

# Butanedioic acid, diethyl ester

|                      |                                                                                                                                                                                                                   |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Other names:         | BUTANEDIOIC ACID DIETHYL ESTER<br>Clorius<br>DIETHYL BUTANEDIOATE<br>DIETHYL SUCCINATE<br>Diethyl ester of butanedioic acid<br>Diethylester kyseliny jantarove<br>Ethyl succinate<br>Succinic acid, diethyl ester |
| Inchi:               | InChI=1S/C8H14O4/c1-3-11-7(9)5-6-8(10)12-4-2/h3-6H2,1-2H3                                                                                                                                                         |
| InchiKey:            | DKMROQRQHGEIOW-UHFFFAOYSA-N                                                                                                                                                                                       |
| Formula:             | C8H14O4                                                                                                                                                                                                           |
| SMILES:              | CCOC(=O)CCC(=O)OCC                                                                                                                                                                                                |
| Mol. weight [g/mol]: | 174.19                                                                                                                                                                                                            |
| CAS:                 | 123-25-1                                                                                                                                                                                                          |

## Physical Properties

| Property code | Value          | Unit   | Source                               |
|---------------|----------------|--------|--------------------------------------|
| gf            | -451.36        | kJ/mol | Joback Method                        |
| hf            | -698.05        | kJ/mol | Joback Method                        |
| hfus          | 22.05          | kJ/mol | Joback Method                        |
| hvap          | 51.71          | kJ/mol | Joback Method                        |
| log10ws       | -0.96          |        | Aqueous Solubility Prediction Method |
| logp          | 0.893          |        | Crippen Method                       |
| mcvol         | 138.460        | ml/mol | McGowan Method                       |
| nfpaf         | %!d(float64=1) |        | KDB                                  |
| nfpah         | %!d(float64=1) |        | KDB                                  |
| pc            | 2260.00 ± 5.00 | kPa    | NIST Webbook                         |
| rhoc          | 306.58 ± 3.48  | kg/m3  | NIST Webbook                         |
| rinpol        | 1146.00        |        | NIST Webbook                         |
| rinpol        | 1191.00        |        | NIST Webbook                         |
| rinpol        | 1198.00        |        | NIST Webbook                         |
| rinpol        | 1179.00        |        | NIST Webbook                         |
| rinpol        | 1182.00        |        | NIST Webbook                         |
| rinpol        | 1149.00        |        | NIST Webbook                         |
| rinpol        | 1185.00        |        | NIST Webbook                         |
| rinpol        | 1193.00        |        | NIST Webbook                         |

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|--------|---------|--------------|
| rinpol | 1191.00 | NIST Webbook |
| rinpol | 1179.00 | NIST Webbook |
| rinpol | 1139.00 | NIST Webbook |
| rinpol | 1180.90 | NIST Webbook |
| rinpol | 1165.00 | NIST Webbook |
| rinpol | 1181.00 | NIST Webbook |
| rinpol | 1149.00 | NIST Webbook |
| rinpol | 1148.00 | NIST Webbook |
| rinpol | 1149.00 | NIST Webbook |
| rinpol | 1147.00 | NIST Webbook |
| rinpol | 1145.00 | NIST Webbook |
| rinpol | 1149.00 | NIST Webbook |
| rinpol | 1191.00 | NIST Webbook |
| rinpol | 1176.00 | NIST Webbook |
| rinpol | 1188.00 | NIST Webbook |
| rinpol | 1191.00 | NIST Webbook |
| rinpol | 1176.00 | NIST Webbook |
| rinpol | 1182.00 | NIST Webbook |
| rinpol | 1181.00 | NIST Webbook |
| rinpol | 1145.00 | NIST Webbook |
| rinpol | 1172.00 | NIST Webbook |
| rinpol | 1170.00 | NIST Webbook |
| rinpol | 1170.00 | NIST Webbook |
| rinpol | 1191.00 | NIST Webbook |
| rinpol | 1183.00 | NIST Webbook |
| rinpol | 1182.00 | NIST Webbook |
| rinpol | 1146.00 | NIST Webbook |
| rinpol | 1153.00 | NIST Webbook |
| rinpol | 1153.00 | NIST Webbook |
| rinpol | 1182.00 | NIST Webbook |
| rinpol | 1182.00 | NIST Webbook |
| rinpol | 1179.00 | NIST Webbook |
| rinpol | 1166.00 | NIST Webbook |
| rinpol | 1167.00 | NIST Webbook |
| rinpol | 1138.00 | NIST Webbook |
| rinpol | 1146.00 | NIST Webbook |
| rinpol | 1198.00 | NIST Webbook |
| rinpol | 1198.00 | NIST Webbook |
| rinpol | 1185.00 | NIST Webbook |
| rinpol | 1180.90 | NIST Webbook |
| rinpol | 1170.00 | NIST Webbook |
| ripol  | 1699.00 | NIST Webbook |
| ripol  | 1700.00 | NIST Webbook |
| ripol  | 1701.00 | NIST Webbook |

