Supplementary Material (ESI) for New Journal of Chemistry

Supplement Information

Synthesis and Properties of Chiral Imidazolium Ionic Liquids with a (*1R,2S,5R*)-(–)-Menthoxymethyl Substituent

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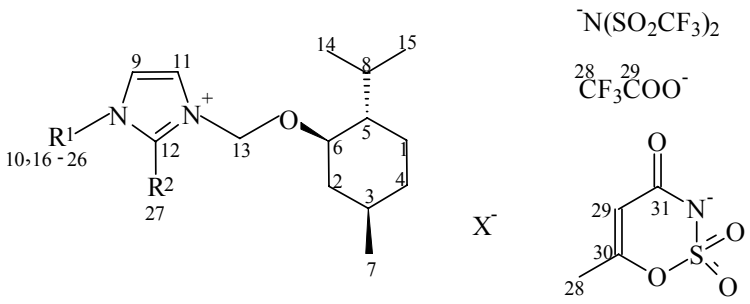

X= Cl, BF_4, ClO_4, I, PF_6, Ace, CF_3COO, Tf_2N;

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-butyl-imidazolium chloride (1d). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.50 (d, *J* = 7.1 Hz, 3H, H14 or H15), 0.88 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H18), 1.23 (m, 1H, H5), 1.39 (m, 3H, H3 and H17), 1.58 (m, 2H, Hb–1 and Hb–4), 1.94 (m, 3H, H8 and H16), 2.11 (m, 1H, Hb–2), 3.40 (td, *J* = 10.7 Hz, *J* = 4.4 Hz, 1H, H6), 4.41 (t, *J* = 7.4 Hz, 2H, H10), 5.72 and 5.92 (d, *J* = 10.4 Hz, *J* = 10.7 Hz, 2H, AB system, H13), 7.61 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H11), 7.82 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 10.62 (t, *J* = 1.1 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.1 (C18), 15.2 (C14 or C15), 19.0 (C17), 20.6 (C7), 21.8 (C14 or C15), 22.4 (C1), 25.0 (C8), 30.7 (C3), 31.8 (C16), 33.6 (C4), 39.9 (C2), 47.2 (C5), 49.4 (C10), 76.4 (C6), 79.2 (C13), 120.9 (C11), 122.4 (C9), 136.6 (C12); elemental analysis calcd (%) for $C_{18}H_{33}ClN_2O$ (328.98): C 65.71, H 10.13, N 8.51; found: C 65.61, H 10.09, N 8.67.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-pentylimidazolium chloride (1e). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.49 (d, *J* = 7.1 Hz, 3H, H14 or H15), 0.85 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H19), 1.30 (m, 6H, H5, H3, H17 and H18), 1.63 (m, 2H, Hb–1 and Hb–4), 1.94 (m, 3H, H8 and H16), 2.09 (m, 1H, Hb–2), 3.39 (td, *J* = 10.4 Hz, *J* = 4.1 Hz, 1H, H6), 4.40 (t, *J* = 7.4 Hz, 2H, H10), 5.72 and 5.94 (d, *J* = 10.7 Hz, *J* = 10.4 Hz, 2H, AB system, H13), 7.61 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H11), 7.75 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 10.64 (t, *J* = 1.1 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.4 (C19), 15.2 (C14 or C15), 20.5 (C7), 21.6 (C18), 21.8 (C14 or C15), 22.4 (C1), 25.0 (C8), 27.8 (C17), 29.6 (C16), 30.7 (C3), 33.7 (C4), 40.0 (C2), 47.3 (C5), 49.8 (C10), 76.6 (C6), 79.3 (C13), 121.1 (C11), 122.5 (C9), 137.0 (C12); elemental analysis calcd (%) for $C_{19}H_{35}ClN_2O$ (343.01): C 66.52, H 10.30, N 8.17; found: C 66.48, H 10.44, N 8.22.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-hexylimidazolium chloride (1f). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.49 (d, *J* = 6.9 Hz, 3H, H14 or H15), 0.90 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H20), 1.26 (m, 8H, H5, H3, H17, H18 and H19), 1.62 (m, 2H, Hb–1 and Hb–4), 1.94 (m, 3H, H8 and H16), 2.09 (m, 1H, Hb–2), 3.39 (td, *J* = 10.4 Hz, *J* = 4.1 Hz, 1H, H6), 4.40 (t, *J* = 7.1 Hz, 2H, H10), 5.72 and 5.92 (d, *J* = 10.4 Hz, *J* = 10.7 Hz, 2H, AB system, H13), 7.64 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H11), 7.78 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 10.48 (t, *J* = 1.0 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.4 (C20), 15.0 (C14 or C15), 20.4 (C7), 21.6 (C19), 21.8 (C14 or C15), 22.2 (C1), 24.8 (C18), 25.3 (C8), 29.7 (C17), 29.9 (C16), 30.6 (C3), 33.5 (C4), 39.8 (C2), 47.1 (C5), 49.6 (C10), 76.4 (C6), 79.0 (C13), 121.1 (C11), 122.4 (C9), 136.5 (C12); elemental analysis calcd (%) for $C_{20}H_{37}ClN_2O$ (357.04): C 67.27, H 10.47, N 7.85; found: C 67.17, H 10.52, N 7.96.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-heptylimidazolium chloride (1g). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.49 (d, *J* = 7.1 Hz, 3H, H14 or H15), 0.89 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H21), 1.30 (m, 10H, H5, H3, H17, H18, H19 and H20), 1.62 (m, 2H, Hb–1 and Hb–4), 1.94 (m, 3H, H8 and H16), 2.11 (m, 1H, Hb–2), 3.39 (td, *J* = 10.4 Hz, *J* = 4.1 Hz, 1H, H6), 4.40 (t, *J* = 7.4 Hz, 2H, H10), 5.72 and 5.94 (d, *J* = 10.4 Hz, 2H, AB system, H13), 7.63 (t, *J* = 1.6 Hz, 1H, H11), 7.84 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 10.81 (t, *J* = 1.1 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.6 (C21), 15.4 (C14 or C15), 20.4 (C7), 21.9 (C14 or C15), 22.0 (C20), 22.4 (C1), 25.0 (C8), 25.6 (C19), 28.2 (C18), 29.9 (C17), 30.7 (C3), 31.2 (C16), 33.7 (C4), 40.0 (C2), 47.3 (C5), 49.8 (C10), 76.4 (C6), 79.3 (C13), 121.1 (C11), 122.3 (C9), 136.9 (C12); elemental analysis calcd (%) for $C_{21}H_{39}ClN_2O$ (371.07): C 67.97, H 10.61, N 7.55; found: C 68.11, H 10.53, N 7.51.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-octylimidazolium chloride (1h). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.49 (d, *J* = 7.1 Hz, 3H, H14 or H15), 0.91 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H22), 1.31 (m, 12H, H5, H3, H17, H18, H19, H20 and H21), 1.62 (m, 2H, Hb–1 and Hb–4), 1.91 (m, 3H, H8 and H16), 2.11 (m, 1H, Hb–2), 3.39 (td, *J* = 10.7 Hz, *J* = 4.4 Hz, 1H, H6), 4.38 (t, *J* = 7.4 Hz, 2H, H10), 5.71 and 5.93 (d, *J* = 10.4 Hz, *J* = 10.7 Hz, 2H, AB system, H13), 7.58 (t, *J* = 1.6 Hz, 1H, H11), 7.66 (t, *J* = 1.9 Hz, *J* = 1.6 Hz,1H, H9), 10.61 (t, *J* = 1.0 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.8 (C22), 15.4 (C14 or C15), 20.7 (C7), 21.9 (C14 or C15), 22.3 (C1), 22.6 (C21), 25.2 (C8), 26.0 (C20), 28.7 (C19), 28.8 (C18), 30.1 (C17), 30.9 (C3), 31.4 (C16), 33.8 (C4), 40.1 (C2), 47.4 (C5), 49.9 (C10), 76.6 (C6), 79.3 (C13), 121.1 (C11), 122.3 (C9), 136.9 (C12); elemental analysis calcd (%) for $C_{22}H_{41}ClN_2O$ (385.1): C 68.61, H 10.75, N 7.28; found: C 68.76, H 10.66, N 7.23.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-nonylimidazolium chloride (1i). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.49 (d, *J* = 6.9 Hz, 3H, H14 or H15), 0.89 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H23), 1.33 (m, 14H, H5, H3, H17, H18, H19, H20, H21 and H22), 1.62 (m, 2H, Hb–1 and Hb–4), 1.96 (m, 3H, H8 and H16), 2.12 (m, 1H, Hb–2), 3.40 (td, *J* = 10.4 Hz, *J* = 4.4 Hz, 1H, H6), 4.40 (t, *J* = 7.4 Hz, 2H, H10), 5.73 and 5.93 (d, *J* = 10.4 Hz, *J* = 10.7 Hz, 2H, AB system, H13), 7.68 (t, *J* = 1.6 Hz, 1H, H11), 7.86 (t, *J* = 1.6 Hz, 1H, H9), 10.53 (t, *J* = 1.2 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.4 (C23), 15.1 (C14 or C15), 20.3 (C7), 21.5 (C22), 21.9 (C14 or C15), 22.3 (C1), 24.8 (C8), 25.6 (C21), 28.4 (C20), 28.5 (C19), 28.7 (C18), 29.7 (C17), 30.5 (C16), 31.1 (C3), 33.4 (C4), 39.8 (C2), 47.1 (C5), 49.5 (C10), 76.2 (C6), 78.9 (C13), 120.9 (C11), 122.3 (C9), 136.3 (C12); elemental analysis calcd (%) for $C_{23}H_{43}ClN_2O$ (399.13): C 69.21, H 10.88, N 7.02; found: C 69.36, H 9.98, N 6.42.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-decylimidazolium chloride (1j). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.49 (d, *J* = 7.1 Hz, 3H, H14 or H15), 0.93 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H24), 1.32 (m, 16H, H5, H3, H17, H18, H19, H20, H21, H22 and H23), 1.62 (m, 2H, Hb–1 and Hb–4), 1.96 (m, 3H, H8 and H16), 2.12 (m, 1H, Hb–2), 3.41 (td, *J* = 10.4 Hz, *J* = 4.1 Hz, 1H, H6), 4.39 (t, *J* = 7.4 Hz, 2H, H10), 5.71 and 5.96 (d, *J* = 10.7 Hz, 2H, AB system, H13), 7.62 (t, *J* = 1.6 Hz, 1H, H11), 7.86 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 10.89 (t, *J* = 1.1 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.7 (C24), 15.2 (C14 or C15), 20.6 (C7), 21.8 (C14 or C15), 22.3 (C1), 22.4 (C23), 25.0 (C8), 25.9 (C22), 28.6 (C21), 28.8 (C20), 29.0 (C19), 29.1 (C18), 30.0 (C17), 30.7 (C3), 31.4 (C16), 33.6 (C4), 40.0 (C2), 47.3 (C5), 49.8 (C10), 76.3 (C6), 79.1 (C13), 120.9 (C11), 122.5 (C9), 136.8 (C12); elemental analysis calcd (%) for $C_{24}H_{45}ClN_2O$ (413.16): C 69.76, H 11.00, N 6.78; found: C 69.58, H 11.80, N 6.80.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-undecylimidazolium chloride (1k). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.49 (d, *J* = 7.1 Hz, 3H, H14 or H15), 0.89 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H25), 1.29 (m, 18H, H5, H3, H17, H18, H19, H20, H21, H22, H23 and H24), 1.62 (m, 2H, Hb–1 and Hb–4), 1.94 (m, 3H, H8 and H16) 2.12 (m, 1H, Hb–2), 3.37 (td, *J* = 10.4 Hz, *J* = 4.1 Hz, 1H, H6), 4.40 (t, *J* = 7.4 Hz, 2H, H10), 5.71 and 5.92 (d, *J* = 10.7 Hz, *J* = 10.4 Hz, 2H, AB system, H13), 7.58 (t, *J* = 1.6 Hz, 1H, H11), 7.88 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 10.81 (t, *J* = 1.1 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.8 (C25), 15.3 (C14 or C15), 20.4 (C7), 21.8 (C14 or C15), 22.4 (C24), 22.4 (C1), 25.3 (C8), 25.7 (C23), 28.5 (C22), 29.1 (C21), 29.0 (C20), 29.1 (C19), 29.2 (C18), 29.9 (C17), 30.7 (C3), 31.6 (C16), 33.6 (C4), 39.8 (C2), 47.2 (C5), 50.0 (C10), 76.4 (C6), 79.3 (C13), 120.9 (C11), 122.5 (C9), 136.7 (C12); elemental analysis calcd (%) for $C_{25}H_{47}ClN_2O$ (427.19): C 70.28, H 11.11, N 6.56; found: C 70.18, H 11.17, N 6.61.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-dodecyl-imidazolium chloride (1l). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.49 (d, *J* = 6.9 Hz, 3H, H14 or H15), 0.93 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H26), 1.31 (m, 20H, H5, H3, H17, H18, H19, H20, H21, H22, H23, H24 and H25), 1.63 (m, 2H, Hb–1 and Hb–4), 1.96 (m, 3H, H8 and H16), 2.13 (m, 1H, Hb–2), 3.40 (td, *J* = 10.4 Hz, *J* = 4.1 Hz, 1H, H6), 4.40 (t, *J* = 7.4 Hz, 2H, H10), 5.70 and 5.91 (d, *J* = 10.4 Hz, *J* = 10.7 Hz, 2H, AB system, H13), 7.60 (t, *J* = 1.6 Hz, 1H, H11), 7.90 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 10.80 (t, *J* = 1.0 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 14.0 (C26), 15.5 (C14 or C15), 20.6 (C7), 21.7 (C14 or C15), 22.4 (C1), 22.6 (C25), 25.1 (C8), 25.8 (C24), 28.9 (C23), 29.1 (C22 and C21), 29.2 (C20), 29.4 (C19 and C18), 30.0 (C17), 30.8 (C3), 31.7 (C16), 33.7 (C4), 39.8 (C2), 47.4 (C5), 50.0 (C10), 76.4 (C6), 79.4 (C13), 121.2 (C11), 122.5 (C9), 137.0 (C12); elemental analysis calcd (%) for $C_{26}H_{49}ClN_2O$ (441.22): C 70.77, H 11.22, N 6.35; found: C 71.02, H 11.13, N 6.32.