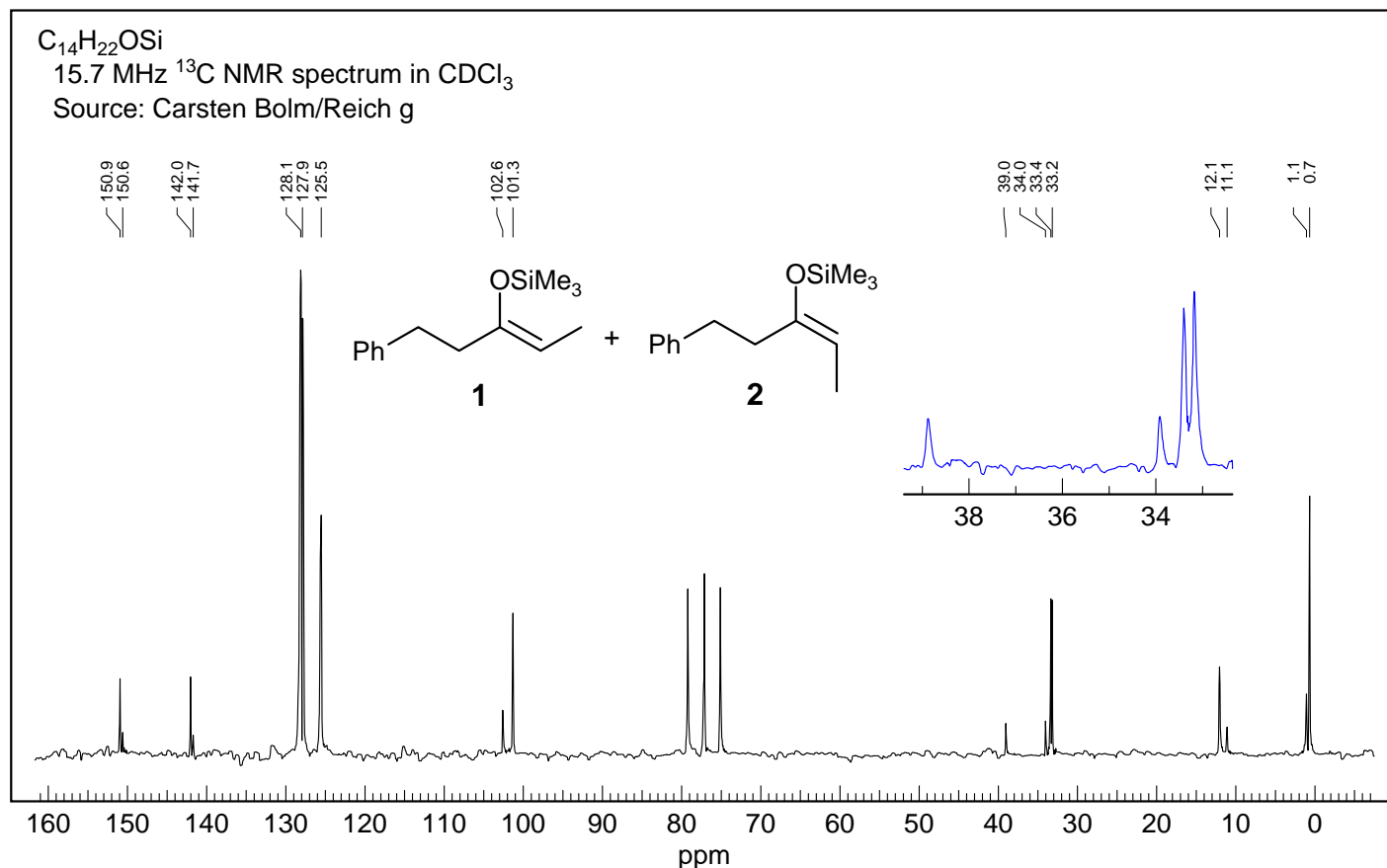


Exercise: The 15.7 MHz ^{13}C NMR spectrum (CDCl_3) below is of an approximately 3:1 mixture of stereoisomers. Which is the major isomer? Explain.



Solution:

The chemical shifts of the major and minor isomers for all carbons except one differ by less than 1.4 ppm. The exception are of the CH_2 carbons. In the major isomers the two CH_2 are close together (33.2 and 33.4), whereas in the minor isomer one of them is downfield at 39.4, the other at 34.0. Thus one of the CH_2 , likely the one marked, differs by at least 5.4 ppm, a typical γ -shift for cis interaction across the double bond. Thus the major isomer is **2**, the *E*-isomer, where the CH_3 and CH_2 are cis to each other. Note that the CH_3 group, which has a γ -interaction with the CH_2 in the *E*-isomer, and with the OSiMe_3 group in the *Z*-isomer has a shift difference of only 1.0 ppm in the two isomers.