|       |         |              |
|-------|---------|--------------|
| ripol | 1716.00 | NIST Webbook |
| ripol | 1683.00 | NIST Webbook |
| ripol | 1689.00 | NIST Webbook |
| ripol | 1694.00 | NIST Webbook |
| ripol | 1679.00 | NIST Webbook |
| ripol | 1680.00 | NIST Webbook |
| ripol | 1687.00 | NIST Webbook |
| ripol | 1704.00 | NIST Webbook |
| ripol | 1690.00 | NIST Webbook |
| ripol | 1658.00 | NIST Webbook |
| ripol | 1677.00 | NIST Webbook |
| ripol | 1690.00 | NIST Webbook |
| ripol | 1681.20 | NIST Webbook |
| ripol | 1684.00 | NIST Webbook |
| ripol | 1681.00 | NIST Webbook |
| ripol | 1705.00 | NIST Webbook |
| ripol | 1661.00 | NIST Webbook |
| ripol | 1675.00 | NIST Webbook |
| ripol | 1690.00 | NIST Webbook |
| ripol | 1690.00 | NIST Webbook |
| ripol | 1677.00 | NIST Webbook |
| ripol | 1667.00 | NIST Webbook |
| ripol | 1690.00 | NIST Webbook |
| ripol | 1714.00 | NIST Webbook |
| ripol | 1697.00 | NIST Webbook |
| ripol | 1672.00 | NIST Webbook |
| ripol | 1672.00 | NIST Webbook |
| ripol | 1655.00 | NIST Webbook |
| ripol | 1677.00 | NIST Webbook |
| ripol | 1706.00 | NIST Webbook |
| ripol | 1668.00 | NIST Webbook |
| ripol | 1697.00 | NIST Webbook |
| ripol | 1702.00 | NIST Webbook |
| ripol | 1669.00 | NIST Webbook |
| ripol | 1675.00 | NIST Webbook |
| ripol | 1682.00 | NIST Webbook |
| ripol | 1688.00 | NIST Webbook |
| ripol | 1689.00 | NIST Webbook |
| ripol | 1689.00 | NIST Webbook |
| ripol | 1689.00 | NIST Webbook |
| ripol | 1689.00 | NIST Webbook |
| ripol | 1679.00 | NIST Webbook |
| ripol | 1686.00 | NIST Webbook |
| ripol | 1690.00 | NIST Webbook |

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|-------|---------------|---|--------------------------------------------------------------------------------------------------------------------------------------|
| ripol | 1687.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1683.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1700.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1673.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1677.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1701.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1664.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1701.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1678.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1701.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1668.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1675.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1716.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1662.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1674.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1668.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1655.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1683.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1667.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1642.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1668.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1698.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1689.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1714.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1680.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1679.00       |   | NIST Webbook                                                                                                                         |
| ripol | 1673.00       |   | NIST Webbook                                                                                                                         |
| tb    | 490.80        | K | (Liquid + liquid) equilibria of (water + propionic acid + diethyl succinate or diethyl glutarate or diethyl adipate) ternary systems |
| tb    | 490.80        | K | Liquid-liquid equilibria of (water + butyric acid + diethyl succinate or diethyl glutarate or diethyl adipate) ternary systems       |
| tb    | 490.90        | K | KDB                                                                                                                                  |
| tb    | 490.85        | K | Liquid-Liquid Equilibria of (Water + Acetic Acid + Diethyl Succinate or Diethyl Glutarate or Diethyl Adipate) Ternary Systems        |
| tc    | 665.00 ± 2.00 | K | NIST Webbook                                                                                                                         |
| tc    | 666.00        | K | Critical temperatures and pressures of some dicarboxylic acid diethyl esters                                                         |
| tc    | 663.00        | K | KDB                                                                                                                                  |

