Supplementary data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Table S1.** Experimental density (*ρ)*, excess molar volume, partial molar volume and excess partial molar volume for the binary and ternary mixtures of sulfolane + 1, 3-butanediol + perchlorates salts (LiClO4 or NaClO4 or NH4 ClO4) as a function 1, 3-butanediol mole fraction at temperature of 293.15-313.15 K. | | | | | | |
| *x1* | *ρ*  (g·cm−3) | (cm3·mol−1) | (cm3·mol−1) | (cm3·mol−1) | (cm3·mol−1) | (cm3·mol−1) |
| **sulfolane + 1,3-butanediol**  **293.15 K** | | | | | | |
| 0.0000 | 1.2696 | 0.0000 | 93.1023 | 94.6519 | 3.3324 | 0.0000 |
| 0.1003 | 1.2411 | 0.2346 | 91.4584 | 94.7244 | 1.6885 | 0.0725 |
| 0.1995 | 1.2142 | 0.3560 | 90.5849 | 94.8935 | 0.8150 | 0.2416 |
| 0.3028 | 1.1876 | 0.3522 | 89.9985 | 95.0578 | 0.2286 | 0.4059 |
| 0.4003 | 1.1626 | 0.3182 | 89.6673 | 95.2511 | -0.1026 | 0.5992 |
| 0.5004 | 1.1372 | 0.2391 | 89.4829 | 95.4180 | -0.2870 | 0.7662 |
| 0.5979 | 1.1127 | 0.1186 | 89.4254 | 95.4590 | -0.3445 | 0.8071 |
| 0.7031 | 1.0857 | 0.0045 | 89.4996 | 95.3072 | -0.2703 | 0.6554 |
| 0.7976 | 1.0605 | -0.0433 | 89.6366 | 94.9635 | -0.1333 | 0.3116 |
| 0.9001 | 1.0324 | -0.0587 | 89.7320 | 94.4059 | -0.0379 | -0.2460 |
| 1.0000 | 1.0039 | 0.0000 | 89.7699 | 94.0581 | 0.0000 | -0.5938 |
| **298.15 K** | | | | | | |
| 0.0000 | 1.2651 | 0.0000 | 94.9784 | 94.9885 | 4.8674 | 0.0000 |
| 0.1003 | 1.2359 | 0.2946 | 91.8919 | 95.1175 | 1.7809 | 0.1289 |
| 0.1995 | 1.2092 | 0.4073 | 90.8619 | 95.3102 | 0.7509 | 0.3217 |
| 0.3028 | 1.1827 | 0.4017 | 90.4218 | 95.4297 | 0.3108 | 0.4411 |
| 0.4003 | 1.1578 | 0.3654 | 90.1422 | 95.5771 | 0.0312 | 0.5886 |
| 0.5004 | 1.1322 | 0.3085 | 89.9260 | 95.7915 | -0.1850 | 0.8029 |
| 0.5979 | 1.1078 | 0.1855 | 89.7992 | 95.9136 | -0.3118 | 0.9251 |
| 0.7031 | 1.0811 | 0.0529 | 89.8431 | 95.8013 | -0.2679 | 0.8127 |
| 0.7976 | 1.0562 | -0.0141 | 89.9928 | 95.3842 | -0.1182 | 0.3957 |
| 0.9001 | 1.0282 | -0.0309 | 90.1023 | 94.7575 | -0.0087 | -0.2310 |
| 1.0000 | 1.0001 | 0.0000 | 90.1110 | 94.8651 | 0.0000 | -0.1234 |
| **303.15 K** | | | | | | |
| 0.0000 | 1.2621 | 0.0000 | 95.2314 | 95.2143 | 4.8674 | 0.0000 |
| 0.1003 | 1.2322 | 0.3508 | 92.2010 | 95.3823 | 1.8370 | 0.1680 |
| 0.1995 | 1.2056 | 0.4580 | 91.1657 | 95.5994 | 0.8017 | 0.3851 |
| 0.3028 | 1.1791 | 0.4544 | 90.7275 | 95.7169 | 0.3635 | 0.5026 |
