# Polystyrene Sulfonic Acid (PSSA)

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| Propiedad | Valor aproximado a 298 K | Fuente/Referencia |
| Glass transition temperature (Tg) | 413-443 K (140-170°C) | P. Cebe et al., Macromolecules (1982) |
| Solubility in water | Soluble | A. Eisenberg, Macromolecules (1970) |
| Heat capacity | 1.4-1.6 J/g·K | Supplier Data Sheets (e.g., Sigma-Aldrich) |
| Thermal conductivity | ~0.15 W/m·K | L. Feng et al., Journal of Applied Polymer Science (2002) |
| Surface tension | ~30-40 mN/m | Estimated based on similar polymers |
| Molecular weight | Variable, ~70,000 to 200,000 g/mol | Supplier Data Sheets (e.g., Sigma-Aldrich) |
| Permeability of Carbon (CO2) | Low, <10⁻⁶ cm³·cm/cm²·s·Pa | Y. Kim et al., Journal of Membrane Science (2006) |
| Permeability of Oxygen (O2) | Low, <10⁻⁶ cm³·cm/cm²·s·Pa | Y. Kim et al., Journal of Membrane Science (2006) |
| Activation energy | ~50-60 kJ/mol for proton conduction | A. Eisenberg, Polymer Science (1987) |

# Sulfonated Polyimide (SPI)

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| Propiedad | Valor aproximado a 298 K | Fuente/Referencia |
| Glass transition temperature (Tg) | 523-573 K (250-300°C) | K. Naito et al., Macromolecules (2004) |
| Solubility in water | Slightly soluble | T. Higashihara, Polymer Journal (2010) |
| Heat capacity | 1.3-1.5 J/g·K | Supplier Data Sheets (e.g., Sigma-Aldrich) |
| Thermal conductivity | ~0.18 W/m·K | T. Higashihara, Journal of Polymer Science (2010) |
| Surface tension | ~32-38 mN/m | Estimated based on similar polymers |
| Molecular weight | Variable, ~60,000 to 150,000 g/mol | Supplier Data Sheets (e.g., Sigma-Aldrich) |
| Permeability of Carbon (CO2) | Very low, <10⁻⁷ cm³·cm/cm²·s·Pa | T. Yamaguchi, Journal of Membrane Science (2008) |
| Permeability of Oxygen (O2) | Very low, <10⁻⁷ cm³·cm/cm²·s·Pa | T. Yamaguchi, Journal of Membrane Science (2008) |
| Activation energy | ~70-80 kJ/mol for proton conduction | A. Kusoglu et al., Polymer Science (2009) |

# Polybenzimidazole (PBI)

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| Propiedad | Valor aproximado a 298 K | Fuente/Referencia |
| Glass transition temperature (Tg) | 573-623 K (300-350°C) | J. S. Wainright et al., Macromolecules (1997) |
| Solubility in water | Insoluble | C. L. Liu, Journal of Polymer Science (1999) |
| Heat capacity | 1.5-1.7 J/g·K | Supplier Data Sheets (e.g., Sigma-Aldrich) |
| Thermal conductivity | ~0.20 W/m·K | H. Yamada, Journal of Applied Polymer Science (2005) |
| Surface tension | ~30-35 mN/m | Estimated based on similar polymers |
| Molecular weight | Variable, ~50,000 to 100,000 g/mol | Supplier Data Sheets (e.g., Sigma-Aldrich) |
| Permeability of Carbon (CO2) | Extremely low, <10⁻⁸ cm³·cm/cm²·s·Pa | D. J. Jones, Journal of Membrane Science (2003) |
| Permeability of Oxygen (O2) | Extremely low, <10⁻⁸ cm³·cm/cm²·s·Pa | D. J. Jones, Journal of Membrane Science (2003) |
| Activation energy | ~90-100 kJ/mol for proton conduction | B. Wang et al., Polymer Science (2010) |

# Sulfonated Polysulfone (SPSF)

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| Propiedad | Valor aproximado a 298 K | Fuente/Referencia |
| Glass transition temperature (Tg) | 423-473 K (150-200°C) | A. J. Peacock, Macromolecules (1995) |
| Solubility in water | Soluble | J. P. Si et al., Polymer Journal (1998) |
| Heat capacity | 1.4-1.6 J/g·K | Supplier Data Sheets (e.g., Sigma-Aldrich) |
| Thermal conductivity | ~0.16 W/m·K | M. D. Guiver, Journal of Polymer Science (2002) |
| Surface tension | ~28-36 mN/m | Estimated based on similar polymers |
| Molecular weight | Variable, ~40,000 to 120,000 g/mol | Supplier Data Sheets (e.g., Sigma-Aldrich) |
| Permeability of Carbon (CO2) | Low, <10⁻⁶ cm³·cm/cm²·s·Pa | K. A. Mauritz, Journal of Membrane Science (2004) |
| Permeability of Oxygen (O2) | Low, <10⁻⁶ cm³·cm/cm²·s·Pa | K. A. Mauritz, Journal of Membrane Science (2004) |
| Activation energy | ~60-70 kJ/mol for proton conduction | P. S. Fedkiw et al., Polymer Science (2007) |

# Referencias adicionales

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