

Improvement of conventional experiments by perfect echo

Product used : Nuclear Magnetic Resonance (NMR)

Fig. 1a) shows the spin echo pulse sequence that we usually use. The disadvantage of this pulse sequence is phase distortions due to J -modulation appear. These phase distortions make data analysis difficult. Fig. 1b) ^{※1} shows the perfect echo pulse sequence that suppresses the influence of J -modulation. Replacing the spin echo pulse sequence with the perfect echo pulse sequence in cleaner spectra free of phase distortions.

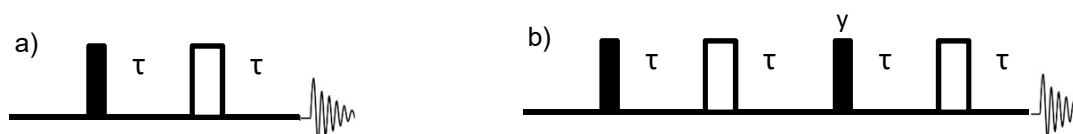


Fig. 1: Pulse sequences of spin echo a) and perfect echo b)

Examples of application.

The CPMG (Carr-Purcell-Meiboom-Gill) method is commonly used for T_2 measurement. The PROJECT (Periodic Refocusing of J Evolution by Coherence Transfer) experiment applies the perfect echo approach to the loop parts. Fig. 2 show spectra collected with CPMG a) and PROJECT b) pulse sequences.

Next, the dpfgse (Double Pulsed Field Gradient Spin Echo) version of WATERGATE experiment is commonly used for water suppression. The experiment that combines the WATERGATE dpfgse and perfect echo is WATERGATE PE. Fig. 3 show spectra collected with WATERGATE dpfgse a) and WATERGATE PE b).

In both Fig. 2 and Fig. 3, the phase distortions are suppressed by the application of perfect echo.

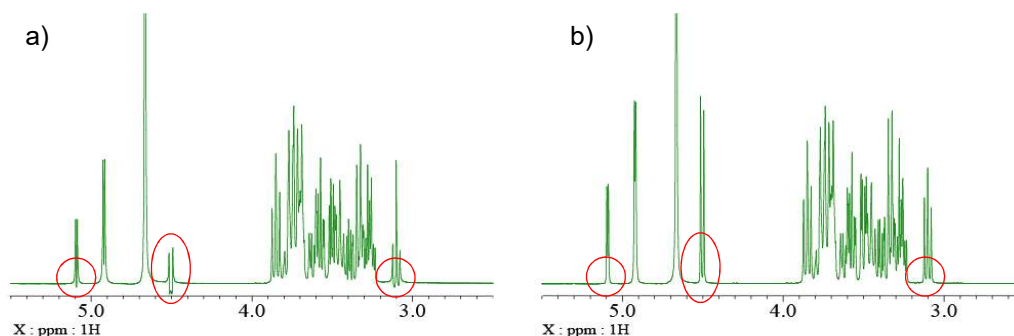


Fig. 2: a) CPMG spectrum and b) PROJECT spectrum of α -cyclodextrin and glucose in D_2O

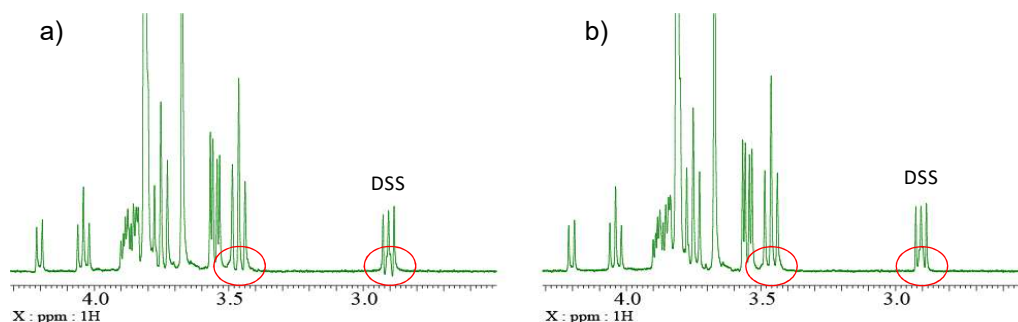


Fig. 3: a) WATERGATE_dpfgse spectrum and b) WATERGATE_PE spectrum of 2mM sucrose and DSS- d_6 in 90% H_2O /10% D_2O

※1 *J. Magn. Reson.*, **84**, 611-615 (1989)

※2 *Chem. Commun.*, **48**, 811-813 (2012)

※3 *Chem. Commun.*, **49**, 358-360 (2013)

Copyright © 2021 JEOL Ltd.

Certain products in this brochure are controlled under the "Foreign Exchange and Foreign Trade Law" of Japan in compliance with international security export control. JEOL Ltd. must provide the Japanese Government with "End-user's Statement of Assurance" and "End-use Certificate" in order to obtain the export license needed for export from Japan. If the product to be exported is in this category, the end user will be asked to fill in these certificate forms.