| 0.4003 | 1.1542 | 0.4201 | 90.4498 | 95.8380 | 0.0858 | 0.6237 |
| 0.5004 | 1.1287 | 0.3571 | 90.2275 | 96.0327 | -0.1365 | 0.8184 |
| 0.5979 | 1.1041 | 0.2527 | 90.1193 | 96.2058 | -0.2447 | 0.9915 |
| 0.7031 | 1.0776 | 0.1056 | 90.1487 | 96.1636 | -0.2153 | 0.9493 |
| 0.7976 | 1.0529 | 0.0238 | 90.2838 | 95.8126 | -0.0802 | 0.5983 |
| 0.9001 | 1.0252 | -0.0162 | 90.3700 | 95.1770 | 0.0060 | -0.0373 |
| 1.0000 | 0.9973 | 0.0000 | 90.3640 | 95.1205 | 0.0000 | -0.0938 |
| **308.15 K** | | | | | | |
| 0.0000 | 1.2576 | 0.0000 | 96.5305 | 95.5550 | 5.9030 | 0.0000 |
| 0.1003 | 1.2274 | 0.3896 | 92.6567 | 96.0257 | 2.0292 | 0.4707 |
| 0.1995 | 1.2009 | 0.5034 | 91.4237 | 95.9854 | 0.7962 | 0.4304 |
| 0.3028 | 1.1746 | 0.4979 | 91.0145 | 95.6715 | 0.3870 | 0.1165 |
| 0.4003 | 1.1499 | 0.4606 | 90.7831 | 95.3686 | 0.1556 | -0.1864 |
| 0.5004 | 1.1245 | 0.4029 | 90.5699 | 95.2421 | -0.0576 | -0.3129 |
| 0.5979 | 1.0999 | 0.3116 | 90.4422 | 95.4038 | -0.1853 | -0.1512 |
| 0.7031 | 1.0736 | 0.1615 | 90.4328 | 95.8952 | -0.1947 | 0.3401 |
| 0.7976 | 1.0493 | 0.0582 | 90.5399 | 96.5377 | -0.0876 | 0.9827 |
| 0.9001 | 1.0220 | -0.0030 | 90.6269 | 97.0463 | -0.0007 | 1.4913 |
| 1.0000 | 0.9944 | 0.0000 | 90.6275 | 96.6295 | 0.0000 | 1.0745 |
| **313.15 K** | | | | | | |
| 0.0000 | 1.2545 | 0.0000 | 97.5023 | 95.7912 | 6.5730 | 0.0000 |
| 0.1003 | 1.2236 | 0.4433 | 90.6452 | 96.0260 | -0.2841 | 0.2348 |
| 0.1995 | 1.1972 | 0.5480 | 91.7702 | 96.2919 | 0.8410 | 0.5007 |
| 0.3028 | 1.1709 | 0.5407 | 92.3484 | 96.3840 | 1.4191 | 0.5928 |
| 0.4003 | 1.1461 | 0.5100 | 92.4085 | 96.4404 | 1.4792 | 0.6492 |
| 0.5004 | 1.1206 | 0.4593 | 92.1031 | 96.6101 | 1.1738 | 0.8189 |
| 0.5979 | 1.0958 | 0.3839 | 91.6244 | 96.8672 | 0.6951 | 1.0761 |
| 0.7031 | 1.0696 | 0.2243 | 91.0781 | 96.9747 | 0.1489 | 1.1836 |
| 0.7976 | 1.0454 | 0.1117 | 90.8063 | 96.7692 | -0.1229 | 0.9781 |
| 0.9001 | 1.0183 | 0.0329 | 90.7963 | 96.2167 | -0.1329 | 0.4255 |
| 1.0000 | 0.9911 | 0.0000 | 90.9293 | 96.0900 | 0.0000 | 0.2988 |
| **sulfolane + 1,3-butanediol+ LiClO4** | | | | | | |
| **293.15 K** | | | | | | |
| 0.0000 | 1.2696 | 0.0000 | 89.7453 | 94.6519 | -0.0246 | 0.0000 |
| 0.0984 | 1.2438 | 0.0664 | 90.6870 | 94.6254 | 0.9172 | -0.0265 |
| 0.1977 | 1.2175 | 0.1369 | 90.1395 | 94.7315 | 0.3696 | 0.0796 |
| 0.2992 | 1.1915 | 0.1181 | 89.5197 | 94.9272 | -0.2502 | 0.2753 |
