Electronic Supplementary Material (ESI) for Polymer Chemistry.

Supporting Information

Functional PEG building blocks via copolymerization of ethylene carbonate and tert.butyl gylcidyl ether

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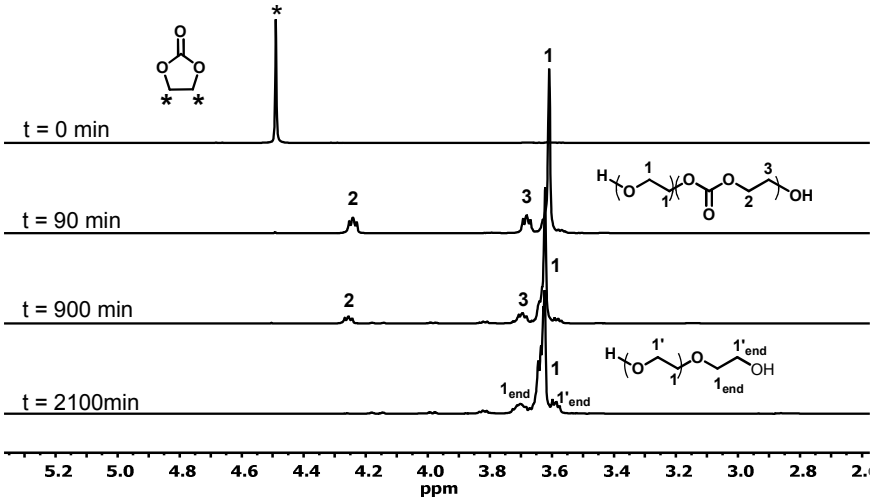


Figure S1 ^{1}H-NMR analysis of **P0 c** at t = 0 min, t = 90 min, t = 900 min and t = 2100 min.

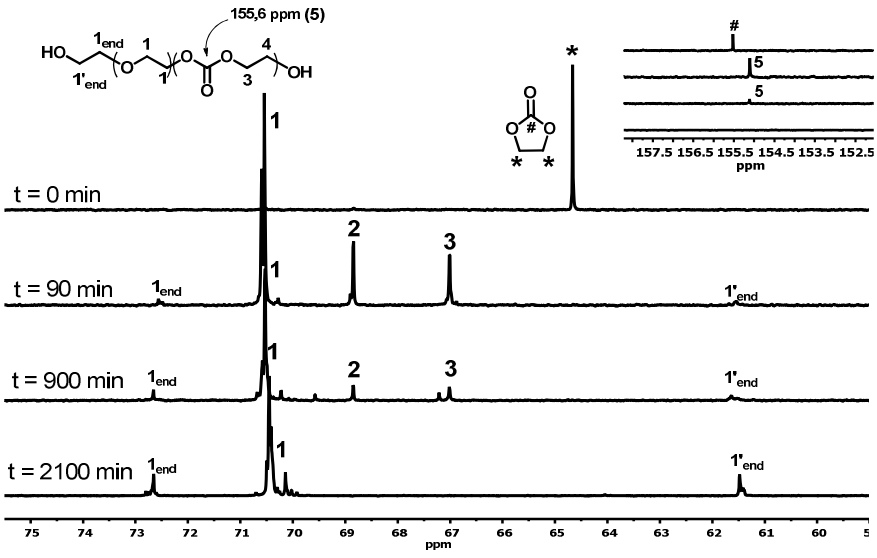
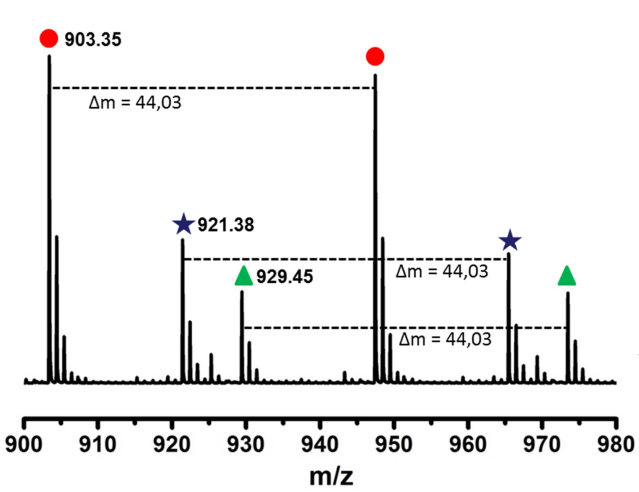
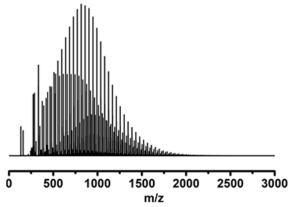


