# Properties of Common Organic Solvents

**Chem 2312H** **T.R. Hoye** **September 7, 2023**

**TABLE 2 (taken from http://murov.info/orgsolvents.htm)**

| **Solvent** | formula | boiling point (°C) | melting point (°C) | density (g/mL) | solubility in $H_2O$[1] (g/100g) | **relative polarity**[2] | eluant strength[3] | threshold limits[4] (ppm) | vapor pressure 20 °C (hPa) | dipole moment (D) | dielectric constant | viscosity $10^{-3}$ Pa s |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| cyclohexane | $C_6H_{12}$ | 80.7 | 6.6 | 0.779 | 0.005 | **0.006** | 0.04 | 100 | 104 | 0 | 2 | 0.89 |
| pentane | $C_5H_{12}$ | 36.1 | -129.7 | 0.626 | 0.0039 | **0.009** | 0.00 | 600 | 573 | 0 | 1.84 | 0.23 |
| hexane | $C_6H_{14}$ | 69 | -95 | 0.655 | 0.0014 | **0.009** | 0.01 | 50 | 160 | 0 | 1.9 | 0.29 |
| heptane | $C_7H_{16}$ | 98 | -90.6 | 0.684 | 0.0003 | **0.012** | | 400 | 48 | 0 | 1.9 | 0.39 |
| carbon tetrachloride | $CCl_4$ | 76.7 | -22.4 | 1.594 | 0.08 | **0.052** | 0.18 | 5 | 120 | 0 | 2.3 | 0.90 |
| carbon disulfide | $CS_2$ | 46.3 | -111.6 | 1.263 | 0.2 | **0.065** | 0.15 | 10 | 400 | 0 | 2.6 | 0.36 |
| *p*-xylene | $C_8H_{10}$ | 138.3 | 13.3 | 0.861 | 0.02 | **0.074** | 0.26 | 100 | 15 | 0 | 2.27 | 0.65 |
| toluene | $C_7H_8$ | 110.6 | -93 | 0.867 | 0.05 | **0.099** | 0.24 | 50 | 29 | 0.36 | 2.4 | 0.55 |
| benzene | $C_6H_6$ | 80.1 | 5.5 | 0.879 | 0.18 | **0.111** | 0.32 | 0.5 | 101 | 0 | 2.3 | 0.60 |
| ether | $C_4H_{10}O$ | 34.6 | -116.3 | 0.713 | 7.5 | **0.117** | 0.38 | 400 | 587 | 1.25 | 4.3 | 0.22 |
| methyl *t*-butyl ether (MTBE) | $C_5H_{12}O$ | 55.2 | -109 | 0.741 | 4.8 | **0.124** | 0.20 | | 250* | 1.4 | 2.6 | 0.36 |
| diethylamine | $C_4H_{11}N$ | 56.3 | -48 | 0.706 | M | **0.145** | 0.63 | 5 | 260 | 1.2 | 3.8 | 0.32 |
| dioxane | $C_4H_8O_2$ | 101.1 | 11.8 | 1.033 | M | **0.164** | 0.56 | 20 | 41 | 0.4 | 2 | 1.18 |
| N,N-dimethylaniline | $C_8H_{11}N$ | 194.2 | 2.4 | 0.956 | 0.14 | **0.179** | | | | | | |
| chlorobenzene | $C_6H_5Cl$ | 132 | -45.6 | 1.106 | 0.05 | **0.188** | 0.30 | 10 | 12 | 1.54 | 5.7 | 0.75 |
| anisole | $C_7H_8O$ | 153.7 | -37.5 | 0.996 | 0.10 | **0.198** | | | 3.5* | 1.4 | 4.3 | 1.05 |
| tetrahydrofuran (THF) | $C_4H_8O$ | 66 | -108.4 | 0.886 | 30 | **0.207** | 0.57 | 200 | 200 | 1.63 | 7.5 | 0.46 |
| ethyl acetate | $C_4H_8O_2$ | 77 | -83.6 | 0.894 | 8.7 | **0.228** | 0.57 | 400 | 97 | 1.78 | 6.0 | 0.43 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ethyl benzoate | $C_9H_{10}O_2$ | 213 | -34.6 | 1.047 | 0.07 | **0.228** | | | | 2.0 | 6.0 | |
