CH-314 Structural Analysis
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Jigsaw 2B

1. [Hore Section 2.2] The ^{1}H Larmor frequency of C_2H_6 exceeds that of C_2H_4 by 2.0 kHz on a spectrometer with a 9.4 T magnet. The chemical shift of C_2H_6 is 1.2 ppm. What is the chemical shift of C_2H_4?

2. [Week 2 Slides 13-15 and Keeler Section 5.1] During acquisition in an NMR experiment we measure what is called a time-domain signal (i.e., the signal is measured as a function of time). However, a time-domain signal is uninterpretable by eye and thus we need a way to transform this signal into an interpretable spectrum. *See also: Jigsaw 2C.1*

    a. What mathematical procedure is used to transform the time-domain signal, and what kind of signal will be the result of this procedure (i.e., in what domain)?

    b. Explain and sketch how the transformation from part (a) works on a time-domain signal and how it can generate a spectrum in the desired domain.

3. [Hore Section 2.2] ^{1}H and ^{13}C NMR spectra were recorded for two isomers of $C_3H_2Br_6$. Both ^{13}C spectra contain peaks at three distinct chemical shifts. Isomer 1 has one distinct ^{1}H chemical shift and isomer 2 has two. *See also: Jigsaws 2A.1, 2C.2, 2D.1, and 2E.1.*

    a. Deduce the structures of the two compounds.

    b. Predict the number of chemical shifts in the ^{1}H and ^{13}C spectra of the other two isomers of $C_3H_2Br_6$.