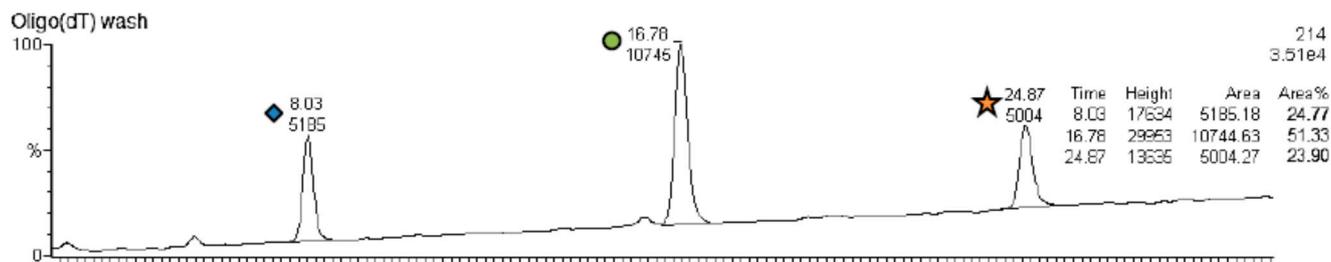
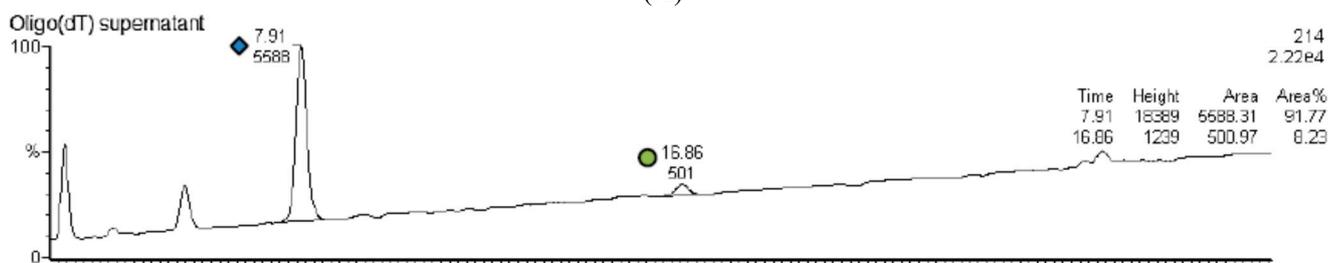


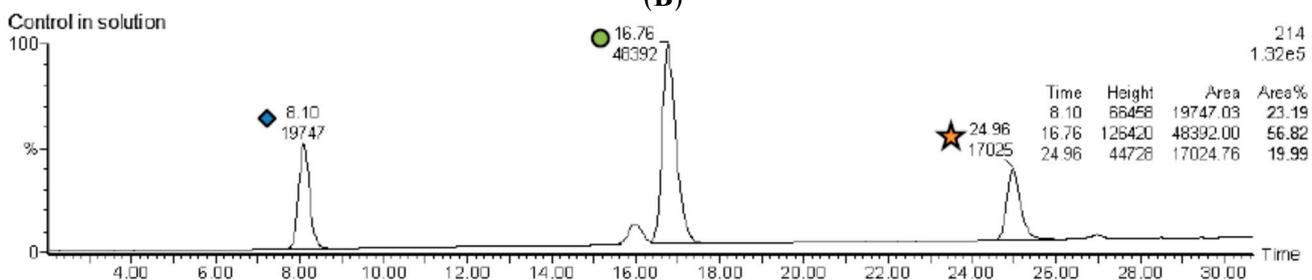
Supplementary Information



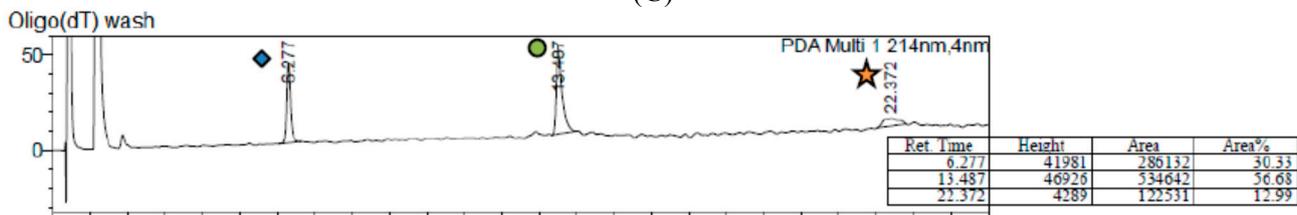
(A)



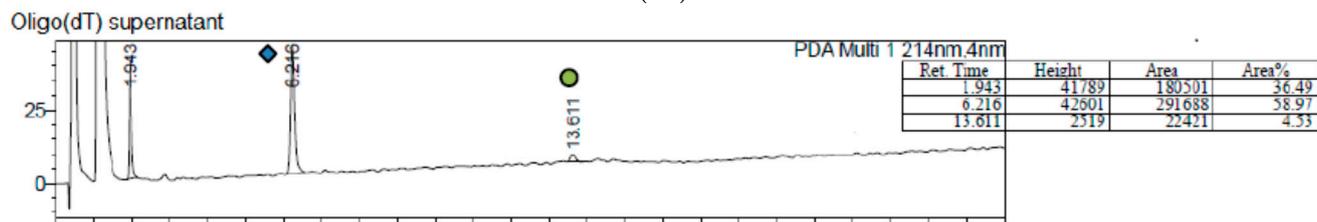
(B)



(C)

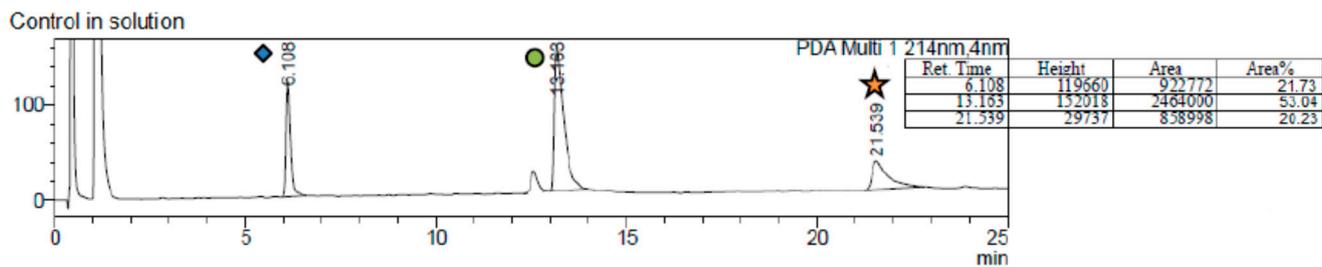


(A')



(B')

Figure S1. Cont.



(C')

Figure S1. LC-MS chromatograms of the supernatants and washes of the experiments ($n = 2$) with benzylamine in presence of oligo(dT) on cellulose in MilliQ water compared to the control library in solution. **A/A'**: wash of the oligo(dT) on cellulose; **B/B'**: supernatant of the library in presence of oligo(dT) on cellulose; **C/C'**: control library in solution. Method I (A/B/C) or II (A'/B'/C'), monitored at 214 nm. Products: \blacklozenge Gua(OH)₂; \bullet Gua-Benz; \star Gua-Benz₂.

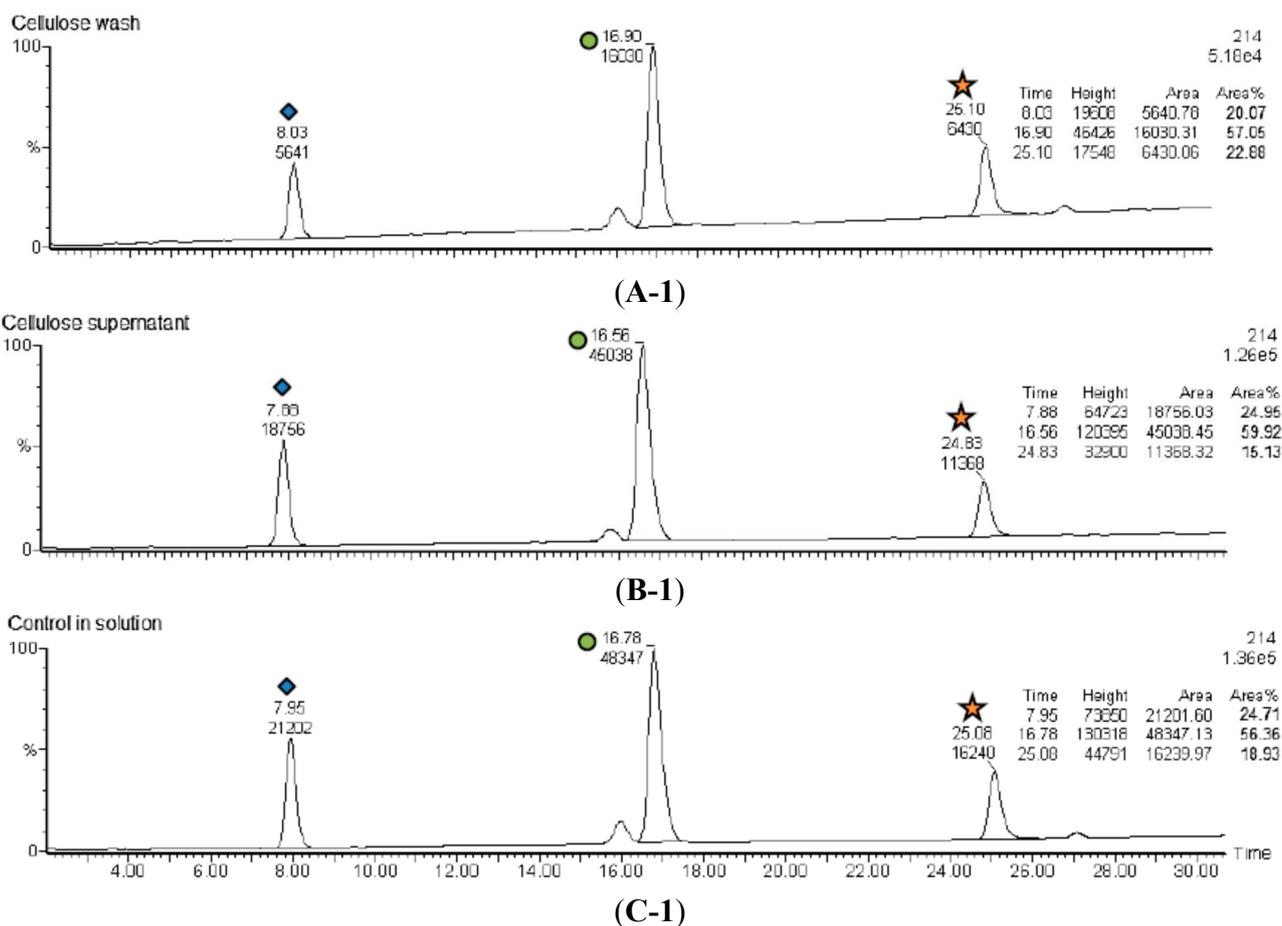
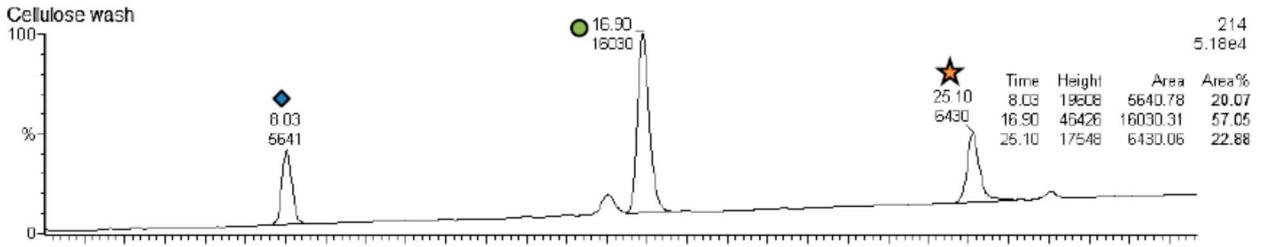
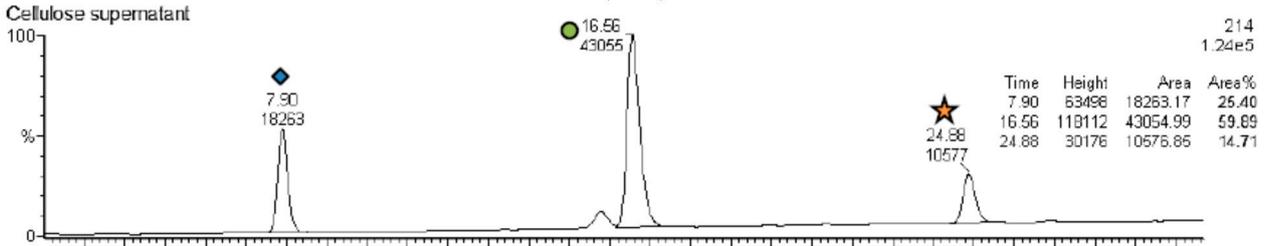


