Poly(dimethylsiloxane)

ALEX C. M. KUO

ACRONYM, ALTERNATE NAMES, TRADE NAMES PDMS; poly[oxy(dimethylsilylene)]; dimethicone; methylsilicone oil; Dow Corning® 200 fluid; Wacker SWS101 fluid; Baysilone® M fluid

CLASS Polysiloxanes; di-methyl silicones and siloxanes

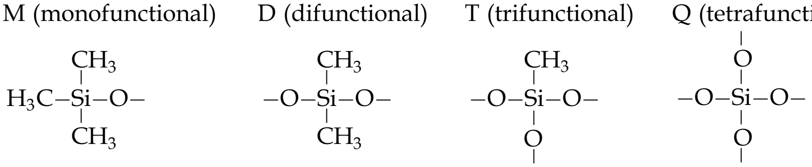
STRUCTURE $-[(CH_3)_2Si-O-]_n$

MAJOR APPLICATIONS Release agents, rubber molds, sealants and gaskets, surfactants, water repellents, adhesives, foam control agents, biomedical devices, personal care and cosmetics, dielectric encapsulation, glass sizing agents, greases, hydraulic fluids, heat transfer fluids, lubricants, fuser oil, masonry protectants, process aids.

PROPERTIES OF SPECIAL INTEREST Thermal stability, low temperature performance and minimal temperature effect. Good resistance to UV radiation. Excellent release properties and surface activity. High permeability to gases. Good damping behavior, antifriction and lubricity. Hydrophobic and physiological inertness. Shear stability, weak intermolecular forces, and excellent dielectric strength. Low volatility at high molecular weight, and high volatility at low molecular weight.

Shorthand notation for siloxane polymer units

Formula:	$(CH_3)_3SiO_{0.5}$	$(CH_3)_2SiO$	$(CH_3)SiO_{1.5}$	SiO_2
MDTQ formula:	M (monofunctional)	D (difunctional)	T (trifunctional)	Q (tetrafunctional)



End-group and structure of certain dimethylsiloxanes

End group	Structure	MDTQ formula	CAS Reg. No.
Methyl	$(CH_3)_3Si-O-[(CH_3)_2Si-O-]_nSi(CH_3)_3$	MD_nM	9016-00-6; 63148-62-9
Hydroxyl	$HO-(CH_3)_2Si-O-[(CH_3)_2Si-O-]_nSi(CH_3)_2-OH$	$M^{OH}D_nM^{OH}$	70131-67-8
Vinyl	$CH_2{=}CH-(CH_3)_2Si-O-[(CH_3)_2Si-O-]_nSi(CH_3)_2-CH{=}CH_2$	$M^{vi}D_nM^{vi}$	68083-19-2
Hydrogen	$H-(CH_3)_2Si-O-[(CH_3)_2Si-O-]_nSi(CH_3)_2-H$	$M^HD_nM^H$	70900-21-9
None	$[(CH_3)_2Si-O-]_3$; cyclic trimer	D_3	541-05-9
Methyl	$[(CH_3)_2Si-O-]_3SiH$	M_3T^H	1873-89-8

Poly(dimethylsiloxane)

Product form and properties[1]

Form	Structure and properties
Fluids	Linear polymer. Liquid at low molecular weights and solid gum at high molecular weights
Elastomers	Cross-linked solids. Reinforcement necessary for property performance
Resins	Highly branched cross-linked solids or fluids

Branched polymers[1]

Silicone resins and rubbers are cross-linked polymers with branched polymer chains containing M (monofunctional), D (difunctional), T (trifunctional), and Q (tetrafunctional) units. Slightly branched polymers made from D, T, and Q structures have lower bulk viscosity and intrinsic viscosity than linear polymers of the same average molecular weight.

Infrared characteristic absorption[2,3]

Group	Absorption, wave number (cm^{-1})
$-Si(CH_3)_2-O-Si(CH_3)_2-$	2,905–2,960; 1,020; 1,090
$Si(CH_3)_3$	2,905–2,960; 1,250; 840; 765
$Si(CH_3)_2$	2,905–2,960; 1,260; 855; 805
$Si-CH_3$	2,905–2,960; 1,245–1,275; 760–845
$Si-H$	2,100–2,300; 760–910
$Si-OH$	3,695; 3,200–3,400; 810–960
$Si-CH=CH_2$	1,590–1,610; 1,410; 990–1,020; 940–980

^{29}Si Nuclear magnetic resonance spectroscopy for typical structural building units in dimethylsiloxanes[4,5]

Structure	MDTQ formula*	Chemical shifts (ppm down-field from TMS)
$-O-Si(CH_3)_3$	M	6.6–7.3
$-Si(CH_3)_2-(C_6H_5)$	M^{ph}	−1
$-Si(CH_3)_2-CH=CH_2$	M^{vi}	−4
$-Si(CH_3)_2-H$	M^{H}	−7
$-Si(CH_3)_2-OH$	M^{OH}	−12
$-[O-Si(CH_3)_2-]$	D	−19 to −23
$[O-Si(CH_3)_2-]_3$	D_3	−9.1
$[O-Si(CH_3)_2-]_4$	D_4	−19.5
$(-O_{0.5}-)_3Si-CH_3$	T	−63 to −68
$(-O_{0.5}-)_4Si$	Q	−105 to −115

*See note above for ‘‘Branched polymers.’’

X-ray photoelectron spectroscopy elemental analysis[6]

Element identification	Binding energy	Atomic composition
Si-2p	102.6	25.0
C-1s	285.0	50.0
O-1s	532.6	25.0

Preparative techniques

Polymerization process	Monomers	Major catalysts	Reference
Hydrolysis	Dichlorodimethylsilane and dialkoxydimethylsilane	Acids, alkalies, and polychlorophosphazenes	(1, 7, 8)
Condensation	Oligomeric dimethylsiloxane-diol	H_2SO_4, HCl, tin dicarboxylates, hydroxides of alkali metals or zeolite	(7, 9–11)
Anionic	Cyclic dimethylsiloxanes	Hydroxides, silanolates and alcoholates of alkali metals, quaternary ammonium or phosphonium bases	(7, 9, 12–14)
Cationic	Cyclic dimethylsiloxanes	Strong protic acids (H_2SO_4 and CF_3SO_3H)	(7, 9, 14, 15)
Emulsion	Silanol ended oligomer or cyclic dimethylsiloxanes	Sodium silicate, tin dicarboxylates acid salt hydroxides of alkali metals	(16–18)
Radiation	Cyclic dimethylsiloxanes	γ (^{60}Co)	(9)

