Electronic Supplementary Information for:

Carbon Dioxide Capture and Utilization: Using Dinuclear Catalysts to Prepare Polycarbonates

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1. Results

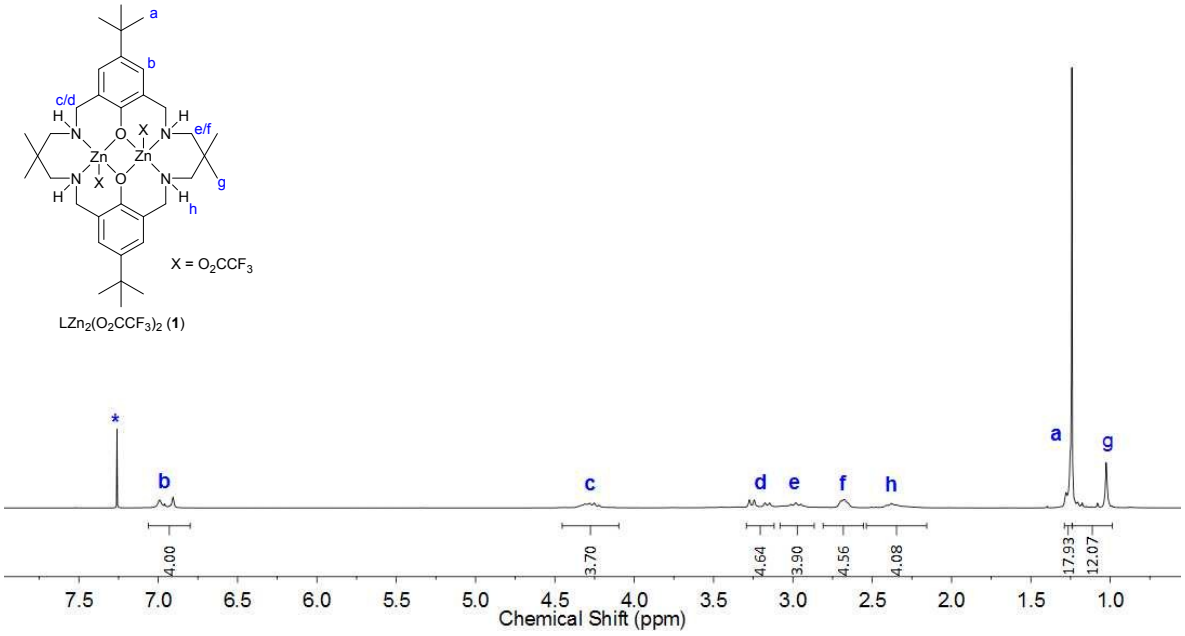

Figure S1. ^{1}H NMR (400.0 MHz, $CDCl_3$-d_1, 298 K) spectrum of $LZn_2(O_2CCF_3)_2$ (**1**). The asterisk denotes the residual protio-solvent.