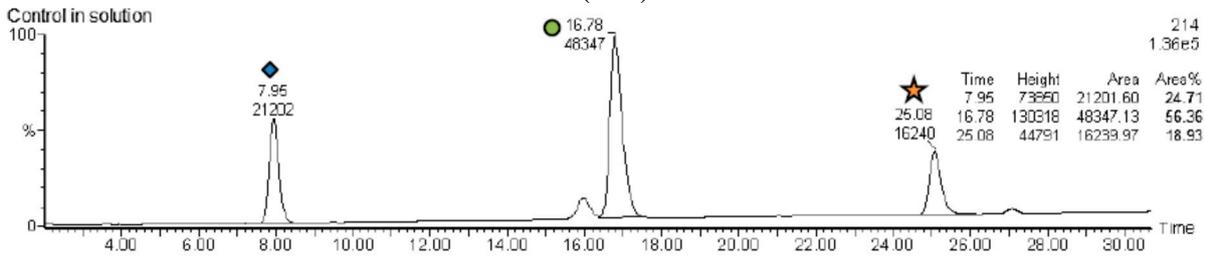
Figure S2. *Cont.*



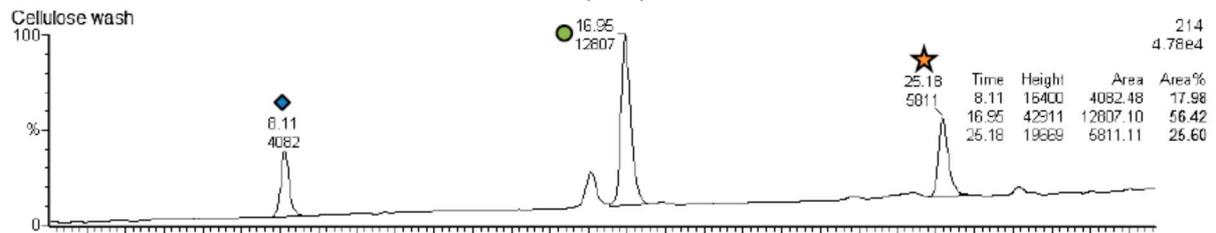
(A-2)



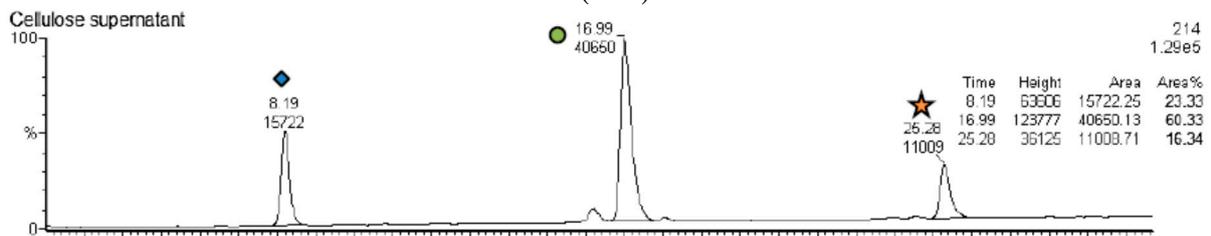
(B-2)



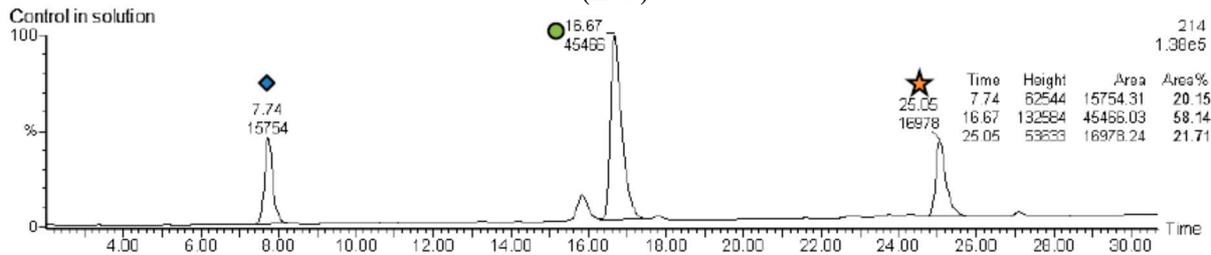
(C-2)



(A-3)



(B-3)



(C-3)

Figure S2. Cont.

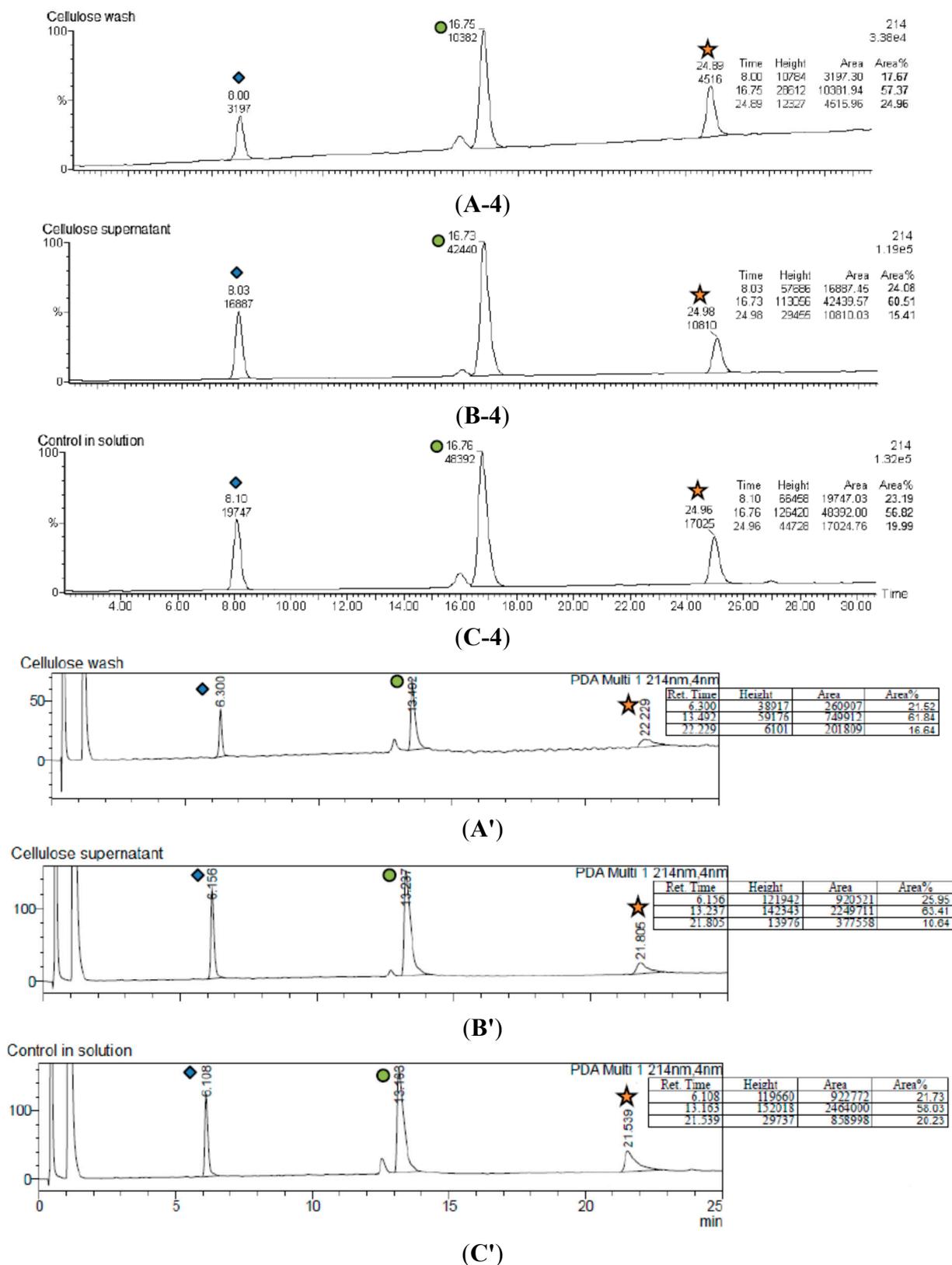


Figure S2. LC-MS chromatograms of the supernatants and washes of the experiments ($n = 5$) with benzylamine in presence of cellulose in MilliQ water compared to the control library in solution. **A/A'**: wash of the cellulose; **B/B'**: supernatant of the library in presence of cellulose; **C/C'**: control library in solution. Method I (**A-1–A-4/B-1–B-4/C-1–C-4**) or II (**A'/B'/C'**), monitored at 214 nm. Products: ♦ Gua(OH)₂; ● Gua-Benz and ★ Gua-Benz₂.