PROPERTY	UNITS	CONDITIONS	VALUE	REFERENCE
Enthalpy of polymerization $-\Delta H_p$	kJ mol^{-1}	D_3 at 25°C	2.79	(19)
		D_3 at 77°C	23.4	
		D_4 at 25°C	−6.4	
		D_4 at 77°C	−13.4	
Entropy of polymerization ΔS_p	J K^{-1} mol^{-1}	D_3 at 25°C	51.0	(19)
		D_3 at 77°C	−3.03	
		D_4 at 25°C	194.4	
		D_4 at 77°C	190.0	
Ceiling temperature	K	PDMS in toluene with 0.22 g ml^{-1}	383	(20)
Solvents	Benzene, toluene, xylene, diethyl ether, chloroform, carbon tetrachloride, ethyl acetate, butanone, perchloroethylene, kerosene			(21)
Partially soluble solvents	Acetone, ethanol, isopropanol, butanol, dioxane, ethyl phenyl ether			(21)
Nonsolvents	Water, methanol, cyclohexanol, ethylene glycol, 2-ethoxy ethanol, dimethyl phthalate, aniline, 2-ethoxyethanol, 2-(2-ethoxyethoxy)ethanol, bromobenzene			(21)

PROPERTY	UNITS	CONDITIONS	VALUE	REFERENCE
Solubility parameter δ	$(MPa)^{1/2}$	Average range	14.9–15.59	(22)
		PDMS (100–60,000 cs)	15.1	(23)
		Static vapor sorption for PDMS ($M_n = 89{,}000$)	15.0	(24)
		Gas chromatography method for PDMS ($M_n = 2{,}410$–$218{,}000$) at 25°C	15.1	(25)
		Gas chromatography method for PDMS ($M_n = 2{,}410$–$218{,}000$) at 90°C	13.4	(25)
Theta temperature Θ	K	Bromobenzene	351.7	(26)
		Bromocyclohexane	302	(26)
		Bromocyclohexane	300.6	(27)
		Ethyl iodide	275.1	(26)
		Ethyl phenyl ether	362.5	(26)
		Ethyl phenyl ether	356	(28)
		Butanone	293	(29)
Second virial coefficient A_2	$mol\,cm^3\,g^{-2}$	PDMS		
		In toluene at 27°C	4.5×10^{-4}	(27)
		In benzene at 27°C	2.95×10^{-4}	(27)
		In chlorobenzane at 30°C	10.4×10^{-5}	(27)
		In bromobenzene at 40°C	3.0×10^{-5}	(26)
		In bromocyclohexane at 36.5°C	3.62×10^{-5}	(27)
		In bromocyclohexane at 47.2°C	6.57×10^{-5}	(27)
		In bromocyclohexane at 56.2°C	9.54×10^{-5}	(27)
		In benzene at 20°C	2.1×10^{-4}	(29)
		In benzene at 20°C	1.84×10^{-4}	(29)

Mark-Houwink parameters: *K* and *a*

Solvents	Temp. (°C)	$K \times 10^3$ $(ml\,g^{-1})$	*a*	Reference
Butanone	20	81.5	0.5	(28)
Butanone	20	89	0.5	(30)
Butanone	20	78.3	0.5	(29)
Ethyl phenyl ether	83	77	0.5	(28)
Ethyl phenyl ether	89.5	73	0.5	(26)
Toluene	25	20	0.66	(31)
Toluene	25	8.28	0.72	(29)
Toluene	25	11	0.92	(30)
Benzene	20	12	0.68	(29)
Mixture of C_8F_{18} and $C_2Cl_4F_2$ (1:2)	22.5	105.7	0.5	(29)
Bromobenzene	78.7	76	0.5	(26)
Ethyl iodide	2.1	70	0.5	(26)
Bromocyclohexane	29	74	0.5	(26)

PROPERTY	UNITS	CONDITIONS	VALUE	REFERENCE
Characteristic ratio $C_\infty = \langle r^2 \rangle_0 / nl^2$	—	Mixture of C_8F_{18} and $C_2Cl_4F_2$ (1:2) at 22.5°C	7.7	(29)
		Butanone at 20°C	6.3	(29)
		Calculation based on Ising lattice method ($l = 1.64$ Å, $\theta_1 = 110°$, $\theta_2 = 143°$)	3.32–5.28	(32)
Root-mean-square end-to-end chain length $(\langle r^2 \rangle_0 / M)^{1/2}$	nm mol$^{1/2}$ g$^{-1/2}$	PDMS in various theta solvents	2.5×10^{-2}	(26)
		PDMS in butanone at 20°C	7.30×10^{-2}	(28)
		Free rotation value calculated at 20°C for $l = 1.65$ Å, $\theta_1 = 110°$, $\theta_2 = 130°$	4.56×10^{-2}	(28)
		Free rotation value calculated at 20°C for $l = 1.65$ Å, $\theta_1 = 110°$, $\theta_2 = 160°$	5.30×10^{-2}	(28)
Root-mean-square radius of gyration $R_g = \langle s^2 \rangle_z^{1/2}$	Å	Blend of PDMS and preduterated PDMS (M_n = 3,000–25,000)	41	(33)
		PDMS in benzene-d_6		
		$M_z = 4,990$	18.6	(34)
		$M_z = 8,670$	25.2	(34)
		$M_z = 12,890$	33.8	(34)
		$M_z = 20,880$	49.4	(34)
		Network prepared by PDMS and preduterated PDMS	39	(33)
Z-average square radius of gyration $\langle s^2 \rangle_{z,linea} / \langle s^2 \rangle_{z,ring}$	—	Linear and cyclic PDMS in diluted benzene-d_6	1.9 ± 0.2	(34)

PROPERTY	UNITS	Organic solvent	Conditions	VALUE	REFERENCE
Interaction parameter of PMDS in organic solvents χ_{12}	—	Pentane	Swelling at 25°C	0.43	(35)
		Toluene	Swelling at 25°C	0.465	(35)
		Nitrobenzene	Swelling at 25°C	2.2	(35)
		Ethyl ether	Swelling at 25°C	0.43	(35)
		Cyclohexane	Swelling at 25°C	0.44	(35)
		Hexane	Swelling at 25°C	0.40	(35)
		Carbon tetrachloride	Swelling at 25°C	0.45	(35)
		Ethyl iodide	Swelling at 25°C	0.58	(35)
		Dioxane	Swelling at 25°C	0.61	(35)
		2,3-dimethylpentane	Swelling at 25°C	0.392	(36)
		2,2,4-trimethylpentane	Swelling at 25°C	0.38	(36)
		Chlorobenzene	Osmotic measurement at 20°C	0.477	(37)
		Cyclohexane	Osmotic measurement at 25°C	0.429	(37)
		Benzene	Osmotic measurement at 25°C	0.481	(37)