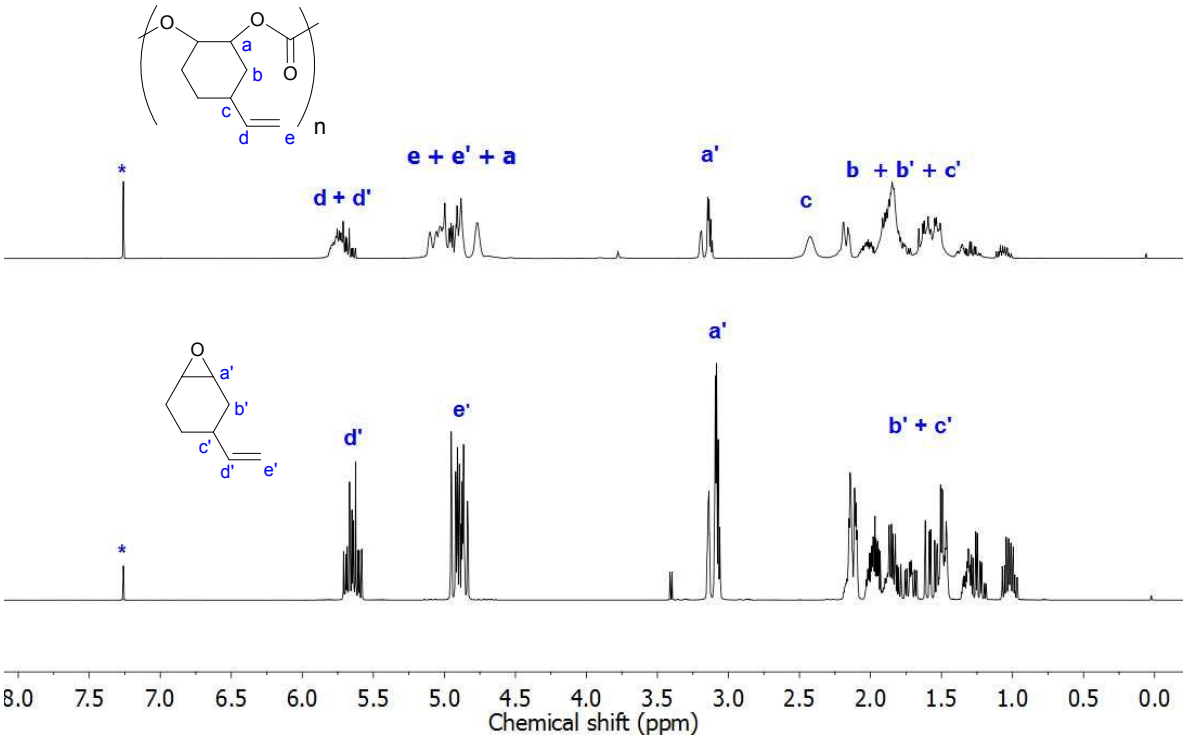

Figure S2. Top: ^{1}H NMR (400.0 MHz, $CDCl_3$-d_1, 298 K) spectrum of crude poly(vinyl-cyclohexene oxide) reaction mixture. Bottom: ^{1}H NMR (400.0 MHz, $CDCl_3$-d_1, 298 K) spectrum of vinyl cyclohexene oxide monomer. The conversion of V-CHO to PVCHC was calculated by the ratio of integration of c to the integration of d+d'. The asterisk denotes the residual protio-solvent.

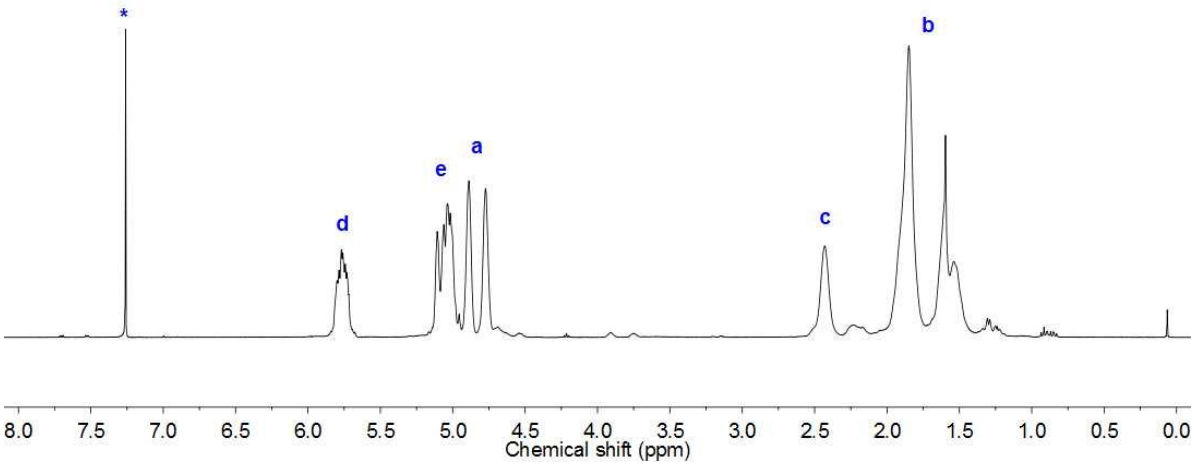

Figure S3. ^{1}H NMR (400.0 MHz, $CDCl_3$-d_1, 298 K) spectrum of isolated poly(vinyl-cyclohexene oxide) (PvCHC, M_n = 6,700 gmol^{-1}). The asterisk denotes the residual protio-solvent.

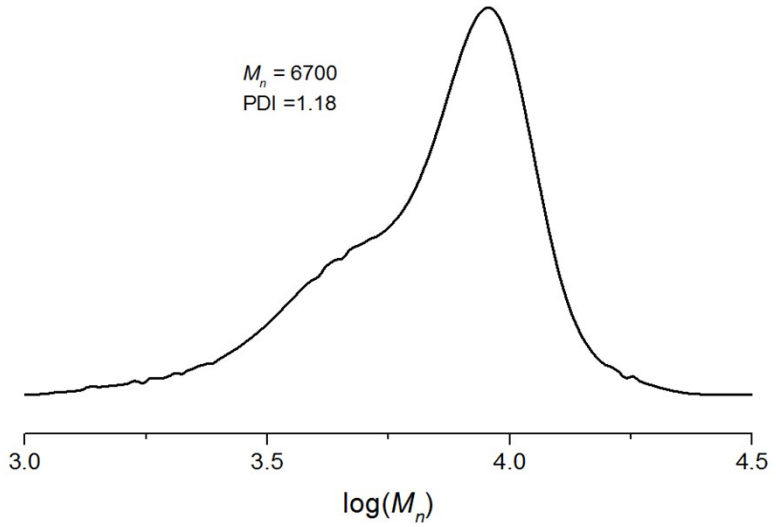

Figure S4. Bimodal molecular weight distribution of the isolated PvCHC polymer (Table 1 Entry 4), obtained by SEC using narrow M_w polystyrene calibration.

