NovaSheet

Technology: TF3-MALS/ELSD

Application: Characterization of Poly(N,N-Diethylamino-Isoprene)

Analysis Conditions / System Set-up

- Sample	: Poly(N,N-Diethylamino-Isoprene)	- Solvent	: THF
- Injection Volume	: 20 µL	- Channel Flow	: 0.2 mL/min
- Sample Concentr.	: 30 mg/mL	- Stop Flow/Delay Time	: 0 s / 0 s
- Initial deltaT	: 42° C	- Channel Thickness	: 127 µm
- Initial Cold Wall T	: 30° C	- Channel Volume	: 1.1 mL
- T1/ Ta	: 0 min.s/ 0 min.s	- RI Detector	: PN3110
- FFF System	: postnova T100 Series Thermal FFF	- MALS Detector	: postnova PN3000MALS

Poly(N,N-Diethylamino-Isoprene) rubbers (PDEAI) are important for many technical applications including modern high-tech polymer materials for the tire and sealing industry. This NovaSheet shows an example for the fast characterization of this polymer and its gel particles using Thermal FFF coupled with RI and MALS detection. For the analysis of this group of rubbers, chromatographic methods have been used in the past. But these methods, e.g. GPC, can only resolve the polymeric fraction of the rubber compound. The gel particles are simply filtered off by the column. Also a significant amount of shear force is acting onto the polymers when separated via a GPC column. By using Thermal FFF, which separates the polymers in an open rectangular channel without stationary phase, these problems and limitations of GPC can be overcome.

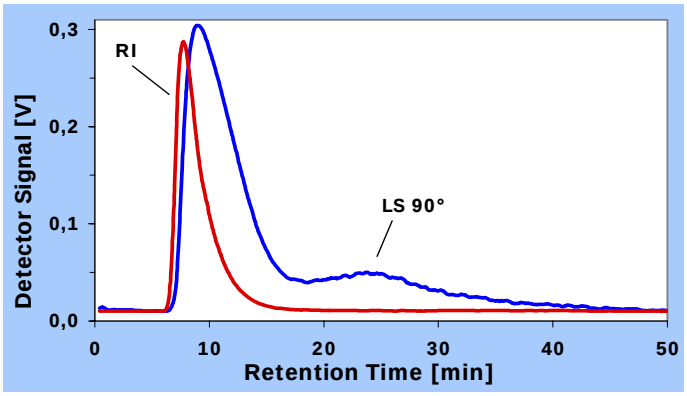

Fig. 1: RI and LS 90° Signal vs. Retention Time of Sample 1.

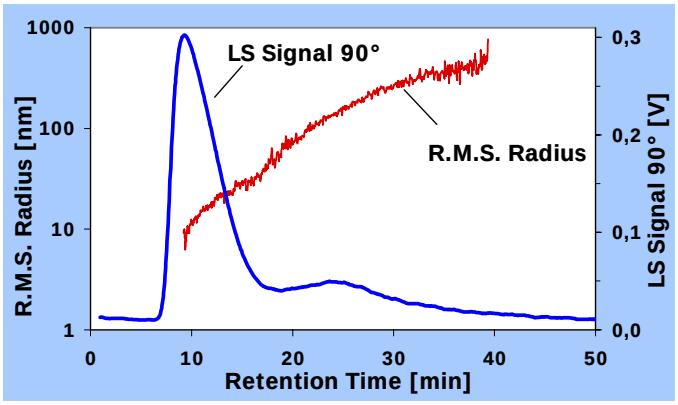

Fig. 2: R.M.S. Radius and 90° LS Signal vs. Retention Time of Sample 1.

Literature using postnova´s T100 Thermal FFF systems:

[1] Fulton, W. S. and S. A. Groves (1997). "Determination of the molecular architecture of synthetic a. natural rubber by Thermal FFF and MALS." J. Nat. Rubber Res. **12**(3): 154-165.
[2] Lee, S., C. H. Eum and A. R. Plepys (2000). "Capability of thermal field-flow fractionation for analysis of processed natural rubber." Bull. Korean Chem. Soc. **21**(1): 69-74.
[3] Lee, S. and A. Molnar (1995). Determination of Molecular Weight and Gel Content of Natural Rubber Using Thermal Field-Flow Fractionation." Macromolecules **28**(18): 6354-6.
[4] Shiundu, P. M. and J. C. Giddings (1996). "Isolation a. character. of polymeric a. particulate components of ABS plastics by Thermal FFF." J. Appl. Polym. Sci. **60**(10): 1695-1707.

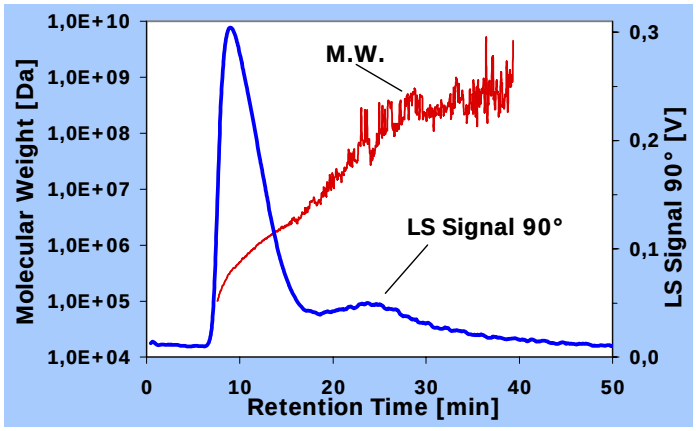

Fig. 3: Molecular Weight and LS Signal vs. Retention Time of Sample 1.

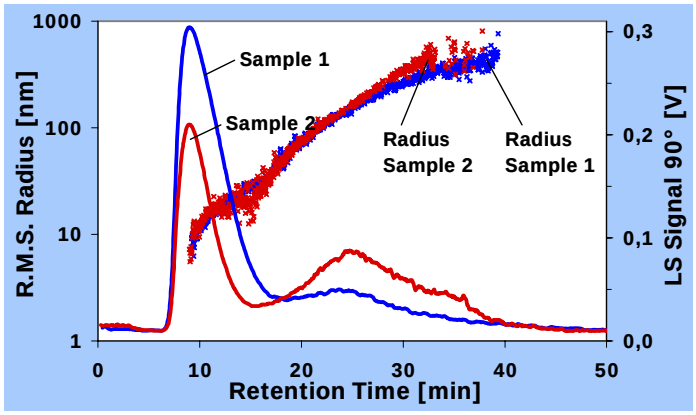

Fig. 4: Overlay of R.M.S. Radius and 90° LS Signal of Sample 1 and 2.

The results show that TF3 can be used for fast and high resolution separation and characterization of PDEAI rubber polymers and gel particles. Differences in molar mass and size distribution as well as in the gel content can be determined easy and accurate.

Why use TF3 for Rubber Characterization?

- ► High resolution separation of polymers AND gels.
- ► Fast, gentle and nearly interaction free separation without stationary phase and shear forces.
- ► Complete view on the original native rubber sample without prior sample preparation / filtering steps.
- ► Possibility to collect fractions and direct coupling with other techniques as RI, MALS, MS, FT-IR, etc..

For more information please contact us at: info@postnova.com