PROPERTY	UNITS	CONDITIONS		VALUE	REFERENCE
		Organic solvent	Conditions		
		Pentane	Gas chromatography at 100°C	0.311	(38)
		Toluene	Gas chromatography at 100°C	0.594	(38)
		Cyclohexane	Gas chromatography at 100°C	0.351	(38)
		Hexane	Gas chromatography at 100°C	0.296	(38)
		Chloroform	Gas chromatography at 100°C	0.60	(38)
		Benzene	Gas chromatography at 100°C	0.577	(38)
		Chlorobenzene	Gas chromatography at 100°C	0.764	(38)
		Dioxane	Gas chromatography at 100°C	1.064	(38)
		n-Butanol	Gas chromatography at 100°C	1.908	(38)
		Ethanol	Gas chromatography at 100°C	2.571	(38)

Interaction parameter χ_{12}

Materials/condition	Temp. (K)	Method	χ_{12}	Reference
PDMS network/PDMS ($M = 422$–875)	298	Swelling	0.19–0.25	(35)
PDMS network/PDMS ($M = 700$–26,400)	298	Swelling	−0.017 to 0.006	(39)
PDMS network/D_5	298	Swelling	0.247	(40)
PDMS/D_4	298	Osmotic measurement	0.298	(41)
PDMS network/$MD_3^{ph}M$	298	Swelling	0.345	(42)
PDMS network/$MD_2^{ph}M$	298	Swelling	0.438	(42)
PDMS network/$MD^{ph}M$	298	Swelling	0.356	(42)
$MD_{13}M/MD_{28}^{ph}M$	458	Light scattering	0.112	(43)
$MD_{13}M/MD_{23}^{ph}M$	518	Light scattering	0.122	(43)
$M^{OH}D_{15}M^{OH}/MD_{23}^{ph}M$	446	Light scattering	0.111	(44)
$MD_{13}M/D_4^{ph}$ cycloisomers	360–371	Light scattering	0.300	(40)
PDMS/polyethylmethylsiloxane ($M_n = 30{,}300$)	332.5	Light scattering	0.00664–0.0077	(45)
PDMS/poly(ethylene oxide)	343–373	Gas chromatography	0.4–1.1	(46)

Parameters for the equation of state

PDMS	Method	T^* (K)	$V_{sp}{}^*$ ($cm^3\ g^{-1}$)	P^* (MPa)	Reference
$M_v = 1 \times 10^5$	Flory-Orwoll and Vrij theory at 25°C	5,528	0.8395	341	(47)
$M_n = 162.4$	Flory-Orwoll and Vrij theory at 25°C	4,468	0.9995	325.3	(48)
$M_n = 340$	Modified Flory-Orwoll and Vrij theory at 40–73°C	3,726.5	0.94877	373.9	(49)
$M_n = 958$	Flory-Orwoll and Vrij theory at 25°C	5,288	0.8694	313.3	(48)
$M_n = 7,860$	Flory-Orwoll and Vrij theory at 25°C	5,554	0.8403	311.5	(48)
$M_n = 187,000$	Modified Flory-Orwoll and Vrij theory at 42–93°C	4,386.7	0.88085	382.6	(49)
$M_n = 47,200$	Ising fluid model at 25–70°C	476	0.9058	302	(50)

Morphology in multiphase systems

System A/B	Microstructure	Architecture	Reference
Poly(butadiene)/PDMS	Cylinders/spheres	A-B diblock	(51)
Poly(styrene)/PDMS	Spheres/lamellae/cylinders	A-B diblock	(52)
Poly(diphenylsiloxane)/PDMS	Lamellae	A-B-A triblock or star-block	(53)
Poly(methyl styrene)/PDMS	Spheres/lamellae	A-B diblock and A-B-A triblock	(54)
Poly(ethylene oxide)/PDMS	Lamellae/cylinders	B-A-B triblock	(46)
Poly(methyl methacrylate)/ PDMS	Spheres/cylinders	A-g-B graft	(55)

Properties of trimethylsiloxy terminated polydimethylsiloxane vs. viscosity[23,56]

Properties	Units	PDMS viscosity at 25°C (cs)						
		0.65	2.0	10	100	1,000	12,500	60,000
Molecular weight (estimated)	$g\ mol^{-1}$	162	410	1,250	5,970	28,000	67,700	116,500
Flash point	K	269.7	352	484	>599	>599	>599	>599
Pour point	K	205	173	173	208	223	227	232
Freezing point	K	205	189	—	—	—	227	—
Specific gravity at 25°C	—	0.760	0.872	0.935	0.964	0.970	0.974	0.977
Viscosity temperature coefficient $[1-(\eta_{372K}/\eta_{311K})]$	—	0.31	0.48	0.56	0.60	0.61	0.61	0.61

PROPERTY	UNITS	CONDITIONS	VALUE*	REFERENCE
Density ρ	$g\ cm^{-3}$	PDMS (1,000–12,500 cs)	0.970	(56)
ρ vs. temperature	—	PDMS ($M_v = 1 \times 10^5$) from 20–207°C	$\rho = 0.9919 - (8.925 \times 10^{-4})t + (2.65 \times 10^{-7})t^2 - (3.0 \times 10^{-11})t^3$	(47)
Specific volume ν_{sp}	$cm^3\ g^{-1}$	From 20–90°C	$\nu_{sp} = 1.0265 + (9.7 \times 10^{-4})(t - 20)$	(57)
ν_{sp} vs. temperature	—	From 90–170°C	$\nu_{sp} = 1.0944 + (10.3 \times 10^{-4})(t - 90)$	(57)
Thermal expansion coefficient α	K^{-1}	PDMS ($M_v = 1 \times 10^5$) at 25°C	9.07×10^{-4}	(47)
		PDMS (from 100–60,000 cs)	9.6×10^{-4}	(23)
		PDMS ($M = 1.5 \times 10^4$) at 30°C	9.0×10^{-4}	(58)
α vs. temperature	—	PDMS ($M_v = 1 \times 10^5$) from 20–207°C	$\alpha = 0.90 \times 10^{-3} + (2.76 \times 10^{-7})t + (1.0 \times 10^{-10})t^2$	(47)
Thermal pressure coefficient, γ, vs. temperature	$bar\ K^{-1}$	PDMS ($M_v = 1 \times 10^5$) from 24–161°C	$\gamma = 8.71 + (4.74 \times 10^{-2})t + (9.3 \times 10^{-5})t^2$	(47)

