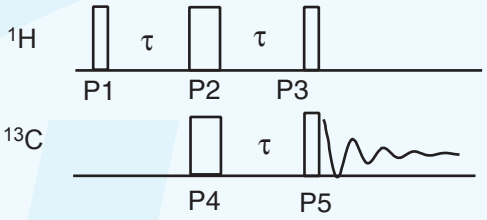
1. Introduction

The **I**nsensitive **N**uclei **E**nhanced by **P**olarization **T**ransfer (INEPT) experiment is used to increase the signal strength of nuclei with low gyromagnetic ratio and low natural abundance. Sensitivity enhancement is described by γ_H/γ_X with γ_H and γ_X being the respective gyromagnetic ratio of H and X. It is achieved by polarization transfer from protons to a bonded nucleus X via X-H spin coupling. This example demonstrates the basic procedure of double resonance 1D NMR data acquisition and processing on Tecmag spectrometers.

2. Pulse sequence

(a)



(b) Pulse width and phase cycle:

P1 (H90°): phH1 = 0, 0, 0, 0, 0, 0, 0, 0, 2, 2, 2, 2, 2, 2, 2, 2.
P2 (H180°): phH2 = 0, 2.
P3 (H90°): phH3 = 1, 1, 3, 3.
P4 (C180°): phC1 = 0, 2.
P5 (C90°): phC2 = 0, 0, 0, 0, 1, 1, 1, 1, 2, 2, 2, 2, 3, 3, 3, 3.
Receiver: phrx = 0, 0, 2, 2, 1, 1, 3, 3.
(phH2, phH3, phC1, phC2, and phrx are 1D phase tables. All tables are in 4 step mode.)

