



## HT-DSV Application Note #17

### Dilute Solution Viscosity Measurement of Polyolefins

Polyolefins are macromolecules formed by the polymerization of olefin (alkene) monomer units. The most common polyolefins are polypropylene (PP) and polyethylene (PE) homopolymers. These polymers have a wide range of applications -- household goods, industrial products, and specialty medical products. Their properties can be further tuned to perform beyond the typical applications. For example, Ethylene Propylene Diene Monomer (EPDM) is a popular olefin elastomer used in automotive sealant and electrical insulation. The purpose of this App Note is to present the range of Intrinsic Viscosities (IV) achievable with an HMJ Y501 Dual Capillary High Temperature Relative Viscometer (HTDSV) system. The analysis conditions are listed below.

Solvent	Decalin
Sample Concentration	0.0025 g/dL to 0.5 g/dL
Prep Temperature	135C - 150C
Dissolution Time	60 minutes - Overnight
Analysis Temperature	135C - 150C

The summary table below clearly shows excellent correlation between HT-DSV measured IV data as compared to calculated or expected IV values.

PE Samples	Measured IV (dL/g)	Calculated/Expected IV
NIST-1475a	1.1645 @ 140C	1.180 @ 130C (NIST COA)
HMW-PE	13.65 @ 150C	Unknown (Calculated MW = 1,600,000)
UHM-PE (3,100,000)	22 @ 135C	Calculated IV = 23
UHM-PE (3,400,000)	23 @ 135C	Calculated IV = 24
UHM-PE (4,000,000)	26 @ 135C	Calculated IV = 26
UHM-PE (8,000,000)	In-Progress	Calculated IV = 43

In addition to the great IV range demonstrated above, the relative viscometer presents a great opportunity to automate this particularly laborious task. Our fully automated High Temperature Vortex DSV system is ideal for this difficult and hazardous measurement.