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-ethylimidazolium tetrafluoroborate (2b). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.48 (d, *J* = 7.1 Hz, 3H, H14 or H15), 0.93 (m, 9H, Ha–4, H7, H14 or H15, Ha–2 and Ha–1), 1.26 (m, 1H, H5), 1.45 (m, 1H, H3), 1.59 (m, 5H, Hb–1, Hb–4 and H16), 1.95 (m, 1H, H8), 2.11 (m, 1H, Hb–2), 3.33 (td, *J* = 10.7 Hz, *J* = 4.1 Hz, 1H, H6), 4.30 (q, *J* = 14.8 Hz, *J* = 7.4 Hz, 2H, H10), 5.53 and 5.69 (d, *J* = 10.4 Hz, 2H, AB system, H13), 7.40 (t, *J* = 1.9 Hz, 1H, H11), 7.44 (t, *J* = 1.6 Hz, 1H, H9), 9.29 (t, *J* = 1.1 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 15.1 (C16), 15.6 (C14 or C15), 21.3 (C7), 22.2 (C14 or C15), 22.8 (C1), 25.5 (C8), 31.4 (C3), 34.1 (C4), 40.3 (C2), 45.4 (C10), 47.9 (C5), 76.8 (C6), 79.9 (C13), 121.5 (C11), 122.2 (C9), 136.8 (C12); elemental analysis calcd (%) for $C_{16}H_{29}BF_4N_2O$ (352,27): C 54.55, H 8.31, N 7.95; found: C 54.35, H 8.39, N 7.98.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-propylimidazolium tetrafluoroborate (2c). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.49 (d, *J* = 7.1 Hz, 3H, H14 or H15), 0.93 (m, 9H, Ha–4, H7, H14 or H15, Ha–2 and Ha–1), 1.09 (t, *J* = 3.6 Hz, 3H, H17), 1.30 (m, 1H, H5), 1.43 (m, 1H, H3), 1.56 (m, 2H, Hb–1 and Hb–4), 2.02 (m, 4H, H8, H16 and Hb–2), 3.49 (td, *J* = 10.4 Hz, *J* = 4.4 Hz, 1H, H6), 4.19 (t, *J* = 7.4 Hz, 2H, H10), 5.55 and 5.64 (d, *J* = 10.7 Hz, 2H, AB system, H13), 7.48 (t, *J* = 1.6 Hz, 1H, H11), 7.59 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 9.03 (t, *J* = 1.0 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 10.7 (C17), 15.7 (C14 or C15), 21.3 (C7), 30.2 (C14 or C15), 22.9 (C1), 23.8 (C16), 25.5 (C8), 31.2 (C3), 40.1 (C4), 40.5 (C2), 47.9 (C5), 51.8 (C10), 76.9 (C6), 80.2 (C13), 121.6 (C11), 122.6 (C9), 136.9 (C12); elemental analysis calcd (%) for $C_{17}H_{31}BF_4N_2O$ (366.30): C 55.74, H 8.55, N 7.65; found: C 55.76, H 8.46, N 7.7.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-butyl-imidazolium tetrafluoroborate (2d). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.48 (d, *J* = 6.9 Hz, 3H, H14 or H15), 0.93 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H18), 1.26 (m, 1H, H5), 1.41 (m, 3H, H3 and H17), 1.60 (m, 2H, Hb–1 and Hb–4), 1.96 (m, 3H, H8 and H16), 2.13 (m, 1H, Hb–2), 3.33 (td, *J* = 10.7 Hz, *J* = 4.4 Hz, 1H, H6), 4.25 (t, *J* = 7.4 Hz, 2H, H10), 5.52 and 5.83 (d, *J* = 10.4 Hz, 2H, AB system, H13), 7.50 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H11), 7.54 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 8.92 (t, *J* = 1.1 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.3 (C18), 15.4 (C14 or C15), 19.2 (C17), 20.9 (C7), 22.3 (C14 or C15), 22.7 (C1), 25.3 (C8), 31.1 (C3), 32.2 (C16), 33.9 (C4), 40.2 (C2), 47.6 (C5), 49.6 (C10), 76.6 (C6), 79.7 (C13), 121.3 (C11), 122.5 (C9), 137.4 (C12); elemental analysis calcd (%) for $C_{18}H_{33}BF_4N_2O$ (380.33): C 56.84, H 8.76, N 7.37; found: C 56.64, H 8.81, N 7.45.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-pentylimidazolium tetrafluoroborate (2e). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.51 (d, *J* = 7.1 Hz, 3H, H14 or H15), 0.91 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H19), 1.37 (m, 6H, H5, H3, H17 and H18), 1.66 (m, 2H, Hb–1 and Hb–4), 1.98 (m, 4H, H8, H16 and Hb–2), 3.33 (td, *J* = 10.4 Hz, *J* = 4.1 Hz, 1H, H6), 4.57 (t, *J* = 7.4 Hz, 2H, H10), 5.57 and 5.67 (d, *J* = 10.7 Hz, 2H, AB system, H13), 7.49 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H11), 7.51 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 8.86 (t, *J* = 1.1 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.7 (C19), 15.4 (C14 or C15), 20.9 (C7), 21.8 (C18), 22.2 (C14 or C15), 22.6 (C1), 25.3 (C8), 28.2 (C17), 29.8 (C16), 31.0 (C3), 34.1 (C4), 40.2 (C2), 47.7 (C5), 49.9 (C10), 76.8 (C6), 79.9 (C13), 121.8 (C11), 122.8 (C9), 136.2 (C12); elemental analysis calcd (%) for $C_{19}H_{35}BF_4N_2O$ (394.36): C 57.86, H 8.96, N 7.10; found: C 57.96, H 8.88, N 7.07.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-hexylimidazolium tetrafluoroborate (2f). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.47 (d, *J* = 6.9 Hz, 3H, H14 or H15), 0.95 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H20), 1.29 (m, 8H, H5, H3, H17, H18 and H19), 1.60 (m, 2H, Hb–1 and Hb–4), 1.97 (m, 4H, H8, H16 and Hb–2), 3.34 (td, *J* = 4.1 Hz, 1H, H6), 4.28 (t, *J* = 7.1 Hz, 2H, H10), 5.56 and 5.65 (d, *J* = 10.4 Hz, 2H, AB system, H13), 7.40 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H11), 7.43 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 8.71 (t, *J* = 1.1 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.6 (C20), 15.3 (C14 or C15), 20.7 (C7), 21.9 (C19), 22.2 (C14 or C15), 22.4 (C1), 25.1 (C18), 25.6 (C8), 29.9 (C17), 30.2 (C16), 31.1 (C3), 33.8 (C4), 39.9 (C2), 47.7 (C5), 49.9 (C10), 76.7 (C6), 79.3 (C13), 121.6 (C11), 122.5 (C9), 135.5 (C12); elemental analysis calcd (%) for $C_{20}H_{37}BF_4N_2O$ (408.39): C 58.82, H 9.15, N 6.86; found: C 59.01, H 9.11, N 6.77.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-heptylimidazolium tetrafluoroborate (2g). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.48 (d, *J* = 7.1 Hz, 3H, H14 or H15), 0.94 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H21), 1.31 (m, 10H, H5, H3, H17, H18, H19 and H20), 1.62 (m, 2H, Hb–1 and Hb–4), 1.93 (m, 4H, H8, H16 and Hb–2), 3.29 (td, *J* = 10.4 Hz, *J* = 4.1 Hz, 1H, H6), 4.27 (t, *J* = 7.4 Hz, 2H, H10), 5.51 and 5.63 (d, *J* = 10.4 Hz, 2H, AB system, H13), 7.52 (t, *J* = 1.6 Hz, 1H, H11), 7.53 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 8.99 (t, *J* = 1.0 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.8 (C21), 15.3 (C14 or C15), 20.8 (C7), 22.1 (C14 or C15), 22.4 (C20), 22.6 (C1), 25.2 (C8), 25.7 (C19), 28.5 (C18), 30.1 (C17), 30.9 (C3), 31.4 (C16), 33.9 (C4), 39.9 (C2), 47.7 (C5), 50.0 (C10), 76.6 (C6), 79.5 (C13), 121.6 (C11), 122.3 (C9), 136.0 (C12); elemental analysis calcd (%) for $C_{21}H_{39}BF_4N_2O$ (422.42): C 59.71, H 9.32, N 6.63; found: C 59.91, H 9.15, N 6.61.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-octylimidazolium tetrafluoroborate (2h). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.50 (d, *J* = 7.1 Hz, 3H, H14 or H15), 0.94 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H22), 1.32 (m, 12H, H5, H3, H17, H18, H19, H20 and H21), 1.61 (m, 2H, Hb–1 and Hb–4), 1.93 (m, 4H, H8, H16 and Hb–2), 3.34 (td, *J* = 10.7 Hz, *J* = 4.4 Hz, 1H, H6), 4.19 (t, *J* = 7.4 Hz, 2H, H10), 5.54 and 5.65 (d, *J* = 10.4 Hz, *J* = 10.7 Hz, 2H, AB system, H13), 7.47 (t, *J* = 1.6 Hz, 1H, H11), 7.49 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 8.81 (t, *J* = 1.0 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.9 (C22), 15.5 (C14 or C15), 20.9 (C7), 22.1 (C14 or C15), 22.5 (C1), 22.8 (C21), 25.3 (C8), 26.1 (C20), 28.8 (C19), 28.9 (C18), 30.3 (C17), 31.0 (C3), 31.6 (C16), 33.9 (C4), 40.0 (C2), 47.7 (C5), 50.1 (C10), 76.7 (C6), 79.5 (C13), 121.3 (C11), 122.5 (C9), 136.0 (C12); elemental analysis calcd (%) for $C_{22}H_{41}BF_4N_2O$ (436.45): C 60.54, H 9.49, N 6.42; found: C 60.33, H 10.19, N 6.48.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-nonylimidazolium tetrafluoroborate (2i). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.51 (d, *J* = 6.9 Hz, 3H, H14 or H15), 0.94 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H23), 1.35 (m, 14H, H5, H3, H17, H18, H19, H20, H21 and H22), 1.60 (m, 2H, Hb–1 and Hb–4), 1.98 (m, 4H, H8, H16 and Hb–2), 3.34 (td, *J* = 10.4 Hz, *J* = 4.4 Hz, 1H, H6), 4.23 (t, *J* = 7.4 Hz, 2H, H10), 5.56 and 5.64 (d, *J* = 10.4 Hz, *J* = 10.7 Hz, 2H, AB system, H13), 7.54 (t, *J* = 1.6 Hz, 1H, H11), 7.55 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 8.72 (t, *J* = 1.1 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.5 (C23), 15.3 (C14 or C15), 20.7 (C7), 21.7 (C22), 22.2 (C14 or C15), 22.5 (C1), 25.1 (C8), 25.6 (C21), 28.5 (C20), 28.4 (C19), 28.8 (C18), 29.9 (C17), 30.6 (C16), 31.4 (C3), 33.8 (C4), 39.9 (C2), 47.6 (C5), 49.7 (C10), 76.6 (C6), 79.2 (C13), 121.2 (C11), 122.4 (C9), 135.5 (C12); elemental analysis calcd (%) for $C_{23}H_{43}BF_4N_2O$ (450.48): C 61.32, H 9.64, N 6.22; found: C 61.41, H 9.66, N 6.07.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-decylimidazolium tetrafluoroborate (2j). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.48 (d, *J* = 7.1 Hz, 3H, H14 or H15), 0.96 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H24), 1.34 (m, 16H, H5, H3, H17, H18, H19, H20, H21, H22 and H23), 1.61 (m, 2H, Hb–1 and Hb–4), 1.98 (m, 4H, H8, H16 and Hb–2), 3.34 (td, *J* = 10.4 Hz, *J* = 4.1 Hz, 1H, H6), 4.19 (t, *J* = 7.4 Hz, 2H, H10), 5.55 and 5.69 (d, *J* = 10.7 Hz, 2H, AB system, H13), 7.44 (t, *J* = 1.6 Hz, 1H, H11), 7.46 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 9.08 (t, *J* = 1.1 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.8 (C24), 15.4 (C14 or C15), 20.9 (C7), 22.0 (C14 or C15), 22.6 (C1), 22.5 (C23), 25.1 (C8), 26.0 (C22), 28.8 (C21), 28.9 (C20), 29.1 (C19), 29.2 (C18), 30.1 (C17), 31.1 (C3), 31.5 (C16), 33.9 (C4), 40.1 (C2), 47.7 (C5), 49.9 (C10), 76.6 (C6), 79.5 (C13), 121.3 (C11), 122.6 (C9), 135.9 (C12); elemental analysis calcd (%) for $C_{24}H_{45}BF_4N_2O$ (464.51): C 62.05, H 9.78, N 6.03; found: C 62.03, H 9.83, N 5.96.