

Electrical Conductivity of Ionic Liquids 1-Hexyl-3-Methylimidazolium Chloride (HMIM) and 1-Methyl-3-Octylimidazolium Chloride (OMIM) in Mixtures with Selected Alkoxy Alcohols Over a Wide Temperature Range.

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Table S1.

The density values [g/cm³] for 2-methoxyethanol, 2-ethoxyethanol, 2-propoxyethanol, and 2-butoxyethanol in the temperature range of (278.15 - 313.15)K at pressure p = 0.1 MPa

| <i>T</i> / K | <i>d</i> [g·cm ⁻³] | <i>d</i> [g·cm ⁻³] |
|-------------------------|---|--|
| 2-methoxyethanol | | 2-ethoxyethanol |
| 278.15 | 0.978194 | 0.943461 |
| 283.15 | 0.973673 | 0.939013 |
| 288.15 | 0.969132 | 0.934538 |
| 293.15 | 0.964569 | 0.930039 |
| 298.15 | 0.959985; 0.96029 [43]; 0.602 [44]; 0.960288[45] | 0.925515; 0.92515 [43]; 0.92572 [46]; 0.9258 [47] |
| 303.15 | 0.955376 | 0.920960 |
| 308.15 | 0.950740 | 0.916375 |
| 313.15 | 0.946075 | 0.911758 |
| 2-propoxyethanol | | 2-butoxyethanol |
| 278.15 | 0.925602 | 0.912934 |
| 283.15 | 0.921293 | 0.908817 |
| 288.15 | 0.916960 | 0.904681 |
| 293.15 | 0.912606 | 0.900525 |
| 298.15 | 0.908225; 0.80819 [43]; 0.908233 [48]; 0.9080 [49] | 0.896348; 0.89629 [43]; 0.89625 [50]; 0.8958 [51] |
| 303.15 | 0.903813 | 0.892143 |
| 308.15 | 0.899372 | 0.887914 |
| 313.15 | 0.89490 | 0.883655 |

Table S2.

Molar conductivity values (Λ_m) and concentrations (m), for 1-hexyl-3-methylimidazolium chloride [HMIM] with the investigated alkoxy alcohols in the temperature range of (278.15 - 313.15)K at pressure $p = 0.1$ MPa.^a