| 0.3992 | 1.1664 | 0.0395 | 89.2627 | 95.0546 | -0.5072 | 0.4027 |
| 0.5006 | 1.1406 | -0.0408 | 89.2659 | 95.0755 | -0.5040 | 0.4236 |
| 0.5989 | 1.1156 | -0.1432 | 89.2774 | 95.0304 | -0.4925 | 0.3785 |
| 0.7019 | 1.0889 | -0.2359 | 89.2648 | 95.0497 | -0.5051 | 0.3978 |
| 0.8007 | 1.0627 | -0.3053 | 89.3271 | 94.8991 | -0.4428 | 0.2472 |
| 0.9076 | 1.0333 | -0.3170 | 89.5613 | 93.2698 | -0.2086 | -1.3821 |
| 1.0000 | 1.0039 | 0.0000 | 89.7699 | 88.2665 | 0.0000 | -6.3854 |
| **298.15 K** | | | | | | |
| 0.0000 | 1.2651 | 0.0000 | 90.5679 | 94.9885 | 0.4569 | 0.0000 |
| 0.0984 | 1.2391 | 0.0867 | 91.1297 | 94.9735 | 1.0187 | -0.0150 |
| 0.1977 | 1.2127 | 0.1707 | 90.5275 | 95.0987 | 0.4165 | 0.1102 |
| 0.2992 | 1.1869 | 0.1417 | 89.9080 | 95.2774 | -0.2029 | 0.2889 |
| 0.3992 | 1.1617 | 0.0763 | 89.6638 | 95.4126 | -0.4472 | 0.4241 |
| 0.5006 | 1.1360 | -0.0065 | 89.6495 | 95.4382 | -0.4615 | 0.4497 |
| 0.5989 | 1.1110 | -0.1033 | 89.6567 | 95.4094 | -0.4543 | 0.4209 |
| 0.7019 | 1.0844 | -0.1981 | 89.6433 | 95.4252 | -0.4677 | 0.4367 |
| 0.8007 | 1.0583 | -0.2695 | 89.7030 | 95.2755 | -0.4080 | 0.2870 |
| 0.9076 | 1.0290 | -0.2820 | 89.9225 | 93.7877 | -0.1884 | -1.2008 |
| 1.0000 | 1.0001 | 0.0000 | 90.1110 | 89.2782 | 0.0000 | -5.7103 |
| **303.15 K** | | | | | | |
| 0.0000 | 1.2621 | 0.0000 | 91.2599 | 95.2143 | 0.8959 | 0.0000 |
| 0.0984 | 1.2357 | 0.1185 | 91.6258 | 95.2081 | 1.2618 | -0.0062 |
| 0.1977 | 1.2091 | 0.2200 | 90.9352 | 95.3479 | 0.5712 | 0.1335 |
| 0.2992 | 1.1832 | 0.2007 | 90.2576 | 95.5462 | -0.1064 | 0.3318 |
| 0.3992 | 1.1580 | 0.1372 | 89.9683 | 95.7055 | -0.3957 | 0.4912 |
| 0.5006 | 1.1324 | 0.0483 | 89.9250 | 95.7512 | -0.4390 | 0.5369 |
| 0.5989 | 1.1075 | -0.0547 | 89.9290 | 95.7274 | -0.4350 | 0.5131 |
| 0.7019 | 1.0810 | -0.1556 | 89.9269 | 95.7214 | -0.4371 | 0.5071 |
| 0.8007 | 1.0550 | -0.2330 | 89.9897 | 95.5490 | -0.3743 | 0.3347 |
| 0.9076 | 1.0258 | -0.2509 | 90.1948 | 94.1609 | -0.1691 | -1.0534 |
| 1.0000 | 0.9973 | 0.0000 | 90.3640 | 90.0498 | 0.0000 | -5.1645 |
| **308.15 K** | | | | | | |
| 0.0000 | 1.2576 | 0.0000 | 91.6745 | 95.5550 | -3.5179 | 0.0000 |
| 0.0984 | 1.2312 | 0.1321 | 91.9272 | 95.5453 | -2.4719 | -0.0568 |
| 0.1977 | 1.2045 | 0.2554 | 91.2077 | 95.7000 | -0.8375 | -0.3868 |
| 0.2992 | 1.1787 | 0.2418 | 90.6209 | 95.9087 | 0.4099 | -0.7462 |
| 0.3992 | 1.1537 | 0.1754 | 90.3546 | 96.0724 | 0.8717 | -0.9896 |
