Rheotek Polymer Viscometer

RPV High Temperature

Suitable for measuring the dilute solution viscosity of Polyethylene and Polypropylene in accordance with ASTM D1601, ISO1628-3 and ASTM D4020

Automated Polymer Viscometer

The **PSL-RHEOTEK RPV HT** automatically measures the flow times of the solvent and polymer samples. The software calculates the precision achieved as well as calculating relative, specific, reduced viscosity, Intrinsic Viscosity and Molecular Weight. In addition, the RPV system provides automated cleaning using a safe vacuum.

Apparatus includes

RPV High Temperature
AKV ASTM Ubbelohde Viscometers
HT glass funnel for PE

Optional
iSP Sample Preparation
SD-1BM reaction block

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RPV High Temperature

The RPV is a modular viscometer system, consisting of a Viscometer Control Module with the latest embedded electronics, High Temperature Viscometer Bath, measuring heads (for optical sample detection), PIAB or vacuum pump, PC, and software platform.

The RPV High Temperature can be configured with one to four positions. In addition, a high temperature automated loading system (auto sampler) can be used for some applications (typically low and medium density PP, UHMWPE).

RPV High Temperature Polymer Viscometer with auto sample loading – two measuring positions (second reaction block is optional)

Note: photos in this datasheet are for illustration purposes only.

Case Study (ASTM D4020)

Two white powdered UHMWPE samples were received by the PSL Polymer Testing Laboratory.

Apparatus used

PSL-RHEOTEK RPV HT fitted with **2 x PSL AKV ISO1628 – Part 3 viscometer tubes.**

The flow time of solvent (decahydronaphthalene) and UHMWPE samples were automatically determined. The built-in software automatically calculated the polymer viscosity results.

Solvent flow times were measured in the same viscometer tubes as for the polymer solutions. The RPV has two measuring positions, so solvent flow times are measured in each position.

Solutions of each sample of Polyethylene were prepared to 0.0002 g/mL in decahydronaphthalene and were solubilised at 150 °C in an oven. Each preparation had their flow times measured three times consecutively and the flow time reported is the mean of the three flow times measured. The difference between the flow times from the mean represents the determinability of the test number.

Example Sample UHMWPE - 1 - Results

Concentration (g/mL)	Determinability (%)	Mean of Corrected Flow Time (s)	Tube constant (mm^2/s)	Relative viscosity	Specific Viscosity	Reduced Viscosity (mL/g)
0.0002	0.02	162.283	0.005232	1.2466	0.2466	1233.0
0.0002	0.05	156.962	0.005411	1.2473	0.2473	1236.4
					Mean	**1234.7**
					Max-min	**3.4**
					Max-Min %	**0.3**

Sample ID	IV (dL/g) ISO 1628 - Part 3	IV (dL/g) ASTM D 4020	Molecular weight (g/mol) (Margolies Equation)
UHMWPE - 1	11.56	11.44	2.03×10^6
UHMWPE - 1	11.59	11.47	2.04×10^6
Mean	**11.57**	**11.46**	**2.03×10^6**
Max-min	**0.030**	**0.030**	**7841**
Max-Min %	**0.26**	**0.26**	**0.39**

Example Sample UHMWPE – 2 – Results

Concentration (g/mL)	Determinability (%)	Mean of Corrected Flow Times (s)	Tube Constant (mm^2/s)	Relative Viscosity	Specific Viscosity	Reduced Viscosity (mL/g)
0.0002	0.05	204.140	0.005411	1.6222	0.6222	3110.9
0.0002	0.02	210.837	0.005232	1.6196	0.6196	3097.8
					Mean	**3104.4**
					Max-min	**13.1**
					Max-Min %	**0.4**

Sample ID	IV (dL/g) ISO 1628 - Part 3	IV (dL/g) ASTM D 4020	Molecular weight (g/mol) (Margolies Equation)
UHMWPE – 2	26.63	26.31	7.01×10^6
UHMWPE – 2	26.54	26.21	6.99×10^6
Mean	**26.59**	**26.26**	**7.00×10^6**
Max-min	**0.096**	**0.095**	**18474**
Max-Min %	**0.36**	**0.36**	**0.26**