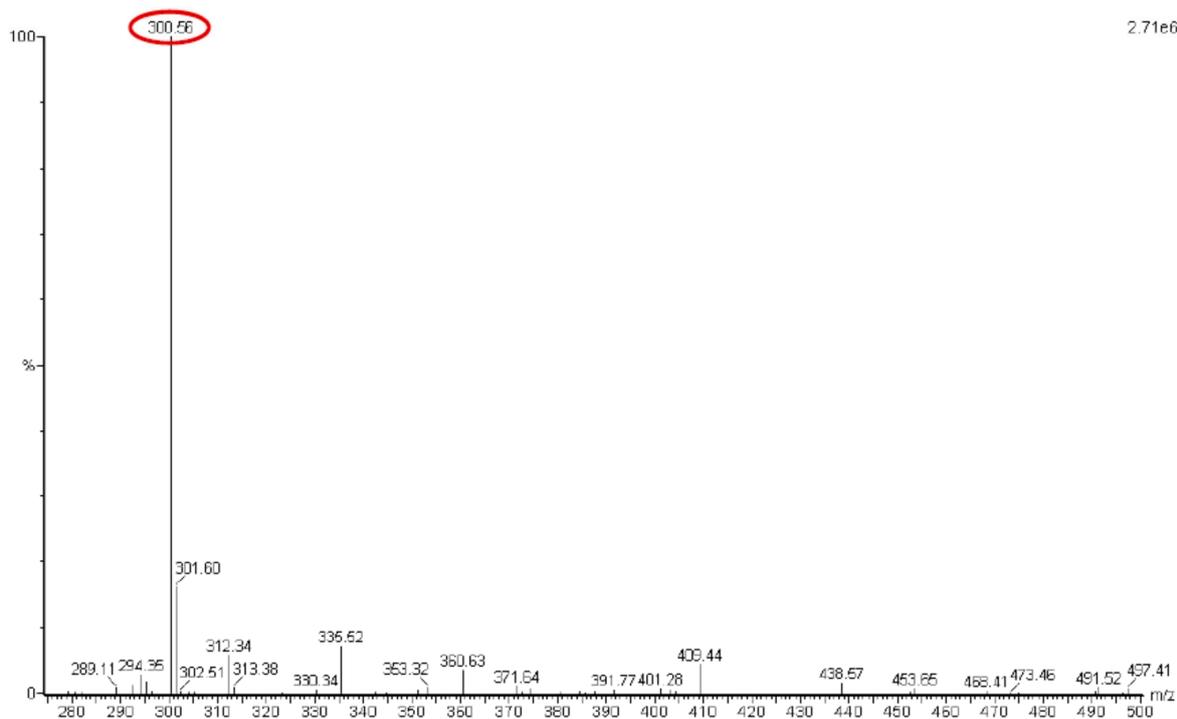


Figure S3. Extracted mass spectrum of the peak at 8.25 min in method I, corresponding to the product Gua(OH)₂. Calcd for C₁₇H₂₂N₃O₂⁺ ([M]⁺): 300.17, found: 300.56.

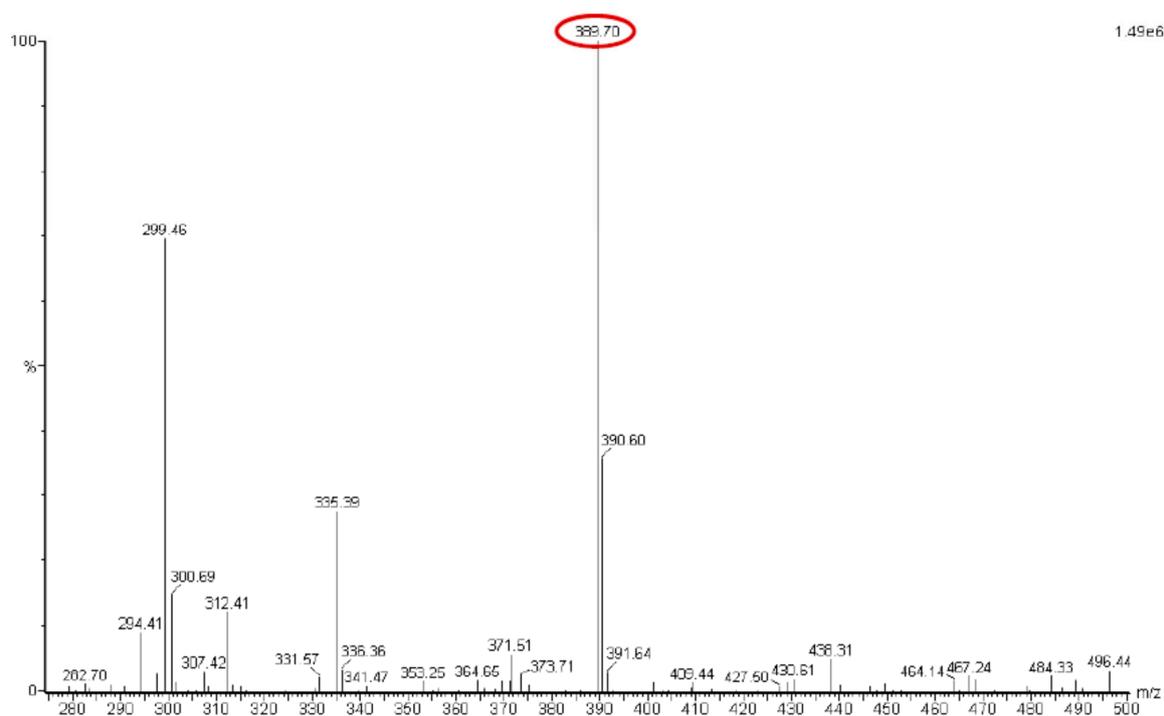


Figure S4. Extracted mass spectrum of the peak at 17.01 min in method I, corresponding to the product Gua-Benz. Calcd for C₂₄H₂₉N₄O⁺ ([M]⁺): 389.23, found: 389.70.

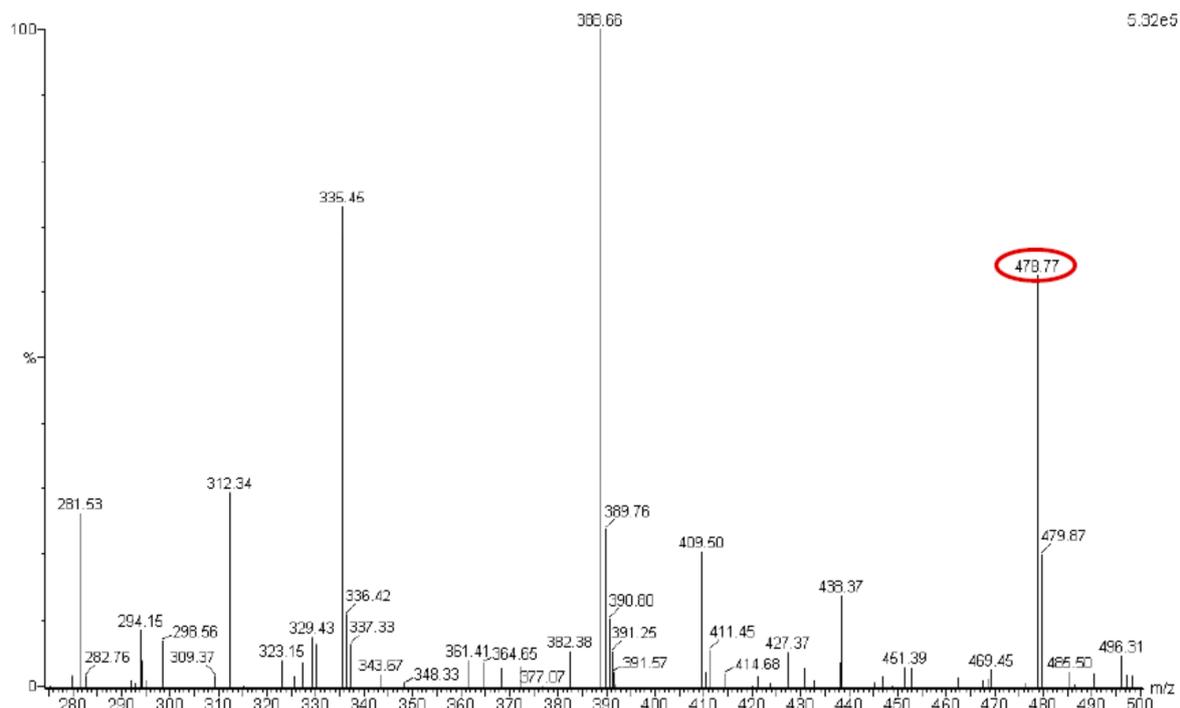


Figure S5. Extracted mass spectrum of the peak at 25.38 min in method I, corresponding to the product Gua-Benz₂. Calcd for C₃₁H₃₆N₅⁺ ([M]⁺): 478.30, found: 478.77.

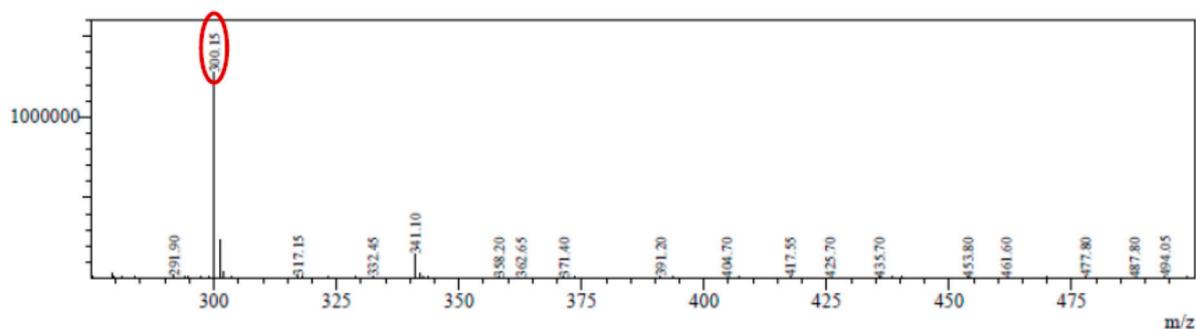


Figure S6. Extracted mass spectrum of the peak at 6.14 min in method II, corresponding to the product Gua(OH)₂. Calcd for C₁₇H₂₂N₃O₂⁺ ([M]⁺): 300.17, found: 300.15.

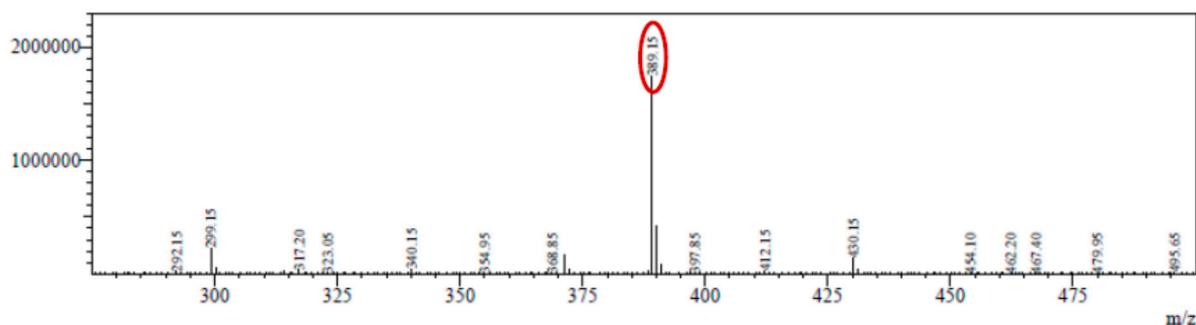


Figure S7. Extracted mass spectrum of the peak at 13.19 min in method II, corresponding to the product Gua-Benz. Calcd for C₂₄H₂₉N₄O⁺ ([M]⁺): 389.23, found: 389.15.

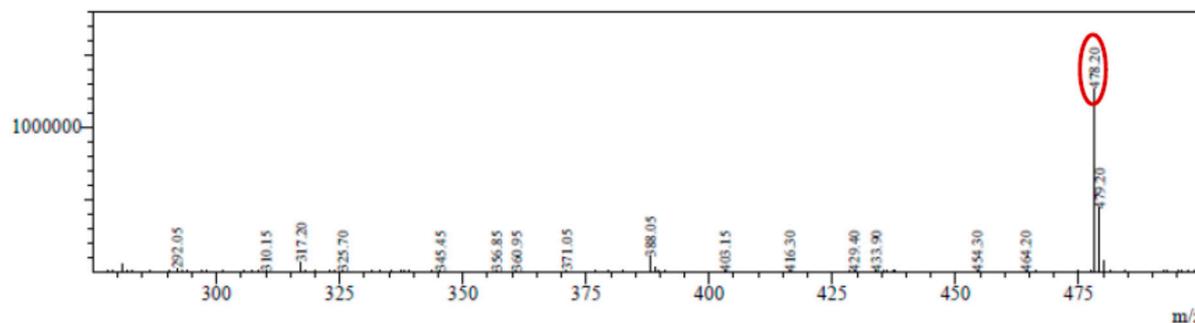


Figure S8. Extracted mass spectrum of the peak at 21.58 min in method II, corresponding to the product Gua-Benz₂. Calcd for C₃₁H₃₆N₅⁺ ([M]⁺): 478.30, found: 478.29.