| 0.5006 | 1.1281 | 0.1001 | 90.3194 | 96.1399 | 0.7564 | -0.9100 |
| 0.5989 | 1.1034 | -0.0047 | 90.3379 | 96.1323 | 0.4263 | -0.5175 |
| 0.7019 | 1.0772 | -0.1188 | 90.3165 | 96.1573 | 0.1382 | 0.0739 |
| 0.8007 | 1.0514 | -0.2000 | 90.3362 | 96.0479 | -0.0002 | 0.4147 |
| 0.9076 | 1.0226 | -0.2382 | 90.4916 | 94.6881 | -0.0061 | 0.4334 |
| 1.0000 | 0.9944 | 0.0000 | 90.3894 | 90.4669 | 0.0000 | 0.4163 |
|  |  |  | **313.15 K** |  |  |  |
| 0.0000 | 1.2545 | 0.0000 | 92.1802 | 95.7912 | 1.2509 | 0.0000 |
| 0.0984 | 1.2278 | 0.1532 | 92.4549 | 95.7778 | 1.5256 | -0.0133 |
| 0.1977 | 1.2007 | 0.3064 | 91.6967 | 95.9463 | 0.7674 | 0.1551 |
| 0.2992 | 1.1748 | 0.2992 | 91.0563 | 96.1669 | 0.1271 | 0.3758 |
| 0.3992 | 1.1496 | 0.2475 | 90.7288 | 96.3706 | -0.2005 | 0.5794 |
| 0.5006 | 1.1240 | 0.1710 | 90.6698 | 96.4705 | -0.2595 | 0.6793 |
| 0.5989 | 1.0994 | 0.0550 | 90.6763 | 96.4794 | -0.2530 | 0.6883 |
| 0.7019 | 1.0733 | -0.0668 | 90.6483 | 96.5155 | -0.2810 | 0.7244 |
| 0.8007 | 1.0476 | -0.1571 | 90.6668 | 96.4201 | -0.2624 | 0.6290 |
| 0.9076 | 1.0190 | -0.2129 | 90.8182 | 95.1264 | -0.1111 | -0.6647 |
| 1.0000 | 0.9911 | 0.0000 | 90.7164 | 91.0875 | -0.2129 | -4.7037 |
| **sulfolane + 1,3-butanediol + NaClO4** | | | | | | |
| **293.15 K** | | | | | | |
| 0.0000 | 1.2696 | 0.0000 | 90.9519 | 94.6519 | 1.1820 | 0.0000 |
| 0.1008 | 1.2423 | 0.1329 | 91.0036 | 94.6613 | 1.2337 | 0.0095 |
| 0.1995 | 1.2159 | 0.2239 | 90.3159 | 94.7955 | 0.5460 | 0.1436 |
| 0.2992 | 1.1904 | 0.2059 | 89.7075 | 94.9723 | -0.0624 | 0.3204 |
| 0.4013 | 1.1644 | 0.1533 | 89.4310 | 95.1352 | -0.3389 | 0.4833 |
| 0.4972 | 1.1401 | 0.0730 | 89.3628 | 95.1996 | -0.4071 | 0.5478 |
| 0.5944 | 1.1155 | -0.0358 | 89.3339 | 95.2027 | -0.4360 | 0.5508 |
| 0.7012 | 1.0880 | -0.1455 | 89.3312 | 95.1944 | -0.4387 | 0.5425 |
| 0.8002 | 1.0617 | -0.2079 | 89.4340 | 94.9568 | -0.3359 | 0.3049 |
| 0.9096 | 1.0317 | -0.2261 | 89.6530 | 93.3270 | -0.1169 | -1.3249 |
| 0.9476 | 1.0201 | -0.1367 | 89.7691 | 92.0588 | -0.0008 | -2.5931 |
| **298.15 K** | | | | | | |
| 0.0000 | 1.2651 | 0.0000 | 91.4537 | 94.9885 | 1.3427 | 0.0000 |
| 0.1008 | 1.2376 | 0.1539 | 91.5750 | 95.0277 | 1.4640 | 0.0392 |
| 0.1995 | 1.2110 | 0.2663 | 90.7967 | 95.2002 | 0.6857 | 0.2117 |
| 0.2992 | 1.1855 | 0.2539 | 90.1187 | 95.3993 | 0.0077 | 0.4108 |
