

Monitoring the Interaction of Polyethylene on Graphite by Temperature-Gradient NMR Spectroscopy.

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Carbon-based sorbents (various types of graphite) have been applied recently with great success in High Temperature Liquid Chromatography (HT-LC) to separate polyolefins according to their chemical composition [1, 2, 3]. However, the fundamentals behind the interaction of polyethylene (PE) from solvents onto the graphite surface need to be understood in order to understand the chromatographic separation mechanism. To achieve this goal high-temperature nuclear magnetic resonance spectroscopy (HT-NMR) can be applied in a unique manner. NMR spectroscopy is not only one of the most important methods for structure elucidation, it is also well-established as a quantitative reference method [4]. Changes in the analyte concentration of a solution by crystallization or adsorption, for example, results in a reduction of signal intensity in the spectrum and can be monitored on-line without calibration.

Recently temperature gradient HT-NMR (TG-NMR) has been developed to monitor the crystallization of polyolefins from solution. Using characteristic signals, the heterogeneity with regard to unsaturation could be determined [5]. In this work, we show how TG-NMR using systematically optimized experimental parameters can be used to follow the adsorption of PE on graphite from solution.

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