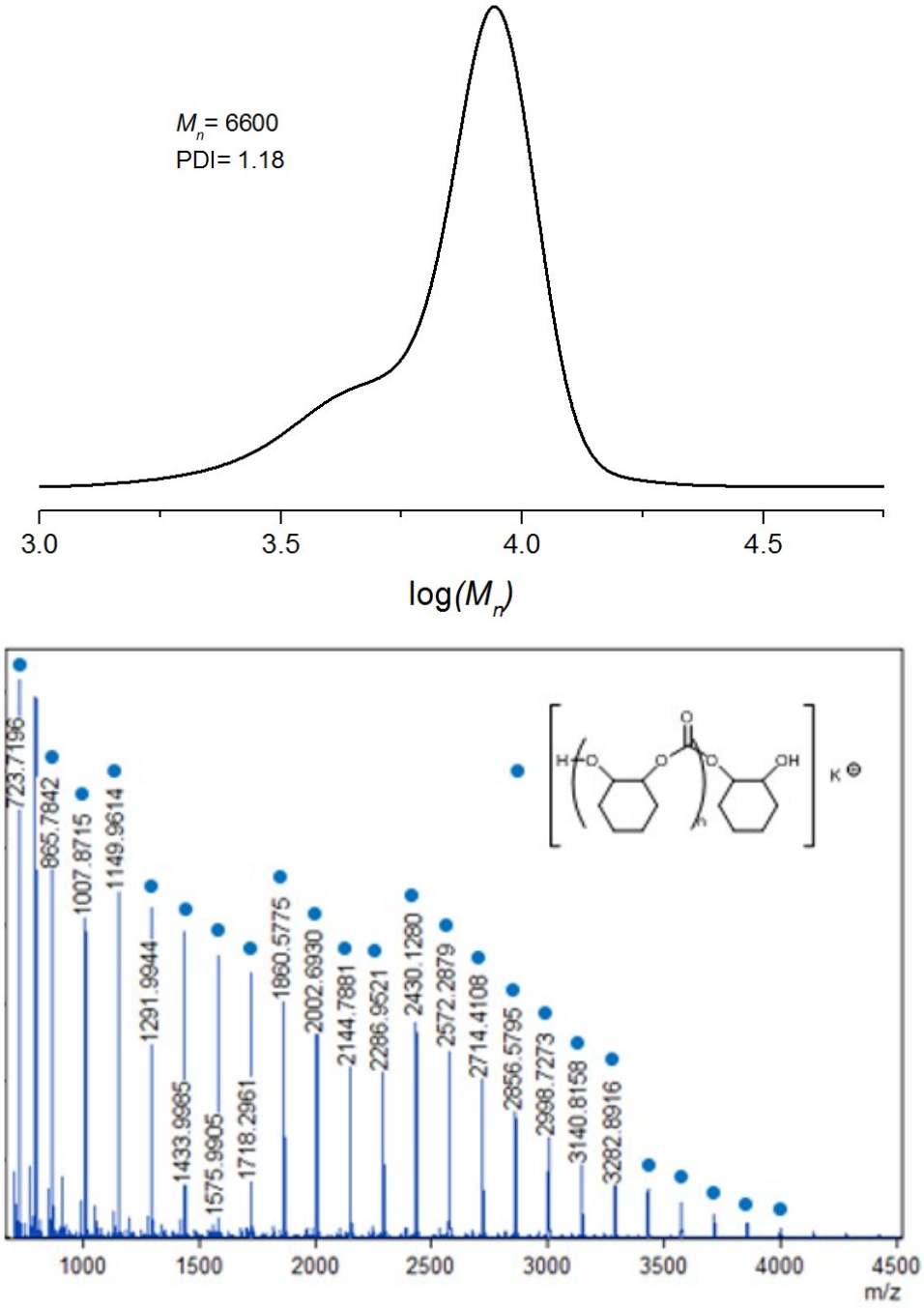

Figure S5. Top: bimodal molecular weight distribution of the isolated PCHC polymer (Table 1 Entry 2), obtained by SEC using narrow M_w polystyrene calibration. Bottom: MALDI-ToF spectrum of the PCHC produced in Table 1 Entry 2, showing the polyol series $[HO(C_7H_{10}O_3)_nC_6H_{11}O_2]K^+$ = $[(142.15)_n+116.16+39.1]$