|    |               |                      |                                                                                                                              |
|----|---------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| tc | 663.00 ± 5.00 | K                    | NIST Webbook                                                                                                                 |
| tf | 252.48        | K                    | Aqueous Solubility Prediction Method                                                                                         |
| tf | 251.63        | K                    | Phase Equilibrium and Physical Properties for the Purification of Propylene Carbonate (PC) and $\gamma$ -Butyrolactone (GBL) |
| tf | 252.25        | K                    | NIST Webbook                                                                                                                 |
| tf | 251.20 ± 0.50 | K                    | NIST Webbook                                                                                                                 |
| tf | 251.90 ± 0.40 | K                    | NIST Webbook                                                                                                                 |
| tf | 252.00        | K                    | KDB                                                                                                                          |
| vc | 0.531         | m <sup>3</sup> /kmol | Joback Method                                                                                                                |

## Temperature Dependent Properties

| Property code | Value     | Unit    | Temperature [K] | Source                                                                                                                  |
|---------------|-----------|---------|-----------------|-------------------------------------------------------------------------------------------------------------------------|
| cpg           | 384.50    | J/mol×K | 718.73          | Joback Method                                                                                                           |
| cpg           | 333.68    | J/mol×K | 565.64          | Joback Method                                                                                                           |
| cpg           | 344.72    | J/mol×K | 596.26          | Joback Method                                                                                                           |
| cpg           | 355.33    | J/mol×K | 626.88          | Joback Method                                                                                                           |
| cpg           | 365.50    | J/mol×K | 657.50          | Joback Method                                                                                                           |
| cpg           | 375.23    | J/mol×K | 688.12          | Joback Method                                                                                                           |
| cpg           | 322.22    | J/mol×K | 535.02          | Joback Method                                                                                                           |
| cpl           | 338.10    | J/mol×K | 292.60          | NIST Webbook                                                                                                            |
| cpl           | 338.10    | J/mol×K | 292.60          | NIST Webbook                                                                                                            |
| cpl           | 330.50    | J/mol×K | 298.15          | NIST Webbook                                                                                                            |
| dvisc         | 0.0005222 | Pa×s    | 429.63          | Joback Method                                                                                                           |
| dvisc         | 0.0002898 | Pa×s    | 499.89          | Joback Method                                                                                                           |
| dvisc         | 0.0002287 | Pa×s    | 535.02          | Joback Method                                                                                                           |
| dvisc         | 0.0003804 | Pa×s    | 464.76          | Joback Method                                                                                                           |
| dvisc         | 0.0020386 | Pa×s    | 324.24          | Joback Method                                                                                                           |
| dvisc         | 0.0011847 | Pa×s    | 359.37          | Joback Method                                                                                                           |
| dvisc         | 0.0007583 | Pa×s    | 394.50          | Joback Method                                                                                                           |
| hvapt         | 56.50     | kJ/mol  | 408.50          | NIST Webbook                                                                                                            |
| pvap          | 0.09      | kPa     | 326.50          | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |

|      |      |     |        |                                                                                                                         |
|------|------|-----|--------|-------------------------------------------------------------------------------------------------------------------------|
| pvap | 0.04 | kPa | 313.40 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| pvap | 0.05 | kPa | 318.40 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| pvap | 0.07 | kPa | 321.40 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| pvap | 0.08 | kPa | 323.50 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| pvap | 0.03 | kPa | 311.40 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| pvap | 0.10 | kPa | 326.50 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| pvap | 0.11 | kPa | 328.50 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |

|      |      |     |        |                                                                                                                         |
|------|------|-----|--------|-------------------------------------------------------------------------------------------------------------------------|
| pvap | 0.13 | kPa | 331.40 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| pvap | 0.14 | kPa | 331.60 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| pvap | 0.15 | kPa | 333.60 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| pvap | 0.19 | kPa | 336.50 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| pvap | 0.22 | kPa | 339.40 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| pvap | 0.02 | kPa | 306.40 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| pvap | 0.34 | kPa | 345.50 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |

