

# Reference: Polymer Properties

## Thermal Transitions of Homopolymers: Glass Transition & Melting Point

Literature values for the glass transition temperature, ( $T_g$ ), and melting temperature, ( $T_m$ ), are given in Table I for the more common homopolymers. Polymers are listed by the repeating unit in the polymer chain. These polymers and corresponding monomers are available from Aldrich. Literature values for a given material can vary widely. The values reported

in Table I have been taken from various sources and represent the most commonly reported numbers.<sup>1</sup> Several factors can influence the reported values, including molecular weight, molecular weight distribution, tacticity, thermal history, purity, and method of measurement.

**Table I: Thermal Transitions of Homopolymers: Glass Transition ( $T_g$ ) & Melting Point ( $T_m$ ) Temperatures**

| Repeating Unit                               | $T_g$ (°C) | $T_m$ (°C) | Repeating Unit                                      | $T_g$ (°C) | $T_m$ (°C) |
|--|------------|------------|---|------------|------------|
| Acenaphthylene                               | 214        |            | <i>N,N</i> -Dimethylacrylamide                      | 89         |            |
| Acetaldehyde                                 | -32        | 165        | Dimethylaminoethyl methacrylate                     | 19         |            |
| 4-Acetoxystyrene                             | 116        |            | 2,6-Dimethyl-1,4-phenylene oxide                    | 167        |            |
| Acrylamide                                   | 165        |            | Dimethylsiloxane                                    | -127       | -40        |
| Acrylic acid                                 | 105        |            | 2,4-Dimethylstyrene                                 | 112        |            |
| Acrylonitrile, syndiotactic                  | 125        | 319        | 2,5-Dimethylstyrene                                 | 143        |            |
| Allyl glycidyl ether                         | -78        |            | 3,5-Dimethylstyrene                                 | 104        |            |
| Benzyl acrylate                              | 6          |            | Dodecyl acrylate                                    | -3         |            |
| Benzyl methacrylate                          | 54         |            | Dodecyl methacrylate                                | -65        |            |
| Bisphenol A- <i>alt</i> -epichlorohydrin     | 100        |            | Dodecyl vinyl ether                                 | -62        |            |
| Bisphenol A terephthalate                    | 205        |            | Epibromohydrin                                      | -14        |            |
| Bisphenol carbonate                          | 174        |            | Epichlorohydrin                                     | -22        |            |
| Bisphenol F carbonate                        | 147        |            | 1,2-Epoxybutane                                     | -70        |            |
| Bisphenol Z carbonate                        | 175        |            | 1,2-Epoxydecane                                     | -70        |            |
| 4-Bromostyrene                               | 118        |            | 1,2-Epoxyoctane                                     | -67        |            |
| <i>cis</i> -Butadiene                        | 102        | 1          | 2-Ethoxyethyl acrylate                              | -50        |            |
| <i>trans</i> -Butadiene                      | -58        | 148        | 4-Ethoxystyrene                                     | 86         |            |
| 1-Butene                                     | -24        | 171        | Ethyl acrylate                                      | -24        |            |