PROPERTY	UNITS	CONDITIONS	VALUE	REFERENCE
Water solubility	ppm	MDM at 296 K, nonturbulent measurement	3.45×10^{-2}	(59)
		MD_3M at 296 K, nonturbulent measurement	7.0×10^{-5}	(59)
		PDMS (M = 1,200) at 298 K, water elution measurement	1.6	(60)
		PDMS (M = 6,000) at 298 K, water elution measurement	0.56	(60)
		PDMS (M = 25,000) at 298 K, water elution measurement	0.17	(60)
		PDMS (M = 56,000) at 298 K, water elution measurement	0.076	(60)

Compressibility[61]

Pressure (kgf cm^{-2})	Viscosity of PDMS (cs)						
	0.65	1	2	100	350	1,000	12,500
	Volume reduction (%)						
0	0	0	0	0	0	0	0
500	6.34	5.36	4.85	4.49	4.47	4.58	4.46
1,000	10.04	8.84	8.21	—	7.42	7.36	7.29
25,000	16.33	15.08	14.34	12.71	12.78	12.74	12.53
50,000	Gel	20.66	20.07	17.43	17.96	17.87	17.71
30,000	—	34.57	34.56	—	32.94	31.31	31.25

X-ray diffraction pattern[62]

Condition	2θ	Reflection
PDMS rubber at −50°C for 6 h	11°40′ (amorphous halo)	110 + 001
	19°30′	110 + 020
	23°20′	021 + 112

Unit cell dimensions[63]

Lattice	Monomer per unit cell	Unit cell dimension (Å)			Cell angle (degrees)			Theoretical density (g cm^{-3})	
		a	*b*	*c*	α	β	γ	Crystal	Amorphous
Monoclinic	6	13.0	8.3	7.75	90	60	90	1.07	0.98

Crystalline state properties

PROPERTY	UNITS	CONDITIONS	VALUE	REFERENCE
Si–C bond length	Å	$[(CH_3)_2SiO-]_4$ at −50°C	1.92	(64)
Si–O bond length	Å	$[(CH_3)_2SiO-]_4$ at −50°C	1.65	(65)
Si–C bond energy	$kJ\,mol^{-1}$	–	326	(65)
Si–O bond energy	$kJ\,mol^{-1}$	–	443	(65)
O–Si–O bond angle	Degree	$[(CH_3)_2SiO-]_4$ at −50°C	109	(64)
		Conformation analysis	112	(66)
Si–O–Si bond angle	Degree	X-ray diffraction analysis	140 ± 10	(63)
		Conformation analysis for hexamethyldisloxane	145–150	(67)
		$[(CH_3)_2SiO-]_4$ at −50°C	142.5	(64)
C–Si–C bond angle	Degree	$[(CH_3)_2SiO-]_4$ at −50°C	106	(64)
Degree of crystallinity α	%	X-ray measurement for 17% silica filled PDMS rubber at −60°C	42	(68)
		X-ray measurement for 17% silica filled PDMS rubber at -80°C	59	(68)
		DSC measurement for PDMS ($M_n = 1.11 \times 10^5$) at T_g using a cooling rate = $10\,K\,min^{-1}$	58.8	(69)
		Calorimeteric measurement for PDMS ($M \sim 6 \times 10^5$) at T_g	67	(19)
		DSC measurement for PDMS at T_g using a cooling rate = $2.1\,K\,min^{-1}$	79	(70)

Avrami parameters

Conditions	Crystallization temp., T_c (°C)	$k \times 10^3$	n	$\tau_{0.5}$ (min)	Reference
Isothermal crystallization of PDMS ($M = 4 \times 10^5$)	−55.6	1.905	2.19	15	(62)
	−58.0	5.75	2.08	8	(62)
	−57.5	7.0	2.2	9	(71)
	−60.5	120	1.75	2.5	(71)
Isothermal crystallization of PDMS ($M = 1 \times 10^5$)	−60.5	1.0	2.5	13.5	(71)
	−65.0	7.35	2.2	8.2	(71)
	−71.0	23	2.25	4.8	(71)
NMR measurement for PDMS ($M_n = 7.4 \times 10^5$)	−58.8	–	3.1	–	(72)

Poly(dimethylsiloxane)

PROPERTY	UNITS	CONDITIONS	VALUE		REFERENCE
Glass transition temperature T_g	K	Measured by DSC	150		(70)
			123.3–149.9		(73)
Melting point T_m	K	Measured by DSC	T_{m1}	T_{m2}	
			226–232	236	(70)
			217.8–228.3	235.3–235.6	(73)
Cold crystallization temperature T_c	K	Measured by DSC	173–183		(70)
			181.4–196.8		(73)
Enthalpy of fusion ΔH_u	$kJ\,mol^{-1}$	Calculation by melting temperature depression of PDMS in toluene solution	1.36		(70)
		Calorimeteric measurement for a PDMS ($M \sim 6 \times 10^5$) with 67% crystallinity	3.04		(19)
Entropy of fusion ΔS	$kJ\,K^{-1}\,mol^{-1}$	Calculation by melting temperature depression of PDMS in toluene solution	5.78×10^{-3}		(70)
		Calorimeter measurement for a PDMS ($M \sim 6 \times 10^5$) with 67% crystallinity	12.46×10^{-3}		(19)
Specific heat C_p	$kJ\,kg^{-1}\,K^{-1}$	PDMS (2–1,000 cs)	1.35–1.51		(56)
		PDMS (350 cs) at 298 K	1.464		(23)
		PDMS (1,000 cs) at 298 K	1.461		(23)
		PDMS ($M = 400{,}000$)	1.552		(23)
Specific heat, C_p, effect of temperature	–	PDMS ($M_n = 1.11 \times 10^5$) at:			(69)
		120 K	0.66		
		140 K	0.824		
		250 K	1.439		
		300 K	1.532		
		350 K	1.625		
Bulk viscosity-molecular weight relationship	cs	PDMS ($M_n > 2{,}500$) at 25°C	$\log \eta = 1.00 + 0.0123M^{0.5}$		(31)
Energy of vaporization E_{vap}	$kJ\,mol^{-1}$	MD_9M	90.45		(74)
		MD_8M	83.75		

