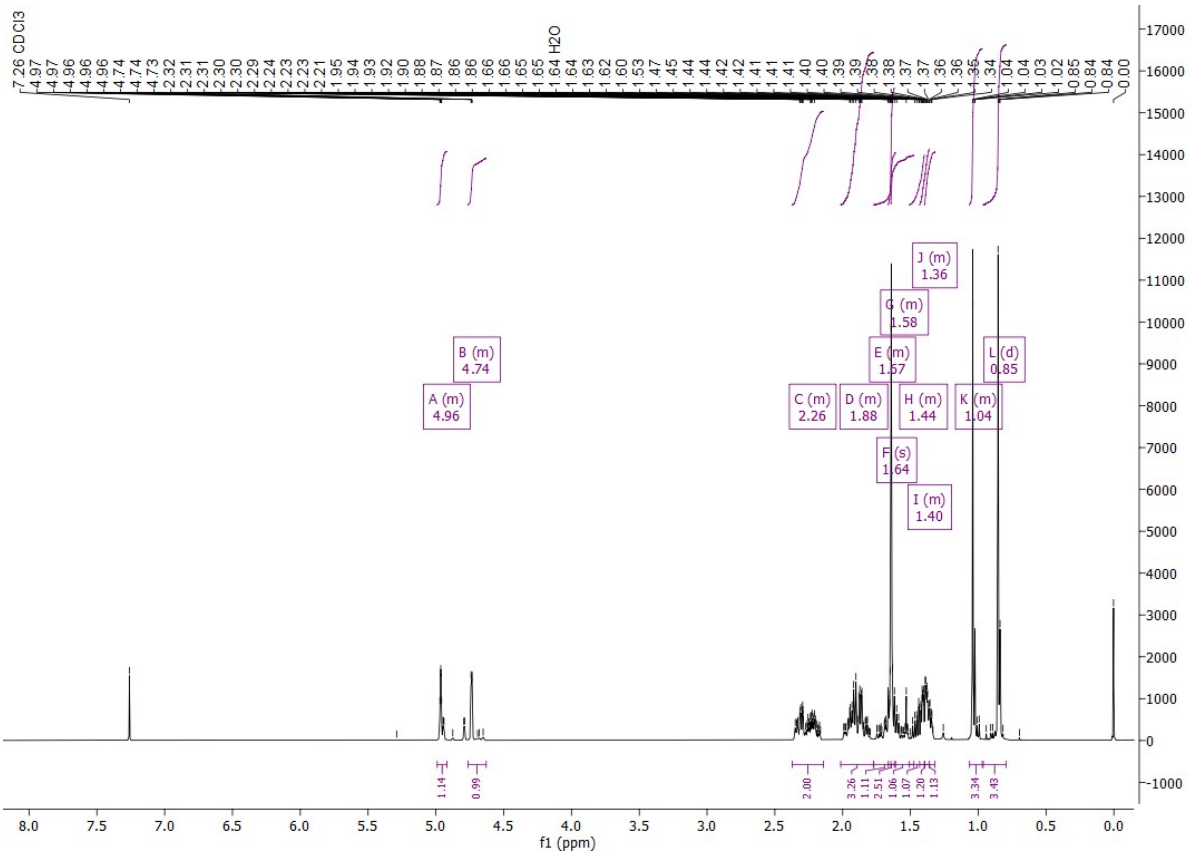


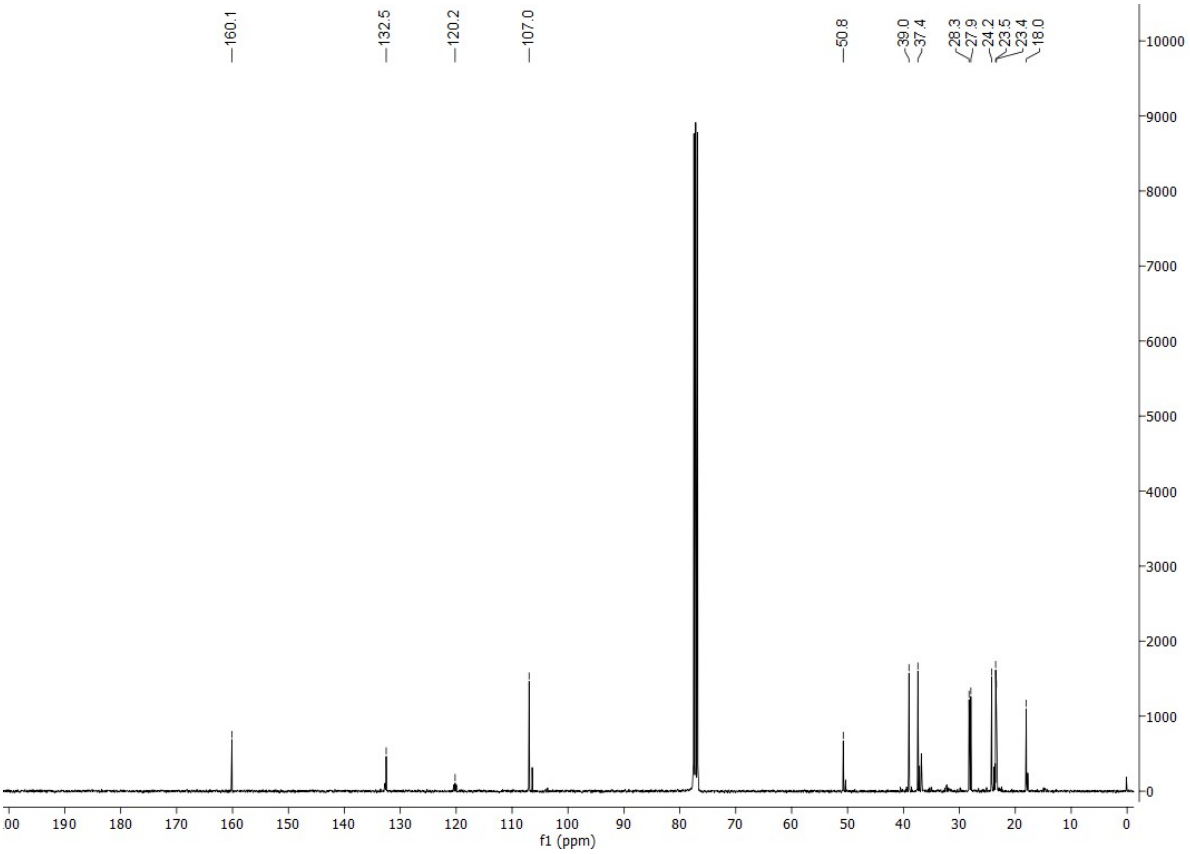
5-methyl-5-(1-methyl-2-methylenecyclopentyl) oct-7-en-2-one (**4b**)