Figure S2 ^{13}C-NMR analysis of **P0 c** at t = 0 min, t = 90 min, t = 900 min and t = 1200 min.





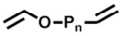
	Mass found	Mass calc.	P_n	End group
●	903.35	903.60	19	
★	921.38	921.60	20	$HO-P_n-H$
▲	929.45	929,61	19	

Table S1 Detailed MALDI-ToF analysis of **P0 c** including the found and the calculated masses. [EC]/[CsOH] = 100, T = 180°C, t = 35h (2100 min). P_n = $\{(EO)\}_n$, $\{(CH_2\text{-}CH_2\text{-}O)\}_n$.

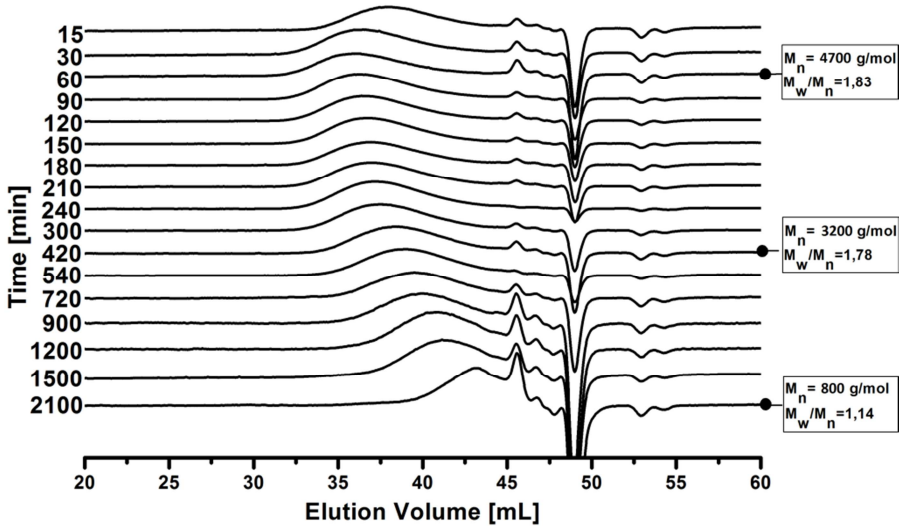
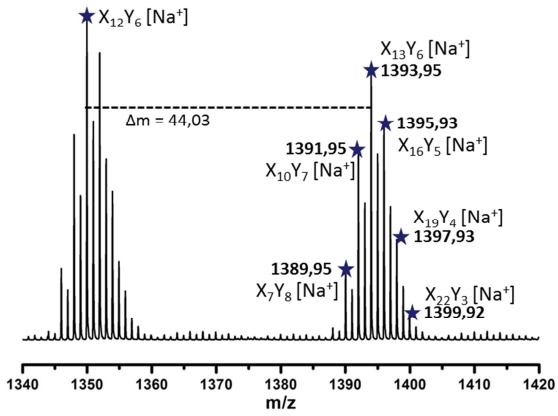
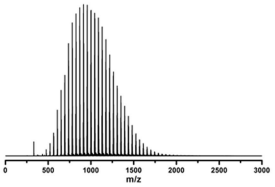


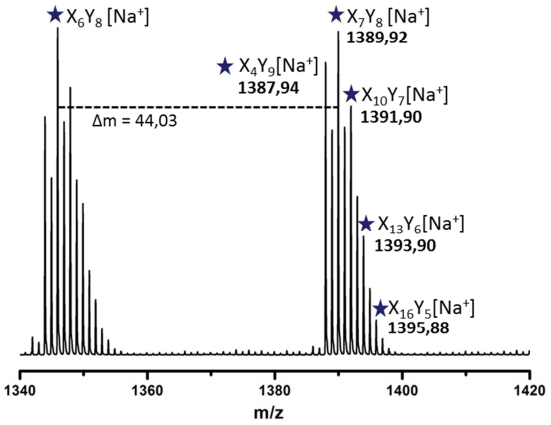
Figure S3 Time resolved SEC analysis of **EC** polymerisation with CsOH as initiator (**P0 c**). [EC]/[CsOH] = 100, T = 180°C, t = 35h (2100 min).

