

Supporting Information

**High pressure density of bis(1-alkyl-3-methylimidazolium)
tetraisothiocyanatocobaltate ionic liquids: experimental and
PC-SAFT with volume-shift modeling**

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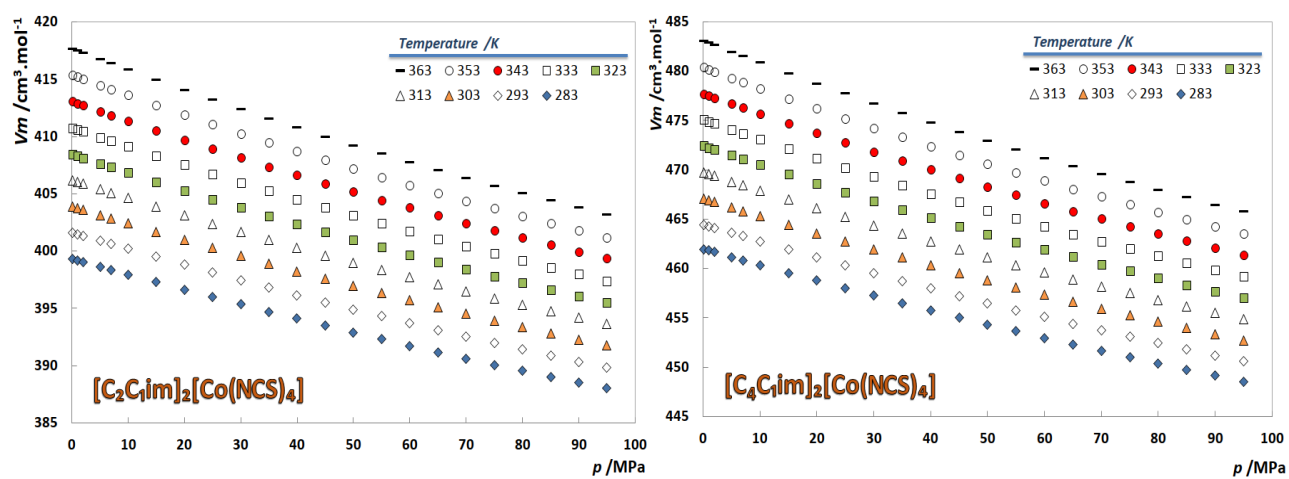


Figure S1. Molar volumes as a function of temperature, pressure, and the studied ILs.

Table S1. Density as function of temperature and pressure for the [C₂C₁im]₂[Co(NCS)₄].

