A Hands on Introduction to NMR

22.920

Lab and Problem Set #2

The Rotating Frame, RF pulses and the Bloch Equations

1. On-resonance with water, show the variation in the signal intensity with RF pulse length. Find the 90°, 180° and 270° pulse lengths.

2. Move well off-resonance, $\Delta\omega > \omega 1$, and see how the signal following a 270° pulse is changed.

3. Set up an inversion recovery sequence and estimate the spin-lattice relaxation time from the value of tau for which the signal in nulled.

1. From the attached set of NMR spectral intensities vs RF pulse length,

a. what is the 90° pulse length in micro-seconds?

b. what is the RF field strength in Hz?

c. what is this in Gauss?

2. Why does the spectrum following a 180° pulse look dispersive?

3. From the attached set of NMR spectral intensities as a function of the relaxation time in an inversion-recovery T1 measurement, compute the T1 in seconds.