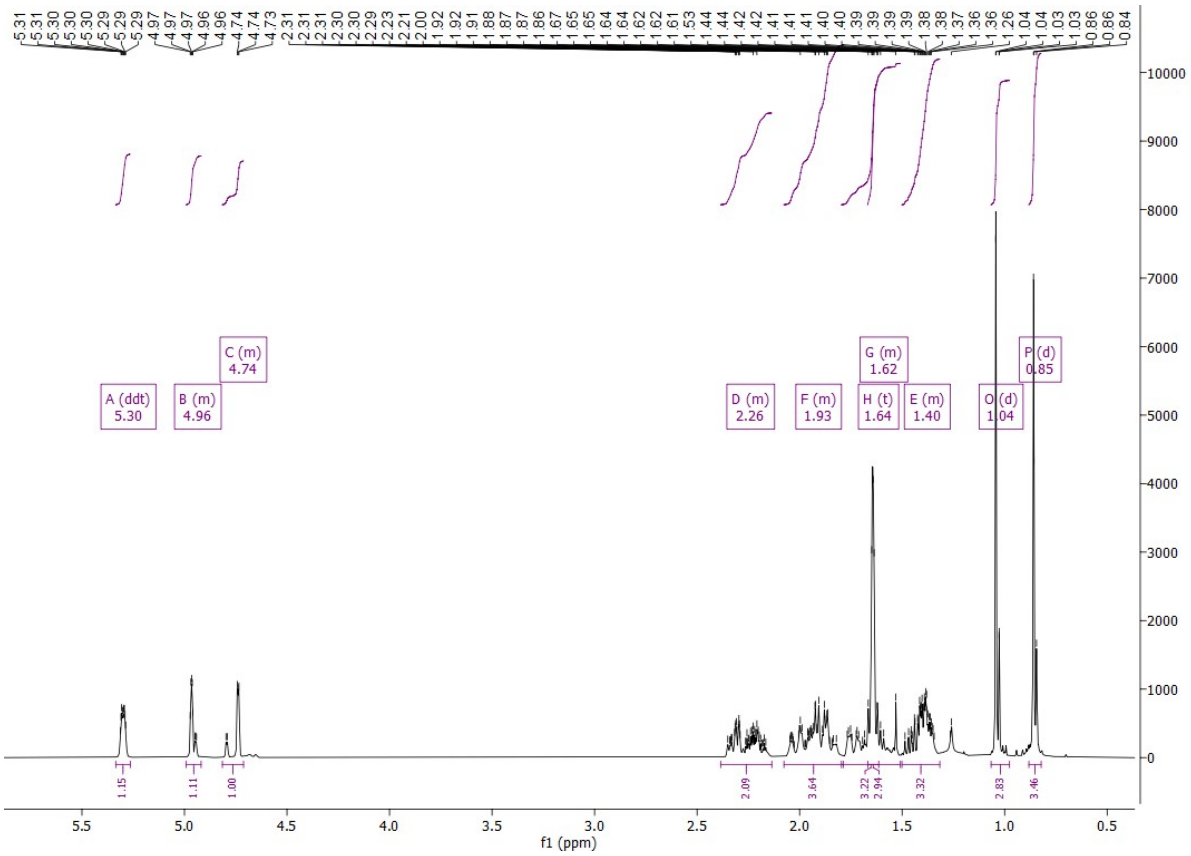


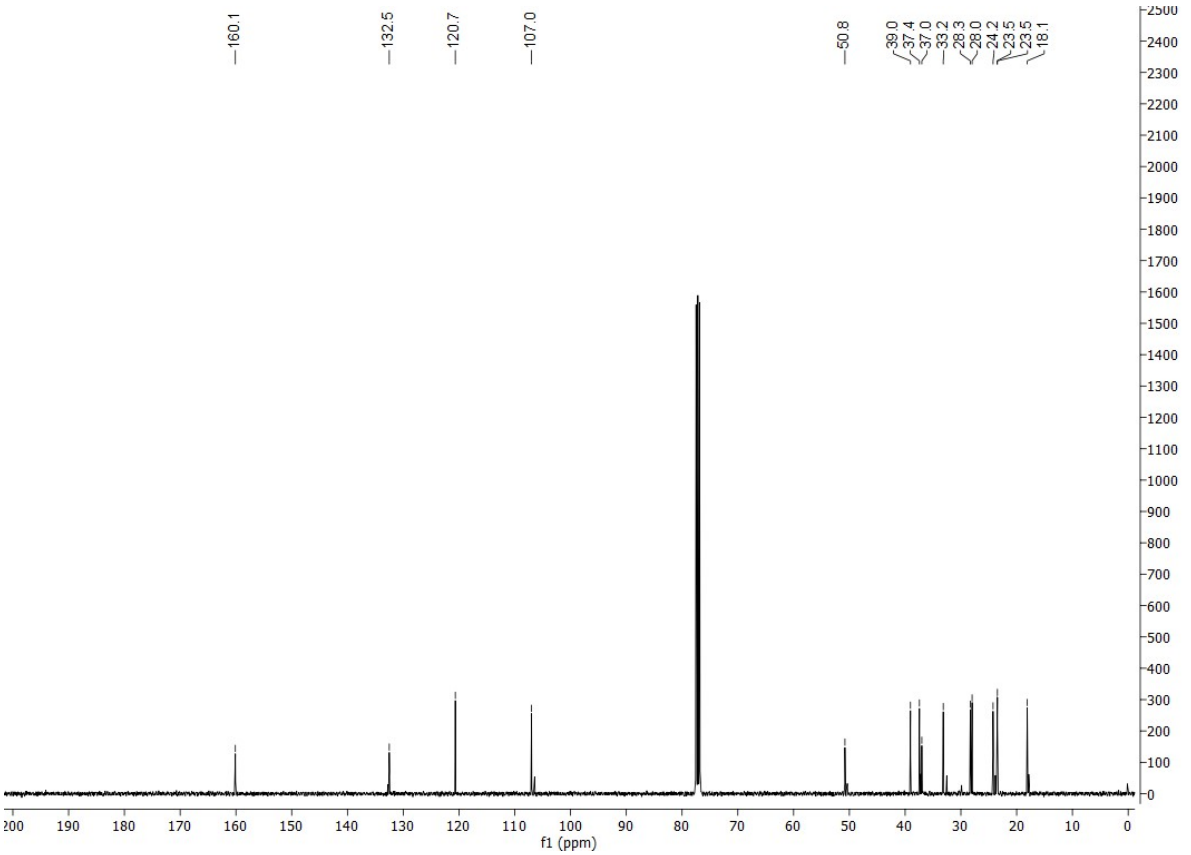
1,4-dimethyl-4-(1-methyl-2-methylenecyclopentyl) cyclohex-1-ene-2,3,3-d_3 ((±)-trichodien-D_3 **3a**)