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-undecylimidazolium tetrafluoroborate (2k). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.47 (d, *J* = 7.1 Hz, 3H, H14 or H15), 0.95 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H25), 1.32 (m, 18H, H5, H3, H17, H18, H19, H20, H21, H22, H23 and H24), 1.60 (m, 2H, Hb–1 and Hb–4), 1.96 (m, 4H, H8, H16 and Hb–2), 3.30 (td, *J* = 10.4 Hz, *J* = 4.1 Hz, 1H, H6), 4.21 (t, *J* = 7.4 Hz, 2H, H10), 5.54 and 5.63 (d, *J* = 10.7 Hz, *J* = 10.4 Hz, 2H, AB system, H13), 7.47 (t, *J* = 1.6 Hz, 1H, H11), 7.48 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 8.99 (t, *J* = 1.1 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.9 (C25), 15.2 (C14 or C15), 20.8 (C7), 22.2 (C14 or C15), 22.3 (C24), 22.6 (C1), 25.4 (C8), 25.8 (C23), 28.6 (C22), 29.0 (C21), 29.2 (C20), 29.1 (C19), 29.3 (C18), 30.1 (C17), 31.2 (C3), 31.8 (C16), 33.9 (C4), 40.0 (C2), 47.4 (C5), 50.2 (C10), 76.6 (C6), 79.5 (C13), 121.3 (C11), 122.5 (C9), 135.8 (C12); elemental analysis calcd (%) for $C_{25}H_{47}BF_4N_2O$ (478.54): C 62.74, H 9.92, N 5.58; found: C 62.49, H 9.98, N 5.69.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-dodecylimidazolium tetrafluoroborate (2l). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.48 (d, *J* = 6.9 Hz, 3H, H14 or H15), 0.95 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H26), 1.30 (m, 20H, H5, H3, H17, H18, H19, H20, H21, H22, H23, H24 and H25), 1.61 (m, 2H, Hb–1 and Hb–4), 1.97 (m, 4H, H8, H16 and Hb–2), 3.33 (td, *J* = 10.4 Hz, *J* = 4.1 Hz, 1H, H6), 4.25 (t, *J* = 7.4 Hz, 2H, H10), 5.55 and 5.63 (d, *J* = 10.4 Hz, *J* = 10.7 Hz, 2H, AB system, H13), 7.51 (t, *J* = 1.6 Hz, 1H, H11), 7.52 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 8.99 (t, *J* = 1.0 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 14.1 (C26), 15.3 (C14 or C15), 20.8 (C7), 21.9 (C14 or C15), 22.6 (C1), 22.8 (C25), 25.2 (C8), 25.9 (C24), 28.7 (C23), 29.3 (C22 and C21), 29.1 (C20), 29.6 (C19 and C18), 30.2 (C17), 30.9 (C3), 31.9 (C16), 33.8 (C4), 39.9 (C2), 47.6 (C5), 50.1 (C10), 76.5 (C6), 79.5 (C13), 121.3 (C11), 122.4 (C9), 136.2 (C12); elemental analysis calcd (%) for $C_{26}H_{49}BF_4N_2O$ (492.57): C 63.39, H 10.05, N 5.69; found: C 63.51, H 10.02, N 5.61.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-ethylimidazolium bis(trifluoromethanesulfonyl)imide (8b) ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.47 (d, *J* = 7.0 Hz, 3H, H14 or H15), 0.89 (m, 9H, Ha–4, H7, H14 or H15, Ha–2 and Ha–1), 1.25 (m, 1H, H5), 1.40 (m, 1H, H3), 1.60 (m, 5H, Hb–1, Hb–4 and H16), 1.96 (m, 2H, H8 and Hb–2), 3.28 (td, *J* = 10.6 Hz, *J* = 4.4 Hz, 1H, H6), 4.30 (q, *J* = 14.8 Hz, *J* = 7.4 Hz, 2H, H10), 5.53 and 5.59 (d, *J* = 10.6 Hz, 2H, AB system, H13), 7.49 (t, *J* = 1.9 Hz, *J* = 1.8 Hz, 1H, H11), 7.52 (t, *J* = 1.9 Hz, 1H, H9), 8.92 (t, *J* = 1.1 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 15.1 (C16), 15.2 (C14 or C15), 20.7 (C7), 21.8 (C14 or C15), 22.6 (C1), 25.2 (C8), 30.9 (C3), 33.9 (C4), 39.9 (C2), 45.3 (C10), 47.5 (C5), 76.6 (C6), 79.6 (C13), 121.7 (C11), 122.5 (C9), 134.6 (C12); anion: 113.2, 117.4, 121.7, 125.9; elemental analysis calcd (%) for $C_{18}H_{29}F_6N_3O_5S_2$ (545.7): C 39.61, H 5.37, N 7.70; found: C 39.41, H 5.46, N 7.75.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-propylimidazolium bis(trifluoromethanesulfonyl)imide (8c). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.48 (d, *J* = 6.9 Hz, 3H, H14 or H15), 0.88 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H17), 1.25 (m, 1H, H5), 1.39 (m, 1H, H3), 1.63 (m, 2H, Hb–1 and Hb–4), 2.01 (m, 4H, H8, H16 and Hb–2), 3.29 (td, *J* = 10.4 Hz, *J* = 4.1 Hz, 1H, H6), 4.21 (t, *J* = 7.4 Hz, 2H, H10), 5.54 and 5.61 (d, *J* = 10.7 Hz, 2H, AB system, H13), 7.51 (t, *J* = 1.4 Hz, 2H, H11 and H9), 8.94 (t, *J* = 1.0 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 10.1 (C17), 15.1 (C14 or C15), 20.6 (C7), 21.7 (C14 or C15), 22.6 (C1), 23.4 (C16), 25.2 (C8), 30.9 (C3), 33.8 (C4), 39.9 (C2), 47.4 (C5), 51.4 (C10), 76.6 (C6), 79.6 (C13), 121.6 (C11), 122.8 (C9), 134.8 (C12); anion: 113.1, 117.4, 121.6, 125.9; elemental analysis calcd (%) for $C_{19}H_{31}F_6N_3O_5S_2$ (559.73): C 40.77, H 5.59, N 7.51; found: C 40.93, H 5.65, N 7.34.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-butylimidazolium bis(trifluoromethanesulfonyl)imide (8d). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.48 (d, *J* = 6.9 Hz, 3H, H14 or H15), 0.88 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H18), 1.34 (m, 4H, H5, H3 and H17), 1.63 (m, 2H, Hb–1 and Hb–4), 1.85 (m, 3H, H8 and H16), 1.95 (m, 1H, Hb–2), 3.29 (td, *J* = 10.4 Hz, *J* = 4.3 Hz, 1H, H6), 4.24 (t, *J* = 7.4 Hz, 2H, H10), 5.54 and 5.61 (d, *J* = 10.7 Hz, *J* = 10.6 Hz, 2H, AB system, H13), 7.51 (m, 2H, H11 and H9), 8.94 (t, *J* = 1.1 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.0 (C18), 15.1 (C14 or C15), 19.1 (C17), 20.7 (C7), 21.8 (C14 or C15), 22.6 (C1), 25.2 (C8), 30.9 (C3), 31.9 (C16), 33.9 (C4), 40.0 (C2), 47.5 (C5), 49.8 (C10), 76.6 (C6), 79.7 (C13), 121.6 (C11), 122.9 (C9), 134.9 (C12), anion: 113.2, 117.4, 121.7, 125.9; elemental analysis calcd (%) for $C_{20}H_{33}F_6N_3O_5S_2$ (573.76): C 41.86, H 5.81, N 7.32; found: C 41.94, H 5.73, N 7.23.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-pentylimidazolium bis(trifluoromethanesulfonyl)imide (8e). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.48 (d, *J* = 6.9 Hz, 3H, H14 or H15), 0.88 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H19), 1.30 (m, 6H, H5, H3, H17 and H18), 1.63 (m, 2H, Hb–1 and Hb–4), 1.94 (m, 4H, H8, H16 and Hb–2), 3.28 (td, *J* = 10.4 Hz, *J* = 4.1 Hz, 1H, H6), 4.23 (t, *J* = 7.4 Hz, 2H, H10), 5.53 and 5.61 (d, *J* = 10.7 Hz, 2H, AB system, H13), 7.49 (t, *J* = 1.9 Hz, *J* = 1.8 Hz, 1H, H11), 7.50 (t, *J* = 1.9 Hz, 1H, H9), 8.95 (t, *J* = 1.0 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.6 (C19), 15.2 (C14 or C15), 20.8 (C7), 21.9 (C18. C14 or C15), 22.7 (C1), 25.3 (C8), 28.0 (C17), 29.8 (C16), 31.0 (C3), 33.9 (C4), 40.0 (C2), 47.5 (C5), 50.2 (C10), 76.6 (C6), 79.8 (C13), 121.7 (C11), 122.9 (C9), 134.9 (C12), anion: 113.2, 117.5, 121.75, 126.0; elemental analysis calcd (%) for $C_{21}H_{35}F_6N_3O_5S_2$ (587.79): C 42.91, H 6.01, N 7.15; found: C 42.97, H 6.13, N 6.96.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-hexylimidazolium bis(trifluoromethanesulfonyl)imide (8f). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.48 (d, *J* = 6.9 Hz, 3H, H14 or H15), 0.89 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H20), 1.25 (m, 8H, H5, H3, H17, H18 and H19), 1.61 (m, 2H, Hb–1 and Hb–4), 1.97 (m, 4H, H8, H16 and Hb–2), 3.31 (td, *J* = 10.4 Hz, *J* = 4.1 Hz, 1H, H6), 4.23 (t, *J* = 7.1 Hz, 2H, H10), 5.55 and 5.62 (d, *J* = 10.4 Hz, *J* = 10.7 Hz, 2H, AB system, H13), 7.50 (t, *J* = 1.9 Hz, *J* = 1.7 Hz, 1H, H11), 7.51 (t, *J* = 1.9 Hz, *J* = 1.7 Hz, 1H, H9), 8.94 (t, *J* = 1.1 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.5 (C20), 15.1 (C14 or C15), 20.6 (C7), 21.7 (C19), 21.9 (C14 or C15), 22.4 (C1), 24.9 (C18), 25.5 (C8), 29.9 (C17), 30.2 (C16), 30.9 (C3), 33.8 (C4), 39.8 (C2), 47.3 (C5), 49.7 (C10), 76.5 (C6), 79.5 (C13), 121.7 (C11), 122.5 (C9), 135.1 (C12), anion: 113.2, 117.4, 121.7, 125.9; elemental analysis calcd (%) for $C_{22}H_{37}F_6N_3O_5S_2$ (601.80): C 43.90, H 6.21, N 6.98; found: C 43.69, H 6.28, N 7.03.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-heptylimidazolium bis(trifluoromethanesulfonyl)imide (8g). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.48 (d, *J* = 7.1 Hz, 3H, H14 or H15), 0.91 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H21), 1.31 (m, 10H, H5, H3, H17, H18, H19 and H20), 1.63 (m, 2H, Hb–1 and Hb–4), 1.90 (m, 4H, H8, H16 and Hb–2), 3.28 (td, *J* = 10.4 Hz, *J* = 4.1 Hz, 1H, H6), 4.23 (t, *J* = 7.4 Hz, 2H, H10), 5.53 and 5.61 (d, *J* = 10.4 Hz, *J* = 10.7 Hz, 2H, AB system, H13), 7.50 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H11), 7.51 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 8.96 (t, *J* = 1.1 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.8 (C21), 15.2 (C14 or C15), 20.7 (C7), 21.8 (C14 or C15), 22.3 (C20), 22.7 (C1), 25.2 (C8), 25.8 (C19), 28.4 (C18), 30.1 (C17), 31.0 (C3), 31.3 (C16), 33.9 (C4), 39.9 (C2), 47.5 (C5), 50.1 (C10), 76.6 (C6), 79.7 (C13), 121.7 (C11), 122.9 (C9), 134.9 (C12), anion: 113.2, 117.4, 121.7, 125.9; elemental analysis calcd (%) for $C_{23}H_{39}F_6N_3O_5S_2$ (615.85): C 44.85, H 6.40, N 6.82; found: C 44.76, H 6.35, N 6.92.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-octylimidazolium bis(trifluoromethanesulfonyl)imide (8h). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.48 (d, *J* = 7.1 Hz, 3H, H14 or H15), 0.90 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H22), 1,32 (m, 12H, H5, H3, H17, H18, H19, H20 and H21), 1.63 (m, 2H, Hb–1 and Hb–4), 1.93 (m, 3H, H8, H16 and Hb–2), 3.31 (td, *J* = 10.7 Hz, *J* = 4.4 Hz, 1H, H6), 4.21 (t, *J* = 7.4 Hz, 2H, H10), 5.53 and 5.63 (d, *J* = 10.4 Hz, *J* = 10.7 Hz, 2H, AB system, H13), 7.49 (t, *J* = 1.6 Hz, 1H, H11), 7.51 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 8.94 (t, *J* = 1.0 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.7 (C22), 15.2 (C14 or C15), 20.6 (C7), 21.7 (C14 or C15), 22.6 (C1), 22.8 (C21), 25.3 (C8), 26.1 (C20), 28.8 (C19), 28.9 (C18), 30.3 (C17), 31.0 (C3), 31.5 (C16), 33.9 (C4), 40.2 (C2), 47.5 (C5), 50.1 (C10), 76.7 (C6), 79.6 (C13), 121.6 (C11), 122.5 (C9), 135.1 (C12), anion: 113.3, 117.5, 121.7, 125.9; elemental analysis calcd (%) for $C_{24}H_{41}F_6N_3O_5S_2$ (629.88): C 45.76, H 6.57, N 6.67; found: C 45.78, H 6.50, N 6.73.