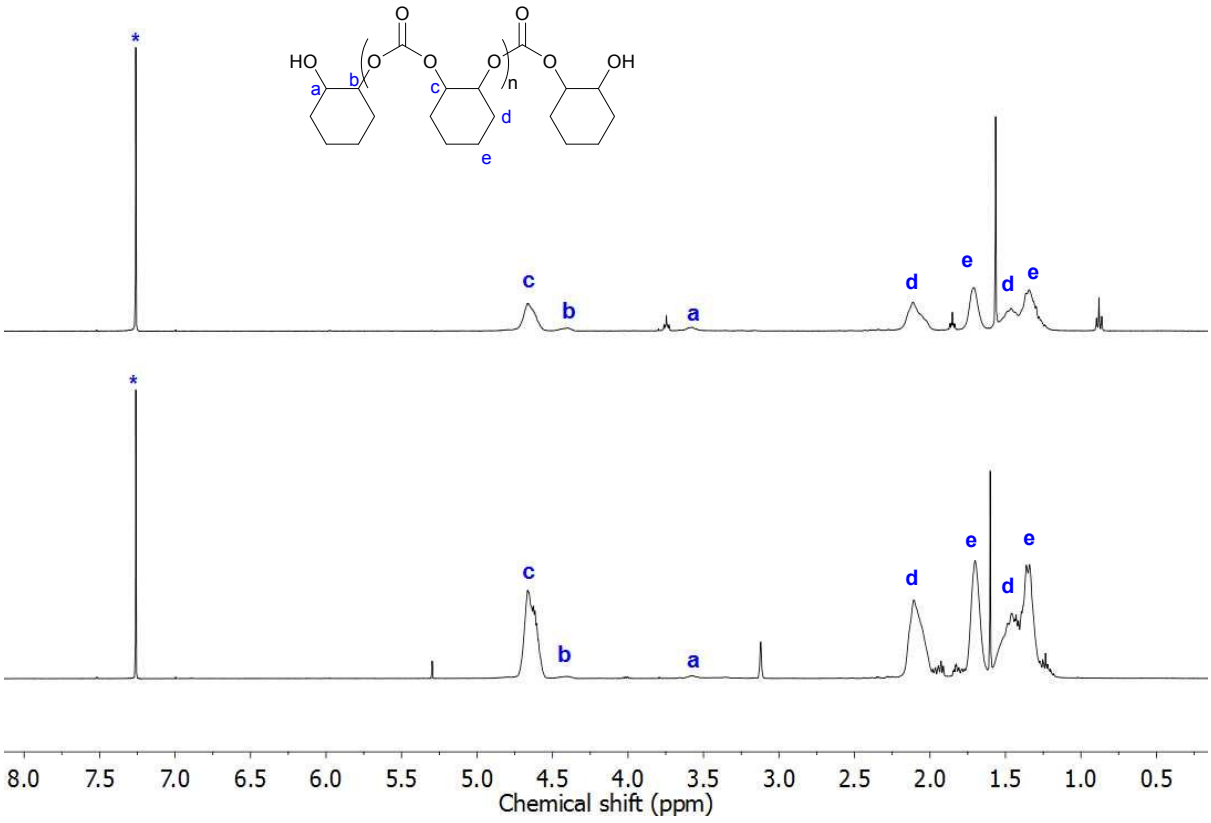

Figure S6. ^{1}H NMR (400.0 MHz, $CDCl_3$-d_1, 298 K) spectra of separated fractions (Top: low M_n fraction, Bottom: high M_n fraction) of PCHC produced in Table 1 Entry 2. The asterisks denote the residual solvent.

