

PVME poly(vinyl methyl ether)

PARAMETER	UNIT	VALUE	REFERENCES
GENERAL			
Common name	-	poly(vinyl methyl ether)	
CAS name	-	ethene, methoxy-, homopolymer	
Acronym	-	PVME	
CAS number	-	9003-09-2	
Formula		$\left[\begin{array}{c} \text{CH}_2\text{CH} \\ \\ \text{OCH}_3 \end{array} \right]_n$	
HISTORY			
Person to discover	-	Reppe, W; Schlichting, O	Reppe, W; Schlichting, O, US Patent 2,104,000, IG Farben, Dec. 28, 1937.
Date	-	1937	
Details	-	production of polymerization products from vinyl ethers	
SYNTHESIS			
Monomer(s) structure	-	$\text{H}_2\text{C}=\text{CHOCH}_3$	
Monomer(s) CAS number(s)	-	107-25-5	
Monomer(s) molecular weight(s)	dalton, g/mol, amu	70.09	
Number average molecular weight, M_n	dalton, g/mol, amu	10,000-18,100	
Mass average molecular weight, M_w	dalton, g/mol, amu	50,500-354,000	
Polydispersity, M_w/M_n	-	1.05-2.5	Morariu, S; Eckelt, J; Wolf, B A, Ind. Eng. Chem. Res., 48, 6943-48, 2009.
Molar volume at 298K	cm ³ mol ⁻¹	calc.=50.0 (crystalline)	
Van der Waals volume	cm ³ mol ⁻¹	calc.=34.4; 35.7 (crystalline)	
STRUCTURE			
Cell type (lattice)	-	trigonal	
Cell dimensions	nm	a:b:c=1.62:1.62:6.5	Bassi, I W; Atti. Accad. Nazl. Lincei, Cl. Sci. Fis., Mat. Nat., Rend., 29, 193, 1960.
Unit cell angles	degree	$\alpha:\beta:\gamma=90:90:120$	
Number of chains per unit cell	-	18	
Tacticity	%	59 (isotactic)	Hanykova, L; Labuta, J; Spevacek, J, Polymer, 47, 6107-16, 2006.
Chain conformation	-	helix 3/1	
Avrami constants, k/n	-	n=1.0-1.24; k=0.83-7.72x104	Zhang, T; Li, T; Nies, E; Beghmans, H; Ge, L, Polymer, 50, 1206-13, 2009.
COMMERCIAL POLYMERS			
Some manufacturers	-	BASF	
Trade names	-	Lutonal	

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PHYSICAL PROPERTIES			
Density at 20°C	g cm ⁻³	1.03-1.05	
Bulk density at 20°C	g cm ⁻³	0.94-1.03	
Color	-	clear	
Refractive index, 20°C	-	1.467-1.478	
Melting temperature, DSC	°C	144	
Thermal expansion coefficient, 23-80°C	°C ⁻¹	6.8E-4	
Glass transition temperature	°C	calc.= -21; exp.= -20 to -34	
Hildebrand solubility parameter	MPa ^{0.5}	calc.=19.44	
Surface tension	mN m ⁻¹	31.8	
MECHANICAL & RHEOLOGICAL PROPERTIES			
Tensile strength	MPa	11.65-14.00	
CHEMICAL RESISTANCE			
Acid dilute/concentrated	-	good/poor	
Alcohols	-	poor	
Alkalis	-	good	
Aromatic hydrocarbons	-	poor	
Esters	-	poor	
Ketones	-	poor	
⊖ solvent, ⊖-temp.=51°C	-	cyclohexane	
Good solvent	-	acetone, ethanol, ethyl acetate, methylene chloride, THF	
Non-solvent	-	diethyl ether, ethylene glycol, hexane	
FLAMMABILITY			
Ignition temperature	°C	230	
Autoignition temperature	°C	390	
Volatile products of combustion	-	CO, CO ₂ , hydrocarbons	
WEATHER STABILITY			
Products of degradation	-	tertiary peroxide, ketone groups, methanol, CO, CO ₂ , acetic acid, methyl acetate, formic acid, dimethyl malonate	
TOXICITY			
HMIS: Health, Flammability, Reactivity rating	-	1/1/0	
Carcinogenic effect	-	not listed by ACGIH, NIOSH, NTP	
Oral rat, LD ₅₀	mg kg ⁻¹	>5,000	
ENVIRONMENTAL IMPACT			
Aquatic toxicity, Bluegill sunfish, LC ₅₀ , 48 h	mg l ⁻¹	>500	
PROCESSING			
Applications	-	marine antifouling paints	

PARAMETER	UNIT	VALUE	REFERENCES
Outstanding properties	-	improves adhesion of liquid coatings, saponification resistant	
BLENDS			
Suitable polymers	-	PAA, PANI, PCL, iPS, sPS, PS, SAN	
ANALYSIS			
FTIR (wavenumber-assignment)	cm ⁻¹ /-	C-H – 2991, 2949, 2839, 1468, 1388; C-C – 1193; C-O – 1135, 1105, 1070	Maeda, Y, Langmuir, 17, 1737-42, 2001; Guo, Y; Peng, Y; Wu, P, J. Mol. Structure, 875, 486-92, 2008.