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-nonylimidazolium (trifluoromethanesulfonyl)imide (8i). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.48 (d, *J* = 6.9 Hz, 3H, H14 or H15), 0.88 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H23), 1.31 (m, 14H, H5, H3, H17, H18, H19, H20, H21 and H22), 1.63 (m, 2H, Hb–1 and Hb–4), 1.93 (m, 4H, H8, H16 and Hb–2), 3.30 (td, *J* = 10.4 Hz, *J* = 4.4 Hz, 1H, H6), 4.22 (t, *J* = 7.4 Hz, 2H, H10), 5.54 and 5.62 (d, *J* = 10.4 Hz, *J* = 10.7 Hz, 2H, AB system, H13), 7.50 (t, *J* = 1.7 Hz, 1H, H11), 7.52 (t, *J* = 1.7 Hz, 1H, H9), 8.82 (t, *J* = 1.1 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.4 (C23), 15.2 (C14 or C15), 20.6 (C7), 21.6 (C22), 21.8 (C14 or C15), 22.6 (C1), 25.2 (C8), 25.7 (C21), 28.4 (C20), 28.6 (C19), 28.9 (C18), 29.9 (C17), 30.5 (C16), 30.9 (C3), 33.8 (C4), 39.9 (C2), 47.4 (C5), 49.6 (C10), 76.6 (C6), 79.6 (C13), 121.8 (C11), 122.5 (C9), 134.8 (C12), anion: 113.2, 117.5, 121.75, 126.0; elemental analysis calcd (%) for $C_{25}H_{43}F_6N_3O_5S_2$ (643.91): C 46.63, H 6.74, N 6.53; found: C 46.73, H 6.66, N 6.33.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-decylimidazolium (trifluoromethanesulfonyl)imide (8j). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.48 (d, *J* = 7.1 Hz, 3H, H14 or H15), 0.92 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H24), 1.31 (m, 16H, H5, H3, H17, H18, H19, H20, H21, H22 and H23), 1.63 (m, 2H, Hb–1 and Hb–4), 1.98 (m, 4H, H8, H16 and Hb–2), 3.30 (td, *J* = 10.4 Hz, *J* = 4.1 Hz, 1H, H6), 4.21 (t, *J* = 7.4 Hz, 2H, H10), 5.53 and 5.66 (d, *J* = 10.7 Hz, 2H, AB system, H13), 7.50 (t, *J* = 1.6 Hz, 1H, H11), 7.52 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 9.01 (t, *J* = 1.0 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.6 (C24), 15.1 (C14 or C15), 20.7 (C7), 21.9 (C14 or C15), 22.6 (C1), 22.5 (C23), 25.2 (C8), 26.0 (C22), 28.7 (C21), 28.9 (C20), 29.0 (C19), 29.2 (C18), 30.1 (C17), 30.9 (C3), 31.6 (C16), 33.9 (C4), 39.9 (C2), 47.5 (C5), 49.9 (C10), 76.7 (C6), 79.6 (C13), 121.6 (C11), 122.8 (C9), 135.1 (C12), anion: 113.1, 117.4, 121.6, 125.9; elemental analysis calcd (%) for $C_{26}H_{45}F_6N_3O_5S_2$ (657.94): C 47.46, H 6.91, N 6.39; found: C 46.59, H 6.94, N 6.49.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-undecylimidazolium bis(trifluoromethanesulfonyl)imide (8k). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.48 (d, *J* = 7.1 Hz, 3H, H14 or H15), 0.91 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H25), 1.27 (m, 18H, H5, H3, H17, H18, H19, H20, H21, H22, H23 and H24), 1.63 (m, 2H, Hb–1 and Hb–4), 1.93 (m, 4H, H8, H16 and Hb–2), 3.29 (td, *J* = 10.4 Hz, *J* = 4.1 Hz, 1H, H6), 4.23 (t, *J* = 7.4 Hz, 2H, H10), 5.53 and 5.61 (d, *J* = 10.7 Hz, *J* = 10.4 Hz, 2H, AB system, H13), 7.50 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H11), 7.51 (t, *J* = 1.6 Hz, 1H, H9), 8.96 (t, *J* = 1.0 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.9 (C25), 15.1 (C14 or C15), 20.6 (C7), 21.7 (C14 or C15), 22.5 (C24), 22.6 (C1), 25.2 (C8), 25.8 (C23), 28.7 (C22), 29.0 (C21), 29.1 (C20), 29.2 (C19), 29.3 (C18), 30.0 (C17), 30.9 (C3), 31.7 (C16), 33.9 (C4), 39.9 (C2), 47.5 (C5), 50.1 (C10), 76.6 (C6), 79.7 (C13), 121.8 (C11), 122.9 (C9), 135.0 (C12); anion: 113.3, 117.5, 120.3, 126.1; elemental analysis calcd (%) for $C_{27}H_{47}F_6N_3O_5S_2$ (671.97): C 48.25, H 7.06, N 6.25; found: C 48.32, H 7.08, N 6.15.

1-[(1*R*,2*S*,5*R*)–(–)–menthoxymethyl]-3-dodecylimidazolium bis(trifluoromethanesulfonyl)imide (8l). ^{1}H NMR ($CDCl_3$, 25 ^{o}C): δ = 0.48 (d, *J* = 6.9 Hz, 3H, H14 or H15), 0.94 (m, 12H, Ha–4, H7, H14 or H15, Ha–2, Ha–1 and H26), 1.30 (m, 20H, H5, H3, H17, H18, H19, H20, H21, H22, H23, H24 and H25), 1.63 (m, 2H, Hb–1 and Hb–4), 1.94 (m, 4H, H8, H16 and Hb–2), 3.28 (td, *J* = 10.4 Hz, *J* = 4.1 Hz, 1H, H6), 4.23 (t, *J* = 7.4 Hz, 2H, H10), 5.53 and 5.61 (d, *J* = 10.4 Hz, *J* = 10.7 Hz, 2H, AB system, H13), 7.50 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H11), 7.51 (t, *J* = 1.9 Hz, *J* = 1.6 Hz, 1H, H9), 8.95 (t, *J* = 1.0 Hz, 1H, H12); ^{13}C NMR ($CDCl_3$): δ = 13.9 (C26), 15.2 (C14 or C15), 20.7 (C7), 21.8 (C14 or C15), 22.6 (C1), 22.7 (C25), 25.3 (C8), 25.9 (C24), 28.8 (C23), 29.2 (C22 and C21), 29.3 (C20), 29.5 (C19 and C18), 30.1 (C17), 31.0 (C3), 31.8 (C16), 33.9 (C4), 39.9 (C2), 47.5 (C5), 50.1 (C10), 76.6 (C6), 79.7 (C13), 121.7 (C11), 122.9 (C9), 134.9 (C12); anion: 113.2, 117.5, 120.9, 125.9; elemental analysis calcd (%) for $C_{28}H_{49}F_6N_3O_5S_2$ (686.00): C 49.02, H 7.21, N 6.13; found: C 48.86, H 7.3, N 6.27.