T/ K																	
283.1		293.1		303.1		313.2		323.2		333.2		343.1		353.1		363.1	
p/ MPa	$\rho/ \text{g}\cdot\text{cm}^{-3}$	p/ MPa	$\rho/ \text{g}\cdot\text{cm}^{-3}$	p/ MPa	$\rho/ \text{g}\cdot\text{cm}^{-3}$	p/ MPa	$\rho/ \text{g}\cdot\text{cm}^{-3}$	p/ MPa	$\rho/ \text{g}\cdot\text{cm}^{-3}$	p/ MPa	$\rho/ \text{g}\cdot\text{cm}^{-3}$	p/ MPa	$\rho/ \text{g}\cdot\text{cm}^{-3}$	p/ MPa	$\rho/ \text{g}\cdot\text{cm}^{-3}$	p/ MPa	$\rho/ \text{g}\cdot\text{cm}^{-3}$
0.1	1.2861	0.1	1.2787	0.1	1.2715	0.1	1.2644	0.1	1.2573	0.1	1.2503	0.1	1.2433	0.1	1.2364	0.1	1.2295
1.0	1.2865	1.0	1.2791	1.0	1.2720	1.0	1.2649	1.0	1.2578	1.0	1.2507	1.0	1.2437	1.0	1.2369	1.0	1.2301
2.0	1.2870	2.0	1.2796	2.0	1.2725	2.0	1.2653	2.0	1.2584	2.0	1.2513	2.0	1.2443	2.0	1.2375	2.0	1.2306
5.0	1.2884	5.0	1.2811	5.0	1.2739	5.0	1.2668	5.0	1.2599	5.0	1.2530	5.0	1.2460	5.0	1.2392	5.0	1.2324
7.0	1.2893	7.0	1.2821	7.0	1.2749	7.0	1.2679	7.0	1.2609	7.0	1.2539	7.0	1.2470	7.0	1.2403	7.0	1.2335
10.0	1.2906	10.0	1.2834	10.0	1.2763	10.0	1.2694	10.0	1.2625	10.0	1.2553	10.0	1.2486	10.0	1.2417	10.0	1.2351
15.0	1.2928	15.0	1.2857	15.0	1.2786	15.0	1.2717	15.0	1.2650	15.0	1.2579	15.0	1.2513	15.0	1.2443	15.0	1.2377
20.0	1.2950	20.0	1.2879	20.0	1.2810	20.0	1.2741	20.0	1.2673	20.0	1.2601	20.0	1.2537	20.0	1.2469	20.0	1.2404
25.0	1.2971	25.0	1.2900	25.0	1.2831	25.0	1.2763	25.0	1.2696	25.0	1.2627	25.0	1.2560	25.0	1.2494	25.0	1.2430
30.0	1.2991	30.0	1.2921	30.0	1.2854	30.0	1.2787	30.0	1.2719	30.0	1.2651	30.0	1.2583	30.0	1.2519	30.0	1.2456
35.0	1.3011	35.0	1.2943	35.0	1.2876	35.0	1.2809	35.0	1.2741	35.0	1.2675	35.0	1.2606	35.0	1.2543	35.0	1.2482
40.0	1.3032	40.0	1.2963	40.0	1.2896	40.0	1.2829	40.0	1.2764	40.0	1.2695	40.0	1.2630	40.0	1.2567	40.0	1.2505
45.0	1.3052	45.0	1.2984	45.0	1.2917	45.0	1.2851	45.0	1.2786	45.0	1.2720	45.0	1.2655	45.0	1.2591	45.0	1.2527
50.0	1.3072	50.0	1.3005	50.0	1.2940	50.0	1.2874	50.0	1.2808	50.0	1.2742	50.0	1.2677	50.0	1.2612	50.0	1.2549
55.0	1.3090	55.0	1.3025	55.0	1.2959	55.0	1.2895	55.0	1.2829	55.0	1.2764	55.0	1.2696	55.0	1.2636	55.0	1.2572
60.0	1.3110	60.0	1.3043	60.0	1.2979	60.0	1.2914	60.0	1.2850	60.0	1.2784	60.0	1.2718	60.0	1.2657	60.0	1.2594
65.0	1.3129	65.0	1.3063	65.0	1.2997	65.0	1.2933	65.0	1.2870	65.0	1.2804	65.0	1.2741	65.0	1.2677	65.0	1.2616
70.0	1.3148	70.0	1.3083	70.0	1.3017	70.0	1.2953	70.0	1.2889	70.0	1.2824	70.0	1.2759	70.0	1.2699	70.0	1.2637
75.0	1.3166	75.0	1.3102	75.0	1.3037	75.0	1.2972	75.0	1.2909	75.0	1.2846	75.0	1.2779	75.0	1.2720	75.0	1.2658
80.0	1.3183	80.0	1.3122	80.0	1.3054	80.0	1.2990	80.0	1.2928	80.0	1.2865	80.0	1.2802	80.0	1.2742	80.0	1.2678
85.0	1.3200	85.0	1.3139	85.0	1.3074	85.0	1.3011	85.0	1.2947	85.0	1.2886	85.0	1.2824	85.0	1.2761	85.0	1.2701
90.0	1.3219	90.0	1.3156	90.0	1.3094	90.0	1.3029	90.0	1.2968	90.0	1.2904	90.0	1.2843	90.0	1.2782	90.0	1.2721
95.0	1.3238	95.0	1.3175	95.0	1.3110	95.0	1.3048	95.0	1.2987	95.0	1.2925	95.0	1.2861	95.0	1.2802	95.0	1.2738

Standard uncertainties are: $u(p)=0.01$ MPa; $u(T)=0.1$ K. Expanded uncertainty for density $U(\rho)$ is $5\cdot 10^{-4}$ g·cm⁻³ (0.95 level of confidence).

Table S2. Density as function of temperature and pressure for the $[\text{C}_4\text{C}_{1\text{im}}]_2[\text{Co}(\text{NCS})_4]$.

