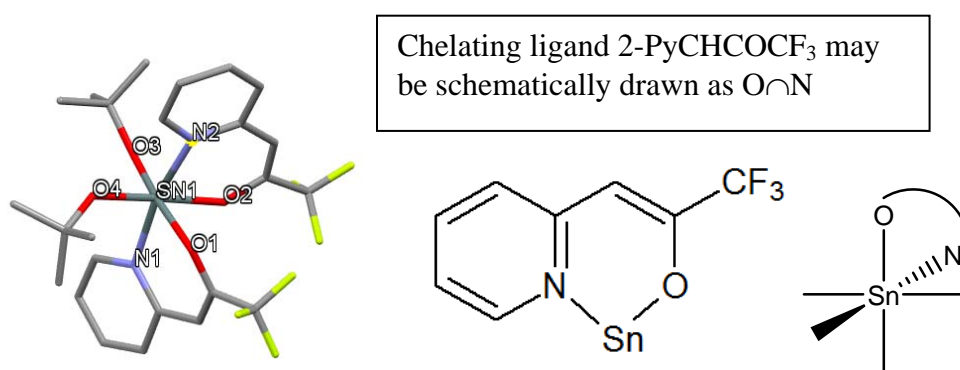


HW 1	Multinuclear NMR	Name:	
Points:	C6800	Date:	
Max. 100 points	Spring 2015	Version A	

- (10 points) Show that $E_{\text{mag}} = -\boldsymbol{\mu} \cdot \mathbf{B}_0 = -\mu_z |B|$
- (15 points) Find nuclear spins I of ${}^6\text{Li}$, ${}^9\text{Be}$, ${}^{55}\text{Mn}$, and ${}^{201}\text{Hg}$. For each nucleus list all possible values of m_I in the order of increasing stability of energy states.
- (15 points) Calculate the energy difference between the spin levels inside a 950 MHz magnet for a ${}^3\text{H}$ nucleus.
- (15 points) Calculate the excess of nuclei on the lowest energy level of ${}^3\text{H}$ at 300 K and 173 K.
- (25 points) Octahedral complex $\text{Sn}(\text{2-PyCHCOCF}_3)_2(\text{O}^t\text{Bu})_2$ may form several geometrical isomers. Find all of them, draw their geometrical formulas (ligand 2-PyCHCOCF₃ schematically), and give their symmetry point group label.



- (10 points) How many signals would you expect in ${}^{19}\text{F}$ NMR spectra for each isomer?
- (10 points) How many signals of ${}^t\text{BuO}$ groups would you expect in ${}^{13}\text{C}$ NMR spectra for each isomer?