|      |          |       |        |                                                                                                                         |
|------|----------|-------|--------|-------------------------------------------------------------------------------------------------------------------------|
| pvap | 0.01     | kPa   | 301.40 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| pvap | 8.61e-03 | kPa   | 296.40 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| pvap | 6.78e-03 | kPa   | 293.50 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| pvap | 5.04e-03 | kPa   | 290.50 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| pvap | 4.95e-03 | kPa   | 290.20 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| pvap | 0.05     | kPa   | 316.40 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| pvap | 0.27     | kPa   | 342.40 | Vapor Pressures and Enthalpies of Vaporization of a Series of the Symmetric Linear n-Alkyl Esters of Dicarboxylic Acids |
| rhoI | 998.39   | kg/m3 | 333.15 | Surface tension of four oxygenated fuels: experiment and correlation                                                    |

|      |         |       |        |                                                                                                            |
|------|---------|-------|--------|------------------------------------------------------------------------------------------------------------|
| rhoI | 993.16  | kg/m3 | 338.15 | Surface tension of four oxygenated fuels: experiment and correlation                                       |
| rhoI | 987.93  | kg/m3 | 343.15 | Surface tension of four oxygenated fuels: experiment and correlation                                       |
| rhoI | 982.70  | kg/m3 | 348.15 | Surface tension of four oxygenated fuels: experiment and correlation                                       |
| rhoI | 977.45  | kg/m3 | 353.15 | Surface tension of four oxygenated fuels: experiment and correlation                                       |
| rhoI | 972.19  | kg/m3 | 358.15 | Surface tension of four oxygenated fuels: experiment and correlation                                       |
| rhoI | 966.91  | kg/m3 | 363.15 | Surface tension of four oxygenated fuels: experiment and correlation                                       |
| rhoI | 1044.83 | kg/m3 | 288.15 | Volumetric and viscometric study with FT-IR analysis of binary systems with diethyl succinate and alcohols |
| rhoI | 1039.63 | kg/m3 | 293.15 | Volumetric and viscometric study with FT-IR analysis of binary systems with diethyl succinate and alcohols |
| rhoI | 1034.44 | kg/m3 | 298.15 | Volumetric and viscometric study with FT-IR analysis of binary systems with diethyl succinate and alcohols |
| rhoI | 1029.25 | kg/m3 | 303.15 | Volumetric and viscometric study with FT-IR analysis of binary systems with diethyl succinate and alcohols |

|      |         |       |        |                                                                                                            |  |
|------|---------|-------|--------|------------------------------------------------------------------------------------------------------------|--|
| rhoI | 1024.08 | kg/m3 | 308.15 | Volumetric and viscometric study with FT-IR analysis of binary systems with diethyl succinate and alcohols |  |
| rhoI | 1018.90 | kg/m3 | 313.15 | Volumetric and viscometric study with FT-IR analysis of binary systems with diethyl succinate and alcohols |  |
| rhoI | 1013.72 | kg/m3 | 318.15 | Volumetric and viscometric study with FT-IR analysis of binary systems with diethyl succinate and alcohols |  |
| rhoI | 1003.60 | kg/m3 | 328.15 | Surface tension of four oxygenated fuels: experiment and correlation                                       |  |
| rhoI | 1008.81 | kg/m3 | 323.15 | Surface tension of four oxygenated fuels: experiment and correlation                                       |  |
| rhoI | 1014.01 | kg/m3 | 318.15 | Surface tension of four oxygenated fuels: experiment and correlation                                       |  |
| rhoI | 1019.20 | kg/m3 | 313.15 | Surface tension of four oxygenated fuels: experiment and correlation                                       |  |
| rhoI | 1024.40 | kg/m3 | 308.15 | Surface tension of four oxygenated fuels: experiment and correlation                                       |  |
| rhoI | 1029.59 | kg/m3 | 303.15 | Surface tension of four oxygenated fuels: experiment and correlation                                       |  |

|      |         |       |        |                                                                                                                                                                                                                     |
|------|---------|-------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| rho1 | 1035.34 | kg/m3 | 298.20 | Modeling phase equilibria of ternary systems (water + formic acid + ester or alcohol) through UNIFAC-original, SERLAS, NRTL, NRTL-modified, and three-suffix Margules: Parameter estimation using genetic algorithm |
| rho1 | 1008.55 | kg/m3 | 323.15 | Volumetric and viscometric study with FT-IR analysis of binary systems with diethyl succinate and alcohols                                                                                                          |

