

ARES-G3™ Rheometer

Polymer Melt Testing



Since polymers transition from viscous liquids during melt processing to rigid solids for end use products, optimizing processing and performance requires a complete characterization using extensional viscosity, **polymer melt rheology, and dynamic mechanical analysis (DMA)**. With all three analytical capabilities in one instrument, the Discovery™ ARES-G3 Rheometer is uniquely designed for research-grade analysis and quality control of polymers. New built-for-purpose hardware and Fast Frequency Chirps accelerate polymer melt testing while delivering results with fewer corrections than others on the market.

Comprehensive Polymer Characterization

The industry's only¹ **force-rebalanced transducer (FRT)** delivering minimal corrections to data

Pioneering **separate motor and transducer (SMT)** technology delivers a higher level of data accuracy under a wider range of measurement conditions

Complete DMA capabilities including flexural bending, tension, and compression testing without the need of a second motor

Trustworthy data with access to raw phase angle measurements and waveforms

Accelerated, Accurate Testing

New touchscreen gives full experimental control right at the instrument

Fast-responding and accurate **oxygen exclusion environment** with dual gun heaters for reliable polymer melt and composites testing

Fully-integrated Fast Frequency Chirps (OWCh) uses optimally windowed chirps end-to-end workflow for up to 80% faster polymer melt QC tests

Updated keypad facilitates common experiment controls, like moving the instrument head or starting an experiment, with ease



¹ At time of publication.

Material Analysis: Why is Polymer Rheology Important?

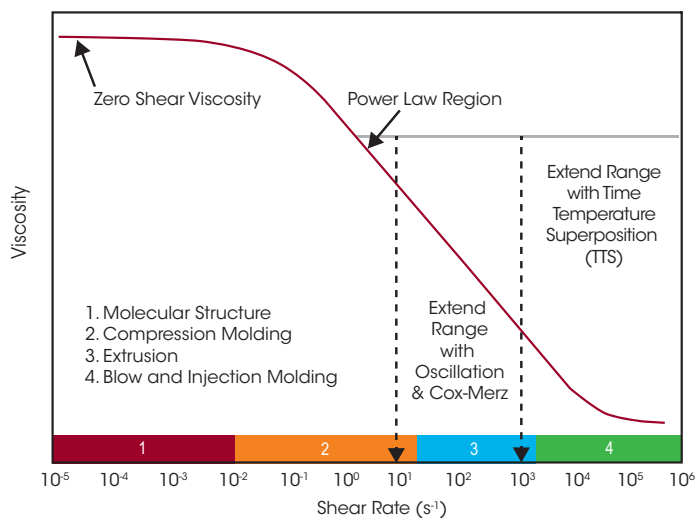
Polymer rheology measurements support molecular weight analysis and viscosity profiles that are essential for processability and architecture analysis. Whether you are developing new polymers, changing formulations, or developing a masterbatch for consistent, efficient manufacturing, polymer rheology helps you understand your materials' structures and successfully innovate in polymer development. Changes in compounding such as adjusting colorants, processing agents, and antioxidants can also greatly change the material's viscosity, elasticity, and flow behavior, influencing everything from extrusion stability to product shelf life and mechanical durability. Since polymers are non-Newtonian and change with time, temperature, or mechanical force, characterizing their rheology across various conditions is essential for optimizing manufacturing and predicting their final performance.

Testing

Understanding Processability

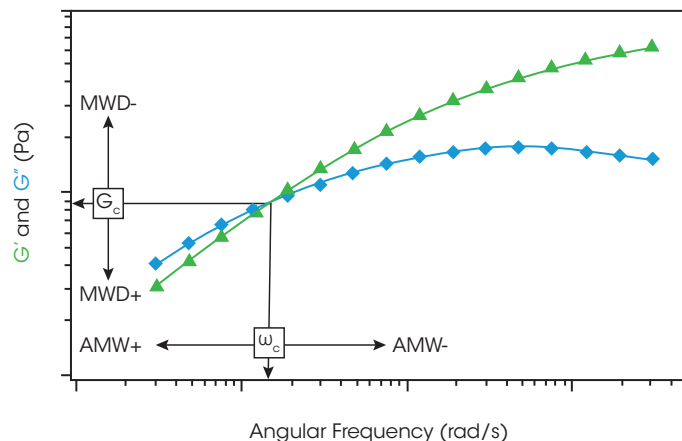
A polymer's molecular weight greatly influences its viscosity, while its molecular weight distribution and degree of branching affect its shear rate dependence. These differences are most apparent at low shear rates that are not possible with melt flow index or capillary devices. The ARES-G3 Rheometer is uniquely designed to capture accurate, high-resolution viscosity measurements across a wide range of shear rates, characterizing the full spectrum from molecular structure at rest through to compression molding, extrusion, and high shear blow molding and injection molding.