PROPERTY	UNITS	CONDITIONS	VALUE	REFERENCE
Energy of activation for viscous flow E_{visc}	$kJ\,mol^{-1}$	MD_9M	13.74	(74)
		PDMS ($M = 4.7 \times 10^3$ to 4.8×10^5)	14.6	(75)
Critical molecular weight for entanglement M_c	$g\,mol^{-1}$	Linear PDMS	21,000	(76)
		Linear PDMS	29,000	(31, 77)
		Linear PDMS	30,000	(75)
		Linear PDMS	33,000	(78)
		Trifunctional branched PDMS	98,000	(78)
		Tetrafunctional branched PDMS	110,000	(78)
Color	APHA	PDMS (Dow Corning 200 fluids)	5	(23)

Monolayer properties of force vs. area isotherm for PDMS on water surface[79]

Property	Units	Material	Value
Area per monomer unit A_0	$Å^2$	$MD_{14}M$	22
Film pressure, F, at 7 Å2	$mN\,m^{-1}$	$MD_{14}M$	10.2
Surface electrostatic potential difference, ΔV, at 7 $Å^2$	mV	$MD_{14}M$	150
Apparent dipole moment per mole per monolayer, μ_p, at 7 $Å^2$	mD	$MD_{14}M$	30

PROPERTY	UNITS	CONDITIONS	VALUE	REFERENCE
Water contact angle θ	Degrees	PDMS (500 cs) film on soda-lime glass after 15 min treatment		
		At 25°C	54	(80)
		At 100°C	70	(80)
		At 200°C	102	(80)
		At 300°C	110	(80)
		At 400°C	103	(80)
		At 500°C	85	(80)
		At 525°C	0	(80)
		PDMS films end-grafted onto silicone wafer	112–117.5	(81)
		PDMS fluid, cross-linked PDMS paper coating, and unfilled PDMS elastomer	95–113	(82)
Methylene iodide contact angle θ	Degrees	PDMS fluid, cross-linked PDMS paper coating, and unfilled PDMS elastomer	67–77	(82)
n-Hexadecane contact angle θ	Degrees	Surface of cross-linked PDMS sheet	40	(83)
Perfluorodecalin contact angle θ	Degrees	PDMS elastomer vs. perfluorocarbon monolayer on mica surface	37	(84)

PROPERTY	UNITS	CONDITIONS	VALUE	REFERENCE
Critical surface tension γ	$mN\ m^{-1}$	Silica filled PDMS rubber at 20°C	20–23	(85)
		Dimethylsiloxane dimer at 20°C	15.7	(86)
		Dimethylsiloxane tetramer at 20°C	17.60	(86)
		Dimethylsiloxane heptamer at 20°C	18.60	(86)
		Dimethylsiloxane dodecamer at 20°C	19.56	(86)
		PDMS (35 cs) at 20°C	19.9	(86)
		PDMS (70 cs) at 20°C	20.3	(86)
		PDMS (100 cs) at 25°C	20.9	(23)
		PDMS (1,000 cs) at 25°C	21.2	(23)
		PDMS (12,500 cs) at 25°C	21.5	(23)
		PDMS (10^6 and 6×10^4 cs) at 20°C	20.4	(57)
		PDMS (10^6 and 6×10^4 cs) at 150°C	13.6	(57)
		PDMS (6×10^4 cs) at 180°C	12.1	(87)
Surface tension vs. M_n	$mN\ m^{-1}$	PDMS at 24°C	$\gamma^{-0.25} = (21.06)^{-0.25} + 8.486/M_n$	(87)
Temperature coefficient of surface tension $-d\gamma/dT$	$mN\ m^{-1}\ K^{-1}$	PDMS (10^6, 6×10^4 cs) at 150°C	0.048	(57)
		PDMS (35 cs) at 20°C	0.067	(86)
Interfacial tension against water γ_{1w}	$mN\ m^{-1}$	PDMS (0.65 cs) at 20°C	39.9	(86)
		PDMS (1.0 cs) at 20°C	42.5	
		PDMS (5.0 cs) at 20°C	42.2	
		PDMS (35 cs) at 20°C	43.1	
Polarity x^p		Form interfacial tension of PDMS (6×10^4 cs)	0.042	(87)
Friction force (interfacial shear strength)	$N\ m^{-2}$	PDMS elastomer vs. fluorocarbon monolayer on mica surface	$21.4(\pm 0.7) \times 10^4$	(88)
		PDMS elastomer vs. hydrocarbon monolayer on mica surface	$4.6(\pm 0.2) \times 10^4$	
Surface shear viscosity	$\mu N\ s m^{-1}$	PDMS ($M = 500$–105,000)	~1	(89)

Interfacial tension of polymer pairs

Polymer pair	γ_{12}, (mN m^{-1})	$-d\gamma_{12}/dT$, (mN m^{-1} K^{-1})	Reference
PDMS/polypropylene	3.2 at 20°C	0.002	(90)
PDMS/poly(*t*-butyl methacrylate)	3.6 at 20°C	0.0025	(91)
PDMS/poly(isobutene)	4.9 at 20°C	0.006	(92)
PDMS/poly(isobutylene)	3.9 at 20°C	0.016	(93)
PDMS/polybutadiene	4.15 at 25°C	0.00865	(94)
PDMS/poly(*n*-butyl methacrylate)	4.2 at 20°C	0.0038	(91)
PDMS/polyethylene, branch	5.3 at 20°C	0.002	(89, 92)
PDMS/polystyrene	6.1 at 20°C	~0	(92)
PDMS/poly(oxytetramethylene)	6.4 at 20°C	0.0012	(91)
PDMS/polychloroprene	7.1 at 20°C	0.0050	(91)
PDMS/poly(vinyl acetate)	8.4 at 20°C	0.0081	(91, 93)
PDMS/polyethylene	5.08 at 150°C	0.0016	(95)
PDMS/poly(vinyl acetate)	7.43 at 150°C	0.0087	(95)
PDMS/poly(oxyethylene)	9.85 at 150°C	0.0078	(95)
PDMS/poly(tetrahydrofuran)	6.26 at 150°C	0.0004	(95)

Gas permeability from PDMS membranes filled with 33% silica (cm^3(STP) cm (s cm^2 cm Hg)$^{-1}$)[96]

Gas	$Pr \times 10^9$	Gas	$Pr \times 10^9$	Gas	$Pr \times 10^9$
H_2	65	N_2O	435	n-C_6H_{14}	940
He	35	NO_2	760	n-C_8H_{18}	860
NH_3	590	SO_2	1500	n-$C_{10}H_{22}$	430
H_2O	3600	CS_2	9000	HCHO	1110
CO	34	CH_4	95	CH_3OH	1390
N_2	28	C_2H_6	250	$COCl_2$	1500
NO	60	C_2H_4	135	Acetone	586
O_2	60	C_2H_2	2640	Pyridine	1910
H_2S	1000	C_3H_8	410	Benzene	1080
Ar	60	n-C_4H^{10}	900	Phenol	2100
CO_2	325	n-C_5H_{12}	2000	Toluene	913