| <i>N-tert</i> -Butylacrylamide               | 128        |            | Ethyl cellulose                                     | 43         |            |
| Butyl acrylate                               | -54        |            | Ethylene, HDPE                                      | -125       | 130        |
| <i>sec</i> -Butyl acrylate                   | -26        |            | Ethylene adipate                                    | -46        | 54         |
| <i>tert</i> -Butyl acrylate                  | 43-107     | 193        | Ethylene- <i>trans</i> -1,4-cyclohexyldicarboxylate | 18         | -          |
| 2- <i>tert</i> -Butylaminoethyl methacrylate | 33         |            | Ethylene isophthalate                               | 51         |            |
| Butyl glycidyl ether                         | -79        |            | Ethylene malonate                                   | -29        |            |
| Butyl methacrylate                           | 20         |            | Ethylene 2,6-naphthalenedicarboxylate               | 113        |            |
| <i>tert</i> -Butyl methacrylate              | 118        |            | Ethylene oxide                                      | -66        | 66         |
| 4- <i>tert</i> -Butylstyrene                 | 127        |            | Ethylene terephthalate                              | 72         | 265        |
| <i>tert</i> -Butyl vinyl ether               | 88         | 250        | 2-Ethylhexyl acrylate                               | -50        |            |
| Butyl vinyl ether                            | -55        | 64         | 2-Ethylhexyl methacrylate                           | -10        |            |
| $\epsilon$ -Caprolactone                     | -60        |            | 2-Ethylhexyl vinyl ether                            | -66        |            |
| Cellulose nitrate                            | 53         |            | Ethyl methacrylate                                  | 65         |            |
| Cellulose tripropionate                      |            |            | Ethyl vinyl ether                                   | -43        | 86         |
| <i>cis</i> -Chlorobutadiene                  | -20        | 80         | 4-Fluorostyrene                                     | 95         |            |
| <i>trans</i> -Chlorobutadiene                | -40        | 101        | Formaldehyde  | -82        | 181        |
| 2-Chlorostyrene                              | 119        |            | Hexadecyl acrylate                                  | 35         |            |
| 3-Chlorostyrene                              | 90         |            | Hexadecyl methacrylate                              | 15         |            |
| 4-Chlorostyrene                              | 110        |            | Hexyl acrylate                                      | 57         |            |
| Chlorotrifluoroethylene                      | 52         | 214        | Hexyl methacrylate                                  | -5         |            |
| 2-Cyanoethyl acrylate                        | 4          |            | 2-Hydropropyl methacrylate                          | 76         |            |
| Cyclohexyl acrylate                          | 19         |            | Hydroquinone- <i>alt</i> -epichlorohydrin           | 60         |            |
| Cyclohexyl methacrylate                      | 92         |            | 2-Hydroxyethyl methacrylate                         | 57         |            |
| Cyclohexyl vinyl ether                       | 81         |            | Indene  | 85         |            |
| 2,6-Dichlorostyrene                          | 167        |            | Isobornyl acrylate                                  | 94         |            |
| Diethylaminoethyl methacrylate               | 20         |            | Isobornyl methacrylate                              | 110        |            |