## Pressure Dependent Properties

| Property code | Value  | Unit | Pressure [kPa] | Source       |
|---------------|--------|------|----------------|--------------|
| tbrp          | 378.20 | K    | 2.00           | NIST Webbook |

## Correlations

| Information                 | Value                         |
|-----------------------------|-------------------------------|
| Property code               | pvap                          |
| Equation                    | $\ln(P_{vp}) = A + B/(T + C)$ |
| Coeff. A                    | 1.61345e+01                   |
| Coeff. B                    | -5.13395e+03                  |
| Coeff. C                    | -4.43450e+01                  |
| Temperature range (K), min. | 368.32                        |
| Temperature range (K), max. | 518.70                        |

| Information   | Value                                      |
|---------------|--------------------------------------------|
| Property code | pvap                                       |
| Equation      | $\ln(P_{vp}) = A + B/T + C*\ln(T) + D*T^2$ |
| Coeff. A      | 1.91712e+02                                |
| Coeff. B      | -1.54243e+04                               |

|                             |              |
|-----------------------------|--------------|
| Coeff. C                    | -2.56720e+01 |
| Coeff. D                    | 1.41972e-05  |
| Temperature range (K), min. | 252.35       |
| Temperature range (K), max. | 660.00       |

# Datasets

## Mass density, kg/m3

| Temperature, K - Liquid | Pressure, kPa - Liquid | Mass density, kg/m3 - Liquid |
|-------------------------|------------------------|------------------------------|
| 283.57                  | 100.00                 | 1049.61                      |
| 283.57                  | 1000.00                | 1050.21                      |
| 283.57                  | 3000.00                | 1051.56                      |
| 283.57                  | 5000.00                | 1052.88                      |
| 283.57                  | 10000.00               | 1056.11                      |
| 283.57                  | 15000.00               | 1059.25                      |
| 283.58                  | 20000.00               | 1062.29                      |
| 283.58                  | 25000.00               | 1065.25                      |
| 283.57                  | 30000.00               | 1068.16                      |
| 283.57                  | 40000.00               | 1073.71                      |
| 283.57                  | 50000.00               | 1079.0                       |
| 283.57                  | 60000.00               | 1084.1                       |
| 283.57                  | 70000.00               | 1089.01                      |
| 283.57                  | 80000.00               | 1093.63                      |
| 283.57                  | 90010.00               | 1098.12                      |
| 283.56                  | 100010.00              | 1102.48                      |
| 293.49                  | 100.00                 | 1039.78                      |
| 293.50                  | 1000.00                | 1040.41                      |
| 293.50                  | 3000.00                | 1041.81                      |
| 293.50                  | 5000.00                | 1043.2                       |
| 293.50                  | 10000.00               | 1046.6                       |
| 293.50                  | 15000.00               | 1049.91                      |
| 293.49                  | 20000.00               | 1053.11                      |
| 293.49                  | 25000.00               | 1056.23                      |
| 293.50                  | 30000.00               | 1059.25                      |
| 293.49                  | 40000.00               | 1065.07                      |
| 293.50                  | 50000.00               | 1070.61                      |
| 293.49                  | 60000.00               | 1075.9                       |
| 293.50                  | 70000.00               | 1080.89                      |

