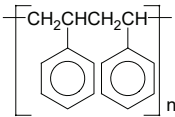
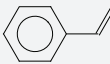


PS, iso isotactic-polystyrene

PARAMETER	UNIT	VALUE	REFERENCES
GENERAL			
Common name	-	isotactic polystyrene	
CAS name	-	benzene, ethenyl-, homopolymer, isotactic	
Acronym	-	i-PS	
CAS number	-	25086-18-4	
Formula			
SYNTHESIS			
Monomer(s) structure	-		
Monomer(s) CAS number(s)	-	100-42-5	
Monomer(s) molecular weight(s)	dalton, g/mol, amu	104.15	
Monomer ratio	-	100%	
Mass average molecular weight, M_w	dalton, g/mol, amu	18,000-1,570,000	
Polydispersity, M_w/M_n	-	2-6.4	
Radius of gyration	nm	22	
STRUCTURE			
Crystallinity	%	30-68	
Cell type (lattice)	-	hexagonal	Guenet, J-M, Polymer-Solvent Molecular Compounds, pp. 180-209, Elsevier, 2008.
Cell dimensions	nm	a=b=2.19, c=0.665	Guenet, J-M, Polymer-Solvent Molecular Compounds, pp. 180-209, Elsevier, 2008.
Space group		R3c	Guenet, J-M, Polymer-Solvent Molecular Compounds, pp. 180-209, Elsevier, 2008.
Tacticity	%	90-99% isotactic triads	Xue, G; Zhang, J; Chen, J; Li, Y; Ma, J; Wang, G; Sun, P, Macromolecules, 33, 2299-2301, 2000; Tosaka, M; Yamaguchi, K; Tsuji, M, Polymer, 51, 2, 547-553, 2010.
Chain conformation	-	3/1 helix (alternating <i>trans</i> and <i>gauche</i>)	Xue, G; Zhang, J; Chen, J; Li, Y; Ma, J; Wang, G; Sun, P, Macromolecules, 33, 2299-2301, 2000; Matsuba, G; Kaji, K; Nishida, K; Kanaya, T; Imai, M, Polym. J., 31, 9, 722-27, 1999.
Lamellae thickness	nm	7.8-13	Taguchi, K; Toda, A; Miyamoto, Y, J. Macromol. Sci. B, 45, 1141-47, 2006.
Spherulite size	μm	300	Kajioka, H; Yoshimoto, S; Taguchi, K; Toda, A, Macromolecules, 43, 3837-43, 2010.
Rapid crystallization temperature	°C	180-200	Bu, H; Gu, F; Bao, L; Chen, M, Macromolecules, 31, 7108-10, 1998.

PS, *iso* isotactic-polystyrene

PARAMETER	UNIT	VALUE	REFERENCES
PHYSICAL PROPERTIES			
Density at 20°C	g cm ⁻³	1.04-1.060	
Melting temperature, DSC	°C	205-240	
Activation energy of thermal degradation	kJ mol ⁻¹	504	Chen, K; Harris, K; Vyazovkin, S, <i>Macromol. Chem. Phys.</i> , 208, 2525-32, 2007.
Glass transition temperature	°C	80-100	
Volume resistivity	ohm-m	1E15	
MECHANICAL & RHEOLOGICAL PROPERTIES			
Flexural strength	MPa	51	
Flexural modulus	MPa	870	
Young's modulus	MPa	1,048	Thomas, S P; Thomas, S; Bandyopadhyay, S, <i>Composites A40</i> , 36-44, 2009.
Poisson's ratio	-	0.33	Thomas, S P; Thomas, S; Bandyopadhyay, S, <i>Composites A40</i> , 36-44, 2009.
CHEMICAL RESISTANCE			
Acid dilute/concentrated	-	very good/poor	
Alcohols	-	good	
Alkalis	-	good	
Aliphatic hydrocarbons	-	poor	
Aromatic hydrocarbons	-	poor	
Esters	-	poor	
Greases & oils	-	poor	
Halogenated hydrocarbons	-	poor	
Ketones	-	poor	
Other	-	toluene, perchloroethylene, carbon tetrachloride, carbon disulfide, MEK, dioxane, cyclohexanone, ethyl acetate	
⊖ solvents	-	benzene, i-butyl acetate, cyclohexane, methyl acetate	
Good solvent	-	n-tetradecane/decahydronaphthalene=2/1, trichlorobenzene	
Non-solvent	-	methyl ethyl ketone and methanol at boiling temperatures	
FLAMMABILITY			
Flammability according to UL-94 standard; thickness 1.6/0.8 mm	class	HB	
Ignition temperature	°C	296	
Autoignition temperature	°C	490	
Limiting oxygen index	% O ₂	17.8-18.1	
Minimum ignition energy	J	0.04	
Heat release	kW m ⁻²	734 (HIPS without flame retardant); 283-378 (HIPS with flame retardants)	
NBS smoke chamber	-	470	
Char at 500°C	%	0	Lyon, R E; Walters, R N, <i>J. Anal. Appl. Pyrolysis</i> , 71, 27-46, 2004.
Heat of combustion	J g ⁻¹	43,650	
Volatile products of combustion	-	styrene, oligomers, organic acids, Alcohols, aldehydes, ketones, CO, CO ₂	

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PARAMETER	UNIT	VALUE	REFERENCES
CO yield	%	8-13 (HIPS with flame retardants)	
ANALYSIS			
FTIR (wavenumber-assignment)	cm ⁻¹ /-	3/1 helix double band – 1082-1052 and 922-904; GTTG – 548, TTGG and GGTG – 562, GTGT – 567 and 586	Xue, G; Zhang, J; Chen, J; Li, Y; Ma, J; Wang, G; Sun, P, <i>Macromolecules</i> , 33, 2299-2301, 2000; Matsuba, G; Kaji, K; Nishida, K; Kanaya, T; Imai, M, <i>Polym. J.</i> , 31, 9, 722-27, 1999.
x-ray diffraction peaks	degree	14.3, 16.5, 18.4, 21.7, 24.5, 27.3	Xue, G; Zhang, J; Chen, J; Li, Y; Ma, J; Wang, G; Sun, P, <i>Macromolecules</i> , 33, 2299-2301, 2000.