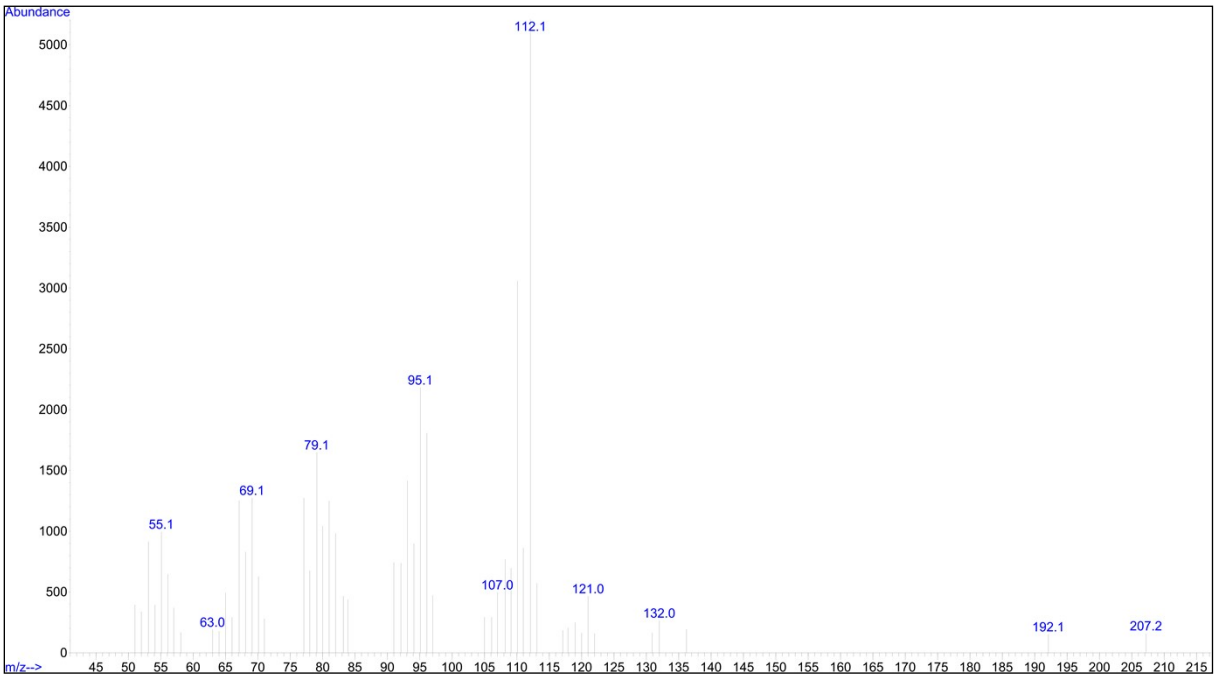
1,4-dimethyl-4-(1-methyl-2-methylenecyclopentyl) cyclohex-1-ene ((±)-trichodien **3b**)



