HT- GPC for Advanced Polymer Characterization

REPSOL
Technology Lab

Short Description

High Temperature GPC determines the molecular weight and molecular weight distribution of polymers soluble only at high temperature, such as polyolefins (HDPE, PP, LDPE, LLDPE, copolymers EP, EVA and EBA. Dual detection system with RI and Viscometer which determine the copolymer concentration and its distribution (SCB), as well the molecular structure of polymers (lineal or branched chains and branching distribution, LCB).

Deliverable

Customizable reports according to the client's needs: Mw, Mn, Mz, PDI, SCB/1000C, LCB, implementing calculation models, etc.

Benefits

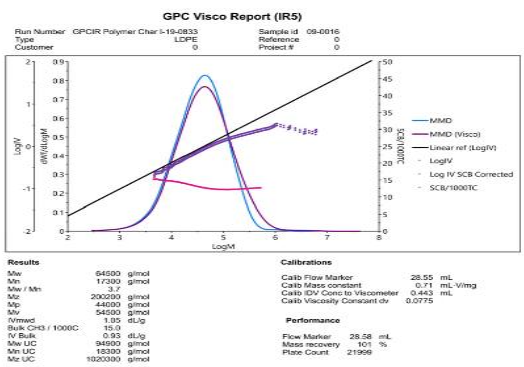
- High-sensitive RI detector designed to measure polymer concentration and short chain branching with excellent stability. RI detector incorporates interference filters at five different wavelengths and a thermoelectrically cooled MCT detector with high sensitivity.
- The high temperature differential viscometer detector provides a measurement of intrinsic viscosity and allows the determination of molecular size and branching structure.

GPC-IR HT

Differential Features

Technology Lab has extensive equipment that allows comprehensive and accurate polymer characterization:

- Chemical characterization by RMN, Raman and FTIR
- Rheological characterization by ARES, Brookfield and Haake
- Structural characterization by GPC, TREF, CRYSTAF
- Morphological characterization by SEM and MOP-Raman



Report of results

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Requirements

- No less than 50mg of sample is needed for polymer characterization by HT-GPC.
- Chemically uncrossed material and soluble in TCB (trichlorobenzen) at 150 ºC.

Limitations

- Chemically cross-linked polymers.
- Polymer solubility in the working range of the HT-GPC (30ºC to 220ºC).
- Carbon black must be previously eliminated by filtration from the sample.

The Product in Depth

Gel permeation chromatography (GPC) is a separation technique, commonly used for polymer characterization, which allows differentiate compounds according to their molecular size. However, when the solubility of analytes is low in conventional solvents or their nature is complex, it is necessary to have more advanced GPC techniques to solve these technical aspects.

High temperature GPC (HT-GPC) achieves to separate this type of samples, as it can operate from 30ºC to 220ºC. Therefore, high viscosity polyolefins, polymers of very high molecular weight and high polydispersity, polymers with long chain branching content or complex mixtures of this type of products can be analyzed by HT-GPC, reliably and reproducibly.

Some Use Cases

- To determine the molecular structure from raw materials to finished products.
- To evaluate catalysts and determine what type of products generates each type of catalyst.
- For prediction of the behavior of a material in its processing (e.g. foams).
- To characterize different types of polymeric additives in different operations.
- To monitor the status of raw materials for pipes, films or cables manufacturing, in order to know their molecular degradation.
- Characterize polymeric materials that have low solubility in usual organic solvents.
- Analysis of resins and asphalts in heavy fractions to determine their molecular weight and polydispersity, and therefore predict their behavior in subsequent processes.