CFC

CROSS FRACTIONATION CHROMATOGRAPHY

Automated high-resolution Cross-Fractionation Chromatograph for Polyolefin characterization.

High resolution cross-fractionation of polyolefins is now possible with Polymer Char's fully automated CFC instrument. Two-dimensional distribution interrelating molar mass and chemical composition is often required for a comprehensive characterization of complex materials. A complete cross-fractionation is the only technique that determines this with no loss of information.

This compact and automated instrument fractionates the polymer according to composition through a TREF (Temperature Rising Elution Fractionation) process, while the resulting fractions are continuously injected into online GPC columns where a second fractionation, this time according to molar mass, is performed. Optionally, the TREF column can be replaced by a TGIC* column in order to separate by adsorption and reach the composition range of elastomer resins.

Polymer Char's analytical CFC technology overcomes the difficulties of preparative fractionation methods, which are tedious and time consuming. The full bivariate distribution is now measured in hours instead of days, with limited consumption of solvent, no manual intervention, and in an intrinsically safe setup.

The virtual instrumentation software allows for a flexible method configuration so that the analysis time and resolution can be optimized. A powerful and intuitive software package is available for data processing, calibration of columns, and graphical representation of distributions, allowing for different views of the data.

*Thermal Gradient Interaction Chromatography analysis of Polyolefins on a graphitized carbon column is a patented technology by DOW Chemical.

Polymer Char References
· App. Note: "Microstructure Characterization of Polyolefins by Automated Cross-Fractionation Chromatography (TREF/GPC)."
· Article: "Development of an Automated Cross-Fractionation Apparatus (TREF-GPC) for a Full Characterization of the Bivariate Distribution of Polyolefins." ICPC 2006. Macromolecular Symposia 2007, 257, 13-28.

Find out more at **www.polymerchar.com/CFC**

KEY FEATURES

▸ Analytical scale, fully-automated instrument for cross-fractionation of polyolefins.

▸ An integrated IR5 MCT detector provides excellent sensitivity in concentration and composition signals.

▸ An autosampler with 42 vials for extended analysis throughput is incorporated.

▸ The first separation step on the basis of composition can be performed by TREF for crystallizable polyolefin materials or by TGIC* for elastomer resins.

▸ Comprehensive information on molar mass and chemical composition distributions in a single analysis is obtained.

▸ Flexible definition of number of fractions and temperatures.

▸ Under standard conditions, two samples per day can be analyzed.

▸ Sub-ambient TREF operation (down to -15ºC) for low crystallinity samples.

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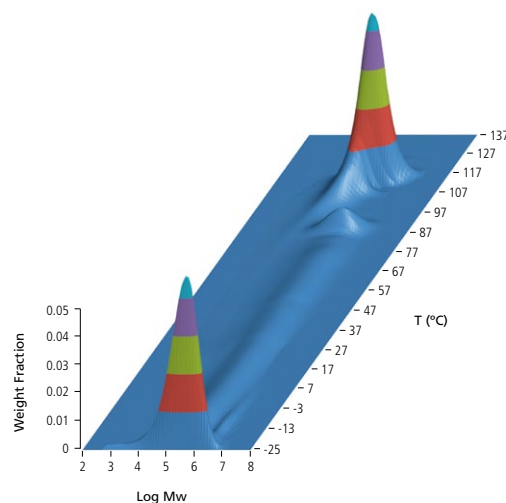
Solutions for Polyolefin Characterization

CRYSTAF: An instrument designed for intensive use in the analysis of the Chemical Composition Distribution in Polyolefins.

TREF: A completely automated apparatus for the analysis of the Chemical Composition Distribution in Polyolefins. It provides complementary information to CRYSTAF data in the analysis of some complex resins.

CRYSTAF-TREF: CRYSTAF and TREF techniques are available in the same equipment for a full Chemical Composition Distribution characterization.

CEF: A high throughput equipment to analyze the Chemical Composition Distribution in Polyolefins, using a new approach combining CRYSTAF and TREF separation mechanisms.

PREP mc²: An automated instrument to perform semipreparative fractionation according to composition by TREF or CRYSTAF, or molar mass.

PREP C20: New column-based preparative fractionation instrument, capable to fractionate up to 20 grams of polymer.

CRYSTEX® QC: A truly automated system based on TREF-separation concept for soluble fraction measurement, ethylene content and intrinsic viscosity in PP/PE plants control.

CRYSTEX® 42: A high-throughput and easy-to-use system for simultaneous measurement of the soluble fraction, ethylene content and intrinsic viscosity in a fully automated process for up to 42 samples.

IVA: Reliable and automated instrument for Intrinsic Viscosity Analysis of polymers with dissolution temperature up to 200ºC.

GPC-IR®: Advanced High Temperature GPC for the analysis of Molar Mass Distribution in Polyolefins. Fully automated sample preparation and filtration. Triple detector (IR, VS, LS) plus composition.

GPC-QC: High Temperature GPC instrument for Quality and Process Control in Polyolefin production plants.

CFC: A fully automated Cross Fractionation Chromatograph (TREF x GPC or TGIC x GPC) for the analysis of Bivariate distribution.

GPC One® Software: The most comprehensive GPC/SEC Calculations Software integrating all detectors' signals.

Data Unit 200: Versatile signals acquisition device to link any vendor GPC instrument with Polymer Char's GPC One®.

TGIC: An adsorption high temperature HPLC technique for the analysis of low crystallinity Polyolefins.

SGIC 2D: An adsorption high temperature HPLC technique combined with GPC and infrared detection for the analysis of composition and molar mass interdependence of Polyolefin resins.

IR4: Integrated, reliable and simple to use infrared (IR) detector to measure concentration and composition.

IR5 MCT: Integrated and modern IR detector with an MCT element (thermoelectrically cooled) for high sensitivity analysis.

Analytical Services: Polymer Char laboratory, a global reference in the field, counts on the latest technologies for Polyolefin Characterization.

Company Profile

Polymer Char is devoted to the development of state-of-the-art instrumentation for Polyolefin Analysis.

The company offers the broadest and most modern range of instruments and services for polymer analysis and more specifically, for the structural characterization of Polyolefins, such as Molar Mass Distribution (GPC-IR®, GPC-QC, GPC One®), Chemical Composition Distribution (CRYSTAF, TREF, CEF), Bivariate Distribution by Cross-Fractionation Chromatography (CFC), High Temperature HPLC (TGIC, SGIC 2D), Soluble Fraction Determination (CRYSTEX®, CRYSTEX® QC and CRYSTEX® 42), Preparative Fractionation (PREP mc², PREP C20), Intrinsic Viscosity (IVA) or integrated Infrared Detection (IR4, IR5 MCT).

Polymer Char is also well known for its advanced approach to virtual instrumentation software that, together with excellent remote control capabilities and its strong commitment to Customer success, places the company at the leading edge on instrumentation diagnostics and technical support.

Together with its global network of partners and distributors, Polymer Char supplies, trains and supports Customers worldwide. The company provides analytical services in 35 countries and its instruments are present today in over 20 countries within the Americas, Europe, Africa, Middle East and Asia Pacific, predominantly serving Polymer Producers and Processors, Government and Academic Research Laboratories, Contract Research Organizations, Analytical and Testing Laboratories, and Chemical Instrumentation Manufacturers.

In the last two decades and with an annual investment of up to 20% of its manpower resources on R&D, Polymer Char has played a key role in the development of most of the existing Polyolefin analysis technologies, such as CRYSTAF, CRYSTEX®, CEF, CFC, and GPC with IR detection. Each new project, each new analysis, underpins Polymer Char as the Polyolefin Characterization Company.