| dimethoxyethane (glyme) | $C_4H_{10}O_2$ | 85 | -58 | 0.868 | M | **0.231** | | | | 1.7 | 7.3 | 1.1 |
| diglyme | $C_6H_{14}O_3$ | 162 | -64 | 0.945 | M | **0.244** | | | | 1.9 | 7.23 | 1.88 |
| methyl acetate | $C_3H_6O_2$ | 56.9 | -98.1 | 0.933 | 24.4 | **0.253** | | 200 | 220 | 1.7 | 6.68 | 0.36 |
| chloroform | $CHCl_3$ | 61.2 | -63.5 | 1.498 | 0.8 | **0.259** | 0.40 | 10 | 210 | 1.0 | 4.8 | 0.54 |
| 3-pentanone | $C_5H_{12}O$ | 101.7 | -39.8 | 0.814 | 3.4 | **0.265** | | 200 | 37.7* | 2.8 | 17.0 | |
| 1,1-dichloroethane | $C_2H_4Cl_2$ | 57.3 | -97.0 | 1.176 | 0.5 | **0.269** | | 100 | 240 | 1.8 | 10 | |
| di-n-butyl phthalate | $C_{16}H_{22}O_4$ | 340 | -35 | 1.049 | 0.0011 | **0.272** | | | | | | 16.6 |
| cyclohexanone | $C_6H_{10}O$ | 155.6 | -16.4 | 0.948 | 2.3 | **0.281** | | 25 | 5 | 2.9 | 15 | 2.00 |
| pyridine | $C_5H_5N$ | 115.5 | -42 | 0.982 | M | **0.302** | 0.71 | 5 | 20 | 2.2 | 13 | 0.88 |
| dimethyl phthalate | $C_{10}H_{10}O_4$ | 283.8 | 1 | 1.190 | 0.43 | **0.309** | | | | | | |
| methylene chloride | $CH_2Cl_2$ | 39.8 | -96.7 | 1.326 | 1.32 | **0.309** | 0.42 | 50 | 475 | 1.6 | 9.0 | 0.42 |
| 2-pentanone | $C_5H_{10}O$ | 102.3 | -76.9 | 0.809 | 4.3 | **0.321** | | | 35.4* | 2.7 | 15.4 | 0.50 |
| 2-butanone | $C_4H_8O$ | 79.6 | -86.3 | 0.805 | 25.6 | **0.327** | 0.51 | 200 | 105 | 2.8 | 18.6 | 0.41 |
| 1,2-dichloroethane | $C_2H_4Cl_2$ | 83.5 | -35.4 | 1.235 | 0.87 | **0.327** | | | 79* | 1.8 | 10.4 | 0.78 |
| benzonitrile | $C_7H_5N$ | 205 | -13 | 0.996 | 0.2 | **0.333** | | 10 | 12 | 4.1 | 26 | 1.27 |
| acetone | $C_3H_6O$ | 56.2 | -94.3 | 0.786 | M | **0.355** | 0.56 | 500 | 240 | 2.85 | 21 | 0.30 |
| dimethylformamide (DMF) | $C_3H_7NO$ | 153 | -61 | 0.944 | M | **0.386** | | 10 | 3.5 | 3.8 | 37 | 0.80 |
| *t*-butyl alcohol | $C_4H_{10}O$ | 82.2 | 25.5 | 0.786 | M | **0.389** | | 100 | 41 | 1.7 | 12.4 | 3.35 |
| aniline | $C_6H_7N$ | 184.4 | -6.0 | 1.022 | 3.4 | **0.420** | | 2 | 0.4 | 1.6 | 6.8 | 3.8 |
| dimethylsulfoxide (DMSO) | $C_2H_6OS$ | 189 | 18.4 | 1.092 | M | **0.444** | 0.75 | | 0.61* | 3.9 | 46.7 | 2.00 |
| acetonitrile | $C_2H_3N$ | 81.6 | -46 | 0.786 | M | **0.460** | 0.65 | 20 | 97 | 3.5 | 37.5 | 0.34 |
| 3-pentanol | $C_5H_{12}O$ | 115.3 | -8 | 0.821 | 5.1 | **0.463** | | | 8.8* | 1.7 | 13.3 | |
| 2-pentanol | $C_5H_{12}O$ | 119.0 | -50 | 0.810 | 4.5 | **0.488** | | | 6.1* | 1.7 | 13.7 | 3.5 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2-butanol | $C_4H_{10}O$ | 99.5 | -114.7 | 0.808 | 18.1 | **0.506** | | 100 | 18.3* | 1.7 | 17.3 | 3.1 |