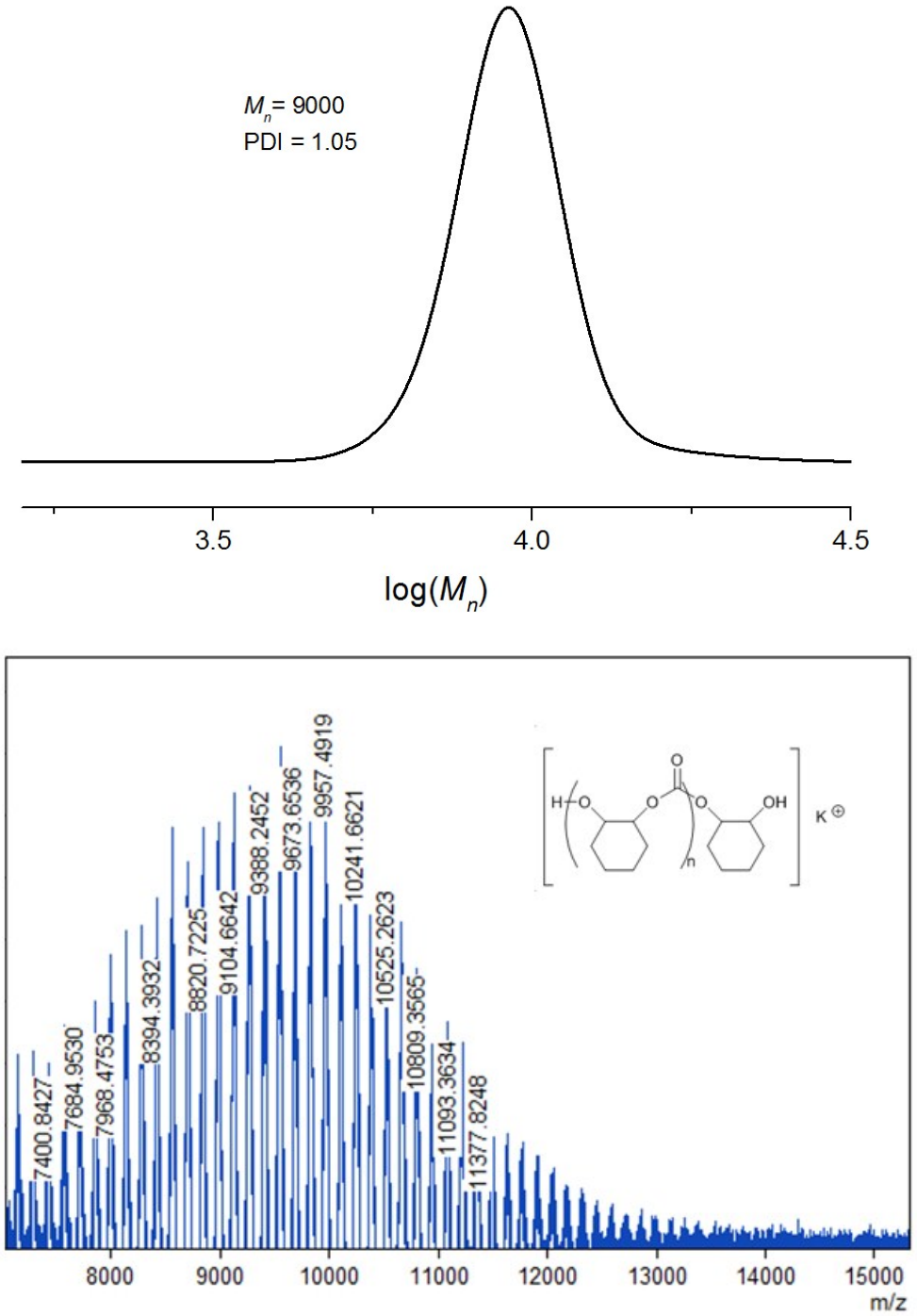

Figure S7. Top: molecular weight distribution of the isolated high M_n fraction of PCHC polymer (Table 1 Entry 2), obtained by SEC using narrow M_w polystyrene calibration. Bottom: MALDI-ToF spectrum of the high M_n fraction of the PCHC produced in Table 1 Entry 2, showing the polyol series $[HO(C_7H_{10}O_3)_nC_6H_{11}O_2]K^+ = [(142.15)_n+116.16+39.1]$