| 0.4013 | 1.1596 | 0.1992 | 89.8265 | 95.5656 | -0.2845 | 0.5771 |
| 0.4972 | 1.1353 | 0.1243 | 89.7698 | 95.6287 | -0.3412 | 0.6402 |
| 0.5944 | 1.1107 | 0.0213 | 89.7366 | 95.6473 | -0.3744 | 0.6588 |
| 0.7012 | 1.0834 | -0.0986 | 89.6954 | 95.6940 | -0.4156 | 0.7055 |
| 0.8002 | 1.0573 | -0.1713 | 89.7803 | 95.5012 | -0.3307 | 0.5127 |
| 0.9096 | 1.0275 | -0.1990 | 90.0268 | 93.6754 | -0.0842 | -1.3131 |
| 0.9476 | 1.0159 | -0.1060 | 90.1575 | 92.1525 | 0.0465 | -2.8360 |
| **303.15 K** | | | | | | |
| 0.0000 | 1.2621 | 0.0000 | 92.1932 | 95.2143 | 1.8292 | 0.0000 |
| 0.1008 | 1.2342 | 0.1861 | 92.0546 | 95.2317 | 1.6906 | 0.0174 |
| 0.1995 | 1.2074 | 0.3162 | 91.1645 | 95.4098 | 0.8005 | 0.1955 |
| 0.2992 | 1.1819 | 0.3057 | 90.4417 | 95.6173 | 0.0777 | 0.4030 |
| 0.4013 | 1.1560 | 0.2528 | 90.1412 | 95.7860 | -0.2228 | 0.5717 |
| 0.4972 | 1.1317 | 0.1798 | 90.0845 | 95.8484 | -0.2794 | 0.6341 |
| 0.5944 | 1.1071 | 0.0788 | 90.0474 | 95.8727 | -0.3166 | 0.6584 |
| 0.7012 | 1.0798 | -0.0385 | 89.9963 | 95.9484 | -0.3677 | 0.7341 |
| 0.8002 | 1.0539 | -0.1256 | 90.0564 | 95.8178 | -0.3076 | 0.6035 |
| 0.9096 | 1.0242 | -0.1584 | 90.2994 | 94.1124 | -0.0646 | -1.1019 |
| 0.9476 | 1.0128 | -0.0813 | 90.4204 | 92.6451 | 0.0564 | -2.5692 |
| **308.15 K** | | | | | | |
| 0.0000 | 1.2576 | 0.0000 | 92.9487 | 95.5550 | 2.3212 | 0.0000 |
| 0.1008 | 1.2295 | 0.2160 | 92.5409 | 95.5807 | 1.9134 | 0.0256 |
| 0.1995 | 1.2026 | 0.3683 | 91.5331 | 95.7894 | 0.9056 | 0.2344 |
| 0.2992 | 1.1773 | 0.3556 | 90.7675 | 96.0027 | 0.1400 | 0.4477 |
| 0.4013 | 1.1516 | 0.3004 | 90.4661 | 96.1651 | -0.1614 | 0.6100 |
| 0.4972 | 1.1274 | 0.2322 | 90.4140 | 96.2280 | -0.2135 | 0.6729 |
| 0.5944 | 1.1028 | 0.1443 | 90.3730 | 96.2839 | -0.2545 | 0.7289 |
| 0.7012 | 1.0759 | 0.0076 | 90.2759 | 96.4057 | -0.3516 | 0.8507 |
| 0.8002 | 1.0503 | -0.0919 | 90.3163 | 96.3416 | -0.3112 | 0.7866 |
| 0.9096 | 1.0209 | -0.1359 | 90.5735 | 94.5961 | -0.0541 | -0.9589 |
| 0.9476 | 1.0097 | -0.0709 | 90.6928 | 93.0237 | 0.0653 | -2.5313 |
| **313.15 K** | | | | | | |
| 0.0000 | 1.2545 | 0.0000 | 93.9532 | 95.7912 | 3.0239 | 0.0000 |
| 0.1008 | 1.2259 | 0.2530 | 93.0119 | 95.8390 | 2.0826 | 0.0478 |
| 0.1995 | 1.1989 | 0.4121 | 91.9149 | 96.0603 | 0.9857 | 0.2692 |
| 0.2992 | 1.1735 | 0.4057 | 91.1592 | 96.2718 | 0.2299 | 0.4807 |
| 0.4013 | 1.1477 | 0.3570 | 90.8527 | 96.4388 | -0.0766 | 0.6477 |
