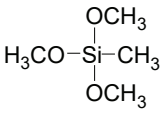
PMSQ polymethylsilsesquioxane

PARAMETER	UNIT	VALUE	REFERENCES
GENERAL			
Common name	-	polymethylsilsesquioxane	
ACS name	-	silsesquioxanes, Me	
Acronym	-	PMSQ	
CAS number	-	68554-70-1	
Linear formula		$\left[CH_3Si_{1.5}\right]_n$	Haussmann, M; Reznik, B; Bockhorn, H; Denev, J A, J. Anal. Appl. Pyrolysis, 91, 224-31, 2011.
HISTORY			
Person to discover	-	Gordon, D J; Wessel, J K	Gordon, D J; Wessel, J K, US Patent 4,290,896, Dow Corning, Sept. 22, 1981.
Date	-	1981	
Details	-	dewatering fine coal slurries using organopolysiloxanes	
SYNTHESIS			
Monomer(s) structure	-		
Monomer(s) CAS number(s)	-	1185-55-3	
Monomer(s) molecular weight(s)	dalton, g/mol, amu	136.22	
Catalyst	-	zinc acetate	
Mass average molecular weight, M_w	dalton, g/mol, amu	1,800-31,000 (prepolymer)	
COMMERCIAL POLYMERS			
Some manufacturers	-	Kobo; Wacker	
Trade names	-	Tospearl; Belsil	
PHYSICAL PROPERTIES			
Density at 20°C	g cm^{-3}	1.32-1.43	
Bulk density at 20°C	g cm^{-3}	0.17-0.46	
Color	-	white	
Refractive index, 20°C	-	1.41-1.42	
Odor	-	characteristic	
Melting temperature, DSC	°C	>1000	
Maximum service temperature	°C	400	Xiang, H; Zhang, L; Wang, Z; Yu, X; Long, Y; Zhang, X; Zhao, N; Xu, J, J. Colloid Interface Sci., 359, 296-303, 2011.
Dielectric constant at 100 Hz/1 MHz	-	2.6--2.8	Kim, B R; Kim, Y D; Moon, M S; Choi, B K; Ko, M J, Microelectronic Eng., 85, 74-80, 2008.
Contact angle of water, 20°C	degree	145-170 (on the surface of treated cotton)	Shirgholami, M A; Khalil-Abad, M S; Khajavi, R; Yazdanshenas, M E, J. Colloid Interface Sci., 359, 530-35, 2011.
Specific surface area	m^2 g^{-1}	15-45	

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MECHANICAL & RHEOLOGICAL PROPERTIES			
Elastic modulus	MPa	8,500-10,000	Kim, B R; Kim, Y D; Moon, M S; Choi, B K; Ko, M J, Microelectronic Eng., 85, 74-80, 2008.
Water absorption, equilibrium in water at 23°C	%	2	
CHEMICAL RESISTANCE			
Alcohols	-	good	
Aliphatic hydrocarbons	-	good	
Esters	-	poor	
Greases & oils	-	good	
Ketones	-	good	
Good solvent	-	DMF	
FLAMMABILITY			
Volatile products of combustion	-	CO, CO_2, dense smoke, H_2O, CH_4	Haussmann, M; Reznik, B; Bockhorn, H; Denev, J A, J. Anal. Appl. Pyrolysis, 91, 224-31, 2011.
TOXICITY			
NFPA: Health, Flammability, Reactivity rating	-	1/0/1	
Carcinogenic effect	-	not listed by ACGIH, NIOSH, NTP	
Oral rat, LD_{50}	mg kg^{-1}	>6,000	
PROCESSING			
Typical processing methods	-	electrospinning, impregnation	
Applications	-	antiblocking agent in plastic films, copying machines and laser printers (fluid control and prevention of static electricity), cosmetics (lipsticks, skin lotions, skin creams), paints and inks (moisture resistance, viscosity control)	
Outstanding properties	-	water repellency (superhydrophobic), insoluble in organic solvents, heat resistance	
ANALYSIS			
FTIR (wavenumber-assignment)	cm^{-1}/-	Si-C – 1273, 781; Si-O-Si – 1000-1130	Shirgholami, M A; Khalil-Abad, M S; Khajavi, R; Yazdanshenas, M E, J. Colloid Interface Sci., 359, 530-35, 2011.