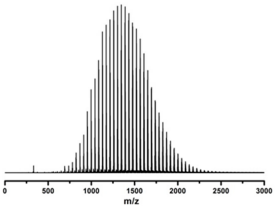




Mass found	Mass calc.	P_n	P_m	End group
★1389,95	1390,01	7	8	$HO-P_{n/m}-H$
★1391,95	1392,00	10	7	
★1393,95	1393,99	13	6	
★1395,93	1395,98	16	5	
★1397,93	1395,97	19	4	
★1399,92	1395,96	22	3	

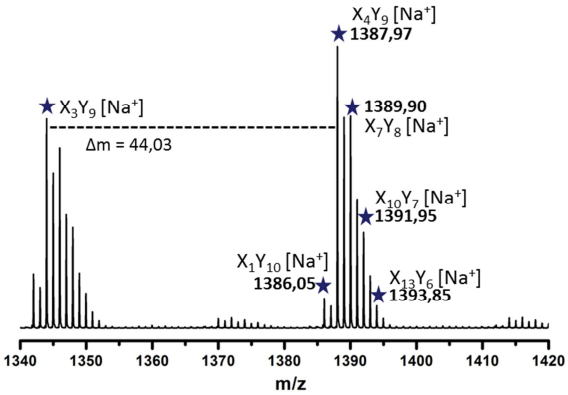
Table S2 Detailed MALDI-ToF analysis of **P1** including the found and the calculated masses. [M]/[CsOH] = 150, [EC]/[TBGE] = 100/50, T = 180°C, t = 15h. $P_n = \{EO\}_n = X$; $P_m = \{TBGE\}_m = Y$

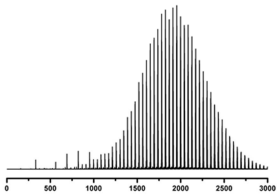




Mass found	Mass calc.	P_n	P_m	End group
★1387,94	1388,02	4	9	$HO-P_{n/m}-H$
★1389,92	1390,01	7	8	
★1391,90	1392,00	10	7	
★1393,90	1393,99	13	6	
★1395,88	1395,98	16	5	

Table S3 Detailed MALDI-ToF analysis of **P2** including the found and the calculated masses. [M]/[CsOH] = 150, [EC]/[TBGE] = 75/75, T = 180°C, t = 15h. $P_n = \{EO\}_n = X$; $P_m = \{TBGE\}_m = Y$





Mass found	Mass calc.	P_n	P_m	End group
★1386,05	1386,03	1	10	$HO-P_{n/m}-H$
★1387,97	1388,02	4	9	
★1389,90	1390,01	7	8	
★1391,95	1392,00	10	7	
★1393,85	1393,99	13	6	

Table S4 Detailed MALDI-ToF analysis of **P3** including the found and the calculated masses. [M]/[CsOH] = 150, [EC]/[TBGE] = 50/100, T = 180°C, t = 15h. $P_n = \{EO\}_n = X$; $P_m = \{TBGE\}_m = Y$