| $10^3\ m /$ $\text{mol}\cdot\text{kg}^{-1}$ | $\Lambda_{\text{m}} / \text{S}\cdot\text{cm}^2\cdot\text{mol}^{-1}$ | | | | | | | |
|--|---|--------|--------|--------|--------|--------|--------|--------|
| 1-hexyl-3-methylimidazolium chloride [HMIM] + 2-methoxyethanol | | | | | | | | |
| T / K | 278.15 | 283.15 | 288.15 | 293.15 | 298.15 | 303.15 | 308.15 | 313.15 |
| 0.23745 | 18.055 | 20.280 | 23.168 | 25.111 | 27.197 | 29.438 | 32.270 | 34.767 |
| 0.56643 | 18.033 | 20.254 | 23.123 | 25.069 | 27.128 | 29.378 | 32.204 | 34.644 |
| 0.98884 | 18.019 | 20.225 | 23.088 | 25.04 | 27.077 | 29.312 | 32.121 | 34.552 |
| 2.22058 | 17.989 | 20.201 | 23.019 | 25.002 | 26.985 | 29.22 | 32.015 | 34.403 |
| 5.79830 | 17.940 | 20.130 | 22.922 | 24.858 | 26.809 | 28.989 | 31.76 | 34.052 |
| 7.93002 | 17.918 | 20.097 | 22.86 | 24.792 | 26.710 | 28.881 | 31.598 | 33.867 |
| 9.90124 | 17.897 | 20.075 | 22.831 | 24.76 | 26.664 | 28.814 | 31.526 | 33.782 |
| 12.6034 | 17.874 | 20.047 | 22.796 | 24.709 | 26.601 | 28.722 | 31.407 | 33.658 |
| 13.2076 | 17.869 | 20.038 | 22.772 | 24.695 | 26.568 | 28.698 | 31.387 | 33.603 |
| 14.0645 | 17.862 | 20.029 | 22.758 | 24.679 | 26.545 | 28.671 | 31.354 | 33.561 |
| 1-hexyl-3-methylimidazolium chloride [HMIM] + 2-ethoxyethanol | | | | | | | | |
| 0.24438 | 13.382 | 15.077 | 16.909 | 18.302 | 20.326 | 22.250 | 24.236 | 26.295 |
| 0.60509 | 13.358 | 15.046 | 16.836 | 18.239 | 20.267 | 22.150 | 24.139 | 26.156 |
| 1.12650 | 13.334 | 15.006 | 16.797 | 18.195 | 20.195 | 22.081 | 24.025 | 26.023 |
| 2.18114 | 13.299 | 14.955 | 16.723 | 18.118 | 20.092 | 21.964 | 23.856 | 25.810 |
| 4.22960 | 13.251 | 14.905 | 16.618 | 17.982 | 19.955 | 21.812 | 23.659 | 25.566 |
| 7.58295 | 13.190 | 14.824 | 16.497 | 17.849 | 19.803 | 21.604 | 23.403 | 25.249 |
| 9.93656 | 13.160 | 14.793 | 16.420 | 17.753 | 19.690 | 21.515 | 23.256 | 25.063 |
| 12.6343 | 13.130 | 14.754 | 16.345 | 17.644 | 19.584 | 21.422 | 23.112 | 24.882 |
| 13.1663 | 13.121 | 14.736 | 16.334 | 17.625 | 19.575 | 21.386 | 23.081 | 24.844 |
| 14.0265 | 13.111 | 14.723 | 16.313 | 17.596 | 19.551 | 21.354 | 23.038 | 24.790 |
| 1-hexyl-3-methylimidazolium chloride [HMIM] + 2-propoxyethanol | | | | | | | | |
| 0.30258 | 7.011 | 7.905 | 8.787 | 9.396 | 10.196 | 11.486 | 12.261 | 13.085 |
| 0.70278 | 6.969 | 7.866 | 8.715 | 9.348 | 10.094 | 11.372 | 12.185 | 12.894 |
| 1.25200 | 6.947 | 7.834 | 8.682 | 9.283 | 10.022 | 11.287 | 12.078 | 12.748 |

| | | | | | | | | |
|--|-------|-------|-------|-------|-------|--------|--------|--------|
| 2.45433 | 6.897 | 7.781 | 8.618 | 9.179 | 9.882 | 11.138 | 11.872 | 12.478 |
| 5.23500 | 6.837 | 7.696 | 8.515 | 9.064 | 9.709 | 10.910 | 11.543 | 12.106 |
| 8.69656 | 6.773 | 7.608 | 8.420 | 8.926 | 9.516 | 10.675 | 11.290 | 11.739 |
| 11.3450 | 6.735 | 7.568 | 8.361 | 8.861 | 9.420 | 10.561 | 11.049 | 11.513 |
| 14.4187 | 6.698 | 7.515 | 8.299 | 8.797 | 9.324 | 10.419 | 10.844 | 11.289 |
| 14.9120 | 6.688 | 7.510 | 8.301 | 8.769 | 9.288 | 10.401 | 10.809 | 11.243 |
| 16.1235 | 6.674 | 7.492 | 8.260 | 8.740 | 9.247 | 10.351 | 10.739 | 11.158 |
| 1-hexyl-3-methylimidazolium chloride [HMIM] + 2-butoxyethanol | | | | | | | | |
| 0.19399 | 3.684 | 4.011 | 4.315 | 4.971 | 5.237 | 5.636 | 6.117 | 6.585 |
| 0.58973 | 3.663 | 3.984 | 4.270 | 4.937 | 5.149 | 5.545 | 6.021 | 6.423 |
| 1.20753 | 3.643 | 3.959 | 4.229 | 4.881 | 5.079 | 5.452 | 5.902 | 6.291 |
| 2.26873 | 3.618 | 3.929 | 4.175 | 4.816 | 4.963 | 5.316 | 5.760 | 6.104 |
| 4.08929 | 3.588 | 3.886 | 4.106 | 4.758 | 4.888 | 5.213 | 5.605 | 5.909 |
| 7.62441 | 3.541 | 3.827 | 4.021 | 4.641 | 4.727 | 5.022 | 5.344 | 5.588 |
| 8.40945 | 3.535 | 3.816 | 3.997 | 4.640 | 4.707 | 4.986 | 5.323 | 5.546 |
| 13.0516 | 3.494 | 3.760 | 3.921 | 4.560 | 4.577 | 4.812 | 5.113 | 5.269 |
| 13.5770 | 3.487 | 3.754 | 3.913 | 4.535 | 4.545 | 4.783 | 5.070 | 5.221 |
| 14.3573 | 3.481 | 3.746 | 3.896 | 4.521 | 4.523 | 4.756 | 5.037 | 5.178 |