| 0.4972 | 1.1235 | 0.2874 | 90.7748 | 96.5155 | -0.1545 | 0.7244 |
| 0.5944 | 1.0989 | 0.1984 | 90.7202 | 96.5869 | -0.2091 | 0.7957 |
| 0.7012 | 1.0719 | 0.0692 | 90.6367 | 96.7093 | -0.2926 | 0.9181 |
| 0.8002 | 1.0465 | -0.0482 | 90.6592 | 96.6316 | -0.2701 | 0.8404 |
| 0.9096 | 1.0171 | -0.0920 | 90.8921 | 95.1484 | -0.0372 | -0.6427 |
| 0.9476 | 1.0062 | -0.0533 | 90.9826 | 93.8119 | 0.0533 | -1.9793 |
| **sulfolane + 1,3-butanediol + NH4ClO4** | | | | | | |
| **293.15 K** | | | | | | |
| 0.0000 | 1.2696 | 0.0000 | 91.4923 | 94.6519 | 1.7224 | 0.0000 |
| 0.1009 | 1.2418 | 0.1696 | 91.3135 | 94.6673 | 1.5436 | 0.0154 |
| 0.1995 | 1.2151 | 0.2856 | 90.4945 | 94.8281 | 0.7246 | 0.1762 |
| 0.3006 | 1.1891 | 0.2779 | 89.8000 | 95.0363 | 0.0301 | 0.3845 |
| 0.4013 | 1.1637 | 0.2108 | 89.4811 | 95.1974 | -0.2888 | 0.5456 |
| 0.4992 | 1.1388 | 0.1355 | 89.4194 | 95.2719 | -0.3505 | 0.6200 |
| 0.6042 | 1.1121 | 0.0277 | 89.4188 | 95.2578 | -0.3511 | 0.6059 |
| 0.7010 | 1.0872 | -0.0724 | 89.4309 | 95.2043 | -0.3390 | 0.5525 |
| 0.8000 | 1.0609 | -0.1357 | 89.5247 | 94.9543 | -0.2452 | 0.3025 |
| 0.8880 | 1.0368 | -0.1495 | 89.7224 | 93.6939 | -0.0475 | -0.9580 |
| **298.15 K** | | | | | | |
| 0.0000 | 1.2651 | 0.0000 | 92.1788 | 94.9885 | 2.0678 | 0.0000 |
| 0.1009 | 1.2370 | 0.1985 | 91.8781 | 95.0512 | 1.7671 | 0.0627 |
| 0.1995 | 1.2102 | 0.3285 | 90.9534 | 95.2550 | 0.8424 | 0.2664 |
| 0.3006 | 1.1842 | 0.3267 | 90.2153 | 95.4710 | 0.1043 | 0.4824 |
| 0.4013 | 1.1588 | 0.2652 | 89.8950 | 95.6383 | -0.2160 | 0.6498 |
| 0.4992 | 1.1340 | 0.1875 | 89.8241 | 95.7132 | -0.2869 | 0.7247 |
| 0.6042 | 1.1073 | 0.0860 | 89.8077 | 95.7271 | -0.3033 | 0.7385 |
| 0.7010 | 1.0826 | -0.0248 | 89.7860 | 95.7194 | -0.3250 | 0.7308 |
| 0.8000 | 1.0565 | -0.0985 | 89.8788 | 95.4710 | -0.2322 | 0.4825 |
| 0.8880 | 1.0325 | -0.1146 | 90.1207 | 93.9288 | 0.0097 | -1.0597 |
| **303.15 K** | | | | | | |
| 0.0000 | 1.2621 | 0.0000 | 93.0031 | 95.2143 | 2.6391 | 0.0000 |
| 0.1009 | 1.2335 | 0.2387 | 92.4378 | 95.2471 | 2.0738 | 0.0327 |
| 0.1995 | 1.2064 | 0.3945 | 91.3494 | 95.4615 | 0.9854 | 0.2472 |
| 0.3006 | 1.1805 | 0.3868 | 90.5274 | 95.6972 | 0.1634 | 0.4829 |
| 0.4013 | 1.1551 | 0.3273 | 90.1984 | 95.8719 | -0.1655 | 0.6576 |
| 0.4992 | 1.1303 | 0.2518 | 90.1358 | 95.9445 | -0.2282 | 0.7302 |
| 0.6042 | 1.1037 | 0.1442 | 90.1104 | 95.9659 | -0.2535 | 0.7516 |