|        |           |         |
|--------|-----------|---------|
| 293.50 | 80000.00  | 1085.77 |
| 293.51 | 90000.00  | 1090.39 |
| 293.51 | 100000.00 | 1094.9  |
| 303.42 | 100.00    | 1028.98 |
| 303.42 | 1000.00   | 1029.62 |
| 303.43 | 3000.00   | 1031.12 |
| 303.43 | 5000.00   | 1032.59 |
| 303.44 | 10000.00  | 1036.15 |
| 303.43 | 15000.00  | 1039.61 |
| 303.42 | 20000.00  | 1042.98 |
| 303.42 | 25000.00  | 1046.26 |
| 303.43 | 30000.00  | 1049.4  |
| 303.43 | 40000.00  | 1055.5  |
| 303.43 | 50000.00  | 1061.26 |
| 303.42 | 60000.00  | 1066.78 |
| 303.42 | 70000.00  | 1072.05 |
| 303.42 | 80000.00  | 1077.09 |
| 303.43 | 90000.00  | 1081.92 |
| 303.43 | 100000.00 | 1086.58 |
| 313.33 | 100.00    | 1018.75 |
| 313.33 | 1000.00   | 1019.44 |
| 313.33 | 3000.00   | 1021.07 |
| 313.32 | 5000.00   | 1022.61 |
| 313.32 | 10000.00  | 1026.44 |
| 313.31 | 15000.00  | 1030.05 |
| 313.33 | 20000.00  | 1033.63 |
| 313.33 | 25000.00  | 1037.06 |
| 313.32 | 30000.00  | 1040.39 |
| 313.32 | 40000.00  | 1046.78 |
| 313.31 | 50000.00  | 1052.81 |
| 313.33 | 60000.00  | 1058.52 |
| 313.33 | 70000.00  | 1064.01 |
| 313.33 | 80000.00  | 1069.21 |
| 313.33 | 90000.00  | 1074.2  |
| 313.33 | 100000.00 | 1078.99 |
| 323.18 | 100.00    | 1008.44 |
| 323.18 | 1000.00   | 1009.19 |
| 323.18 | 3000.00   | 1010.86 |
| 323.19 | 5000.00   | 1012.5  |
| 323.18 | 10000.00  | 1016.52 |
| 323.18 | 15000.00  | 1020.37 |
| 323.18 | 20000.00  | 1024.08 |
| 323.18 | 25000.00  | 1027.7  |
| 323.19 | 30000.00  | 1031.17 |

|        |           |         |
|--------|-----------|---------|
| 323.19 | 40000.00  | 1037.8  |
| 323.19 | 50000.00  | 1044.06 |
| 323.19 | 60000.00  | 1050.01 |
| 323.19 | 70000.00  | 1055.67 |
| 323.19 | 80000.00  | 1061.06 |
| 323.19 | 90000.00  | 1066.22 |
| 323.19 | 100000.00 | 1071.19 |
| 333.10 | 100.00    | 998.31  |
| 333.10 | 1000.00   | 999.11  |
| 333.10 | 3000.00   | 1000.91 |
| 333.10 | 5000.00   | 1002.64 |
| 333.11 | 10000.00  | 1006.85 |
| 333.11 | 15000.00  | 1010.94 |
| 333.11 | 20000.00  | 1014.85 |
| 333.11 | 25000.00  | 1018.62 |
| 333.11 | 30000.00  | 1022.27 |
| 333.11 | 40000.00  | 1029.2  |
| 333.11 | 50000.00  | 1035.72 |
| 333.11 | 60000.00  | 1041.91 |
| 333.11 | 70000.00  | 1047.69 |
| 333.11 | 80000.00  | 1053.26 |
| 333.11 | 90000.00  | 1058.57 |
| 333.11 | 100000.00 | 1063.7  |
| 342.97 | 100.00    | 987.87  |
| 342.98 | 1000.00   | 988.73  |
| 342.98 | 3000.00   | 990.63  |
| 342.98 | 5000.00   | 992.45  |
| 342.98 | 10000.00  | 996.91  |
| 342.97 | 15000.00  | 1001.22 |
| 342.97 | 20000.00  | 1005.3  |
| 342.98 | 25000.00  | 1009.24 |
| 342.97 | 30000.00  | 1013.07 |
| 342.97 | 40000.00  | 1020.32 |
| 342.97 | 50000.00  | 1027.1  |
| 342.98 | 60000.00  | 1033.53 |
| 342.97 | 70000.00  | 1039.64 |
| 342.98 | 80000.00  | 1045.43 |
| 342.97 | 90000.00  | 1050.91 |
| 342.97 | 100000.00 | 1056.19 |
| 352.82 | 100.00    | 977.64  |
| 352.82 | 1000.00   | 978.58  |
| 352.82 | 3000.00   | 980.59  |
| 352.82 | 5000.00   | 982.53  |
| 352.82 | 10000.00  | 987.26  |