^a Standard uncertainties are $u(T) = 0.01$ K, $u(p) = 0.05$ MPa, $u(c) = 10^{-4} \cdot c$, and the combined expanded uncertainty is $U_c(\Lambda) = 0.0005 \cdot \Lambda$ (level of confidence = 0.95).

Table S3.

Molar conductivity values (Λ_m) and concentrations (m), for 1-methyl-3-octylimidazolium chloride [OMIM] with the investigated alkoxy alcohols in the temperature range (278.15 - 313.15) K at pressure $p = 0.1$ MPa.^a

| $10^3\ m\ /\$ $\text{mol}\cdot\text{kg}^{-1}$ | $\Lambda_{\text{m}}\ /\ \text{S}\cdot\text{cm}^2\cdot\text{mol}^{-1}$ | | | | | | | |
|--|---|--------|--------|--------|--------|--------|--------|--------|
| 1-methyl-3-octylimidazolium chloride [OMIM] + 2-methoxyethanol | | | | | | | | |
| $T\ /\ \text{K}$ | 278.15 | 283.15 | 288.15 | 293.15 | 298.15 | 303.15 | 308.15 | 313.15 |
| 0.23745 | 17.355 | 19.280 | 22.168 | 23.910 | 26.197 | 28.438 | 31.270 | 33.767 |
| 0.56643 | 17.333 | 19.254 | 22.123 | 23.869 | 26.128 | 28.378 | 31.204 | 33.644 |
| 0.98884 | 17.319 | 19.225 | 22.088 | 23.840 | 26.077 | 28.312 | 31.121 | 33.552 |
| 2.22058 | 17.289 | 19.201 | 22.019 | 23.802 | 25.985 | 28.220 | 31.015 | 33.403 |
| 5.79830 | 17.240 | 19.130 | 21.922 | 23.658 | 25.809 | 27.989 | 30.760 | 33.052 |