<sup>1</sup>See catalog numbers [Z41,247-3](#), [Z41,255-4](#), [Z22,171-6](#), [Z40,603-1](#) and [Z22,195-3](#) in the *Book section*.

# Reference: Polymer Properties

## Thermal Transitions of Homopolymers: Glass Transition & Melting Point (continued)

Table I: Thermal Transitions of Homopolymers: Glass Transition ( $T_g$ ) & Melting Point ( $T_m$ ) Temperatures (continued)

| Repeating Unit   | $T_g$ (°C) | $T_m$ (°C) | Repeating Unit                      | $T_g$ (°C) | $T_m$ (°C) |
|--|------------|------------|-------------------------------------|------------|------------|
| Isobutyl acrylate  | -24        |            | <i>p</i> -Phenylene terephthalamide | 345        |            |
| Isobutylene  | -73        |            | Phenylene vinylene                  | 80         | 380        |
| Isobutyl methacrylate  | 53         |            | Phenyl methacrylate                 | 110        |            |
| Isobutyl vinyl ether   | -19        | 165        | Phenyl vinyl ketone                 | 74         |            |
| <i>cis</i> -Isoprene   | -63        | 28         | Potassium acrylate                  | 194        |            |
| <i>trans</i> -Isoprene   | -66        | 65         | Propylene, atactic                  | -13        |            |
| <i>N</i> -Isopropylacrylamide  | 85-130     |            | Propylene, isotactic                | -8         | 176        |
| Isopropyl acrylate, isotactic  | -11        | 162        | Propylene, syndiotactic             | -8         |            |
| Isopropyl methacrylate   | 81         |            | Propylene oxide                     | -75        | 66         |
| Methacrylic acid   | 228        |            | Propyl vinyl ether                  | -49        | 76         |
| Methacrylic anhydride  | 159        |            | Sodium acrylate                     | 230        |            |
| Methacrylonitrile  | 120        |            | Sodium methacrylate                 | 310        |            |
| 2-Methoxyethyl acrylate  | -50        |            | Styrene, atactic                    | 100        |            |
| 4-Methoxystyrene   | 113        |            | Styrene, isotactic                  | 100        | 240        |
| Methyl acrylate  | 10         |            | Tetrabromobisphenol A carbonate     | 157        |            |
| Methyl cellulose   |            |            | Tetrafluoroethylene                 | 117        | 327        |
| Methyl glycidyl ether  | -62        |            | Tetrahydrofuran                     | -84        |            |
| Methyl methacrylate, atactic   | 105,120    |            | Tetramethylene adipate              | -118       |            |
| Methyl methacrylate, syndiotactic  | 115        | 200        | Tetramethylene terephthalate        | 17         | 232        |
| 4-Methylpentene  | 29         | 250        | Thio-1,4-phenylene                  | 97         | 285        |
| Methylphenylsiloxane   | -86        |            | 2,2,2-Trifluoroethyl acrylate       | -10        |            |
| Methylstyrene  | 20         |            | Trimethylene oxide                  | -78        |            |
| 3-Methylstyrene  | 97         |            | Trimethylsilyl methacrylate         | 68         |            |
| 4-Methylstyrene  | 97         |            | 2,4,6-Trimethylstyrene              | 162        |            |
| Methyl vinyl ether   | -31        | 144        | Vinyl acetal                        | 355        | 82         |
| Nylon 4,6 (tetramethylene adipamide)   | 43         |            | Vinyl acetate                       | 30         |            |
| Nylon 6 (-caprolactam)   | 52         | 225        | Vinyl alcohol                       | 85         | 220        |
| Nylon 6,6 (hexamethylene adipamide)  | 50         | 265        | Vinyl benzoate                      | 71         |            |
| Nylon 6,9 (hexamethylene azelamide)  | 58         |            | Vinyl 4- <i>tert</i> -butylbenzoate | 101        | -          |
| Nylon 6,10 (hexamethylene sebacamide)  | 50         | 227        | Vinyl butyral                       | 322        | 49         |
| Nylon 6,12 (hexamethylene dodecane-diamide)  | 46         |            | Vinyl carbazole                     | 227        | 320        |
| Nylon 11 ( $\omega$ -undecanamide)   | 42         | 189        | Vinyl chloride                      | 81         | 227        |
| Nylon 12 ( $\omega$ -dodecanamide)   | 41         | 179        | Vinyl cyclohexanoate                | 76         |            |
| 1-Octadecene   | 55         |            | Vinylferrocene                      | 189        |            |
| Octadecyl methacrylate   | -100       |            | Vinyl fluoride                      | 41         | 200        |
| 1-Octene   | -63        |            | Vinyl formal                        | 105        |            |
| Octyl methacrylate   | -20        |            | Vinylidene chloride                 | -18        | 200        |
| Oxy-4,4'-biphenyleneoxy-1,4-phenylenesulfonyl-1,4-phenylene                          | 230        | 290        | Vinylidene fluoride                 | -40        | 171        |
| Oxy-1,4-phenylenesulfonyl-1,4-phenyleneoxy-1,4-phenyleneisopropylidene-1,4-phenylene | 165        | 190        | 2-Vinyl naphthalene                 | 151        |            |
| Oxy-1,4-phenylenesulfonyl-1,4-phenylene ether  | 214        | 230        | Vinyl pivalate                      | 86         |            |
| <i>p</i> -Phenylene isophthalamide   | 225        | 380        | Vinyl propionate                    | 10         |            |
|  |            |            | 2-Vinylpyridine                     | 104        |            |
|  |            |            | 4-Vinylpyridine                     | 142        |            |
|  |            |            | 1-Vinyl-2-pyrrolidone               | 54         |            |
|  |            |            | Vinyl trifluoroacetate              | 46         |            |