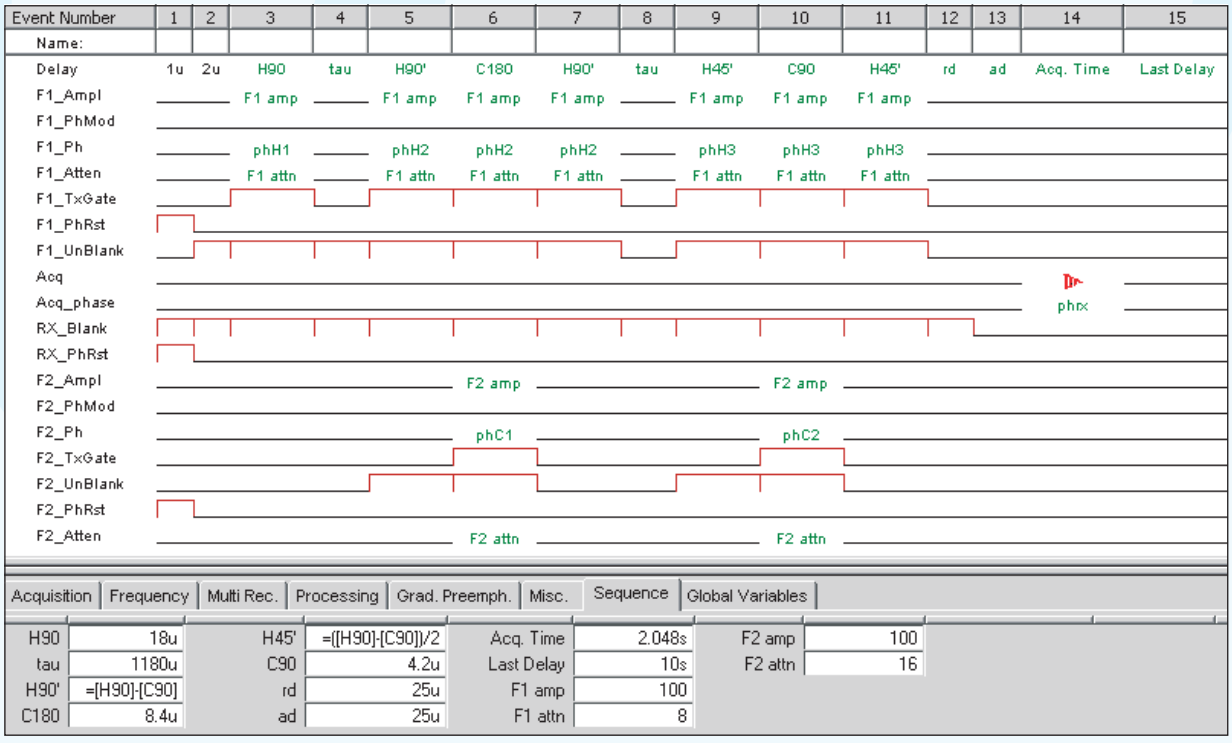


Fig. 1. (a) The ^{13}C INEPT sequence. (b) The sequence in the NTNMR sequence editor.

3. Experiment and Results

Sample:	5 % $CHCl_3$ in acetone-D_6
Spectrometer:	7 Tesla Magnet with Tecmag HF3 discovery
Probe:	Naloac D300-5 OWB 5mm $^{1}H/^{13}C$ Switchable probe
^{1}H hard pulse:	13.9 kHz (90^{o} = 18 µs)
^{13}C hard pulse:	59.5 kHz (90^{o} = 4.2 µs)
τ:	1.18 ms (= $1/4J_{C,H}$ = 212 Hz)
SW +/-:	± 500 Hz
Last Delay:	10 s
Scans 1D:	128

Notes:

1. Before editing the sequence (Fig. 1b), calibrate the 90^{o} pulse widths of ^{1}H and ^{13}C using the nutation experiment (see note, "One Pulse Experiment and Pulse Calibration").
2. The center of pulses P2 and P4 (also P3 and P5) should be aligned. Since P2 > P4 (and P3 > P5) P2 (and P3) have to split into 3 pulses. The delay of P2's (and P3's) middle pulse equals to P4 (and P5), and the delay of both sides is (P2 - P4)/2 [and (P3 - P5)/2]. The middle pulse of P2 (and P3) falls on the same event as P4 (and P5).

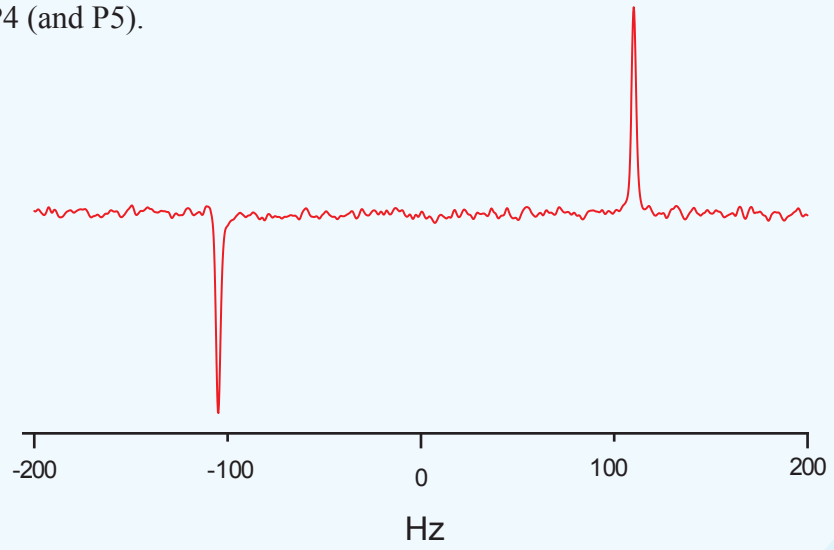


Fig. 2. The ^{13}C INEPT spectrum of $CHCl_3$ as obtained using the sequence shown in Fig.1.

4. References

1. G.A. Morris, R. Freeman, *J. Am. Chem. Soc.* **1979**, *101,* 760-763.
2. S. Braun, H.-O. Kalinowski, S. Berger, "150 and More Basic NMR Experiments", Wiley-VCH, 1999, p.168-170.