| | | | | | | | | |
|---|--------|--------|--------|--------|--------|--------|--------|--------|
| 7.93002 | 17.218 | 19.097 | 21.860 | 23.592 | 25.710 | 27.881 | 30.598 | 32.867 |
| 9.90124 | 17.197 | 19.075 | 21.831 | 23.560 | 25.664 | 27.814 | 30.526 | 32.782 |
| 12.6034 | 17.174 | 19.047 | 21.796 | 23.509 | 25.601 | 27.722 | 30.407 | 32.658 |
| 13.2076 | 17.169 | 19.038 | 21.772 | 23.495 | 25.568 | 27.698 | 30.387 | 32.603 |
| 14.0645 | 17.162 | 19.029 | 21.758 | 23.479 | 25.545 | 27.671 | 30.354 | 32.561 |
| 1-methyl-3-octylimidazolium chloride [OMIM] + 2-ethoxyethanol | | | | | | | | |
| 0.24438 | 12.182 | 13.577 | 15.409 | 17.302 | 19.026 | 21.050 | 22.936 | 25.195 |
| 0.60509 | 12.158 | 13.546 | 15.336 | 17.239 | 18.967 | 20.950 | 22.839 | 25.056 |
| 1.12650 | 12.134 | 13.506 | 15.297 | 17.195 | 18.895 | 20.881 | 22.725 | 24.923 |
| 2.18114 | 12.099 | 13.455 | 15.223 | 17.118 | 18.792 | 20.764 | 22.556 | 24.710 |
| 4.22960 | 12.051 | 13.405 | 15.118 | 16.982 | 18.655 | 20.612 | 22.359 | 24.466 |
| 7.58295 | 11.990 | 13.324 | 14.997 | 16.849 | 18.503 | 20.404 | 22.103 | 24.149 |
| 9.93656 | 11.960 | 13.293 | 14.920 | 16.753 | 18.390 | 20.315 | 21.956 | 23.963 |
| 12.6343 | 11.930 | 13.254 | 14.845 | 16.644 | 18.284 | 20.222 | 21.812 | 23.782 |
| 13.1663 | 11.921 | 13.236 | 14.834 | 16.625 | 18.275 | 20.186 | 21.781 | 23.744 |
| 14.0265 | 11.911 | 13.223 | 14.813 | 16.596 | 18.251 | 20.154 | 21.738 | 23.690 |
| 1-methyl-3-octylimidazolium chloride [OMIM] + 2-propoxyethanol | | | | | | | | |
| 0.30258 | 5.811 | 6.505 | 7.487 | 8.296 | 9.196 | 10.086 | 10.961 | 11.885 |
| 0.70278 | 5.769 | 6.466 | 7.415 | 8.248 | 9.094 | 9.972 | 10.885 | 11.694 |
| 1.25200 | 5.747 | 6.434 | 7.382 | 8.183 | 9.022 | 9.887 | 10.778 | 11.548 |
| 2.45433 | 5.697 | 6.381 | 7.318 | 8.079 | 8.882 | 9.738 | 10.572 | 11.278 |
| 5.23500 | 5.637 | 6.296 | 7.215 | 7.964 | 8.709 | 9.510 | 10.243 | 10.906 |
| 8.69656 | 5.573 | 6.208 | 7.120 | 7.826 | 8.516 | 9.275 | 9.990 | 10.539 |
| 11.3450 | 5.535 | 6.168 | 7.061 | 7.761 | 8.420 | 9.161 | 9.749 | 10.313 |
| 14.4187 | 5.498 | 6.115 | 6.999 | 7.697 | 8.324 | 9.019 | 9.544 | 10.089 |
| 14.9120 | 5.488 | 6.110 | 7.001 | 7.669 | 8.288 | 9.001 | 9.509 | 10.043 |
| 16.1235 | 5.474 | 6.092 | 6.960 | 7.640 | 8.247 | 8.951 | 9.439 | 9.958 |
| 1-methyl-3-octylimidazolium chloride [OMIM] + 2-butoxyethanol | | | | | | | | |
| 0.19399 | 2.684 | 2.911 | 3.115 | 3.671 | 3.937 | 4.436 | 4.817 | 5.285 |
| 0.58973 | 2.663 | 2.884 | 3.070 | 3.637 | 3.849 | 4.345 | 4.721 | 5.123 |
| 1.20753 | 2.643 | 2.859 | 3.029 | 3.581 | 3.779 | 4.252 | 4.602 | 4.991 |
| 2.26873 | 2.618 | 2.829 | 2.975 | 3.516 | 3.663 | 4.116 | 4.460 | 4.804 |

| | | | | | | | | |
|---------|-------|-------|-------|-------|-------|-------|-------|-------|
| 4.08929 | 2.588 | 2.786 | 2.906 | 3.458 | 3.588 | 4.013 | 4.305 | 4.609 |
| 7.62441 | 2.541 | 2.727 | 2.821 | 3.341 | 3.427 | 3.822 | 4.044 | 4.288 |
| 8.40945 | 2.535 | 2.716 | 2.797 | 3.340 | 3.407 | 3.786 | 4.023 | 4.246 |
| 13.0516 | 2.494 | 2.660 | 2.721 | 3.260 | 3.277 | 3.612 | 3.813 | 3.969 |
| 13.5770 | 2.487 | 2.654 | 2.713 | 3.235 | 3.245 | 3.583 | 3.770 | 3.921 |
| 14.3573 | 2.481 | 2.646 | 2.696 | 3.221 | 3.223 | 3.556 | 3.737 | 3.878 |

^a Standard uncertainties are $u(T) = 0.01$ K, $u(p) = 0.05$ MPa, $u(c) = 10^{-4} \cdot c$, and the combined expanded uncertainty is $U_c(\Lambda) = 0.0005 \cdot \Lambda$ (level of confidence = 0.95).