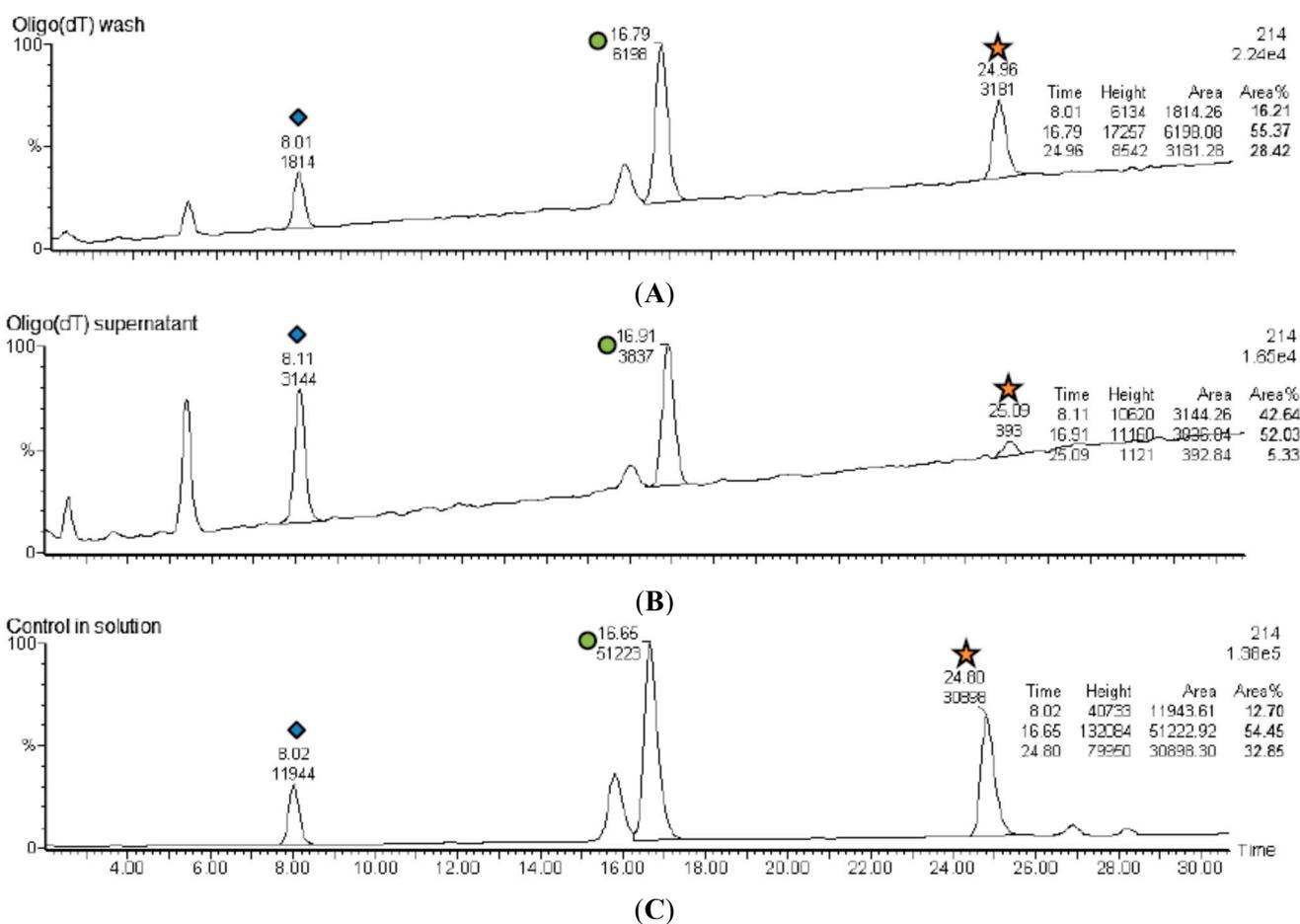


Figure S9. LC-MS chromatograms of the supernatants and washes of the experiment with benzylamine in presence of oligo(dT) on cellulose in phosphate buffer (100 mM, pH 6.0) compared to the control library in solution. **A:** wash of the oligo(dT) on cellulose; **B:** supernatant of the library in presence of oligo(dT) on cellulose; **C:** control library in solution. Method I, monitored at 214 nm. Products: ◆ Gua(OH)₂; ● Gua-Benz and ★ Gua-Benz₂.

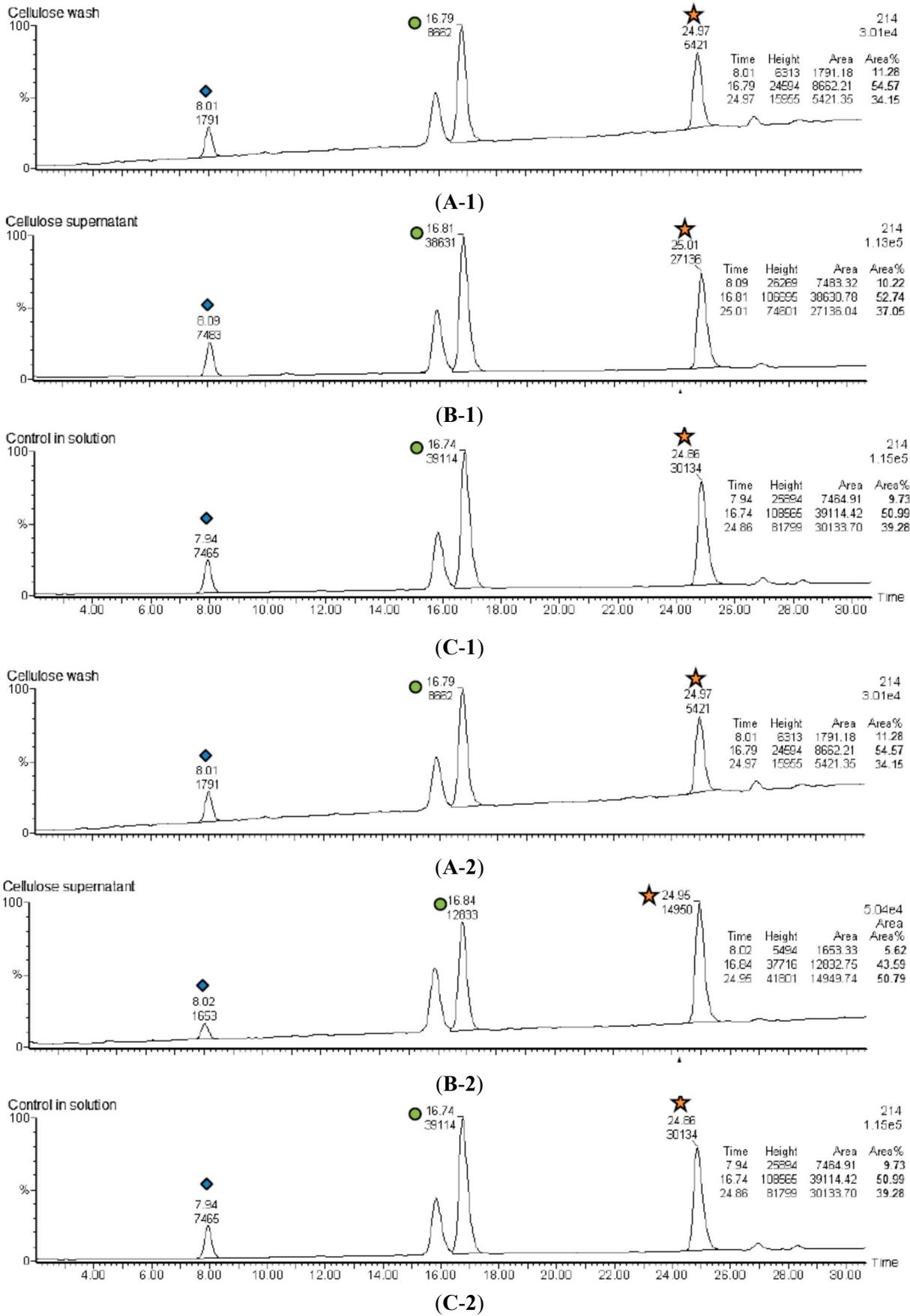


Figure S10. Cont.

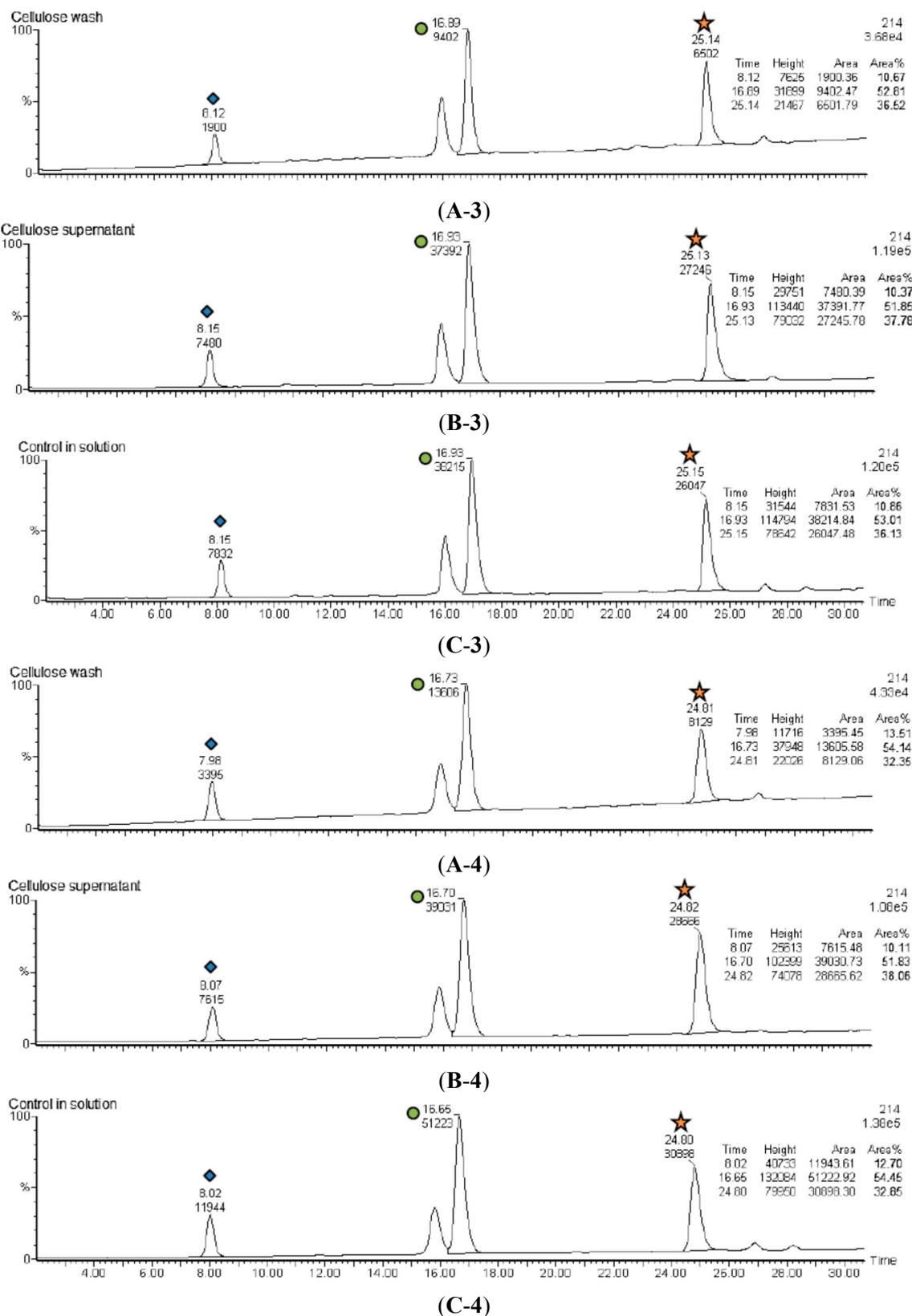


Figure S10. LC-MS chromatograms of the supernatants and washes of the experiments ($n = 4$) with benzylamine in presence of cellulose in phosphate buffer (100 mM, pH 6.0) compared to the control library in solution. **A-1–A-4:** wash of the cellulose; **B-1–B-4:** supernatant of the library in presence of cellulose; **C-1–C-4:** control library in solution. Method I, monitored at 214 nm. Products: \blacklozenge Gua(OH)₂; \bullet Gua-Benz and \star Gua-Benz₂.