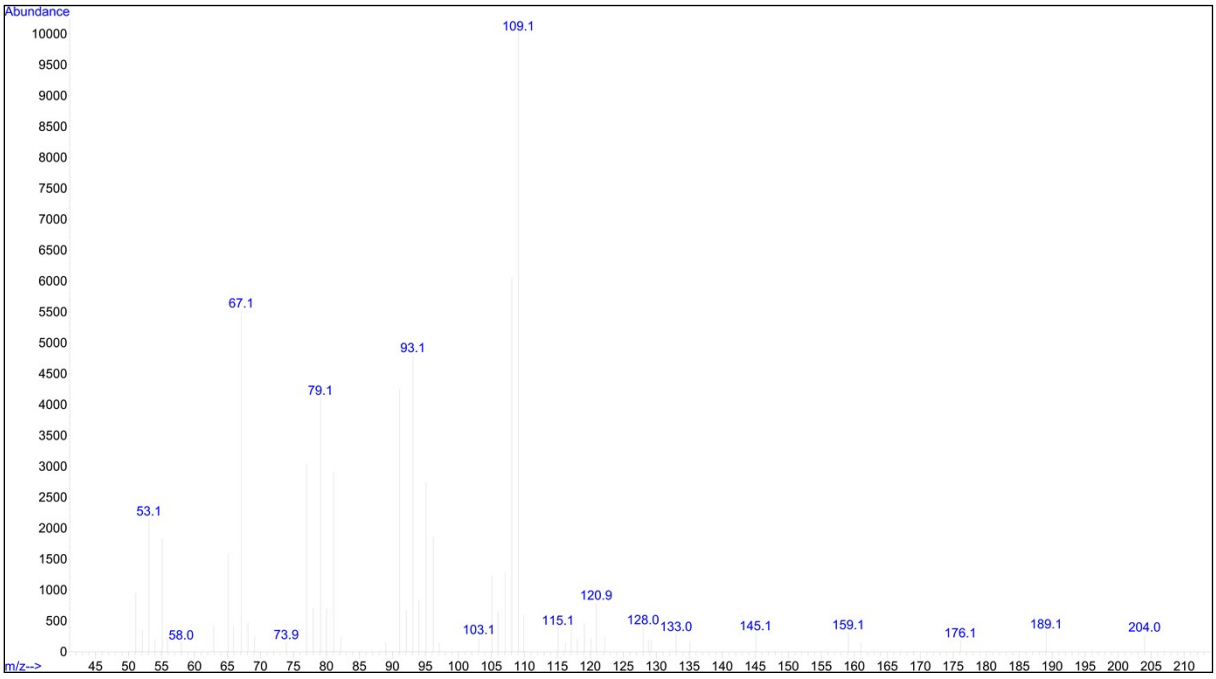


GC-EI-MS Analysis of TD-D_3 3a and TD 3b

1,4-dimethyl-4-(1-methyl-2-methylenecyclopentyl) cyclohex-1-ene-2,3,3-d_3 ((±)-trichodiene-D_3 **3a**)

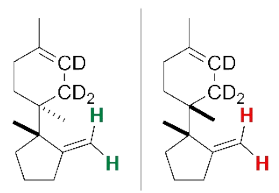


1,4-dimethyl-4-(1-methyl-2-methylenecyclopentyl) cyclohex-1-ene ((±)-trichodiene **3b**)



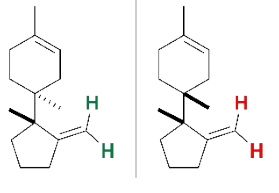
Diastereomeric ratio of TD-D_3 3a and TD 3b

1,4-dimethyl-4-(1-methyl-2-methylenecyclopentyl) cyclohex-1-ene-2,3,3-d_3 ((±)-trichodiene-D_3 **3a**)



d.r. = 4.5 : 1 ~ 82% (±)-TD-D_3

1,4-dimethyl-4-(1-methyl-2-methylenecyclopentyl) cyclohex-1-ene ((±)-trichodiene **3b**)



d.r. = 4.5 : 1 ~ 82% (±)-TD

3. REFERENCES

1 N. R. Babij, E. O. McCusker, G. T. Whiteker, B. Canturk, N. Choy, L. C. Creemer, C. V. D. Amicis, N. M. Hewlett, P. L. Johnson, J. A. Knobelsdorf, F. Li, B. A. Lorsbach, B. M. Nugent, S. J. Ryan, M. R. Smith and Q. Yang, *Org. Process Res. Dev.*, **2016**, *20*, 661–667.