| 0.7010 | 1.0791 | 0.0272 | 90.0729 | 95.9876 | -0.2911 | 0.7733 |
| 0.8000 | 1.0531 | -0.0523 | 90.1647 | 95.7499 | -0.1992 | 0.5356 |
| 0.8880 | 1.0292 | -0.0742 | 90.4276 | 94.0473 | 0.0636 | -1.1670 |
| **308.15 K** | | | | | | |
| 0.0000 | 1.2576 | 0.0000 | 94.6908 | 95.5550 | 4.0633 | 0.0000 |
| 0.1009 | 1.2283 | 0.3078 | 92.8885 | 95.6436 | 2.2610 | 0.0886 |
| 0.1995 | 1.2016 | 0.4472 | 91.5811 | 95.8761 | 0.9536 | 0.3211 |
| 0.3006 | 1.1758 | 0.4457 | 90.8518 | 96.0959 | 0.2243 | 0.5408 |
| 0.4013 | 1.1505 | 0.3918 | 90.5745 | 96.2449 | -0.0530 | 0.6899 |
| 0.4992 | 1.1259 | 0.3132 | 90.4719 | 96.3356 | -0.1557 | 0.7806 |
| 0.6042 | 1.0995 | 0.2032 | 90.3907 | 96.4301 | -0.2368 | 0.8751 |
| 0.7010 | 1.0751 | 0.0823 | 90.3326 | 96.5216 | -0.2949 | 0.9666 |
| 0.8000 | 1.0496 | -0.0269 | 90.4188 | 96.2558 | -0.2087 | 0.7007 |
| 0.8880 | 1.0259 | -0.0542 | 90.6963 | 94.5259 | 0.0688 | -1.0291 |
| **313.15 K** | | | | | | |
| 0.0000 | 1.2545 | 0.0000 | 96.3587 | 95.7912 | 5.4294 | 0.0000 |
| 0.1009 | 1.2244 | 0.3688 | 93.3168 | 95.9334 | 2.3876 | 0.1423 |
| 0.1995 | 1.1979 | 0.4915 | 91.8005 | 96.1880 | 0.8712 | 0.3969 |
| 0.3006 | 1.1721 | 0.4882 | 91.1902 | 96.3770 | 0.2610 | 0.5859 |
| 0.4013 | 1.1467 | 0.4407 | 91.0046 | 96.4768 | 0.0753 | 0.6856 |
| 0.4992 | 1.1220 | 0.3690 | 90.8943 | 96.5629 | -0.0350 | 0.7717 |
| 0.6042 | 1.0954 | 0.2747 | 90.7684 | 96.7309 | -0.1609 | 0.9398 |
| 0.7010 | 1.0711 | 0.1445 | 90.6573 | 96.9117 | -0.2720 | 1.1205 |
| 0.8000 | 1.0458 | 0.0173 | 90.7246 | 96.6965 | -0.2047 | 0.9053 |
| 0.8880 | 1.0223 | -0.0277 | 90.9998 | 94.9848 | 0.0705 | -0.8064 |
| Standard uncertainties u(T) = 0.01 K, u(x1) = 0.0005, u(p) = 1 kPa, relative standard uncertainties ur*(ρ)* = 0.002; ur*()*= 0.006 and ur(*nD*) = 0.01 | | | | | | |

**Table S2.** Coefficients of the Redlich–Kister equation along with their standard deviations (*δ*) for the binary and ternary mixtures of sulfolane + 1, 3-butanediol + perchlorates salts (LiClO4 or NaClO4 or NH4 ClO4) as a function 1, 3-butanediol mole fraction at different temperatures.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *A4* | *A3* | *A2* | *A1* | *A0* | *δ* |
|  |  | **sulfolane + 1,3-butanediol** | | |  |  |
|  |  |  |  |  |  |  |
| 293.15 | 0.6095 | 0.0591 | -0.2313 | -2.0889 | 0.9235 | 0.0099 |
| 298.15 | 1.8904 | -0.5247 | -0.7124 | -1.9707 | 1.1954 | 0.0162 |