|        |           |         |
|--------|-----------|---------|
| 352.82 | 15000.00  | 991.79  |
| 352.83 | 20000.00  | 996.08  |
| 352.83 | 25000.00  | 1000.24 |
| 352.83 | 30000.00  | 1004.25 |
| 352.83 | 40000.00  | 1011.8  |
| 352.83 | 50000.00  | 1018.87 |
| 352.83 | 60000.00  | 1025.54 |
| 352.83 | 70000.00  | 1031.82 |
| 352.83 | 80000.00  | 1037.81 |
| 352.83 | 90000.00  | 1043.47 |
| 352.83 | 100010.00 | 1048.95 |
| 362.66 | 100.00    | 967.3   |
| 362.66 | 1000.00   | 968.28  |
| 362.66 | 3000.00   | 970.41  |
| 362.67 | 5000.00   | 972.48  |
| 362.67 | 10000.00  | 977.45  |
| 362.67 | 15000.00  | 982.21  |
| 362.67 | 20000.00  | 986.74  |
| 362.67 | 25000.00  | 991.07  |
| 362.67 | 30000.00  | 995.26  |
| 362.67 | 40000.00  | 1003.16 |
| 362.67 | 50000.00  | 1010.5  |
| 362.66 | 60000.00  | 1017.41 |
| 362.67 | 70000.00  | 1023.98 |
| 362.67 | 80000.00  | 1030.14 |
| 362.67 | 90000.00  | 1036.01 |
| 362.67 | 100000.00 | 1041.65 |

Reference

<https://www.doi.org/10.1021/acs.jced.5b00385>

## Thermal conductivity, W/m/K

| Temperature, K - Liquid | Pressure, kPa - Liquid | Thermal conductivity, W/m/K - Liquid |
|-------------------------|------------------------|--------------------------------------|
| 264.81                  | 5000.00                | 0.1565                               |
| 265.06                  | 100.00                 | 0.1559                               |
| 265.23                  | 15000.00               | 0.1602                               |
| 265.57                  | 15000.00               | 0.1596                               |
| 265.83                  | 10000.00               | 0.1586                               |
| 265.83                  | 20000.00               | 0.1615                               |
| 265.94                  | 20000.00               | 0.1602                               |
| 266.08                  | 15000.00               | 0.1594                               |

|        |          |        |
|--------|----------|--------|
| 266.13 | 10000.00 | 0.1582 |
| 266.38 | 100.00   | 0.1561 |
| 266.47 | 5000.00  | 0.1571 |
| 266.81 | 20000.00 | 0.1607 |
| 266.94 | 5000.00  | 0.1572 |
| 267.04 | 100.00   | 0.1561 |
| 267.83 | 10000.00 | 0.1589 |
| 284.87 | 20000.00 | 0.1580 |
| 285.16 | 10000.00 | 0.1556 |
| 285.41 | 20000.00 | 0.1579 |
| 285.62 | 5000.00  | 0.1539 |
| 285.63 | 100.00   | 0.1527 |
| 285.68 | 15000.00 | 0.1570 |
| 285.71 | 10000.00 | 0.1554 |
| 286.14 | 5000.00  | 0.1537 |
| 286.27 | 15000.00 | 0.1569 |
| 286.33 | 100.00   | 0.1528 |
| 286.36 | 10000.00 | 0.1555 |
| 286.56 | 15000.00 | 0.1562 |
| 286.61 | 5000.00  | 0.1538 |
| 286.76 | 20000.00 | 0.1578 |
| 287.36 | 15000.00 | 0.1563 |
| 287.43 | 5000.00  | 0.1535 |
| 287.75 | 100.00   | 0.1527 |
| 304.47 | 100.00   | 0.1484 |
| 304.53 | 15000.00 | 0.1529 |
| 304.85 | 20000.00 | 0.1551 |
| 305.64 | 20000.00 | 0.1543 |
| 305.66 | 100.00   | 0.1483 |
| 305.72 | 10000.00 | 0.1518 |
| 306.12 | 5000.00  | 0.1497 |
| 306.12 | 15000.00 | 0.1529 |
| 306.39 | 20000.00 | 0.1549 |
| 306.44 | 10000.00 | 0.1519 |
| 306.79 | 5000.00  | 0.1501 |
| 306.80 | 15000.00 | 0.1529 |
| 306.84 | 10000.00 | 0.1513 |
| 307.27 | 10000.00 | 0.1510 |
| 307.29 | 5000.00  | 0.1502 |
| 307.33 | 100.00   | 0.1482 |
| 326.02 | 100.00   | 0.1436 |
| 326.76 | 100.00   | 0.1433 |
| 327.17 | 10000.00 | 0.1466 |
| 327.21 | 5000.00  | 0.1448 |

