Surface Energy Data for PS: Polystyrene, CAS #9003-53-6

Source[a]	Mst. Type[b]	Data[c]	Comments[d]
Ellison, 1954[8]	Critical ST	γ_c = 33 mJ/m^2; 20°C	Test liquids not known.
Shafrin, 1963[201]	Critical ST	γ_c = 43 mJ/m^2; no temp cited	Test liquids not known.
Shafrin, 1963[201]	Critical ST	γ_c = 35 mJ/m^2; no temp cited	From polar test liquids only.
Jarvis, 1964[15]	Critical ST	γ_c = 33 mJ/m^2; 25°C	Various test liquids.
Lee, 1968[131]	Critical ST	γ_c = 36 mJ/m^2; no temp cited	Test liquids: water, glycerol, formamide, alcohols, and long-chain polyglycols; atactic PS.
Dann, 1970[94]	Critical ST	γ_c = 30.5 mJ/m^2; 25°C	Ethylene glycol/2-ethoxyethanol mixes, based on advancing contact angles.
Dann, 1970[94]	Critical ST	γ_c = 30.5 mJ/m^2; 25°C	Ethylene glycol/2-ethoxyethanol mixes, based on retreating contact angles.
Dann, 1970[94]	Critical ST	γ_c = 31.5 mJ/m^2; 25°C	Polyglycol blends, based on advancing contact angles.
Dann, 1970[94]	Critical ST	γ_c = 37 mJ/m^2; 25°C	Polyglycol blends, based on retreating contact angles.
Dann, 1970[94]	Critical ST	γ_c = 30 mJ/m^2; 25°C	Formamide/2-ethoxyethanol mixes, based on advancing contact angles.
Dann, 1970[94]	Critical ST	γ_c = 34 mJ/m^2; 25°C	Formamide/2-ethoxyethanol mixes, based on retreating contact angles.
Dann, 1970[94]	Critical ST	γ_c = 36 mJ/m^2; 25°C	Per ASTM D-2578, using formamide/2-ethoxyethanol mixes.
Markgraf, 2005[62]	Critical ST	γ_c = 33 mJ/m^2; no temp cited	Test liquids not known; low ionomer PS.
Markgraf, 2005[62]	Critical ST	γ_c = 38 mJ/m^2; no temp cited	Test liquids not known; high ionomer PS.
Jarvis, 1964[15]	Contact angle	$\theta_W{}^A$ = 96°; 25°C, 15-30% RH	Polymer surface prepared by solvent evaporation
Jarvis, 1964[15]	Contact angle	$\theta_W{}^A$ = 93°; 25°C, 15-30% RH	Smooth surface prepared by pressing polymer powder against stainless steel at 25°C
Dann, 1970[94]	Contact angle	$\theta_W{}^A$ = 84°; 25°C	Sessile drop method; surface cleaned with detergent and rinsed with distilled water.
Wu, 1971[29]	Contact angle	$\theta_W{}^A$ = 91°; 20°C	
Westerdahl, 1974[63]	Contact angle	$\theta_W{}^Y$ = 88°; no temp cited	Dow 475 modified PS film, thickness 10 mils.
Omenyi, 1981[178]	Contact angle	$\theta_W{}^A$ = 84°; 22°C	
Wu, 1982[27]	Contact angle	$\theta_W{}^A$ = 91°, $\theta_W{}^R$ = 84°, $d\theta_W$ = 7°; 20°C	
Triolo, 1983[189]	Contact angle	$\theta_W{}^R$ = 86°; no temp cited	Spincast on silanized coverslips. Fully hydrated sample immersed in water; interface with advancing, submerged octane bubble. M_n = 84,600.
Wang, 1983[249]	Contact angle	$\theta_W{}^A$ = 90°; no temp cited	Amorphous, atactic, non-oriented PS, M_w = 67,000; surface polished and cleaned.
Wang, 1983[249]	Contact angle	$\theta_W{}^A$ = 90°; no temp cited	Amorphous, atactic PS, M_w = 67,000; oriented with 3:1 draw ratio. Contact angle measured perpindicular to orientation; surface polished and cleaned.
Wang, 1983[249]	Contact angle	$\theta_W{}^A$ = 82°; no temp cited	Amorphous, atactic PS, M_w = 67,000; oriented with 3:1 draw

			ratio. Contact angle measured parallel to orientation; surface polished and cleaned.
Wang, 1983[249]	Contact angle	$\theta_W^A = 98^o$; no temp cited	Amorphous, atactic PS, $M_w = 67{,}000$; oriented with 4.5:1 draw ratio. Contact angle measured perpindicular to orientation; surface polished and cleaned.