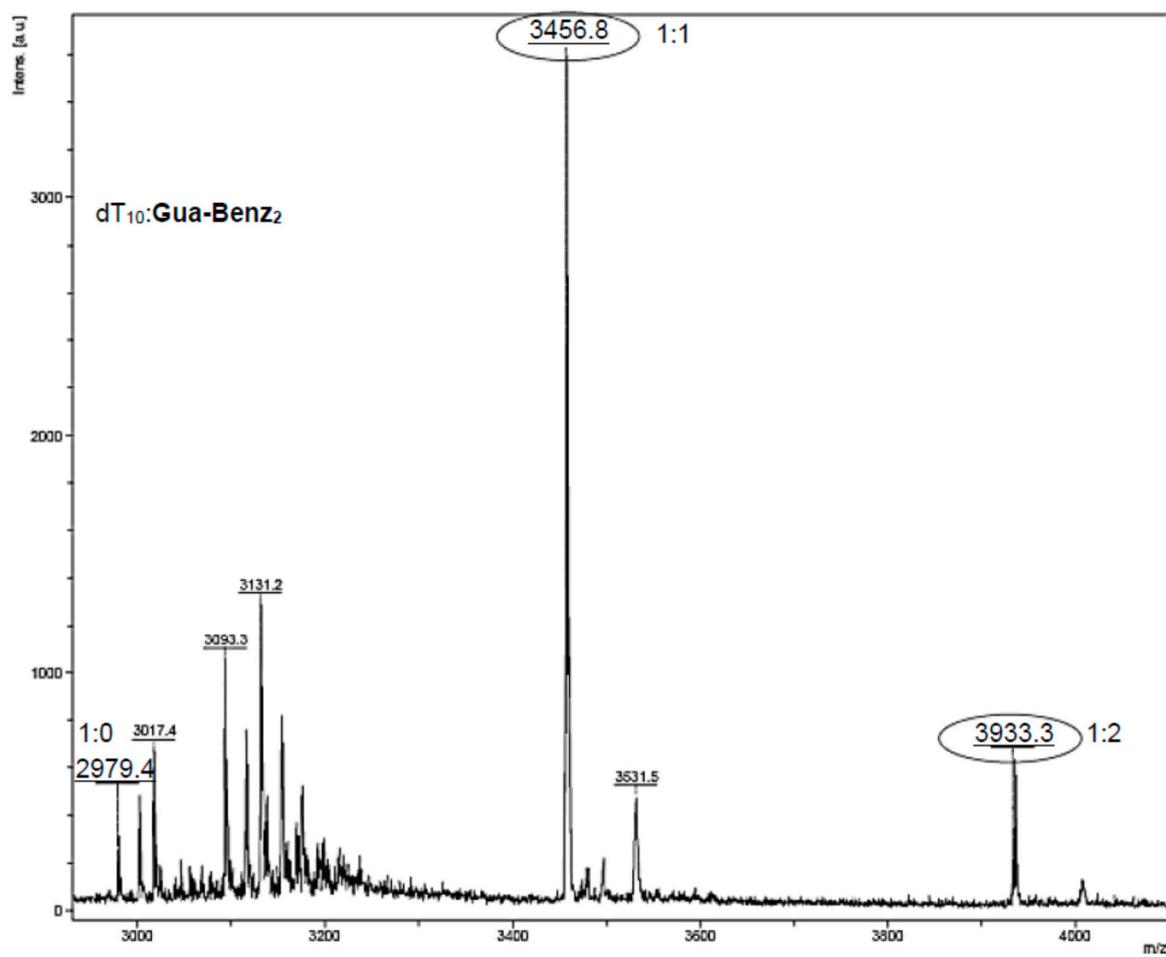


Figure S11. MALDI-TOF mass spectrum of a mixture of dT₁₀:Gua-Benz₂ (molar ratio 1:10).

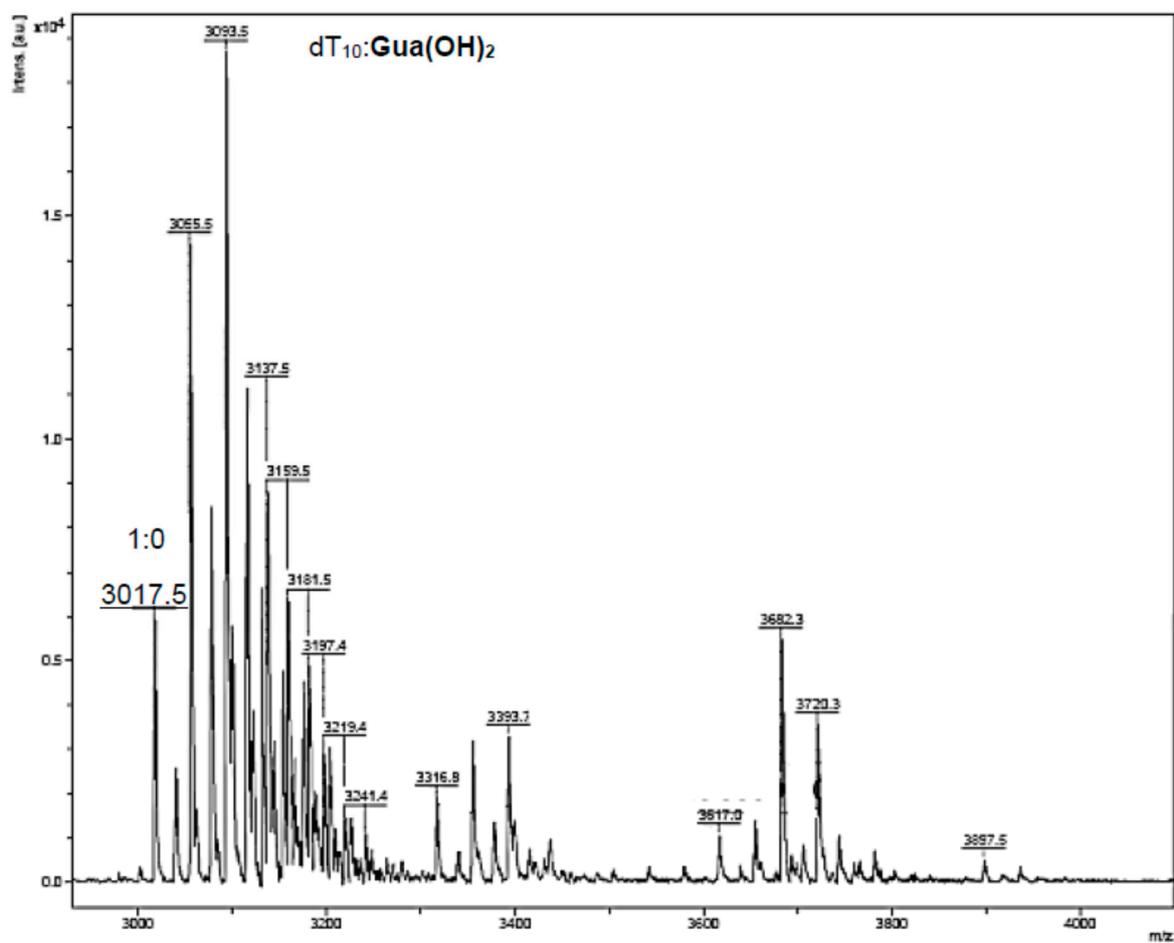


Figure S12. MALDI-TOF mass spectrum of a mixture of dT₁₀:Gua(OH)₂ (molar ratio 1:10).

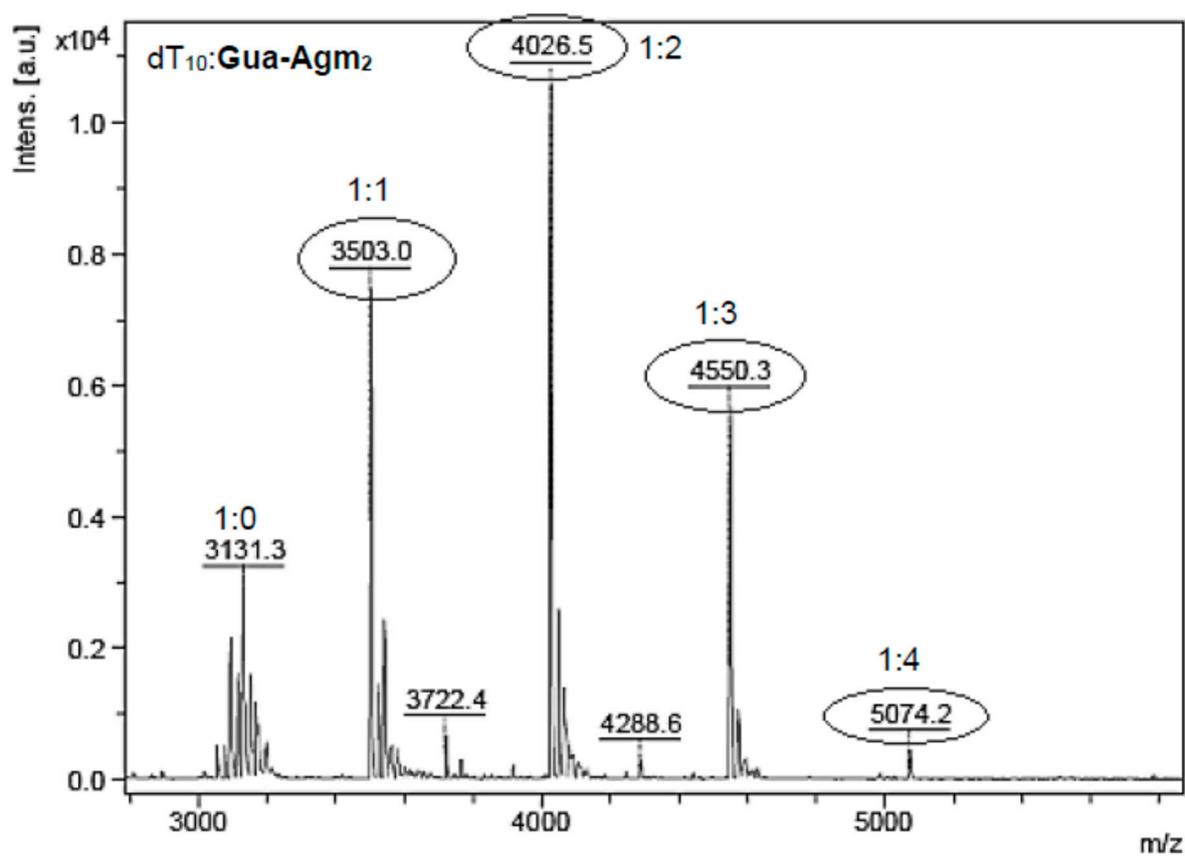


Figure S13. MALDI-TOF mass spectrum of a mixture of dT₁₀:Gua-Agm₂ (molar ratio 1:10).