Temperature effect of oxygen permeability and solubility from PDMS membrane[96]

Temp. (°C)	$Pr \times 10^9$ (cm^3(STP) cm (s cm^2 cm Hg)$^{-1}$)	Solubility (ml g^{-1})
28	62	0.31
−40	20	0.39
−75	0.74	47

Solubility of gases in PDMS at 25°C/760 mm Hg

Gas	Solubility (ml g^{-1})[61]	Solubility (ml g^{-1})[96]	Diffusion rate, $D \times 10^5$ (cm^2 s^{-1})[96]
He	0.010	0.045	60
Ar	0.301	0.33	14
Air	0.168	–	–
O_2	0.258	0.31	16
N_2	0.166	0.15	15
CO_2	1.497	2.2	11
CH_4	0.543	0.57	12.7
SF_6	0.996	–	–
C_3F_8	1.041	–	–
H_2	–	0.12	–
C_4H_{10}	–	15.0	25

Williams-Landel-Ferry (WLF) parameters measurement for trimethylsiloxy-terminated PDMS[133]

PDMS, M_n (g mol^{-1})	Reference temp. T_0 (K)	C_1	C_2 (K^{-1})	T_g, DSC (K)
10370	147	10.4	14.24	149.5
4160	145.5	14.22	23.84	149.3
2080	143.8	14.32	23.37	147.5
830	141.1	13.48	20.03	141.2
420	136.5	11.46	14.01	135.9

PROPERTY	UNITS	CONDITIONS	VALUE	REFERENCE
Thermal conductivity	W m^{-1} K^{-1}	PDMS (100 cs) at 80°C	0.1511	(56)
		PDMS (1,000 cs) at 80°C	0.1566	(56)
		PDMS (12,500 cs) at 80°C	0.1520	(56)
		PDMS (1,000–60,000 cs) at 50°C	0.1591	(23)
		PDMS (12,500 cs) at 14.7°C	0.1678	(98)
Load-bearing capacity	kg	PDMS fluid	50–150	(1)
Lubricity	mm	Shell four ball test; wear scar, steel on steel; PDMS (100 cs) at 1 h/600 rpm/50 kg load/ambient temperature	1.91	(99)
		Shell four ball test; wear scar, steel on bronze; PDMS (100 cs) at 1 h/600 rpm/10 kg load/ambient temperature	2.0	
Speed of sound longitudinal velocity	m s^{-1}	PDMS (0.65 cs) at 30°C	837.2	(97)
		PDMS (50 cs) at 30°C	981.6	
		PDMS (100 cs) at 30°C	985.2	
		PDMS (1,000 cs) at 30°C	987.3	
		PDMS (1,000 cs) at 50.7°C	933.3	

PROPERTY	UNITS	CONDITIONS	VALUE	REFERENCE
Temperature coefficient of sound transmission	—	PDMS (0.65 cs) at 30°C PDMS (50 cs) at 30°C PDMS (100 cs) at 30°C PDMS (1,000 cs) at 30°C	−3.8 −2.7 −2.7 −2.6	(97)
Anomalous longitudinal velocity due to phase transition effect	$m\,s^{-1}$	PDMS (200,000 cs) cooling at $T < 205$ K PDMS (200,000 cs) cooling at $T > 235$ K	1,850 1,200	(100)

Dielectric properties of trimethylsiloxy terminated PDMS at various viscosity[23, 101]

Viscosity at 25°C (cs)	0.65	2.0	10	100	1,000	12,500	60,000
Dielectric constant, at 10^2–10^4 Hz	2.2	2.45	2.72	2.75	2.75	2.75	2.75
Dielectric strength at 25°C ($kV\,cm^{-1}$)	118	138	148	158	158	158	158
Volume resistivity at 25°C (ohm cm)	1.0×10^{14}	5.0×10^{14}	1.0×10^{15}	1.0×10^{15}	1.0×10^{15}	1.0×10^{15}	1.0×10^{15}

Dielectric data for PDMS (440 cs) at various temperatures[1]

Properties	Units	Sample	20°C	100°C	200°C
Dielectric constant ε	—	PDMS (440 cs)	2.8	2.5	2.3
Dissipation factor, $\tan\delta$ at 800 Hz	—	PDMS (440 cs)	1.2×10^{-4}	1.3×10^{-4}	1.5×10^{-4}
Volume resistivity	ohm cm	PDMS (440 cs)	4×10^{15}	6×10^{14}	1×10^{14}
Dielectric strength	$kV\,cm^{-1}$	PDMS (440 cs)	120	100	95

PROPERTY	UNITS	CONDITIONS	VALUE	REFERENCE
Refractive index n_D^{25}	—	PDMS (0.65–10 cs) at 25°C PDMS (100–60,000 cs) at 25°C	1.375–1.399 1.4030–1.4036	(101)
Diamagnetic susceptibility X_m	$cm^3\,g^{-1}$	PDMS ($M = 1{,}200$) MD_5M D_3 and D_4	0.620×10^{-6} 0.658×10^{-6} 0.632×10^{-6}	(102) (103) (103)
Verdet constant of magnetic rotary power	min $gauss^{-1}$ cm^{-1}	PDMS (0.65–1,000 cs) at 25°C and 5,893 Å	$(1.623–1.693) \times 10^{-2}$	(104)
Dipole moment μ	D	Hydroxy-terminated PDMS ($M = 20{,}000$) in cyclohexane at 25 °C Hydroxy-terminated PDMS ($M = 70{,}230$) in cyclohexane at 25 °C Trimethylsiloxy-terminated PDMS ($M = 78{,}500$) in cyclohexane at 25 °C	11.54 21.48 22.24	(105)

PROPERTY	UNITS	CONDITIONS	VALUE	REFERENCE
Dipole moment per repeat unit $\mu/n^{1/2}$	D	Trimethylsiloxy-terminated PDMS in cyclohexane	0.697	(105)
		Hydroxy-terminated PDMS in cyclohexane	0.666	
Root-mean-square dipole moment ratio $\langle \mu^2 \rangle_0/nm^2$	–	PDMS (DP = 194–2,076) undiluted at 25 °C	0.30	(106)
		PDMS (DP = 194–2,076) in cyclohexane at 25 °C	0.40	(106)
		PDMS (DP = 2–4,940) in cyclohexane at 25°C	0.29	(107)
True contact charge density	$nC\,cm^{-2}$	RTV silicone rubber under contact pressure ($1.2 \times 10^4\,N\,m^{-2}$)	-15 ± 5	(108)
Autoignition temperature (ASTM D 286-30)	K	PDMS (1 cs)	691	(21)
		PDMS (5 cs)	716	
		PDMS (10 cs)	725	
		PDMS (100 cs)	>763	
Limiting oxygen index (LOI)	%	PDMS silicone rubber	26–42	(109)
Arc resistance	s	PDMS silicone rubber	250	(109)
Corona resistance	kV	PDMS silicone rubber	40	(109)

