

Plastic Melt Flow Rheology Testing for Polyolefins:

Melt Rheology Testing provides a quick, efficient, accurate, and cost effective means for detecting potential problems in the processing of polyolefin resins, co-polymers, blends, and rheology modifiers. Plastic melt rheology eliminates the need for time consuming melt tension measurements and inadequate melt index measurements. Detect processing problems of polyolefins before large quantities of off spec product are produced. Before you take your product to the assembly line, make sure you have the rheology data to avoid costly recalls and scrap.

Examples:

- Determination of the degree of long chain branching
- Temperature dependence of viscosity
- Die design and parameters for CAD modeling
- Frequency temperature relationships
- Blown and cast film, maintain gauge uniformity
- Reduce inconsistent lot to lot variations, high rejections, poor yields
- Measure melt strength
- Thermal aging on melt properties, changes in the molecular structure
- Recycling and reclaim of plastics, measure the quality
- Rheological behavior or molten polymeric blends, which an factor in processability.
- Melt rheology of miscible or compatibilized polymer blends.
- Viscoelastic properties as a function of temperature, shear rate, frequency
- Viscosity, shear rate, storage and loss modulus, complex viscosity, tan-delta

Models:

- **Power Law Viscosity Model** – used to emulate the shear thinning or shear thickening behavior on non-Newtonian fluids having a constant slope
- Time Temperature Superposition, Boltzmann Principle Master Curves
- **Flow activation energy** – calculates E_a by using an Arrhenius fit of zero shear viscosity η_0 verses temperature. Normally used with the Ellis Flow Model and TTS modeling of master curves of polyolefins.
- **Zero shear viscosity** – η_0 can be used for several models, calculations, and with dynamic, stress relaxation, creep compliance, and relaxation spectrum data.
- **Ellis** – 3 coefficient model for fitting data from a fluid that has a lower Newtonian region, followed by a transition into a Power Law fluid
- **Bueche** – fitting viscosity verses shear rate data for polymer melts such as polyethylene
- **Carreau** – 4 coefficient model for fitting data from a fluid that has a lower Newtonian region, followed by a transition into a Power Law fluid.
- **Cross** – 3 coefficient model for fitting data from a fluid that has a lower Newtonian region, followed by a transition into a Power Law fluid.