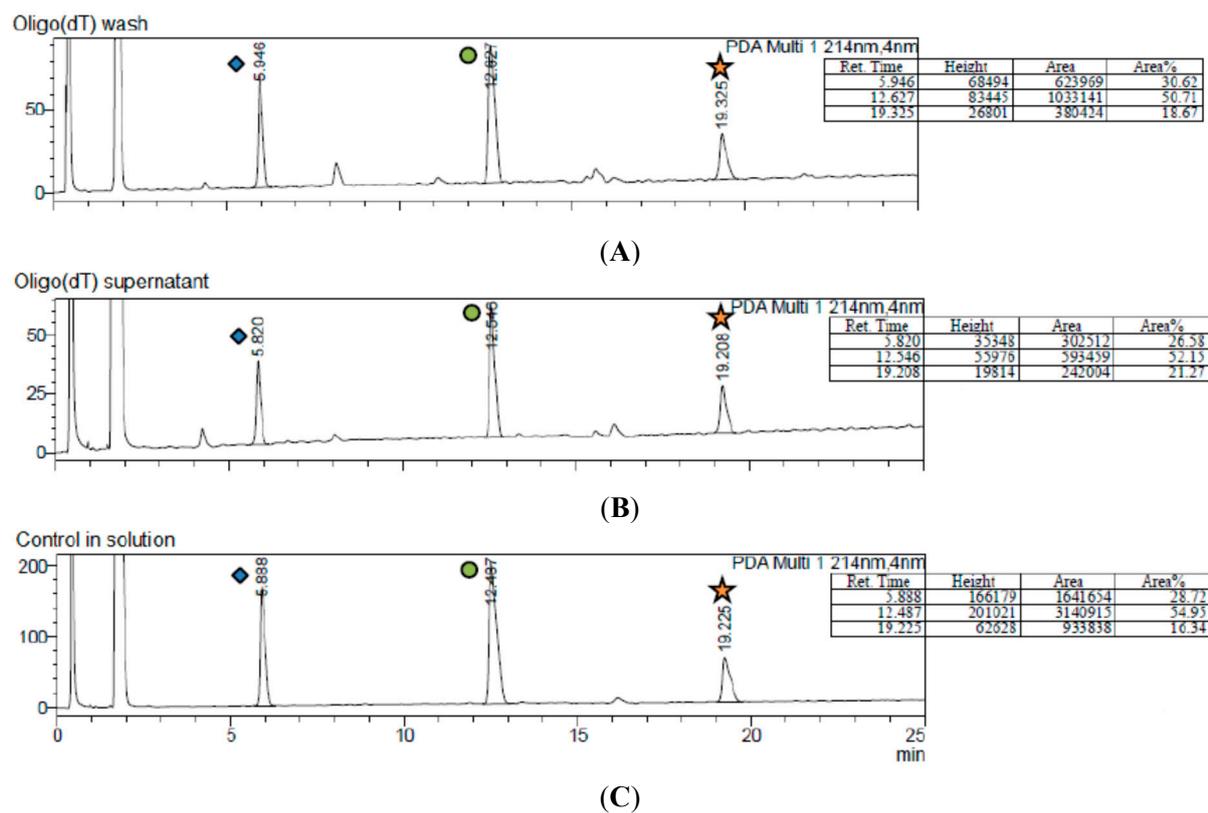


Figure S14. LC-MS chromatograms of the supernatants and washes of the experiments with L-phenylalanine in presence of oligo(dT) on cellulose in MilliQ water compared to the control library in solution. **A:** wash of the oligo(dT) on cellulose; **B:** supernatant of the library in presence of oligo(dT) on cellulose; **C:** control library in solution. Method II, monitored at 214 nm. Products: \blacklozenge Gua(OH)₂; \bullet Gua-Phe and \star Gua-Phe₂.

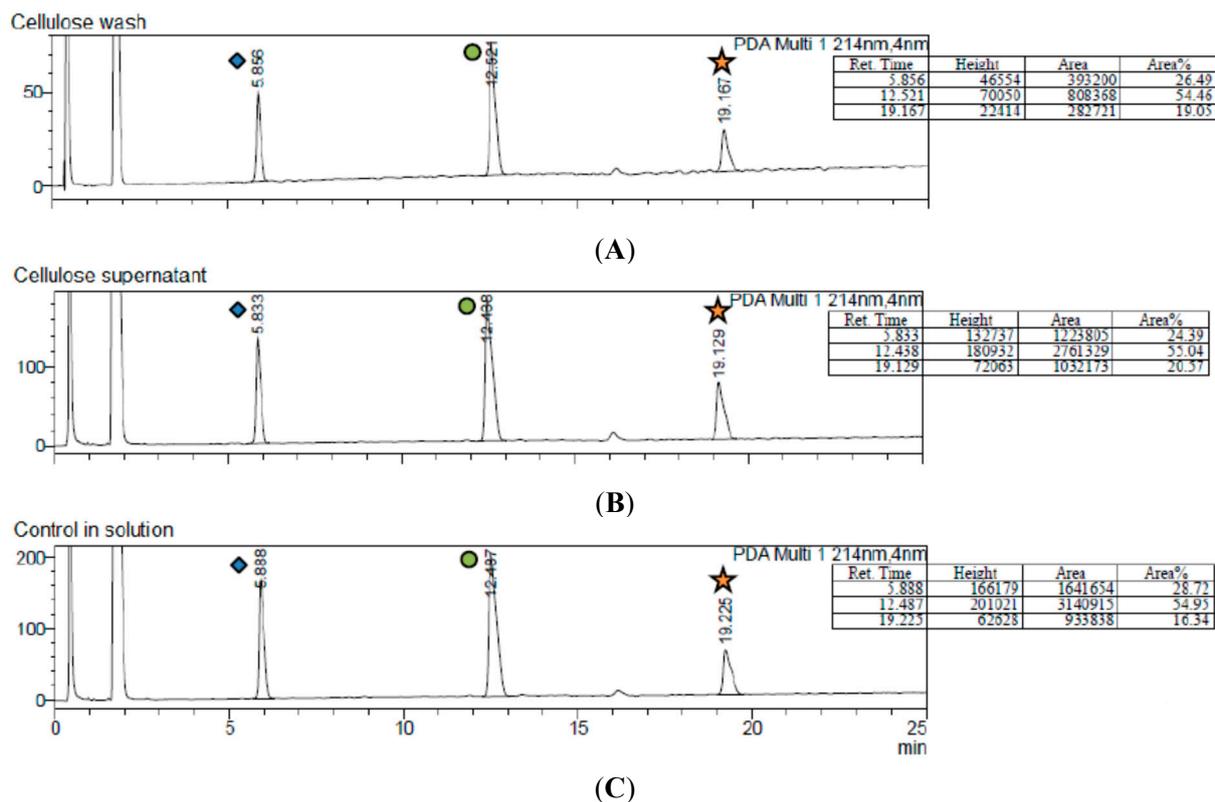


Figure S15. LC-MS chromatograms of the supernatants and washes of the experiments with L-phenylalanine in presence of cellulose in MilliQ water compared to the control library in solution. **A:** wash of the cellulose; **B:** supernatant of the library in presence of cellulose; **C:** control library in solution. Method II, monitored at 214 nm. Products: \blacklozenge Gua(OH)₂; \bullet Gua-Phe and \star Gua-Phe₂.

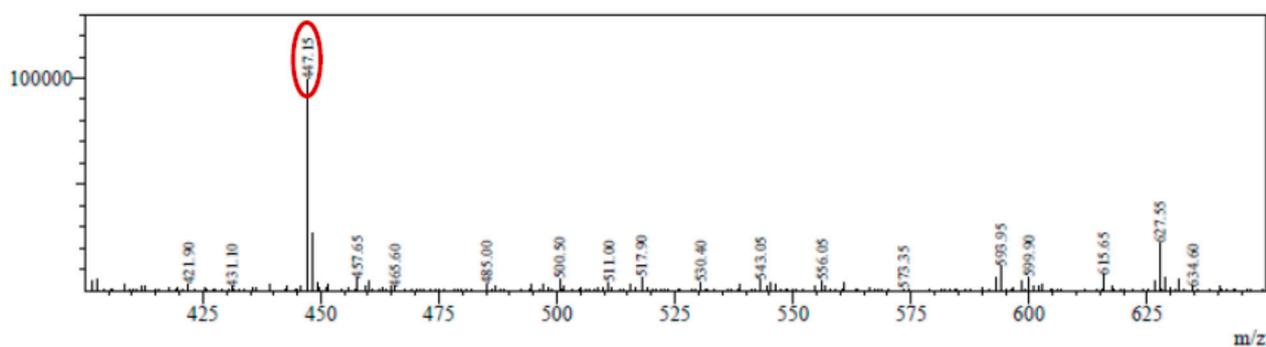


Figure S16. Extracted mass spectrum of the peak at 12.02 min in method II, corresponding to the product Gua-Phe. Calcd for $C_{26}H_{31}N_4O_3^+$ ($[M]^+$): 447.24, found: 447.15.

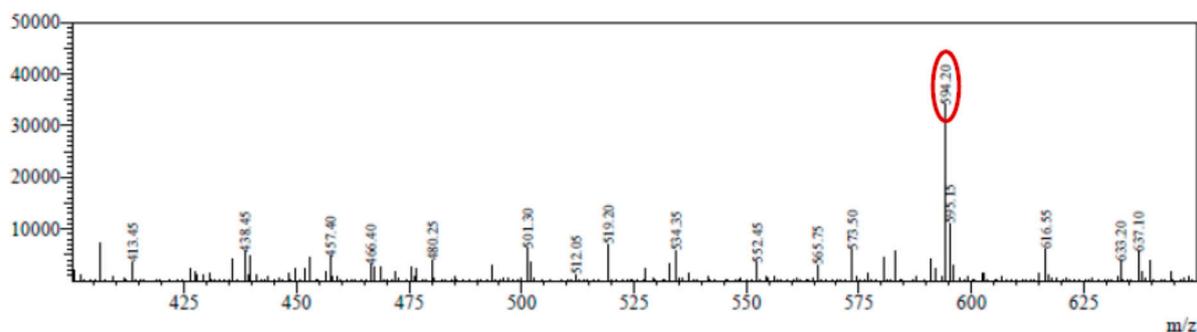


Figure S17. Extracted mass spectrum of the peak at 19.15 min in method II, corresponding to the product Gua-Phe₂. Calcd for C₃₅H₄₀N₅O₄⁺ ([M]⁺): 594.31, found: 594.20.

