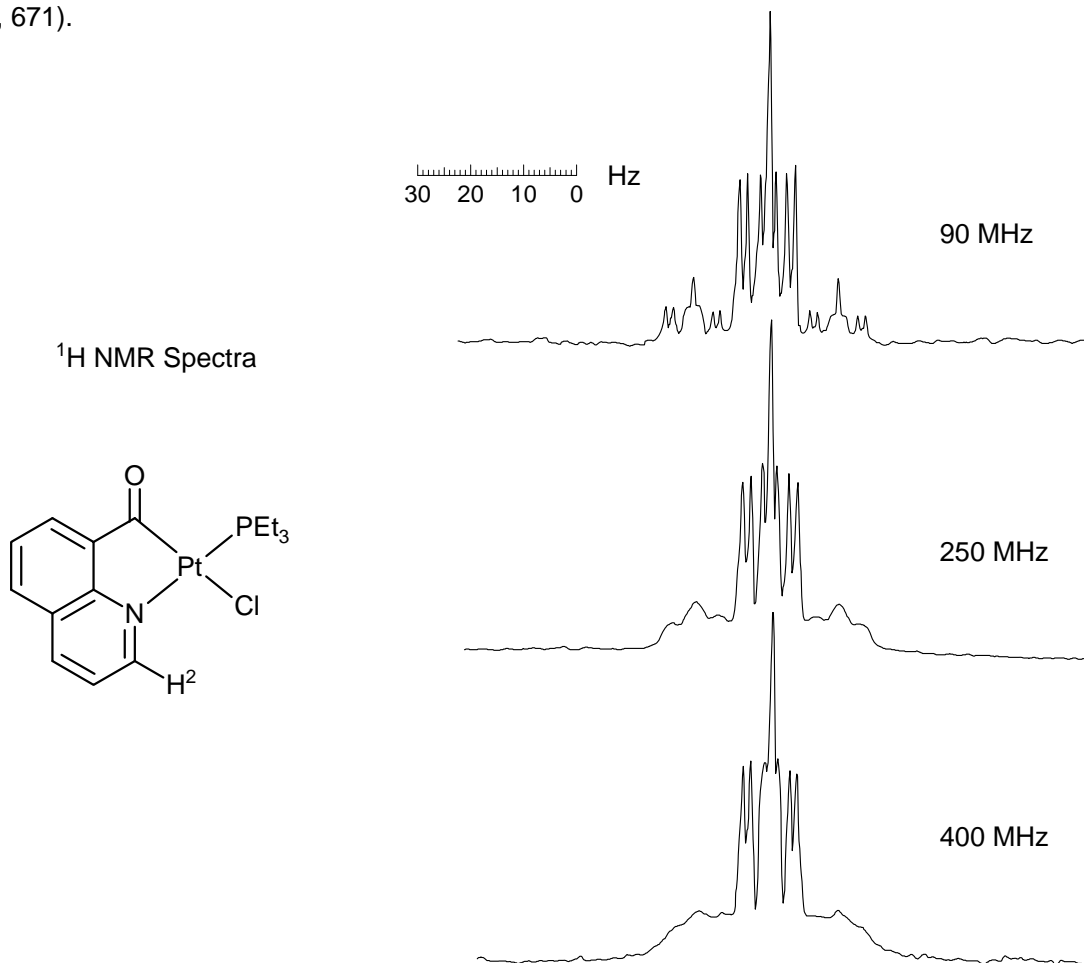
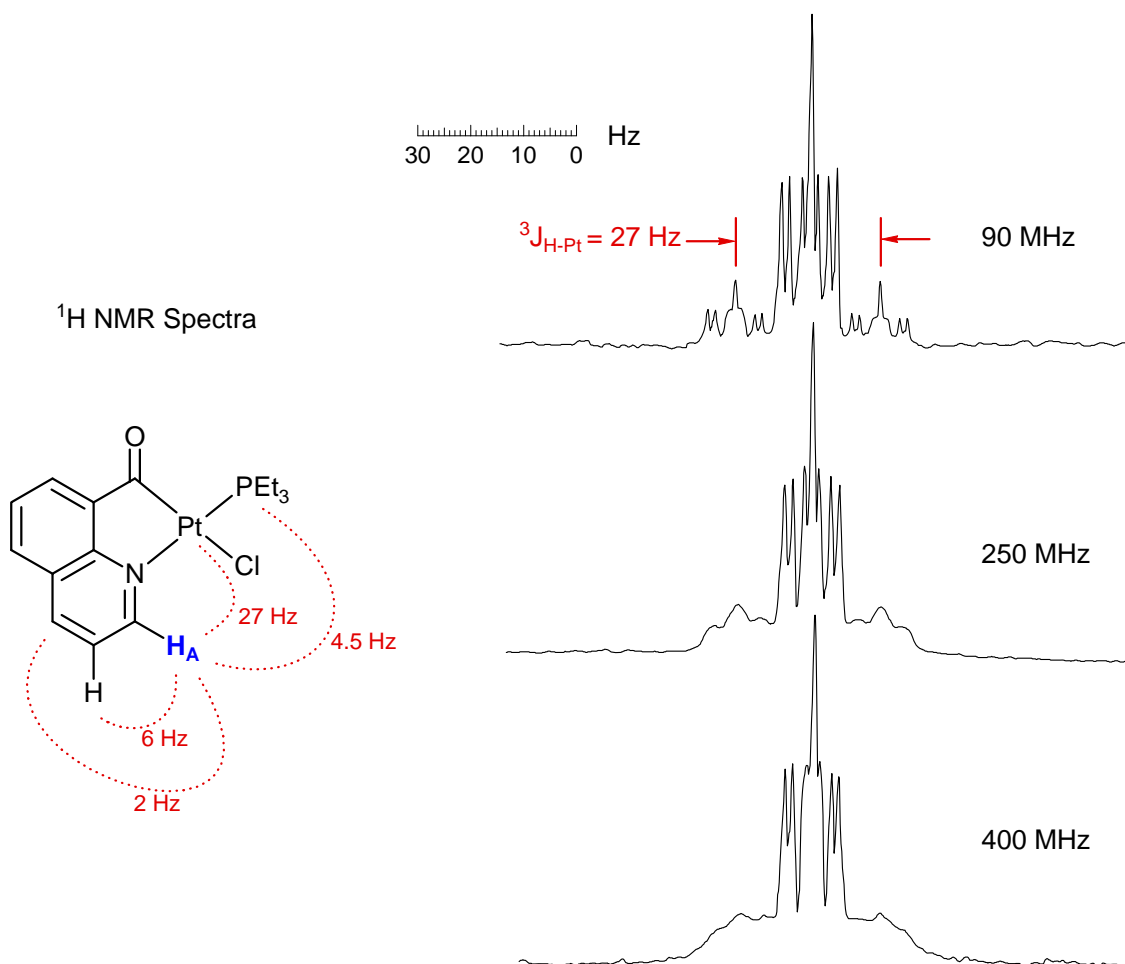


