CH-314 Structural Analysis
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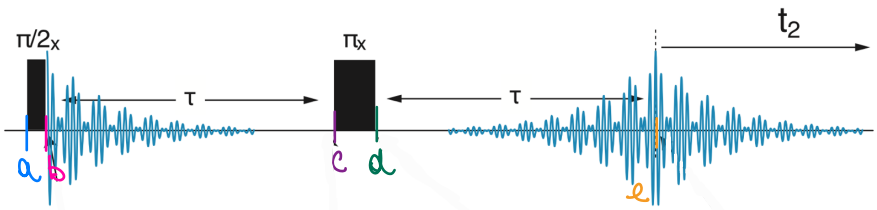
Jigsaw 5A

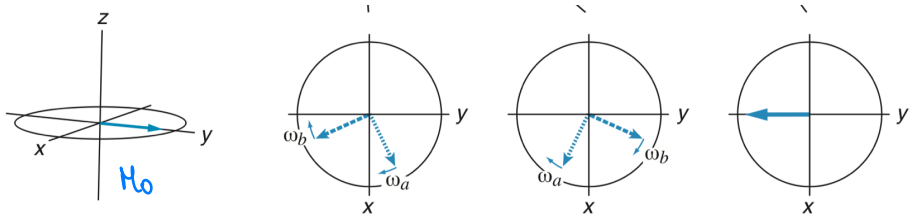
Vector model: The spin echo

The spin echo sequence was one of the first multi-pulse sequences in NMR and is still frequently used in modern experiments.

1. Draw the spin echo pulse sequence, making sure to indicate the pulse lengths and phases, delays (τ, you do not need to choose a specific value), and the acquisition period.



2. Use vector diagrams to show what happens to magnetization initally at equilibrium along the z-aixs during the spin echo sequence.



This doesn't match up with your pulse sequence or the table below…magnetization after first x pulse should be at -y (not +y)

3. For the point immediately before and after each pulse, as well as immediately before acquisition, fill in the values of magnetization along the x, y, and z directions in the table below. Use M_{eq} to represent the equilibrium magnetization.

just for w2

	a	b	c	d	e
M_x	0	0	~~$M_0 \cos\omega_2 \tau$~~	~~$M_0 \cos\omega_2 \tau$~~	0
M_y	0	$-M_0$	~~$M_0 \sin\omega_2 \tau$~~	~~$-M_0 \sin\omega_2 \tau$~~	M_0
M_z	M_{eq}	0	0	0	0

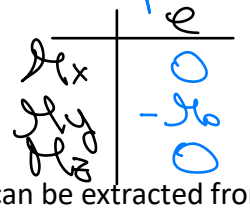
-M_eq (stay consistent with notation)

-M_eq*cos(wt)

sin and cos switched for c and d (M_y should be cos); negative signs flipped for c and d

4. In what way would the result differ if the second pulse was applied at 90° to the phase you chose (e.g., an x-pulse is replaced by a y-pulse)? Without drawing up further detailed diagrams, state what the effect of applying this new pulse would be.

If we change direct° of the pulse, the final orientat° of the magnetizat° vector. Typically, if we replace x-pulse by y-pulse:



5. What information can be extracted from a series of experiments where τ is progressively incremented?

We can get T_2, that is transverse relaxat° time.