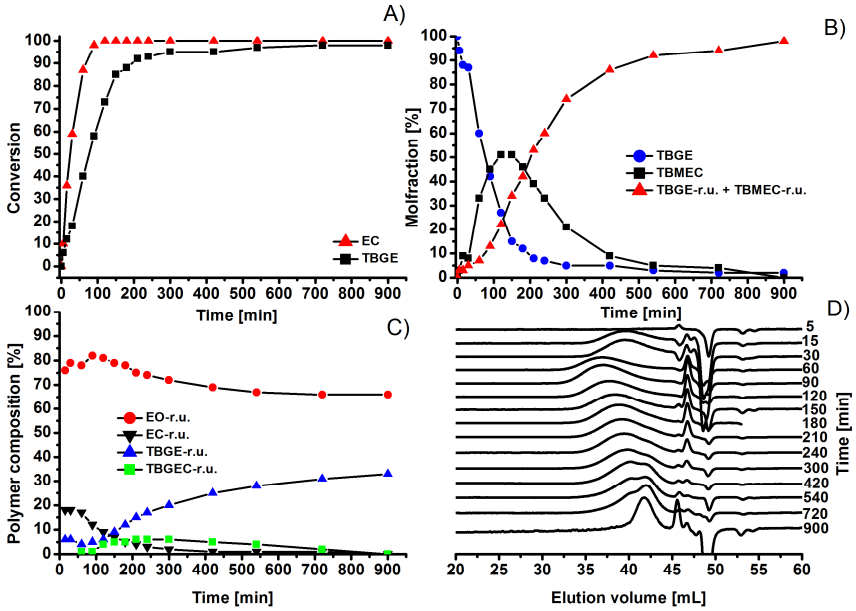


Figure S4 Kinetic investigation of for the synthesis of **P1** ([M]/[CsOH] = 150, [EC]/[TBGE] = 100/50, T = 180°C, t = 15h). A): Conversion versus time plot. B): Molfraction of TBGE, TBMEC, and TBGE-r.u. + TBMEC-r.u. versus time. C): Polymer composition versus time plot. D): Time depended GPC analysis of the copolymerisation.

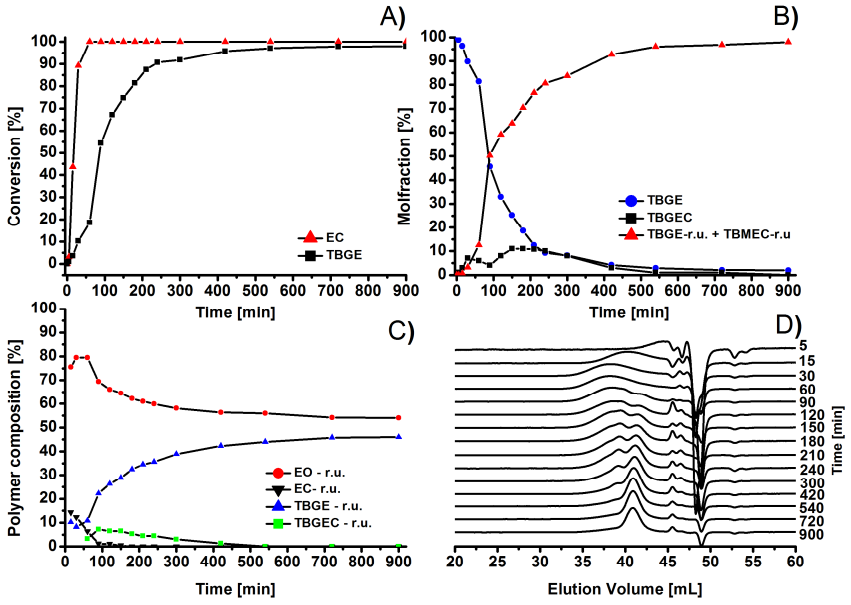


Figure S5 Kinetic investigation of for the synthesis of **P2** ([M]/[CsOH] = 150, [EC]/[TBGE] = 75/75, T = 180°C, t = 15h). A): Conversion versus time plot. B): Molfraction of TBGE, TBMEC, and TBGE-r.u. + TBMEC-r.u. versus time. C): Polymer composition versus time plot. D): Time depended GPC analysis of the copolymerisation.

