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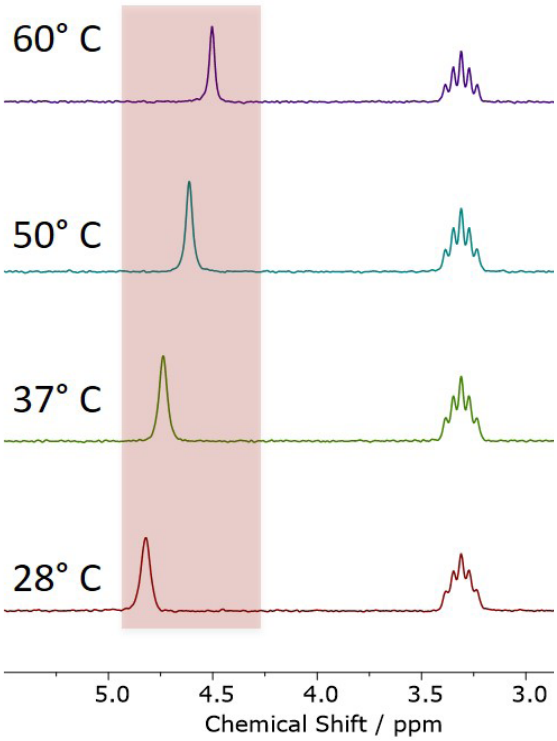
Spinsolve variable sample temperature

Measure your samples or monitor reactions at elevated temperatures

The Spinsolve 43 MHz systems can be equipped with a unique temperature control system that allows you to measure your samples at elevated temperatures (between 26 °C and 60 °C) without requiring nitrogen or dry air supply. This is achieved by adjusting the magnet temperature instead of using a gas flow approach, which not only eliminates the need for a VT unit, it also does not require any inset in the magnet that typically reduces the available space for the sample. This solution does not compromise resolution, sensitivity or stability and is also available with Spinsolve ULTRA models.

Outstanding Features

- Works with standard 5 mm tubes and flow cell without sensitivity loss
- No calibration or probe retuning required after temperature resetting
- Temperature range : 26 to 60 °C
- Frequency: 43 MHz
- Available with Classic and ULTRA Spinsolve models
- Compatible with pulsed field gradient option

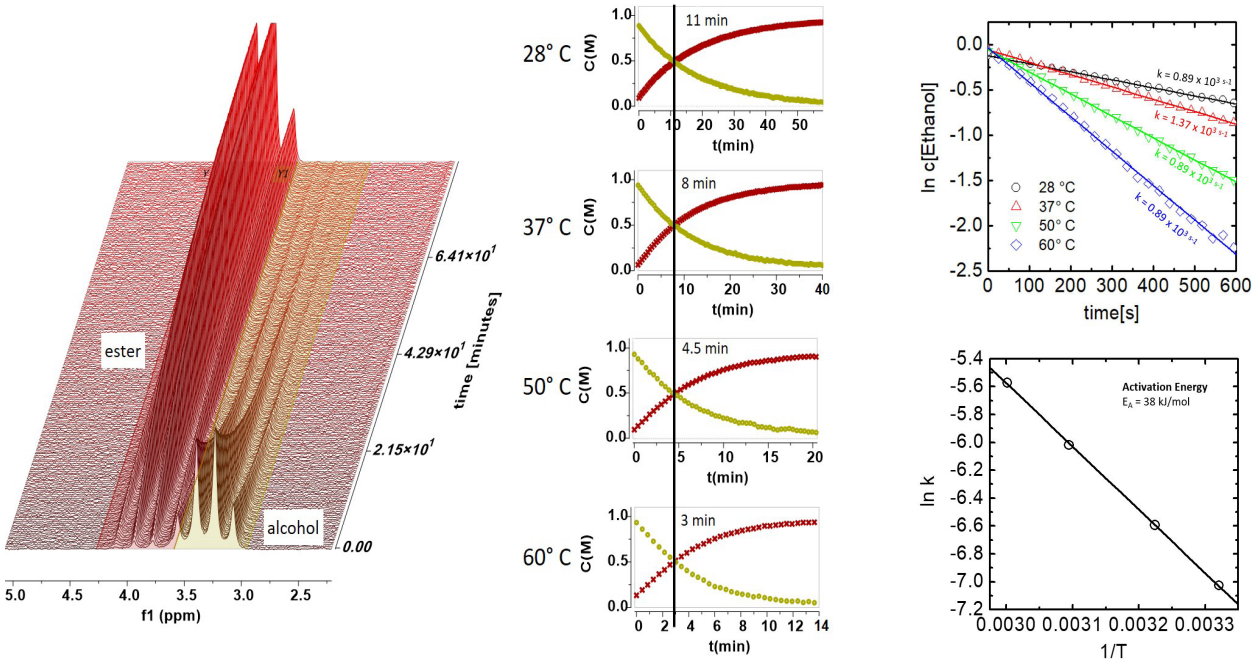


MeOD-NMR Thermometer: MeOD spectra acquired at different temperatures. The chemical shift differences are in excellent agreement with the calibration values of the NMR thermometer.

Temperature dependence of reaction kinetics

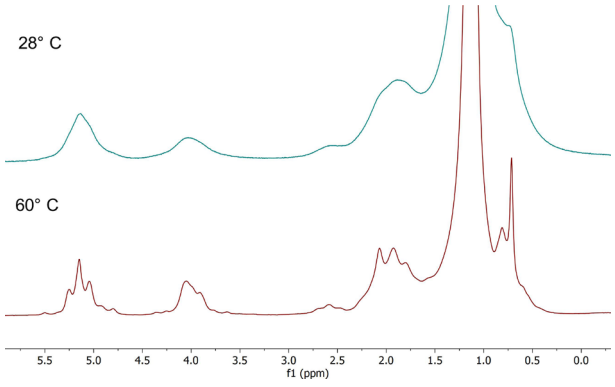
The sample temperature control allows you to conduct temperature dependent studies in the NMR tube or online. Below we can see the results obtained for the esterification of trifluoroacetic acid with ethanol at different temperatures. The appearance of the ester peak and the disappearance of the alcohol peak can be easily followed. The four graphs on the right show the concentrations obtained through the integration of the ester and the alcohol as a function of time for different temperatures.

As trifluoro acetic acid was used in high excess the reaction follows a pseudo first order kinetics, which is demonstrated by the linear dependence of the logarithm of the ethanol concentration as a function of time. From the slopes of the linear fit the reaction rate constants can be extracted. When plotting the logarithm of the rate constant against 1/T and applying the Arrhenius equation the activation energy of the reaction can be determined via the slope of the linear dependence. This is demonstrated in the graph on the right hand side.



Line narrowing for viscous samples at higher temperatures

The linewidth in the NMR spectrum depends not only on the homogeneity of the magnetic field, but also on sample properties like the viscosity. Highly viscous samples have shorter relaxation times resulting in broad lines. With increasing sample temperature the viscosity decreases and the lines in the NMR spectrum get narrower. The example on the right compares spectra of a vegetable oil measured at 28° C (top) and 60° C (bottom). It can be clearly seen how the linewidth improves at 60°C and the J-coupling patterns become visible.



Contact us now for a quote, to request a demo or to measure your samples

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