Supplementary Material (ESI) for New Journal of Chemistry

Table SI1. Close contacts in 1a·H_2O, 1b·0.5H_2O, and 1c·0.5H_2O.[a]

Hydrogen Type	D-H…A	D-H(Å)	H…A(Å)	-ΔvdW	D…A(Å)	D-H…A degrees	Symmetry code
1a·H_2O Methyl							
Water-*H*	O2'-H3W...Cl1	0.98(3)	2.19(3)	-0.763	3.145(2)	166(3)	
	O2-H1W...Cl1	0.82(3)	2.35(3)	-0.604	3.170(2)	177(3)	1-x,1/2+y,1/2-z
	O2-H2W...Cl1'	0.76(3)	2.39(3)	-0.565	3.140(2)	169(3)	
	O2'-H4W...Cl1'	0.76(3)	2.45(3)	-0.501	3.200(2)	170(3)	
Im-ring-*H*	C12'-H12A...Cl1	0.91(2)	2.68(2)	-0.273	3.493(2)	149(2)	
	C9'-H9A...Cl1	0.95(2)	2.71(2)	-0.237	3.452(2)	135(2)	1+x,y,z
	C11'-H11A...O2	0.93(2)	2.49(2)	-0.229	3.313(3)	147(2)	x,-1+y,z
	C9-H9...Cl1	0.89(2)	2.80(2)	-0.146	3.500(3)	136(2)	1+x,y,z
	C12-H12...Cl1'	0.91(2)	2.81(2)	-0.145	3.587(2)	144(2)	
Cation-cation	C11-H11...O1'	0.92(2)	2.58(2)	-0.138	3.355(3)	142(2)	
Methyl-CH_3	C10-H10G...O2	1.00(3)	2.44(3)	-0.274	3.397(4)	159(2)	
	C10'-H10D...O2'	0.94(2)	2.50(2)	-0.214	3.357(3)	152(2)	
Bridge-CH_2	C13-H13F...Cl1'	1.03(2)	2.76(2)	-0.194	3.718(2)	156(2)	
Edge-π	C9 - N1'				3.577(3)		
	C11 - C12'				3.425(3)		
1b·0.5H_2O Ethyl							
Water-*H*	O2 - Cl2			-0.219	3.052(3)		-1-x,-1/2+y,-1-z
	O2 - Cl1			-0.191	3.079(4)		
Im-Ring-*H*	C9-H9A...Cl2	0.95	2.61	-0.34	3.520(5)	160.5	
	C13-H13A…Cl2	0.99	2.62	-0.326	3.581(4)	162.5	x,-1+y,z
	C11'-H11B...Cl2	0.95	2.75	-0.202	3.582(4)	146.9	1+x,-2+y,z
	C12-H12A...Cl1	0.95	2.75	-0.202	3.566(5)	144.5	
	C12'-H12B...Cl1	0.95	2.77	-0.177	3.351(4)	120.1	x,-1+y,z
	C9'-H9'A...Cl1	0.95	2.8	-0.153	3.556(4)	137.5	-x,-1/2+y,-1-z
	C12-H12A...O2	0.95	2.7	-0.02	3.528(7)	146	
Ethyl-CH_2	C16'-H16D...Cl1	0.98	2.85	-0.102	3.802(6)	164.9	
Ethyl-CH_3	C10'-H10C...O2	0.99	2.47	-0.254	3.144(7)	125.4	x,-1+y,z
	C10'-H10C...O2	0.99	2.47	-0.076	3.144(7)	125.4	x,-1+y,z
Bridge-CH_2	C13-H13B...Cl1	0.99	2.69	-0.26	3.612(4)	155	
Cation-cation	C3'-H3'A...O1	1	2.56	-0.157	3.359(4)	136.4	-1+x,1+y,z

1c·0.5H_2O Propyl							
Water-*H*	O11-H1Bw...Cl1	0.83(5)	2.38(5)	-0.573	3.205(5)	173(4)	
	O11-H2Bw...Cl3	0.83(6)	2.48(6)	-0.475	3.287(5)	167(5)	x,y,-1+z
	O10-H1Aw...Cl4	0.89(5)	2.31(5)	-0.635	3.204(5)	176(4)	
	O10-H2Aw...Cl2	0.69(5)	2.60(5)	-0.354	3.281(6)	172(6)	x,y,1+z
Im-Ring-*H*	C12-H12A...Cl3	0.95	2.35	-0.600	3.269(4)	162.8	
	C12'-H12B...Cl2	0.95	2.37	-0.576	3.282(4)	160.0	
	C9-H9A...Cl1	0.95	2.53	-0.415	3.438(4)	158.8	
	C9'-H9'A...Cl4	0.95	2.58	-0.374	3.460(4)	155.0	
	C29'-H29B...Cl3	0.95	2.62	-0.333	3.461(4)	148.2	-1+x,y,-1+z
	C29-H29A...Cl2	0.95	2.63	-0.333	3.478(4)	149.3	-1+x,y,1+z
	C11'-H11A...Cl1	0.95	2.65	-0.297	3.547(4)	157	-1+x,y,z
	C11-H11B...Cl4	0.95	2.68	-0.271	3.572(5)	156.9	
	C31-H31A...O10	0.95	2.44	-0.283	3.323(6)	155.1	
	C31'-H31B...O11	0.95	2.47	-0.252	3.359(5)	156.1	
Cation-cation	C32-H32B...O1'	0.95	2.59	-0.126	3.490(5)	157.2	-1+x,y,z
	C32'-H32A...O1	0.95	2.66	-0.064	3.551(5)	157.1	-1+x,y,z
Propyl-CH_2	C30'-H30A...Cl4	0.99	2.67	-0.278	3.534(5)	145.9	
	C30-H30C...Cl1	0.99	2.74	-0.208	3.584(4)	143.1	-1+x,y,z
Bridge-CH_2	C13-H13C...Cl4	0.99	2.59	-0.364	3.461(4)	147.2	1+x,y,z
	C13'-H13A...Cl1	0.99	2.60	-0.349	3.476(4)	147.3	
π	C11' - C29'				3.428(5)		
π	N4' - C9'				3.438(5)		
π	C11' - C31'				3.467(5)		
π	N2' - C29'				3.514(5)		
π	C9' - C31'				3.528(5)		
π	N3' – C11'				3.559(5)		

[a]-ΔvdW = contact distance under van der Waals separation. Criteria for significant intermolecular contact taken as < - 0.100 Å the sum of the van der Waals radii (vdWR(H) + vdWR(A)). When the hydrogen atoms on water solvent atoms were not located, -ΔvdW is calculated for the D-A distance rather than the H-A distance.