The industry's only² true separate motor and transducer (SMT) uniquely isolates the sample from the motor to reveal minute changes that might be missed on other instruments. SMT is powered by the force rebalanced transducer (FRT) that remains stationary to deliver pure, undistorted measurements, giving researchers the confidence to explore subtle rheological behaviors under realistic processing conditions.



Fingerprinting Polymer Architecture

The ARES-G3 Rheometer supports polymer structural analysis by measuring storage modulus (G') and loss modulus (G''), which reveal transitions, molecular weight, and molecular weight distribution. Molecular weight is especially important for determining extrusion stability and whether the polymer retains artifacts or recovers a smooth surface after extrusion. Frequency sweeps like the one below show whether the molecular weight distribution is consistent (narrow) or variable (wide) – vital information for ensuring batch-to-batch consistency. While these tests previously took up to ten minutes, new Fast Frequency Chirps technology shortens frequency sweeps to under a minute, helping polymer manufacturers and quality engineers keep up with the accelerated pace of manufacturing.

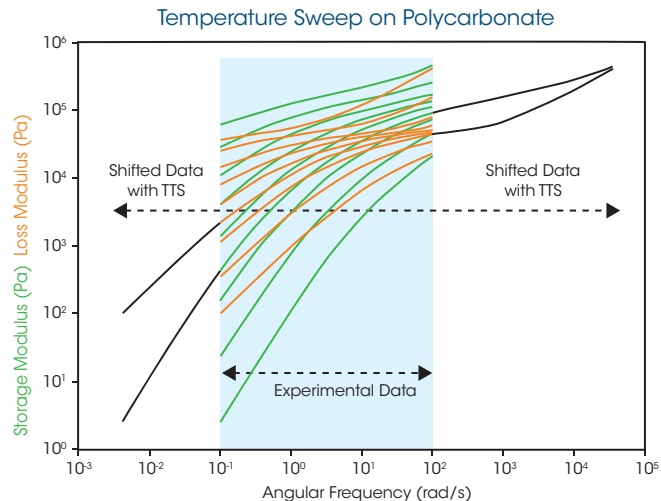


Introduction to Polymer Melt Rheology and its Application in Polymer Processing



Predicting Long-Term Behavior

Master curves combine a polymer's storage and loss modulus into one chart to predict long-term behavior across very high and low frequencies not easily accessed with instrumentation. New Fast Frequency Chirps technology revolutionizes rheology frequency sweeps by dramatically increasing speed and data density. These faster frequency sweeps enable ramped time temperature superposition (TTS) master curves, reducing experiments from hours/days to less than an hour without sacrificing accuracy or resolution.



Accessory Overview

Extensional Viscosity

Fully understand polymer architecture and detect branching with extensional rheology.

Fast Frequency Chirps

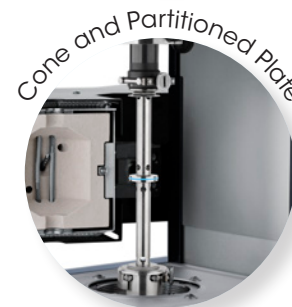
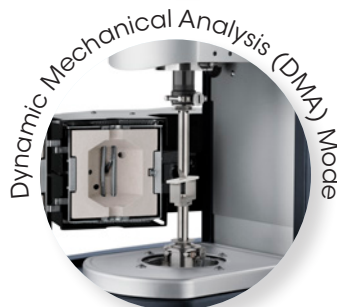
Gain faster confidence in long-term behavior of polymers with accelerated master curve generation.

Dynamic Mechanical Analysis (DMA) Mode

Extend beyond polymer melt characterization to identify glass transition temperatures and structural behavior in the solid state.

Cone and Partitioned Plate

Access higher shear rates without edge fracture impacts.



² At time of publication.