

## Ciba® Testing Services

### Case Study

#### Determination of the amount of polymer block B in a poly A-co-poly-B block copolymer

#### Problem

Although conventional size exclusion chromatography (SEC) yet yields reliable data on molecular weight parameters ( $M_n$ ,  $M_w$ ,  $M_w/M_n$ ), it cannot be used for analysis of the composition of, e. g., a poly-A-co-poly B block copolymer sample without use of a second detector focusing on a specific property of one of the two blocks. However, the latter aspect is often of fundamental importance in order to provide more detailed insight into the relative distribution of block B in the poly-A-co-poly B block copolymer along the axis of molecular weight and vice versa as well as to yield useful information with respect to optimization of the synthetic processes.

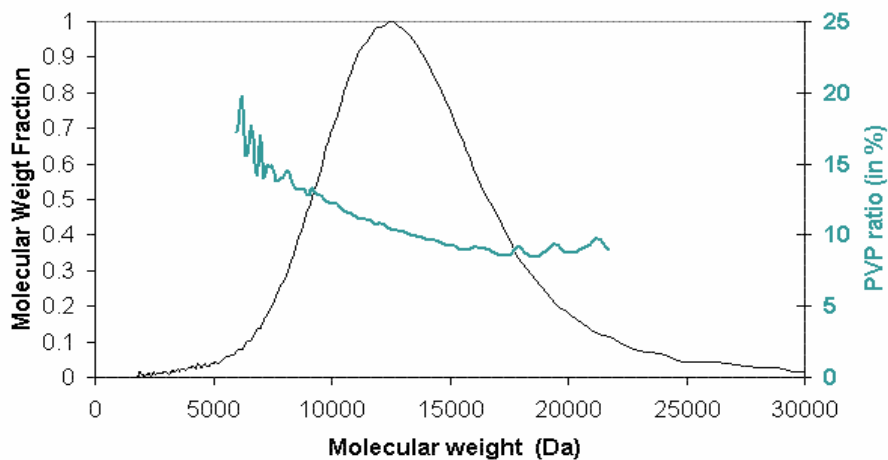
#### Solution

By use of SEC with dual detection combining, e. g., refractive index (RI) measurement focusing on both a non-chromophoric hydrophobic block A (PBA) and a chromophoric basic block B (PVP) as well as UV-detection specifically focusing on the basic block B chromophor, it was possible to obtain the percentage of block B in the poly A-co-poly B block copolymer across the whole molecular weight distribution of the polymer peak.

Furthermore, it should be emphasized that ionizable structural elements within a polymer chain, as in the present case, are prone to substantial adsorptive stationary phase interactions requiring special chromatographic hardware or mobile phase systems in order to completely suppress the unwanted solute-stationary phase effects.

#### Application/Use

Although spectroscopic techniques can be used with respect to give an exact assignment of the "average" percentages of both block A and block B in a poly A-co-poly B block copolymer, up to present only SEC with dual (RI + UV) detection is able to provide information on the distribution of block B in a poly A-co-poly B block copolymer along the molecular weight axis and vice versa. Due to the fact that the final product qualities strongly depend on an efficient "fine-tuning" of this ratio, determination of the percentage of block B in the poly A-co-poly B block copolymer is a very important issue.



Weight ratio of polymer block B along the molecular weight axis

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