|        |          |        |
|--------|----------|--------|
| 327.56 | 100.00   | 0.1437 |
| 327.58 | 15000.00 | 0.1489 |
| 327.69 | 20000.00 | 0.1503 |
| 327.81 | 5000.00  | 0.1449 |
| 328.07 | 10000.00 | 0.1471 |
| 328.35 | 15000.00 | 0.1484 |
| 328.56 | 20000.00 | 0.1502 |
| 328.57 | 5000.00  | 0.1449 |
| 328.62 | 10000.00 | 0.1469 |
| 329.63 | 5000.00  | 0.1453 |
| 329.69 | 15000.00 | 0.1481 |
| 330.11 | 20000.00 | 0.1501 |
| 345.18 | 20000.00 | 0.1462 |
| 345.49 | 5000.00  | 0.1404 |
| 345.53 | 100.00   | 0.1385 |
| 345.80 | 10000.00 | 0.1422 |
| 345.99 | 5000.00  | 0.1402 |
| 346.11 | 5000.00  | 0.1404 |
| 346.18 | 15000.00 | 0.1448 |
| 346.44 | 10000.00 | 0.1423 |
| 346.52 | 15000.00 | 0.1442 |
| 346.59 | 20000.00 | 0.1462 |
| 346.63 | 100.00   | 0.1384 |
| 346.65 | 15000.00 | 0.1446 |
| 346.94 | 20000.00 | 0.1461 |
| 347.16 | 100.00   | 0.1385 |
| 347.34 | 10000.00 | 0.1419 |
| 365.09 | 100.00   | 0.1339 |
| 365.15 | 10000.00 | 0.1381 |
| 365.16 | 5000.00  | 0.1359 |
| 365.54 | 15000.00 | 0.1395 |
| 365.59 | 5000.00  | 0.1360 |
| 365.79 | 100.00   | 0.1341 |
| 366.05 | 20000.00 | 0.1409 |
| 366.11 | 10000.00 | 0.1380 |
| 366.50 | 100.00   | 0.1339 |
| 366.54 | 20000.00 | 0.1409 |
| 366.57 | 15000.00 | 0.1399 |
| 366.66 | 20000.00 | 0.1415 |
| 366.72 | 10000.00 | 0.1379 |
| 367.17 | 5000.00  | 0.1358 |
| 367.25 | 20000.00 | 0.1415 |
| 367.31 | 15000.00 | 0.1397 |
| 385.28 | 20000.00 | 0.1379 |



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 acid + water: <https://www.doi.org/10.1021/je100231g>

## Legend

|                 |                                                 |
|-----------------|-------------------------------------------------|
| <b>cpg:</b>     | Ideal gas heat capacity                         |
| <b>cpl:</b>     | Liquid phase heat capacity                      |
| <b>dvisc:</b>   | Dynamic viscosity                               |
| <b>gf:</b>      | Standard Gibbs free energy of formation         |
| <b>hf:</b>      | Enthalpy of formation at standard conditions    |
| <b>hfus:</b>    | Enthalpy of fusion at standard conditions       |
| <b>hvap:</b>    | Enthalpy of vaporization at standard conditions |
| <b>hvapt:</b>   | Enthalpy of vaporization at a given temperature |
| <b>log10ws:</b> | Log10 of Water solubility in mol/l              |
| <b>logp:</b>    | Octanol/Water partition coefficient             |
| <b>mcvol:</b>   | McGowan's characteristic volume                 |
| <b>nfpaf:</b>   | NFPA Fire Rating                                |
| <b>nfpah:</b>   | NFPA Health Rating                              |
| <b>pc:</b>      | Critical Pressure                               |
| <b>pvap:</b>    | Vapor pressure                                  |
| <b>rhoc:</b>    | Critical density                                |
| <b>rho:</b>     | Liquid Density                                  |
| <b>rinpol:</b>  | Non-polar retention indices                     |
| <b>ripol:</b>   | Polar retention indices                         |
| <b>tb:</b>      | Normal Boiling Point Temperature                |
| <b>tbrp:</b>    | Boiling point at reduced pressure               |
| <b>tc:</b>      | Critical Temperature                            |
| <b>tcondl:</b>  | Liquid thermal conductivity                     |
| <b>tf:</b>      | Normal melting (fusion) point                   |
| <b>vc:</b>      | Critical Volume                                 |

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