Problem R-120 ($C_{16}H_{21}ClNOPPt$). Shown below are partial 1H NMR spectra of a platinum complex at several field strengths. All three spectra are at the same Hz scale. Only the signal for H^2 is shown (source: *Magn. Res. Chem.* **1985**, 23, 671).



- (a) Explain and analyze the small outer peaks of the multiplet.
- (b) Analyze the multiplet. Give approximate coupling constants, report them in the form $^nJ_{XY} = \text{__ Hz}$. Assign the couplings.
- (c) Why do the small outer peaks become broad at higher field strength? This is not a fluxional molecule, and there is no ligand exchange under these conditions.

Problem R-120 ($C_{16}H_{21}ClNOPt$). Shown below are partial 1H NMR spectra of a platinum complex at several field strengths. All three spectra are at the same Hz scale. Only the signal for H_A is shown (source: *Magn. Res. Chem.* **1985**, 23, 671).



(a) Explain the small outer peaks of the multiplet.

3 These are ^{195}Pt satellites: $^3J_{HPt} = 27 \text{ Hz}$ ^{195}Pt $I = 1/2$, 33.7% abundant
 ^{31}P $I = 1/2$, 100% abundant

(b) Analyze the multiplet. Give approximate coupling constants, report them in the form $^nJ_{XY} = _ \text{ Hz}$. Assign the couplings.

The central peak is a ddd, $J = 6, 4.5, 2 \text{ Hz}$

6 Hz is ortho coupling ($^3J_{H-H}$)

4 4.5 Hz is coupling to P ($^4J_{H-P}$)

2 Hz is meta coupling ($^4J_{H-H}$)

(c) Why do the small outer peaks become broad at higher field strength? This is not a fluxional molecule, and there is no ligand exchange under these conditions.

3 ^{195}Pt must be relaxing by the CSA mechanism (chemical shift anisotropy), whose effectiveness varies as B_0^2 , so T_1 values become shorter at higher field, until the coupling in the satellites begins to be averaged out at 400 MHz. The central peak corresponds to the other Pt isotopes and is not affected by this process.