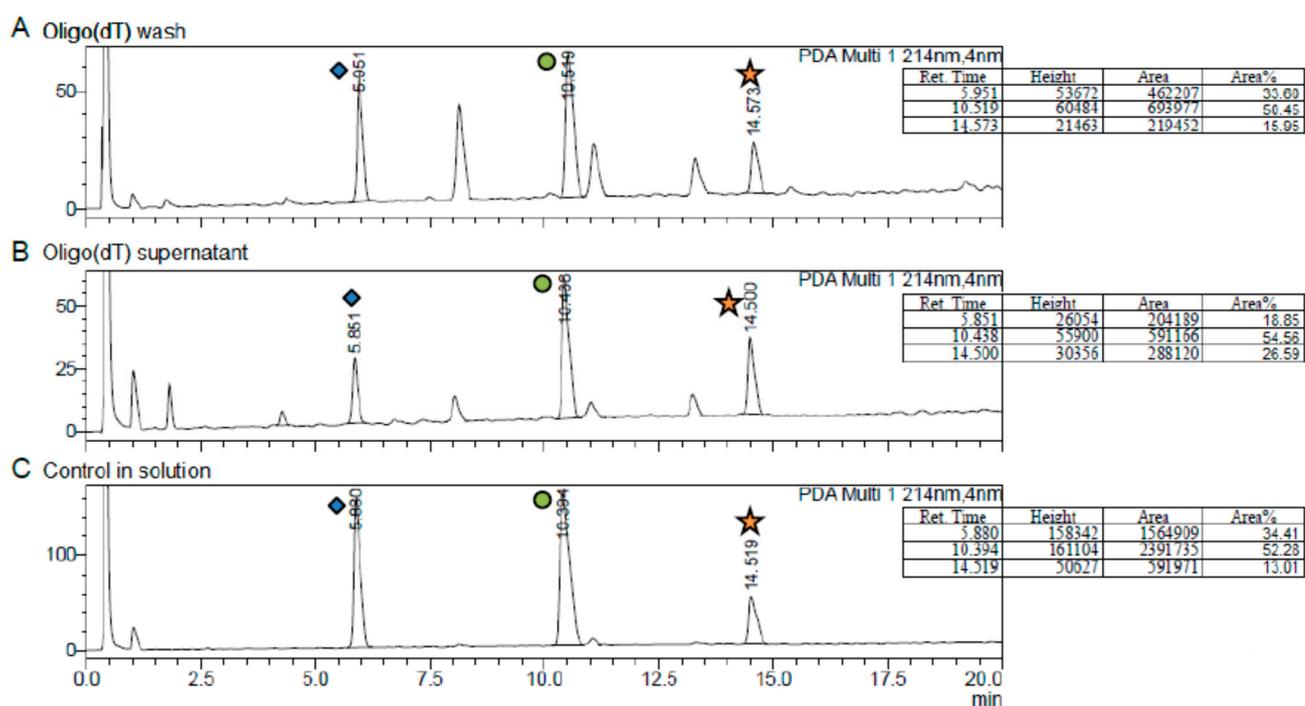


Figure S18. LC-MS chromatograms of the supernatants and washes of the experiments with L-leucine (Leu) in presence of oligo(dT) on cellulose in MilliQ water compared to the control library in solution. **A:** wash of the oligo(dT) on cellulose; **B:** supernatant of the library in presence of oligo(dT) on cellulose; **C:** control library in solution. Method II, monitored at 214 nm. Products: \blacklozenge Gua(OH)₂; \bullet Gua-Leu and \star Gua-Leu₂.

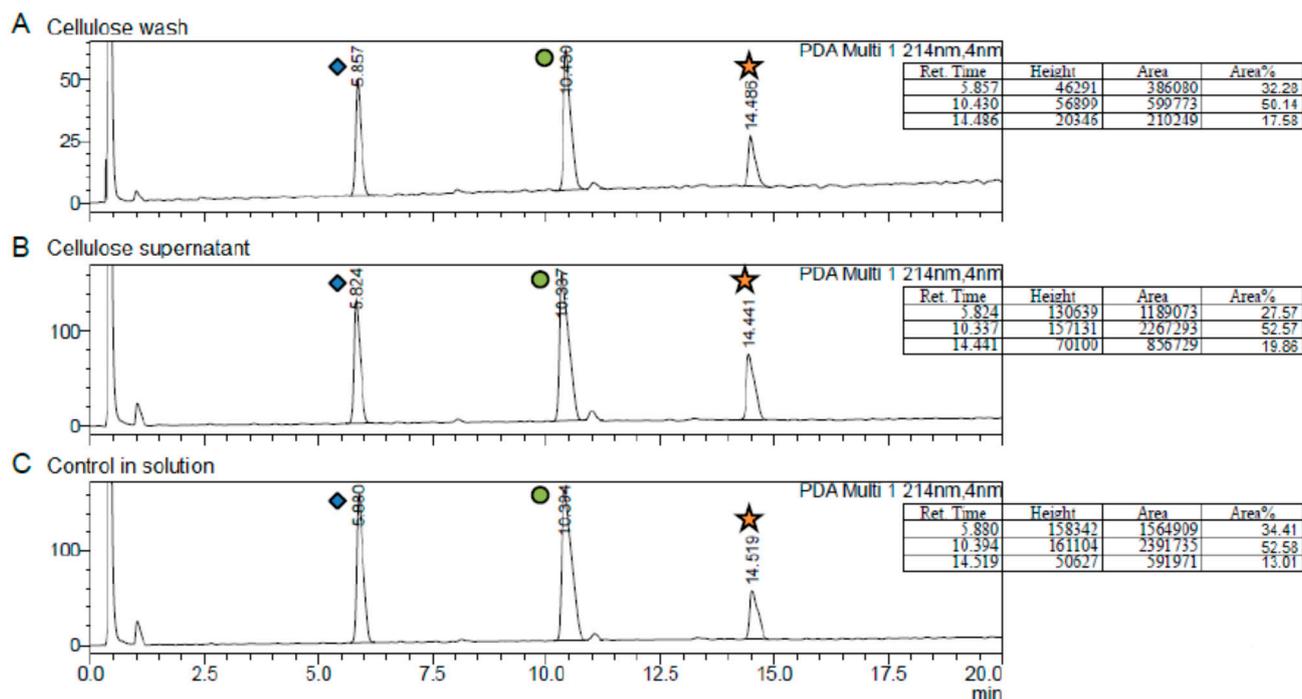


Figure S19. LC-MS chromatograms of the supernatants and washes of the experiments with L-leucine (Leu) in presence of cellulose in MilliQ water compared to the control library in solution. **A:** wash of the cellulose; **B:** supernatant of the library in presence of cellulose; **C:** control library in solution. Method II, monitored at 214 nm. Products: \blacklozenge Gua(OH)₂; \bullet Gua-Leu and \star Gua-Leu₂.

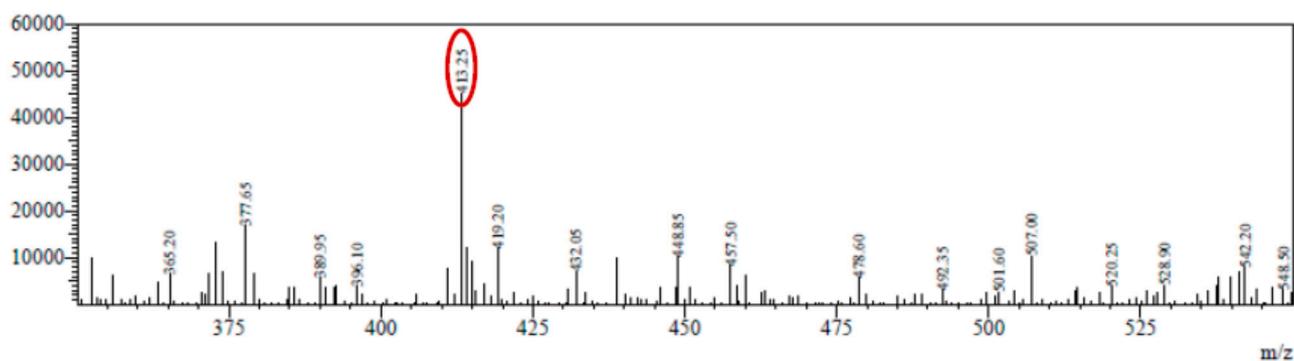


Figure S20. Extracted mass spectrum of the peak at 9.66 min in method II, corresponding to the product Gua-Leu. Calcd for C₂₃H₃₃N₄O₃⁺ ([M]⁺): 413.25, found: 413.25.

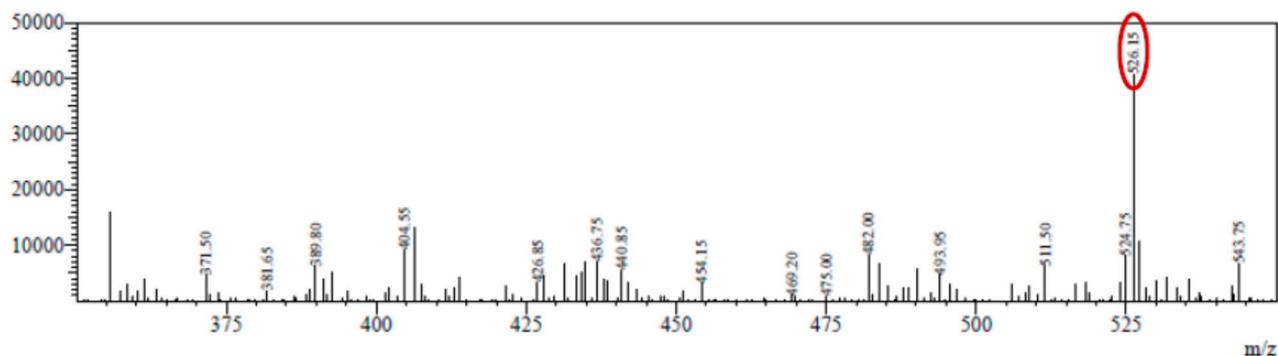


Figure S21. Extracted mass spectrum of the peak at 14.36 min in method II, corresponding to the product Gua-Leu₂. Calcd for C₂₉H₄₄N₅O₄⁺ ([M]⁺): 526.34, found: 526.15.

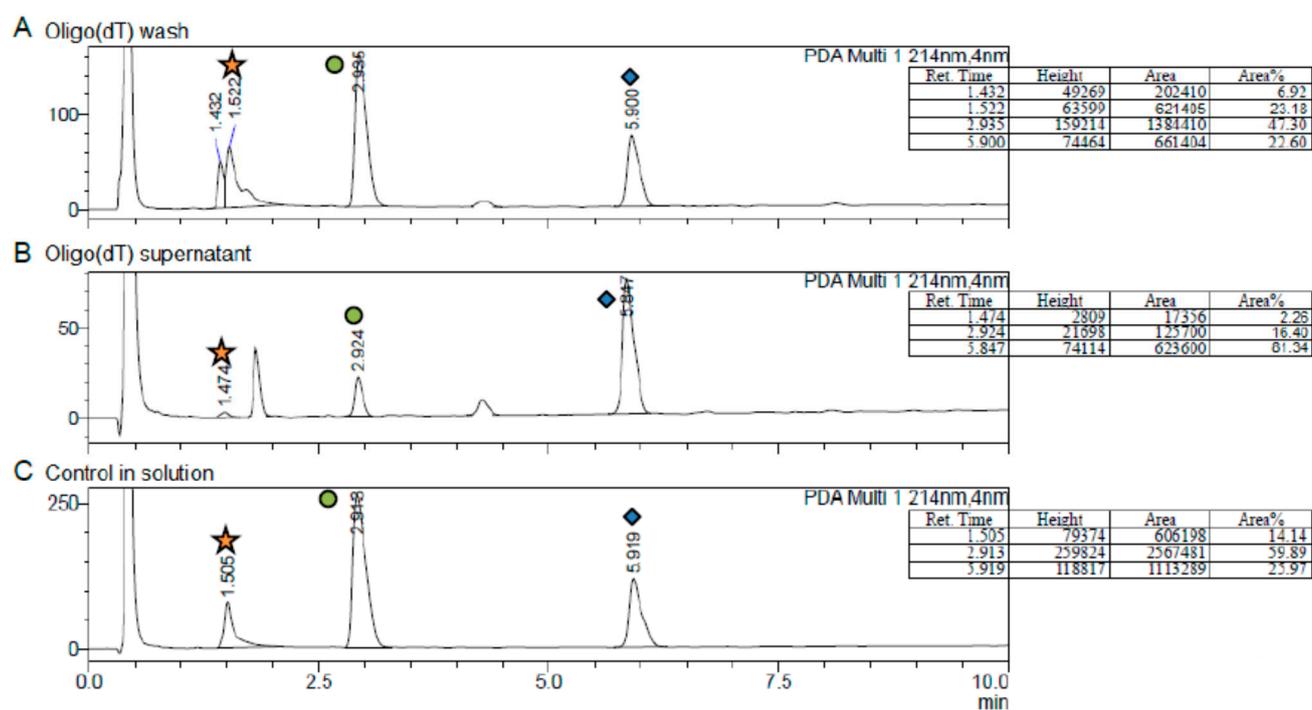


Figure S22. LC-MS chromatograms of the supernatants and washes of the experiments with L-Arginine (Arg) in presence of oligo(dT) on cellulose in MilliQ water compared to the control library in solution. **A**: wash of the oligo(dT) on cellulose; **B**: supernatant of the library in presence of oligo(dT) on cellulose; **C**: control library in solution. Method II, monitored at 214 nm. Products: \blacklozenge Gua(OH)₂; \bullet Gua-Arg and \star Gua-Arg₂.