Wang, 1983[249]	Contact angle	$\theta_W^A = 75^o$; no temp cited	Amorphous, atactic PS, $M_w = 67{,}000$; oriented with 4.5:1 draw ratio. Contact angle measured parallel to orientation; surface polished and cleaned.
Guiseppe, 1986[77]	Contact angle	$\theta_W^Y = 84^o$; no temp cited	
Cheever, 1986[71]	Contact angle	$\theta_W^Y = 85^o$; no temp cited	Molded PS.
Strobel, 1987[192]	Contact angle	$\theta_W^A = 88^o$; no temp cited	Commercial grade biaxially-oriented film, thickness 1.5 mils.
Occhiello, 1990[203]	Contact angle	$\theta_W^A = 90^o$, $\theta_W^R = 78^o$, $d\theta_W = 12^o$; no temp cited	Measured by sessile drop. $M_w = 2700$.
Occhiello, 1990[203]	Contact angle	$\theta_W^A = 90^o$, $\theta_W^R = 79^o$, $d\theta_W = 11^o$; no temp cited	Measured by sessile drop. $M_w = 50{,}000$.
Jonsson, 1992[112]	Contact angle	$\theta_W^Y = 81^o$; no temp cited	Cleaned by sonification in a 70/30 ethanol/water solution and rinsed with distilled water.
Fukuzawa, 1994[113]	Contact angle	$\theta_W^Y = 91.3^o$; no temp cited	Contact angle measured after stabilizing for 15 secs.
Baier, 1996[148]	Contact angle	$\theta_W^Y = 90^o$; no temp cited	
Cho, 2005[226]	Contact angle	$\theta_W^Y = 73^o$; no temp cited	Measured by sessile drop method.
Kondyurin, 2006[277]	Contact angle	$\theta_W^Y = 90^o$; no temp cited	
Carre, 2007[61]	Contact angle	$\theta_W^A = 85.4^o$; 22^oC	
Dann, 1970[94]	Contact angle	$\gamma_s^d = 40$ mJ/m^2; 25^oC	Various test liquids.
Wu, 1971[29]	Contact angle	$\gamma_s = 42.0$ mJ/m^2 ($\gamma_s^d = 41.2$, $\gamma_s^p = 0.8$); 20^oC	Test liquids: water and diiodomethane, by geometric mean equation.
Wu, 1971[29]	Contact angle	$\gamma_s = 42.6$ mJ/m^2 ($\gamma_s^d = 38.3$, $\gamma_s^p = 4.3$); 20^oC	Test liquids: water and diiodomethane, by harmonic mean equation.
Kitazaki, 1972[191]	Contact angle	$\gamma_s = 40.6$ mJ/m^2 ($\gamma_s^d = 33.8$, $\gamma_s^p = 6.8$); no temp cited	Various test liquids; original results split polar component into hydrogen- and non-hydrogen bonding parameters.
Van Krevelen, 1976[85]	Contact angle	$\gamma_s = 42.0$ mJ/m^2 ($\gamma_s^d = 41.4$, $\gamma_s^p = 0.6$); no temp cited	Test liquids not known.
Wu, 1979[45]	Contact angle	$\gamma_c = 43.0$ mJ/m^2; 20^oC	Test liquids not known; calculated by the equation of state method.
Omenyi, 1981[178]	Contact angle	$\gamma_s = 32.4$ mJ/m^2; 22^oC	Test liquids not known.
van Oss, 1986[25]	Contact angle	$\gamma_s = 42$ mJ/m^2 ($\gamma_s^{LW} = 42$, $\gamma_s^{AB} = 0.0$, $\gamma_s^+ = 0.0$, $\gamma_s^- = 1.1$); 20^oC	Test liquids: water, alpha-bromonaphthalene, diiodomethane, formamide, and glycerin; acid-base analysis.
Fukuzawa, 1994[113]	Contact angle	$\gamma_s = 30.6$ mJ/m^2 ($\gamma_s^{LW} = 33.4$, $\gamma_s^{AB} = -2.8$, $\gamma_s^+ = 0.36$, $\gamma_s^- = 5.3$); no temp cited	Test liquids: water, formamide, and diiodomethane; acid-base analysis, calculated per Good and Van Oss[86]. Contact angles measured after stabilizing for 15 secs.
Fukuzawa, 1994[113]	Contact angle	$\gamma_s = 34.8$ mJ/m^2; no temp cited	Test liquids: water, formamide, and diiodomethane; acid-base analysis calculated by arithmetic and geometric means.

Morra, 1999[134]	Contact angle	γ_s = 38.2 mJ/m^2 (γ_s^{LW} = 38.4, γ_s^{AB} = -0.2, γ_s^+ = 0.03, γ_s^- = 0.2); no temp cited	Test liquids not known; acid-base analysis based on reference values for water of γ^+ = 48.5 mJ/m^2 and γ = 11.2 mJ/m^2.