Anisotropy of segments and monomer units of PDMS

PROPERTY	UNITS	CONDITIONS	VALUE	REFERENCE
Optical configuration parameter Δa	cm^3	PDMS ($M = 1.8 \times 10^6$) in petroleum ether	0.96×10^{-25}	(110)
		Cross-linked PDMS at 20°C	4.5×10^{-25}	(111)
		Cross-linked PDMS at −60°C	0	(111)
		Cross-linked PDMS at 70°C	8.1×10^{-25}	(112)
		Cross-linked PDMS swelled in decalin at 70°C	5.1×10^{-25}	(112)
		Cross-linked PDMS swelled in cyclohexane at 70°C	3.8×10^{-25}	(112)
		Cross-linked PDMS swelled in CCl_4 at 70°C	1.8×10^{-25}	(112)
Stress-optical coefficient C	$m^2\,N^{-1}$	PDMS		
		At 200°C	1.35×10^{-10}	(113)
		At 22/25°C	$1.35/1.75 \times 10^{-10}$	(114)
		At 105/190°C	$1.9/2.65 \times 10^{-10}$	(114)

Degradation behavior

End-group of PDMS	Depolymerization conditions	Activation energy ($kJ\ mol^{-1}$)	Reference
Trimethylsiloxy-terminated	Random scission thermal depolymerization at 420–480°C	176	(115)
Trimethylsiloxy-terminated	Thermal oxidation depolymerization at 350–420°C	126	(115)
Hydroxyl-terminated	Unzipping in vacuum at $T > 250$°C	35.6	(115)
Hydroxyl-terminated	0.01% NaOH or 0.01% H_2SO_4 catalyzed depolymerization at 170–300°C	58.6	(116)
Hydroxyl-terminated	Stress relaxation measurement in anhydrous argon at 150–260°C	95.4	(117)
Hydroxyl-terminated	0.01% KOH catalyzed reaction at 60–140°C	21.4	(118)
Trimethylsiloxy-terminated ^{14}C-PDMS	Degradation occurred in soil with < 3% moisture and formed volatilized dimethylsilane diol	—	(119)
Trimethylsiloxy-terminated ^{14}C-PDMS	No biodegradation was found in activated sewage sludge bacteria	—	(119)

Thermochemical parameters[118]

Viscosity of PDMS (cs)	Heat of gasification ($MJ\ kg^{-1}$)	Heat of combustion ($MJ\ kg^{-1}$)	Flame heat radiated to surface ($kW\ m^{-2}$)
0.65	0.327	36.1	—
2.0	0.492	30.0	—
10	3.0–3.6	26.8	26
10,000,000	3.0–3.6	26.8	26

Decomposition products[120]

Thermal decomposition products (100 cs PDMS)	% at 475°C	Thermal-oxidative decomposition product	% at 430°C (approximate)
D_3	45	Cyclic siloxanes	81
D_4	19	HCHO	13
D_5	5	CO_2	3
D_6	11	CO	2
D_7	7	CH_3OH	1.5
D_8	2	HCO_2H	0.2

Poly(dimethylsiloxane)

Fire parameters (cone calorimeter test)[118]

Samples	External heat flux ($kW\,m^{-2}$)	Peak rate of heat release ($kW\,m^{-2}$)	Specific extinction area ($m^2\,kg^{-1}$)
MM	30	2,800	–
MD_2M	60	2,200	–
MD_3M	60	1,750	–
MD_8M	60	750	–
10 cs PDMS	60	175	–
50 cs PDMS	60	140	600
6×10^5 cs PDMS	60	105	550
1×10^7 cs PDMS	60	95	550
Elastomers/silica filled	60	80-110	1,300–1,700

Ecotoxicity in aquatic compartment

Species	Materials	Result or hazard rating	Reference
Fresh water			
Salmo gairdneri	PDMS (350 cs) 25% in food for 28 days, followed by a 14-day observation period	No effect on behavior and growth with 10 mg PDMS $fish^{-1}$ day^{-1}	(119)
Phoxinus phoxinus	PDMS (viscosity not specified)	LC_{40} – 8 days = 3,000 ($mg\,l^{-1}$)	(119)
Leuciscus idus	350 (Baysilone fluid M350)	LC_0 – 96 h = 200 ($mg\,l^{-1}$)	(121)
Sea water			
Pomatoschistus minutus, *Gasterosteus aculeatus*	PDMS (100, 350, and 12,500 cs)	No mortality 96 h at saturation	(119)
Pleuronectes platessa	PDMS (50 cs)	Toxicity – 96 h > 10,000 $mg\,l^{-1}$ at the surface of water (5 $mg\,l^{-1}$ in water)	(119)
Scorpaena porcus	PDMS (50 cs) 30% emulsion	LC_{50} – 50 h = 700 ($mg\,l^{-1}$)	(119)
Carassius auratus	PDMS (50 cs) 30% emulsion	LC_{50} – 24 h = 3,500 ($mg\,l^{-1}$)	(119)

Ecotoxicity in terrestrial compartment[119]

Species	Materials	Result or hazard rating
Plant: Soybean	Soil containing a sewage sludge with ^{14}C-PDMS was examined as nutrients for plants from germination of the seed growth to grains during a 7 month period	No significant difference from controls were observed
Insects activity: *Acheta domesticus*	PDMS (5–1,000 cs) direct apply 5 μl to the ventral thorax of insect	The time of loss of righting reflex increased with the viscosity of the PDMS, and the mortality at 48 h decreased 2 fold when the viscosity of PDMS increased 200 fold
Birds: *Anas platyrhynchos* and *Colinus virginatus*	PDMS (100 cs) was used for feed for 5 days in the diet (5,000 $mg\,kg^{-1}$ food) and kept 3 additional days on a standard food	No mortality and no other signs of toxicity occurred

Acute oral toxicity

Species	PDMS viscosity (cs)	Result or hazard rating, LD_{50} (mg kg^{-1})	Reference
Rat	10	>4,990	(119)
Guinea pig	50	>47,750	(119)
Rat	100	>4,800	(119)
Rabbit/dog/cat	140	>9,800	(119)
Rat	350	>48,600	(119)
Rat	1,000	>4,800	(119)
Rat	350 (Baysilone M350)	>5,000	(121)
Female rat	All viscosities (SWS101 fluids)	>34,600	(122)