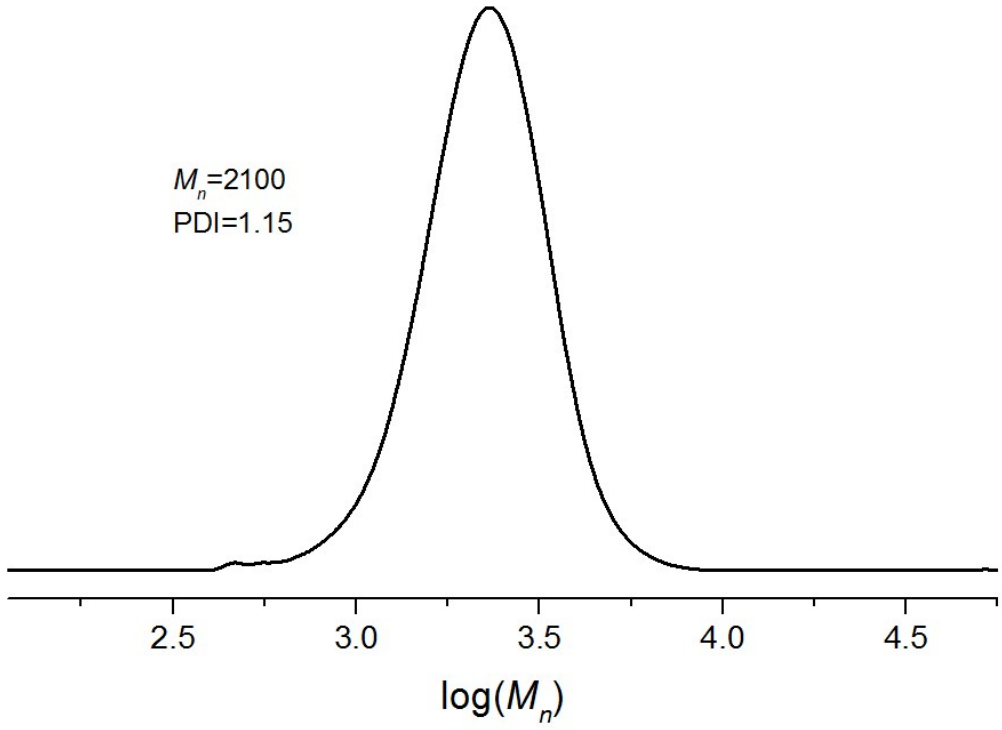

Figure S8. Monomodal molecular weight distribution of the PCHC polymer using 10 equiv. CHD in the polymerization (Table 3 Entry 2), obtained by SEC using narrow M_w polystyrene calibration.

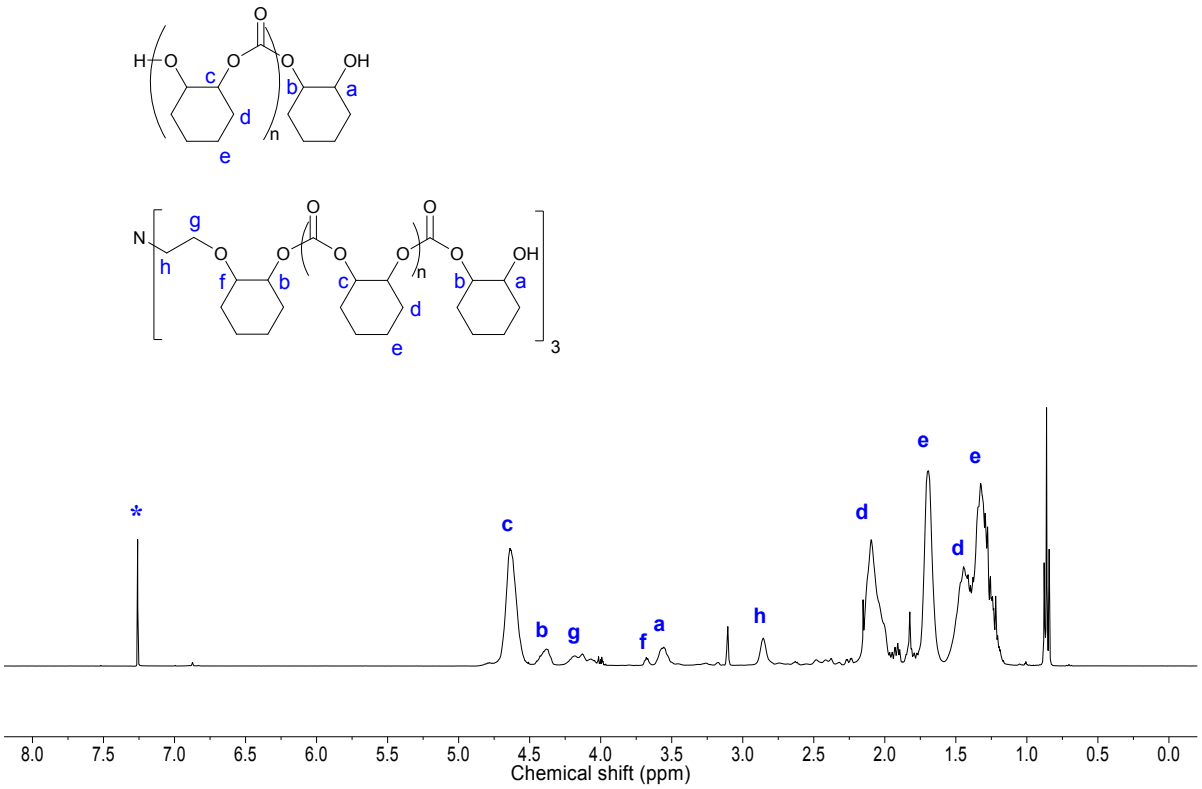

Figure S9. ^{1}H NMR (400.0 MHz, $CDCl_3$-d_1, 298 K) spectrum of isolated poly(cyclohexene oxide) produced in the polymerization with TEA additive (M_n = 1,500 gmol^{-1}, Table 3, Entry 5). The asterisk denotes the residual protio-solvent.