Kwok, 2000[166]	Contact angle	γ_c = 28.9 mJ/m^2; no temp cited	Re-calculated by equation of state method from data produced by Ellison, 1954[13].
Kwok, 2000[166]	Contact angle	γ_c = 29.7 mJ/m^2; no temp cited	Re-calculated by equation of state method from data produced by Kwok, 1998[169].
Kwok, 2000[166]	Contact angle	γ_c = 29.5 mJ/m^2; no temp cited	Re-calculated by alternate equation of state method from data produced by Kwok, 1998[169].
Cho, 2005[226]	Contact angle	γ_s = 44 mJ/m^2 (γ_s^d = 38, γ_s^p = 6); no temp cited	Test liquids: water and formamide.
Marian, 1963[197]	From polymer melt	γ_s = 32.4 mJ/m^2; 20^{o}C	Direct measurement of polymer melt extrapolated to 20^{o}C.
Oda, 1968[247]	From polymer melt	γ_s = 40.8 mJ/m^2; 20^{o}C	Measurement by sessile bubble of polymer melt extrapolated to 20^{o}C. M_v = 44,000.
LeGrand, 1969[36]	From polymer melt	γ_s = 39.4 mJ/m^2; 20^{o}C	Direct measurement of polymer melt extrapolated to 20^{o}C. M_n = 9200.
LeGrand, 1969[36]	From polymer melt	γ_s = 39.3 mJ/m^2; 20^{o}C	Direct measurement of polymer melt extrapolated to 20^{o}C. M_n = 1680.
Bender, 1970[248]	From polymer melt	γ_s = 39.3 mJ/m^2; 20^{o}C	Measurement by sessile bubble of polymer melt extrapolated to 20^{o}C; anionic polymerized PS, M_n = 9,290.
Wu, 1970[35]	From polymer melt	γ_s = 40.6 mJ/m^2 (γ_s^d = 32.5, γ_s^p = 8.1); 20^{o}C	Direct measurement of polymer melt extrapolated to 20^{o}C.
Wu, 1970[35]	From polymer melt	γ_s = 40.7 mJ/m^2 (γ_s^d = 33.9, γ_s^p = 6.8); 20^{o}C	Measurement by pendant drop of polymer melt extrapolated to 20^{o}C. M_v = 44,000.
Wu, 1971[29]	From polymer melt	γ_s = 40.7 mJ/m^2 (γ_s^d = 34.3, γ_s^p = 6.4); 20^{o}C	Measurement by pendant drop of polymer melt extrapolated to 20^{o}C; polarity calculated from interfacial tension with PE by geometric mean equation.
Lee, 1968[131]	Calculated	γ_s = 29 mJ/m^2; no temp cited	Calculated from glass temperature of 373K; atactic PS.
Wu, 1968[182]	Calculated	γ_s = 36 mJ/m^2; 20^{o}C	Calculated from molecular constitution.
Wu, 1970[35]	Calculated	γ_s = 37.5 mJ/m^2; 20^{o}C	Calculated from parachor and molecular weight.
Sewell, 1971[193]	Calculated	γ_s = 31.3 mJ/m^2; no temp cited	Calculated from parachor and cohesive energy.
Sewell, 1971[193]	Calculated	γ_s = 29.4 mJ/m^2; no temp cited	Calculated by least squares from cohesive energy and molar volume.
Wu, 1974[47]	Calculated	γ_s = 29.5 mJ/m^2; 20^{o}C	Calculated from free volume theory and molecular weight.
Wu, 1974[47]	Calculated	γ_s = 30.0 mJ/m^2; 20^{o}C	Calculated from free volume theory and molecular weight.
Van Krevelen, 1976[85]	Calculated	γ_s = 43 mJ/m^2; no temp cited	Calculated from parachor parameter.
Wu, 1982[18]	Calculated	γ_s = 38.7 mJ/m^2; 20^{o}C	Calculated from cohesive energy density and solubility parameters.
Pritykin, 1986[199]	Calculated	γ_s = 48.7 mJ/m^2; no temp cited	Calculated from cohesion parameters and monomer refractometric characteristics, equation 1.
Pritykin, 1986[199]	Calculated	γ_s = 40.4 mJ/m^2; no temp cited	Calculated from cohesion parameters and monomer refractometric characteristics, equation 2.
Van Ness, 1992[186]	Calculated	γ_s = 39.6 mJ/m^2; 20^{o}C	Calculated molten surface tension value, extrapolated to 20^{o}C.

Mangipudi, 1996[269]	Other	γ_s = 44 mJ/m^2; no temp cited	Measured by contact deformation per Johnson-Kendall-Roberts method.
Yagnyatinskaya, 1970[200]	Unknown	γ_s = 45.2 mJ/m^2; no temp cited	No details available.