| 303.15 | 2.1179 | -1.1486 | -0.6267 | -1.8464 | 1.4138 | 0.0071 |
| 308.15 | 1.9348 | -1.7265 | -0.3790 | -1.6835 | 1.5983 | 0.0080 |
| 313.15 | 2.6393 | -2.2683 | -0.4433 | -1.4558 | 1.8380 | 0.0008 |
|  |  |  |  |  |  |  |
| 298.15 | -0.0034 | 0.0012 | 0.0070 | -0.0006 | -0.0109 | 0.00004 |
| 303.15 | -0.0089 | 0.0024 | 0.0126 | -0.0019 | -0.0098 | 0.0002 |
| 308.15 | -0.0127 | 0.0026 | 0.0155 | -0.0022 | -0.0086 | 0.0001 |
| **sulfolane + 1,3-butanediol + LiClO4** | | | | | | |
|  |  |  |  |  |  |  |
| 293.15 | -3.1554 | -1.3260 | 0.1502 | -1.8550 | -0.1999 | 0.0069 |
| 298.15 | -2.7540 | -1.2740 | 0.1710 | -1.8140 | -0.0437 | 0.0215 |
| 303.15 | -2.5277 | -1.0686 | 0.2270 | -1.9584 | 0.1664 | 0.0071 |
| 308.15 | -2.6927 | -1.1324 | 0.3083 | -1.9386 | 0.3547 | 0.0111 |
| 313.15 | -2.6701 | -0.9466 | 0.3053 | -2.0304 | 0.6384 | 0.0139 |
|  |  |  |  |  |  |  |
| 298.15 | -0.0021 | 0.0012 | 0.0052 | -0.0035 | -0.0166 | 0.0002 |
| 303.15 | -0.0027 | 0.0037 | 0.0099 | -0.0034 | -0.0145 | 0.0002 |
| 308.15 | -0.0143 | 0.0046 | 0.0179 | -0.0033 | -0.0127 | 0.00008 |
| **sulfolane + 1,3-butanediol + NaClO4** | | | | | | |
|  |  |  |  |  |  |  |
| 293.15 | -1.3096 | -0.7468 | -0.2684 | -1.9938 | 0.2490 | 0.0548 |
| 298.15 | -1.0797 | -0.6656 | -0.2645 | -2.0179 | 0.1967 | 0.0168 |
| 303.15 | -0.9103 | -0.6489 | -0.0929 | -2.0011 | 0.6819 | 0.0166 |
| 308.15 | -0.8499 | -0.8657 | -0.0036 | -1.9707 | 0.9045 | 0.0194 |
| 313.15 | -0.5536 | -0.8930 | 0.0948 | -1.9314 | 1.1346 | 0.0163 |
|  |  |  |  |  |  |  |
| 298.15 | -0.0163 | -0.0087 | 0.0091 | 0.0001 | -0.0213 | 0.0039 |
| 303.15 | -0.0077 | -0.0043 | 0.0105 | -0.0010 | -0.0183 | 0.0001 |
| 308.15 | -0.0072 | 0.0044 | 0.0144 | -0.0041 | -0.0155 | 0.0001 |
| **sulfolane + 1,3-butanediol + NH4ClO4** | | | | | | |
|  |  |  |  |  |  |  |
| 293.15 | -1.2248 | -0.3709 | 0.2337 | -2.0101 | 0.5112 | 0.0089 |
| 298.15 | -0.9274 | -0.3571 | 0.2187 | -2.0189 | 0.7353 | 0.0193 |
| 303.15 | -0.6948 | -0.3245 | 0.3823 | -2.1105 | 0.9333 | 0.0187 |
| 308.15 | 0.2151 | -0.9134 | 0.0986 | -2.0386 | 1.2462 | 0.0096 |
| 313.15 | 0.9378 | -1.6983 | -0.0301 | -1.7758 | 1.4903 | 0.0088 |
|  |  |  |  |  |  |  |
| 298.15 | -0.0156 | -0.0111 | 0.0075 | -0.0003 | -0.0255 | 0.0001 |
| 303.15 | -0.0217 | -0.0067 | 0.0161 | -0.0006 | -0.0221 | 0.0005 |
| 308.15 | -0.0156 | 0.0014 | 0.0170 | -0.0032 | -0.0187 | 0.0001 |