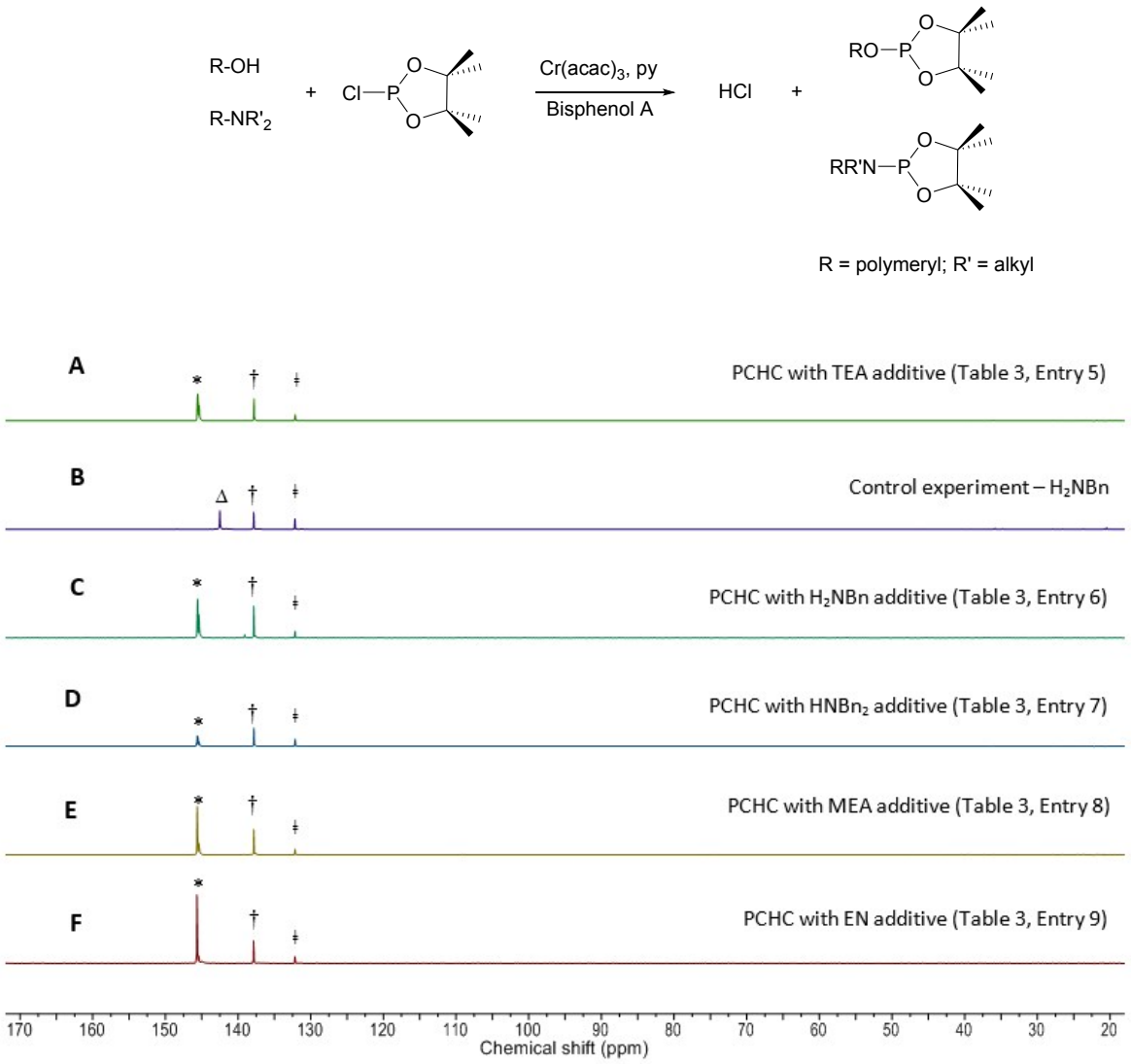

Figure S10. $^{31}P\{^{1}H\}$ NMR spectra (162.1 MHz, $CDCl_3$-d_1, 298 K) of the products of the reactions between the amine reagent (H_2NBn, **B**) or polymer end groups (**A and B-F**) and 2-chloro-4,4,5,5-tetramethyl dioxaphospholane. The asterisks, triangle, daggers and double daggers denote resonances corresponding to the product of the dioxaphospholane with secondary alcohol (δ = 145.5 ppm), primary amine (δ = 142.5 ppm), Bisphenol A (δ = 138.0 ppm) and water (δ = 132.0 ppm), respectively.