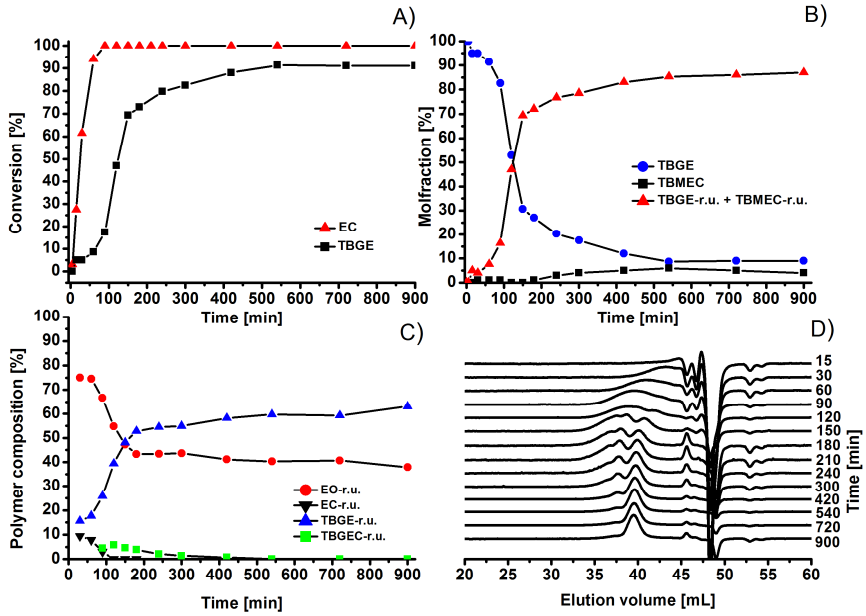


Figure S6 Kinetic investigation of for the synthesis of **P3** ([M]/[CsOH] = 150, [EC]/[TBGE] = 50/100, T = 180°C, t = 15h). A): Conversion versus time plot. B): Molfraction of TBGE, TBMEC, and TBGE-r.u. + TBMEC-r.u. versus time. C): Polymer composition versus time plot. D): Time depended GPC analysis of the copolymerisation.

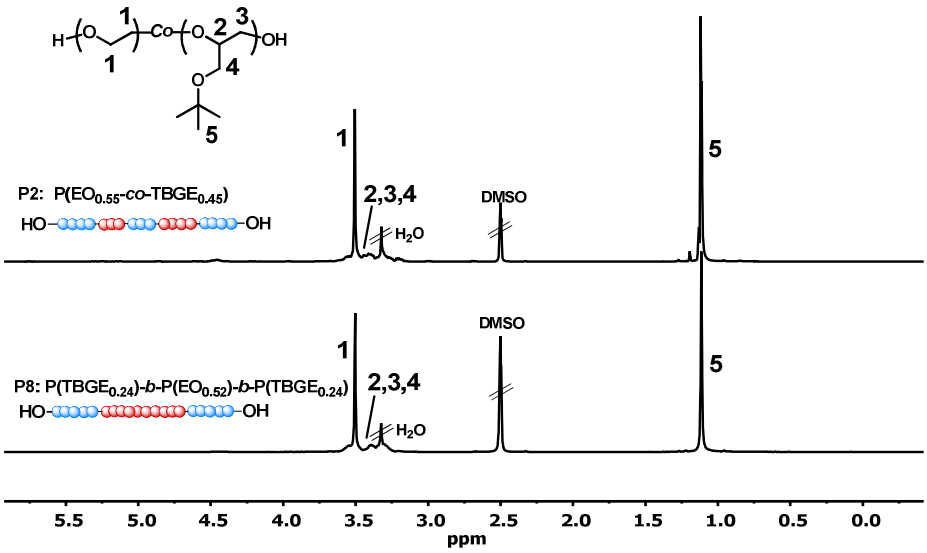


Figure S7 Comparison of ^{1}H-NMR spectra of **P2** (multi block) and **P8** (triblock).