Acute dermal toxicity

Species	PDMS viscosity (cs)	Result or hazard rating, LD_{50} (mg kg^{-1})	Reference
Rabbit (male New Zealand)	350	No adverse effect at 24 h, LD_{50} is >19,400 mg kg^{-1} bw	(119)
Rats	50, 500, and 1,000	LD_{50} is >2,000 mg kg^{-1} bw	(119)
Rabbits	0.65–1,000,000	LD_{50} is >10,200 mg kg^{-1}	(122)

Inhalation toxicity[119]

Species	PDMS materials	Result and hazard rating, LC_{50} (mg kg^{-1})
Wistar rat	PDMS (10,000 cs) aerosol in a 25% solution in white spirit	No observed adverse effect, LC_{50}: 4 h is >11,582 mg m^{-3}
Wistar rat	Aerosol of 10,000 cs PDMS fluid 25% solution in dichloromethane	No observed adverse effect, LC_{50}: 4 h is >695 mg m^{-3}

Skin irritation[119]

PDMS viscosity (cs)	Species	Volume (ml)	Type of application	No. of applications	Duration (days)	Effects
50	Rabbit	–	Semi occlusive (continuous application to intact skin)	10	14	Nonirritating
100	Rabbit	0.5	Applied to the ears under an occlusive dressing	1	1	Nonirritating
100	Guinea pig	0.5	Draize method, 10 times per day	10 (daily)	15	Nonirritating
–	Rabbit (female, New Zealand)	0.5	Draize method	1	3	Nonirritating
1,000	Rabbit	0.5	Draize method, OEDC Guideline 404	1	7	Nonirritating

Poly(dimethylsiloxane)

Silicone PDMS rubber preparation[109, 123, 124]

Method	Fabricating system	Chemistry	Major applications
Room temperature vulcanizing silicone	One-part or two-part	Hydrosilylation or condensation	Sealant, adhesive, encapsulation and mold making
High temperature vulcanizing silicone	One-part or two-part from 150–230°C	Hydrosilylation or peroxide catalyzed reaction	Molded, extruded, calendered or fabric coated rubber parts (e.g., insulators, gaskets, seals, keypads, baby-bottle nipples)
Others	One-part	Electron, gamma, and UV radiation	Protective coating and cable wire insulation

Properties of PDMS elastomer

PROPERTY	UNITS	CONDITIONS	VALUE	REFERENCE
Poisson's ratio	—	Dimethylsiloxane block in copolymer of poly[dimethylsiloxane-*b*-styrene]	0.5	(69)
Shear modulus	Pa	Unfilled PDMS elastomer (M_n = 10,000)	2.03×10^5	(125)
		Trifunctional PDMS networks	2.32×10^5	(126)
Resilience (Bashore)	%	ASTM 2632, reinforced PDMS rubber	30–65	(127)
Abrasion resistance	rev/0.254 cm	ASTM D 1630-61, reinforced PDMS rubber	155–1,600	(128)
Tear propagation	cycles/1.27 cm	ASTM D 813-59, reinforced PDMS rubber	120–150,000	(128)
Volumetric thermal expansion coefficient	K^{-1}	Reinforced PDMS rubber	$(5.9–7.9) \times 10^{-4}$	(127)
Specific heat	$kJ\,kg^{-1}\,K^{-1}$	Reinforced PDMS rubber	1.17–1.46	(127)
Hardness	Points	ASTM 2240, reinforced PDMS rubber (shore A)	30–80	(127)
Compression set	%	ASTM D 395B, reinforced PDMS rubber with post cured at 4 h/200°C		(127)
		After 22 h/177°C	~10	
		After 22 h/23°C	~10	
		After 22 h/−40°C	~30	
		After 22 h/−50°C	~100	
		After 3 years/23°C	~20	

Properties of PDMS elastomers*(129, 130)

PROPERTY	UNITS	CONDITIONS	VALUES† A	B	C	D
Specific gravity	—	ASTM D 792	1.13	1.04	1.51	1.04
Viscosity	Pa s	ASTM 4287, 10 s^{-1}	290	Nonflow	Nonflow	Nonflow
Extrusion rate	g min^{-1}	At 90 psi, 1/8 in orifice	100	350	110	440
Durometer (shore A)	points	ASTM D 2240	40	25	37	35
Tensile strength	MPa	ASTM D 412	9.0	2.24	1.55	1.79
Elongation	%	ASTM D 412	725	550	640	430
Tear strength, Die B	kN m^{-1}	ASTM D 624	37.7	4.9	6.48	5.6
Dielectric strength	kV mm^{-1}	ASTM D 149	18.5	21.7	17.4	13.5
Dielectric constant ε	—	ASTM D 150, at 100 Hz	2.98	2.8	3.69	2.77
Volume resistivity	ohm cm	ASTM D 257	3.8×10^{14}	1.5×10^{15}	6.1×10^{14}	2.4×10^{14}
Dissipation factor	—	ASTM D 150, at 100 Hz	0.0033	0.0015	0.0022	0.0035

*Prepared by vulcanization of PDMS polymer with cross-linker and reinforcement filler.
†A = Injection molded liquid silicone rubber, Silastic® LSR 9280-40. B = One-part RTV acetoxy cure, Dow Corning® 732. C = One-part RTV alcohol cure, Dow Corning® 737. D = One-part RTV oxime cure, Dow Corning® 739.

Properties of methylsiloxane resins, $(CH_3)_x(SiO)_y$ *(131)

C/Si RATIO	DENSITY (g cm^{-3})	REFRACTIVE INDEX n_D^{25}
1.17	1.20	1.425
1.34	1.15	1.422
1.41	1.08	1.421
1.5	1.06	1.418

*Prepared by hydrolysis of mixed methyltrichlorosilane and dimethyldichlorosilane.

Poly(dimethylsiloxane)

Major producers[132]

USA	Europe	Asia
Dow Corning Corp.	Wacker Silicones Co.	Shin-Etsu Chemical Co.
General Electric Co.	Dow Corning Corp.	Dow Corning Toray Silicone Co.
Wacker Silicones Co.	General Electric Co.	GE-Toshiba Silicone Co.
McGhan NuSil Co.	Bayer AG	
OSi Specialties Inc.	Rhone-Poulenc Inc.	
	Hüls Aktiengesellschaft Th. Goldschmidt AG	

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