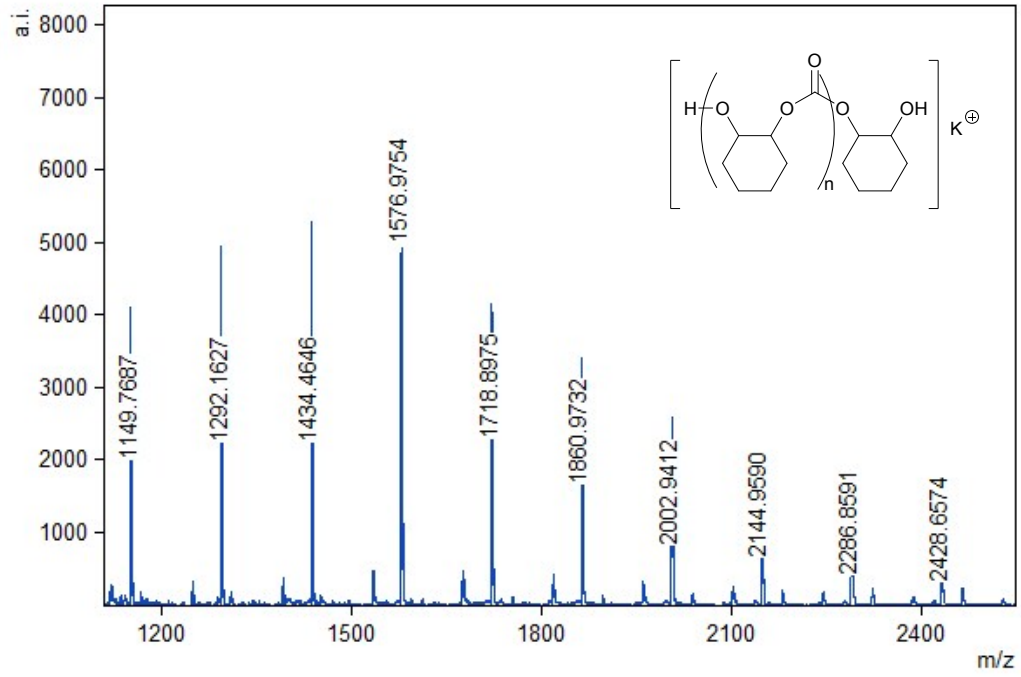

Figure S11. MALDI-ToF spectrum of the isolated PCHC (M_n = 1,500 g mol^{-1}, PDI = 1.23) produced in the polymerization with TEA additive (Table 3, Entry 5), showing the polyol series $[HO(C_7H_{10}O_3)_nC_6H_{11}O_2]K^+ = [(142.15)_n+116.16+39.1$.

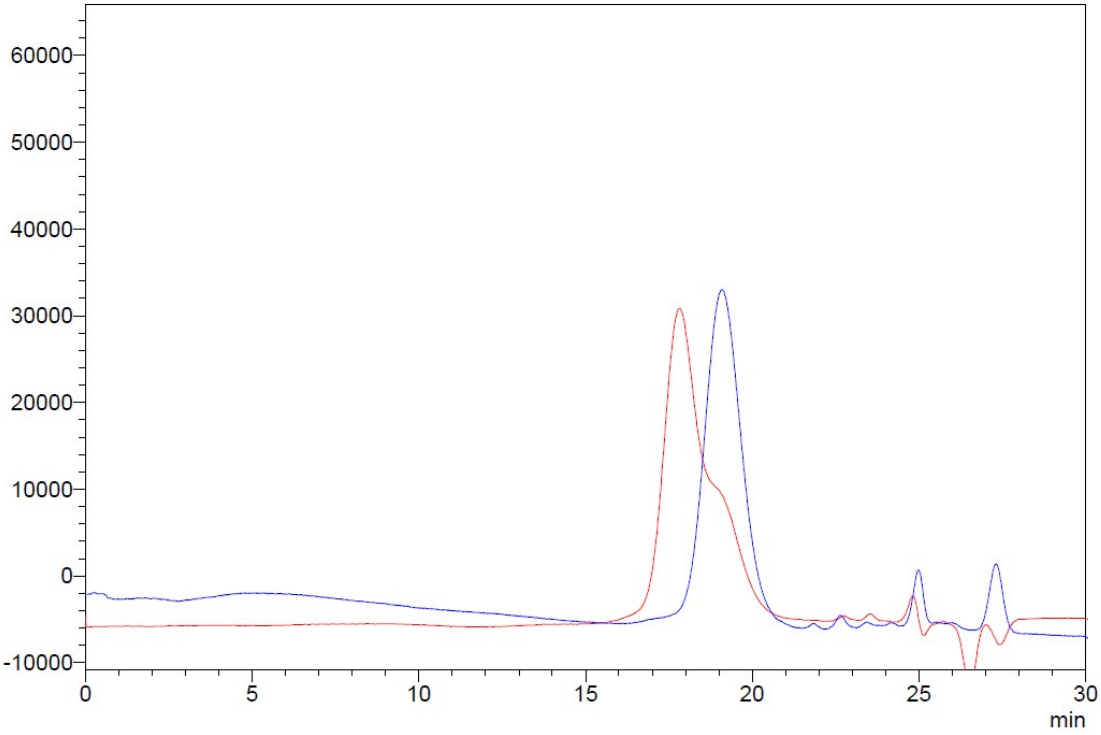

Figure S12. Combined SEC traces of PCHC produced using 20 equiv. $HNBn_2$ in Table 3 Entry 5, with RI detection (red) and UV detection (blue), using THF as the eluent.

2. References

1. M. R. Kember, J. Copley, A. Buchard and C. K. Williams, *Polym. Chem.*, 2012, **3**, 1196-1201.