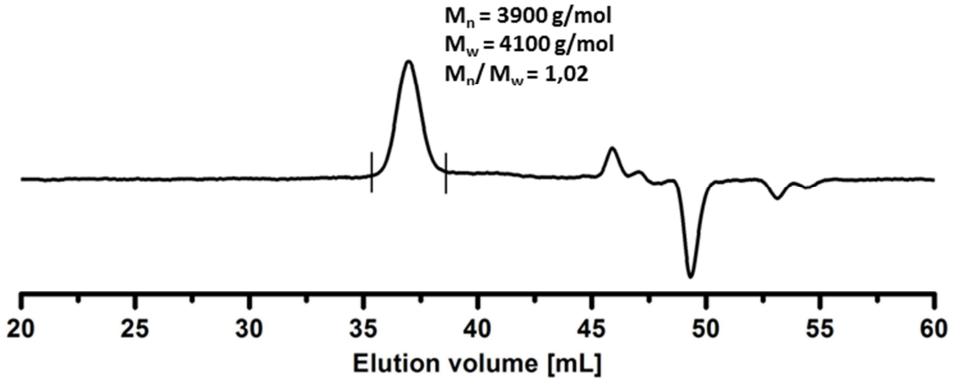
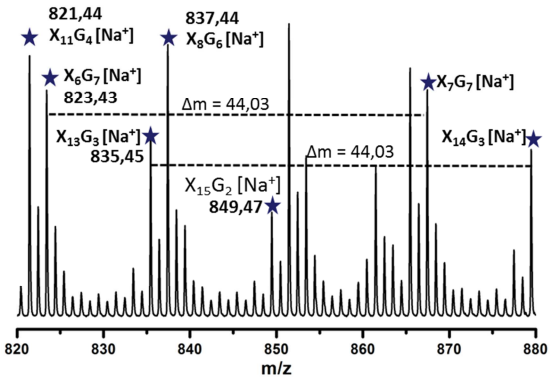
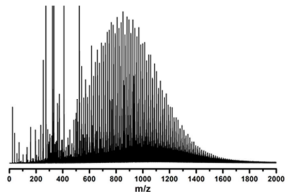


Figure S8 SEC elugram of **P8** (triblock) in DMF.





Mass found	Mass calc.	P_n	P_k	End group
★821,44	821,49	11	4	HO—$P_{n/k}$—H
★823,43	823,46	6	7	
★835,45	835,51	13	3	
★837,44	837,48	8	6	
★849,47	849,53	15	2	

Table S5 Detailed MALDI-ToF analysis of **P9** including the found and the calculated masses. P_n = (EO)$_n$ = X; P_k = (TBGE)$_k$ = G

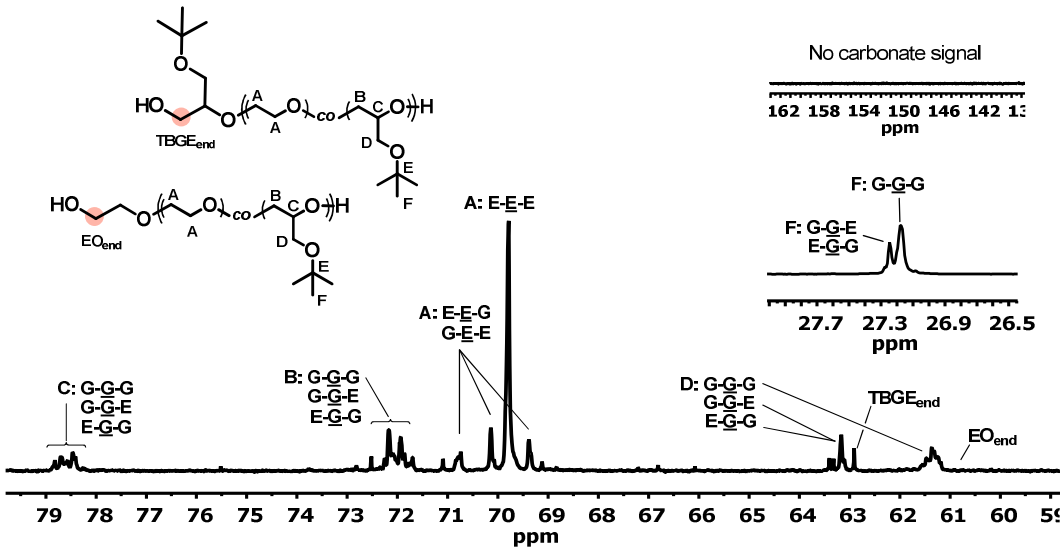


Figure S9 Detailed ^{13}C-NMR (100 MHz, d_6-DMSO) analysis of **P4** including end group assignment.

Removal of the brownish colour from raw polymer products (representative example)

P4 (1 g) was placed in a round bottom flask and dissolved in isopropyl alcohol (10 mL). Activated carbon (200 mg) was added to the solution and stirred for 2 h. The mixture was filtered and the solvent was removed under reduced pressure yielding a colourless oil (1 g, quant.).