<i>T/ K</i>																	
283.16		293.13		303.17		313.17		323.18		333.15		343.14		353.13		363.14	
<i>p/ MPa</i>	$\rho/ \text{g}\cdot\text{cm}^{-3}$	<i>p/ MPa</i>	$\rho/ \text{g}\cdot\text{cm}^{-3}$	<i>p/ MPa</i>	$\rho/ \text{g}\cdot\text{cm}^{-3}$	<i>p/ MPa</i>	$\rho/ \text{g}\cdot\text{cm}^{-3}$	<i>p/ MPa</i>	$\rho/ \text{g}\cdot\text{cm}^{-3}$	<i>p/ MPa</i>	$\rho/ \text{g}\cdot\text{cm}^{-3}$	<i>p/ MPa</i>	$\rho/ \text{g}\cdot\text{cm}^{-3}$	<i>p/ MPa</i>	$\rho/ \text{g}\cdot\text{cm}^{-3}$	<i>p/ MPa</i>	$\rho/ \text{g}\cdot\text{cm}^{-3}$
0.1	1.2331	0.1	1.2264	0.1	1.2196	0.1	1.2126	0.1	1.2058	0.1	1.1990	0.1	1.1924	0.1	1.1858	0.1	1.1792
1.0	1.2335	1.0	1.2269	1.0	1.2201	1.0	1.2132	1.0	1.2063	1.0	1.1995	1.0	1.1929	1.0	1.1863	1.0	1.1798
2.0	1.2339	2.0	1.2274	2.0	1.2205	2.0	1.2136	2.0	1.2068	2.0	1.2001	2.0	1.1935	2.0	1.1869	2.0	1.1803
5.0	1.2353	5.0	1.2289	5.0	1.2221	5.0	1.2152	5.0	1.2083	5.0	1.2018	5.0	1.1951	5.0	1.1886	5.0	1.1820
7.0	1.2362	7.0	1.2297	7.0	1.2229	7.0	1.2162	7.0	1.2094	7.0	1.2027	7.0	1.1962	7.0	1.1896	7.0	1.1832
10.0	1.2376	10.0	1.2311	10.0	1.2243	10.0	1.2177	10.0	1.2108	10.0	1.2042	10.0	1.1977	10.0	1.1912	10.0	1.1848
15.0	1.2398	15.0	1.2335	15.0	1.2268	15.0	1.2201	15.0	1.2133	15.0	1.2067	15.0	1.2004	15.0	1.1938	15.0	1.1875
20.0	1.2419	20.0	1.2356	20.0	1.2291	20.0	1.2225	20.0	1.2158	20.0	1.2092	20.0	1.2028	20.0	1.1965	20.0	1.1900
25.0	1.2440	25.0	1.2376	25.0	1.2313	25.0	1.2248	25.0	1.2181	25.0	1.2116	25.0	1.2051	25.0	1.1989	25.0	1.1926
30.0	1.2459	30.0	1.2397	30.0	1.2335	30.0	1.2269	30.0	1.2205	30.0	1.2139	30.0	1.2075	30.0	1.2013	30.0	1.1950
35.0	1.2480	35.0	1.2418	35.0	1.2356	35.0	1.2291	35.0	1.2228	35.0	1.2162	35.0	1.2098	35.0	1.2036	35.0	1.1974
40.0	1.2501	40.0	1.2438	40.0	1.2377	40.0	1.2313	40.0	1.2249	40.0	1.2183	40.0	1.2122	40.0	1.2059	40.0	1.1999
45.0	1.2519	45.0	1.2459	45.0	1.2397	45.0	1.2333	45.0	1.2270	45.0	1.2205	45.0	1.2144	45.0	1.2081	45.0	1.2022
50.0	1.2539	50.0	1.2480	50.0	1.2417	50.0	1.2353	50.0	1.2291	50.0	1.2228	50.0	1.2164	50.0	1.2105	50.0	1.2045
55.0	1.2558	55.0	1.2500	55.0	1.2436	55.0	1.2374	55.0	1.2311	55.0	1.2249	55.0	1.2186	55.0	1.2128	55.0	1.2067
60.0	1.2576	60.0	1.2519	60.0	1.2456	60.0	1.2394	60.0	1.2332	60.0	1.2270	60.0	1.2207	60.0	1.2151	60.0	1.2089
65.0	1.2594	65.0	1.2538	65.0	1.2475	65.0	1.2413	65.0	1.2351	65.0	1.2291	65.0	1.2229	65.0	1.2169	65.0	1.2112
70.0	1.2613	70.0	1.2555	70.0	1.2494	70.0	1.2434	70.0	1.2372	70.0	1.2310	70.0	1.2250	70.0	1.2190	70.0	1.2132
75.0	1.2632	75.0	1.2574	75.0	1.2513	75.0	1.2452	75.0	1.2392	75.0	1.2330	75.0	1.2270	75.0	1.2211	75.0	1.2153
80.0	1.2649	80.0	1.2591	80.0	1.2531	80.0	1.2470	80.0	1.2410	80.0	1.2351	80.0	1.2291	80.0	1.2231	80.0	1.2173
85.0	1.2666	85.0	1.2610	85.0	1.2548	85.0	1.2489	85.0	1.2429	85.0	1.2369	85.0	1.2310	85.0	1.2252	85.0	1.2193
90.0	1.2684	90.0	1.2626	90.0	1.2567	90.0	1.2506	90.0	1.2448	90.0	1.2389	90.0	1.2328	90.0	1.2271	90.0	1.2214
95.0	1.2701	95.0	1.2644	95.0	1.2585	95.0	1.2525	95.0	1.2465	95.0	1.2407	95.0	1.2348	95.0	1.2291	95.0	1.2233

Standard uncertainties are: $u(p)=0.02$ MPa; $u(T)=0.1$ K. Expanded uncertainty for density $U(\rho)$ is $5\cdot 10^{-4}$ $\text{g}\cdot\text{cm}^{-3}$ (0.95 level of confidence).