IVA

INTRINSIC VISCOSITY ANALYZER

Fully automated instrument for determination of intrinsic viscosity in polymeric materials.

Polymer Char introduces IVA in response to the market's need for a reliable and automated instrument for intrinsic viscosity analysis of polymeric materials in solution. Intrinsic viscosity can be seen as an indirect measurement of the average molar mass and, as a result, it provides valuable information within any polymer characterization process.

IVA is based on Polymer Char's recently developed QC platform, which integrates, in a reduced footprint, a robust dual-capillary relative viscometer combined with a high-temperature autosampler with a capacity for 42 samples. IVA can analyze a wide range of polymers with IV values from 0.5dL/g up to over 40dL/g, such as polyolefins, PET, PAN, PMMA, and others, by using almost any organic solvent.

The principle of a relative viscometer is simple: the pressure-drop across a stainless-steel capillary tubing caused by the flow of polymer solution is compared to the one produced by the solvent, which is measured simultaneously by a twin reference capillary. The relative viscosity of polymer solution is derived from the ratio of pressure, and the intrinsic viscosity is calculated taking into account the injected mass.

IVA capillaries and tubing do not require manual washing or rinsing, and provide robust and precise viscosity values over time. The careful design of the heated compartment and transfer lines ensure that no cold spots are found and that even the most challenging polymers can be analysed.

When using IVA, the analyst places the vials with polymer into the autosampler's external tray, at room temperature. Then the instrument takes the vials into the dissolution oven, fills them with solvent and starts shaking. Dissolution temperature, shaking intensity, non-oxidative atmosphere with nitrogen, and time are accurately controlled so that the analyst can select the optimum conditions to achieve full dissolution while minimizing thermal degradation.

The analysis of polyolefins and other polymers containing significant C-H content can be further improved by the incorporation of the optional Infrared detector IR4 to accurately quantify the injected polymer's mass, which results in improved precision and accuracy of intrinsic viscosity determination.

KEY FEATURES

- Full automation of dissolution and analysis processes. No manual solvent handling.

- No need for accurate weighing when the optional IR detector is used.

- High-temperature autosampler for dissolution of samples in the same instrument.

- Self-cleaning design based on dual capillary relative viscometer.

- Simple to operate and reliable instrument.

- High precision achieved by automation.

- Up to 42 samples can be analyzed sequentially without user intervention.

- Analysis of high and ultrahigh molar mass polymers.

- Low solvent consumption.

- Compatible with most organic solvents such as decaline, chloroform, tetrahydrofuran, tri-chlorobenzene, and others.
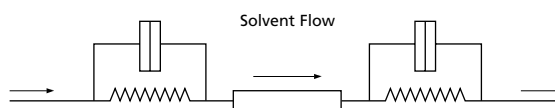
Dual metal capillary viscometer, ASTM D5225

$$y = 20.54x - 1.348$$
$$R^2 = 0.993$$

$$y = 1.555x^2 + 18.00x - 0.643$$
$$R^2 = 0.994$$
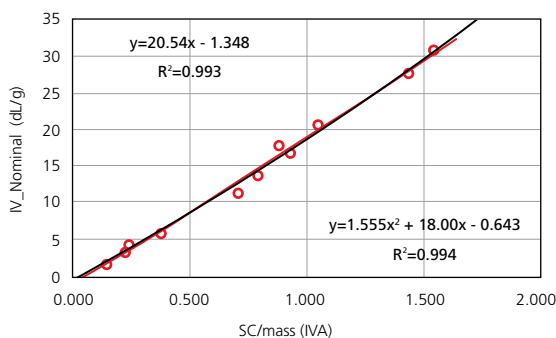
IVA can analyze polymers from very low density, such as PE, up to UHMWPE samples

Polymer Char

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 mc^2: 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 mc^2, 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.