| cyclohexanol | $C_6H_{12}O$ | 161.1 | 25.2 | 0.962 | 4.2 | **0.509** | | 50 | 1.2 | 1.9 | 15 | |
| 1-octanol | $C_8H_{18}O$ | 194.4 | -15 | 0.827 | 0.096 | **0.537** | | | | 1.7 | 10.3 | 7.4 |
| 2-propanol | $C_3H_8O$ | 82.4 | -88.5 | 0.785 | M | **0.546** | 0.82 | 400 | 44 | 1.66 | 19 | 2.07 |
| 1-heptanol | $C_7H_{16}O$ | 176.4 | -35 | 0.819 | 0.17 | **0.549** | | | | 1.7 | 12 | 6.0 |
| *i*-butanol | $C_4H_{10}O$ | 107.9 | -108.2 | 0.803 | 8.5 | **0.552** | | | | 1.8 | 17.9 | 6.68 |
| 1-hexanol | $C_6H_{14}O$ | 158 | -46.7 | 0.814 | 0.59 | **0.559** | | | 0.22* | | 12.5 | 4.6 |
| 1-pentanol | $C_5H_{12}O$ | 138.0 | -78.2 | 0.814 | 2.2 | **0.568** | | | 2.2* | 5.7 | 14 | 3.5 |
| acetyl acetone | $C_5H_8O_2$ | 140.4 | -23 | 0.975 | 16 | **0.571** | | | 3 | 3.0 | 23 | |
| ethyl acetoacetate | $C_6H_{10}O_3$ | 180.4 | -80 | 1.028 | 2.9 | **0.577** | | | 0.78* | | | |
| 1-butanol | $C_4H_{10}O$ | 117.6 | -89.5 | 0.81 | 7.7 | **0.586** | | 20 | 6.3 | 1.7 | 17.5 | 2.59 |
| benzyl alcohol | $C_7H_8O$ | 205.4 | -15.3 | 1.042 | 3.5 | **0.608** | | | 0.094* | 1.7 | 13 | 5.47 |
| 1-propanol | $C_3H_8O$ | 97 | -126 | 0.803 | M | **0.617** | 0.82 | | 21* | 1.68 | 22 | 1.95 |
| acetic acid | $C_2H_4O_2$ | 118 | 16.6 | 1.049 | M | **0.648** | >1 | 10 | 15.3 | 1.68 | 6.2 | 1.12 |
| 2-aminoethanol | $C_2H_7NO$ | 170.9 | 10.5 | 1.018 | M | **0.651** | | 3 | 0.53 | 2.3-2.6 | 37.7 | 20.8 |
| ethanol | $C_2H_6O$ | 78.5 | -114.1 | 0.789 | M | **0.654** | 0.88 | 1000 | 59 | 1.7 | 24 | 1.08 |
| diethylene glycol | $C_4H_{10}O_3$ | 245 | -10 | 1.118 | M | **0.713** | | | 0.027 | 2.3 | 31.8 | 30.2 |
| methanol | $CH_4O$ | 64.6 | -98 | 0.791 | M | **0.762** | 0.95 | 200 | 128 | 1.6 | 33 | 0.54 |
| ethylene glycol | $C_2H_6O_2$ | 197 | -13 | 1.115 | M | **0.790** | 1.11 | | | 2.3 | 37.7 | 16.1 |
| glycerin | $C_3H_8O_3$ | 290 | 17.8 | 1.261 | M | **0.812** | | | | 2.7 | 42.5 | 934 |
| water, heavy | $D_2O$ | 101.3 | 4 | 1.107 | M | **0.991** | | | 15 | 1.84 | 78.3 | 1.10 |
| water | $H_2O$ | 100.00 | 0.00 | 0.998 | M | **1.000** | >>1 | | 17.5 | 1.85 | 80.1 | 0.89 |

1 M = miscible.
2 The values for relative polarity are normalized from measurements of solvent shifts of absorption spectra and were extracted from Christian Reichardt, *Solvents and Solvent Effects in Organic Chemistry*, Wiley-VCH Publishers, 3rd ed., **2003.**
3 Snyder's empirical eluant strength parameter for alumina. Extracted from Reichardt, page 495.
4 Threshold limits for exposure. Extracted from Reichardt, pages 501-502.