WEE-Knowledge

Capillary viscometry

Important formulas

Term	**Formula without correction**	**Unit**
Kinematic viscosity	$\nu = \frac{\eta}{\rho} = K \cdot t$	[m^2/s]
Relative viscosity, Viscosity ratio	$\eta_{rel} = \frac{\eta}{\eta_0} = \frac{t}{t_0}$	[1]
Specific viscosity	$\eta_{spez} = \frac{(\eta - \eta_0)}{\eta_0} = \frac{(t - t_0)}{t_0}$	[1]
Reduced viscosity, Viscosity number	$\eta_{red} = VZ = I = \frac{(\eta - \eta_0)}{c \cdot \eta_0} = \frac{(t - t_0)}{c \cdot t_0}$	[cm^3/g]
Inherent viscosity	$\eta_{inh} = \frac{\ln \eta_{rel}}{c}$	[cm^3/g]
Intrinsic viscosity, Limiting viscosity number	$[\eta] = IV = \lim_{c \to 0} \frac{(\eta - \eta_0)}{c \cdot \eta_0}$	[cm^3/g]
K-value according to Fikentscher	$K = \frac{a - 1 + \sqrt{1 + a \cdot \left(\frac{2}{c} + 2 + a\right)}}{0{,}15 + 0{,}3 \cdot c}$ $a = 1{,}5 \cdot \log \eta_{rel}$	[cm^3/g]

η: Dynamic viscosity
ρ: Density sample solution
K: Viscometer constant
t: Retention time sample solution
t_0: Retention time solvent
c: Concentration sample solution

Overview measuring methods

Type	**Solvent**	**Temperature**	**Norms**
Polyamide PA	96% H2SO4, 90% Formic acid, m-Cresol	25°C	ISO 307
Polybutylene terephthalate PBT	Phenol/Dichlorbenzene (50:50)	25°C	ISO 1628-5
Polycarbonate PC	Methylene chloride	25°C	ISO 1628-4
Polyethylene PE	Decahydronaphtalene	135°C	ISO 1628-3 ASTM D 1601
Polyethylene terephthalat PET	m-Cresol, Phenol/Dichlorbenzene (50:50)	25°C	ISO 1628-5 ASTM D 4603
Polymethyl methacrylate PMMA	Chloroform	25°C	ISO 1628-6
Polypropylene PP	Decahydronaphtalene	135°C	ISO 1628-3
Polystyrene PS	Toluene	25°C	
Polysulfone PSU	Chloroform	25°C	
Polyvinyl chloride PVC	Cyclohexanone	25°C	ISO 1628-2 ASTM D 1243
Styrene/Acrylonitrile Copolymer SAN	Methyl ethyl ketone	25°C	
Styrene/Butadiene Copolymer SB	Toluene	25°C	

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