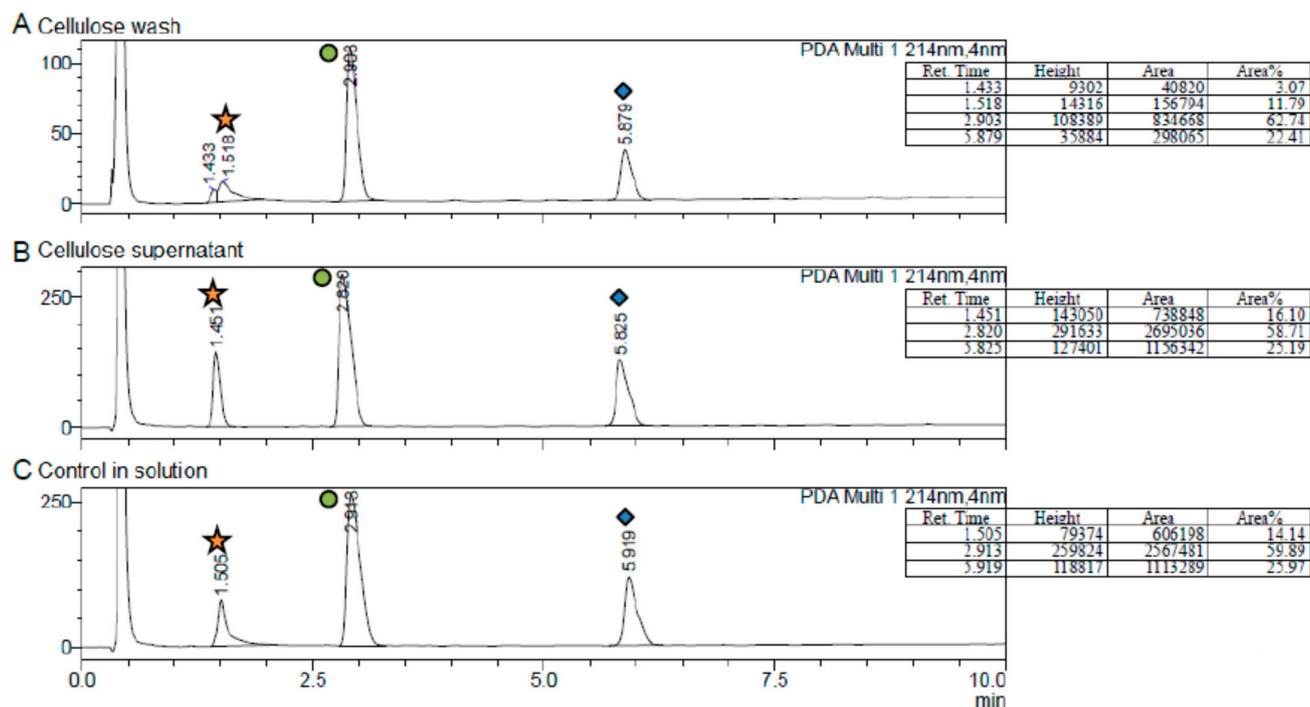


Figure S23. LC-MS chromatograms of the supernatants and washes of the experiments with L-Arginine (Arg) in presence of cellulose in MilliQ water compared to the control library in solution. **A:** wash of the cellulose; **B:** supernatant of the library in presence of cellulose; **C:** control library in solution. Method II, monitored at 214 nm. Products: \blacklozenge Gua(OH)₂; \bullet Gua-Arg and \star Gua-Arg₂.

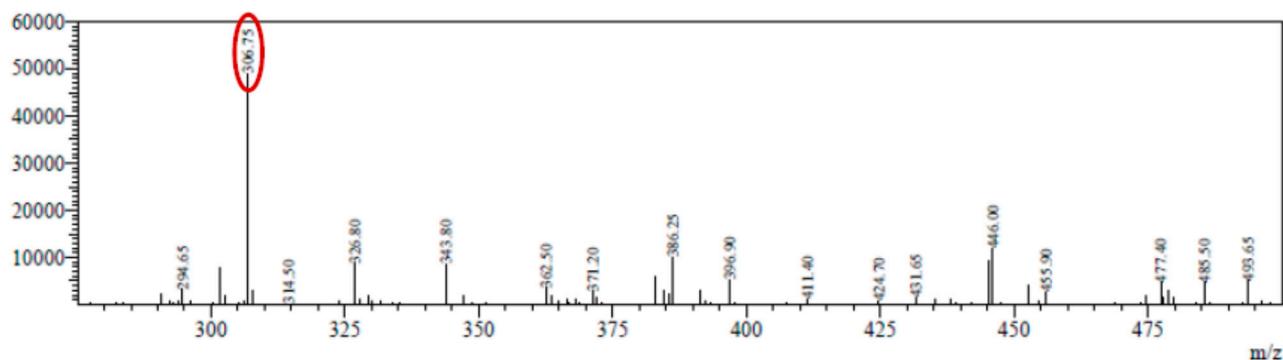


Figure S24. Extracted mass spectrum of the peak at 1.35 min in method II, corresponding to the product Gua-Arg₂. Calcd for C₂₇H₄₈N₁₁²⁺ ([M-H]²⁺): 306.69, found: 306.75.

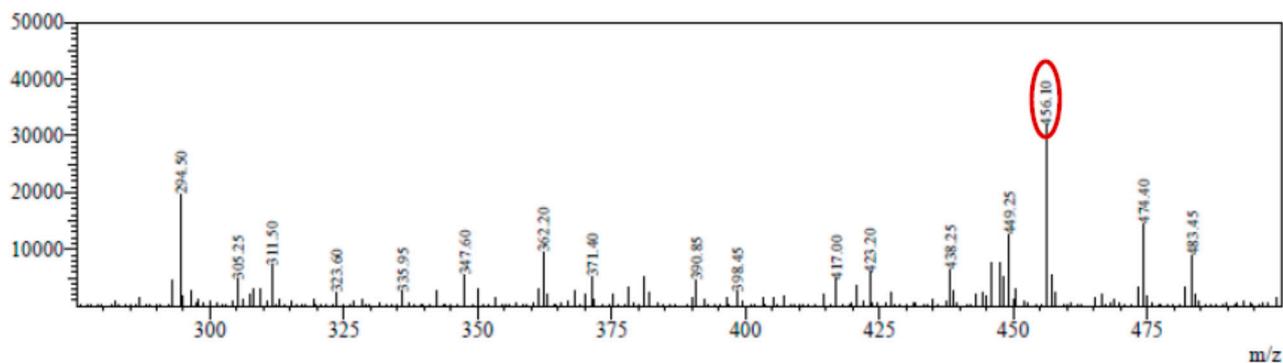


Figure S25. Extracted mass spectrum of the peak at 2.66 min in method II, corresponding to the product Gua-Arg. Calcd for $C_{23}H_{34}N_7O_3^+$ ($[M-H]^+$): 456.27, found: 456.10.

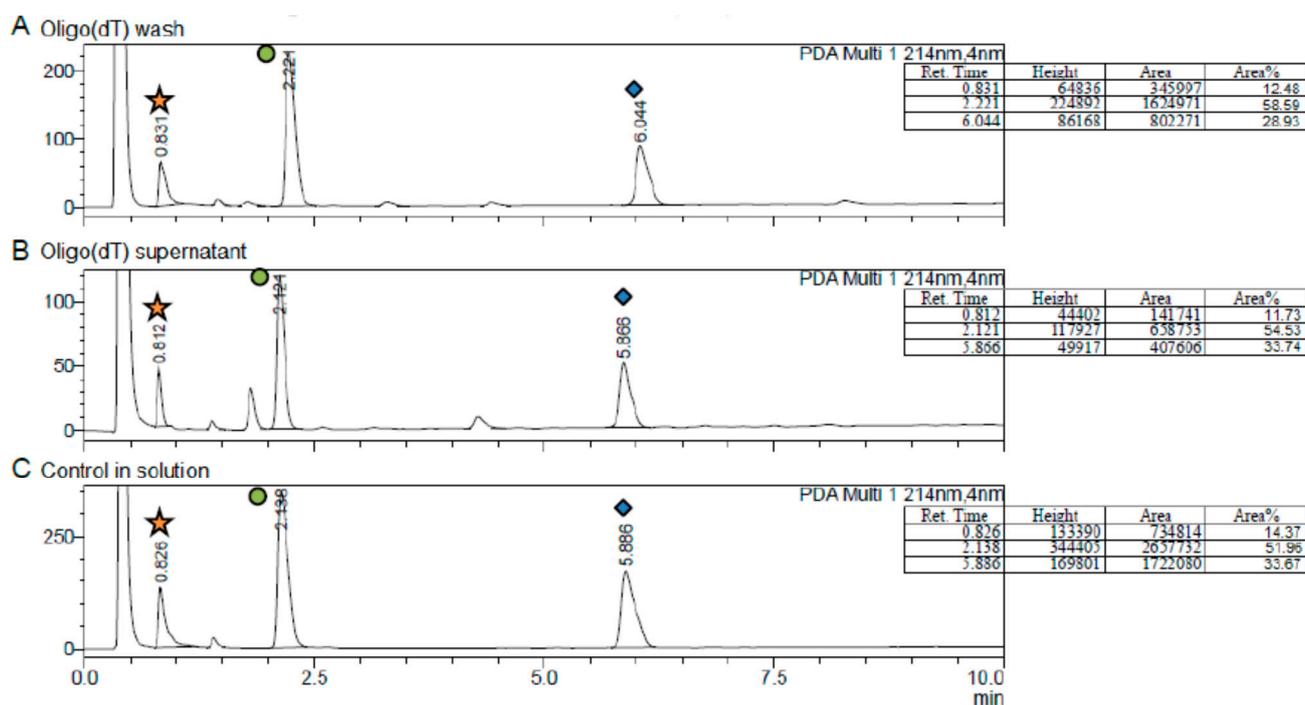


Figure S26. LC-MS chromatograms of the supernatants and washes of the experiments with L-histidine (His) in presence of oligo(dT) on cellulose in MilliQ water compared to the control library in solution. **A**: wash of the oligo(dT) on cellulose; **B**: supernatant of the library in presence of oligo(dT) on cellulose; **C**: control library in solution. Method II, monitored at 214 nm. Products: \blacklozenge Gua(OH)₂; \bullet Gua-His and \star Gua-His₂.

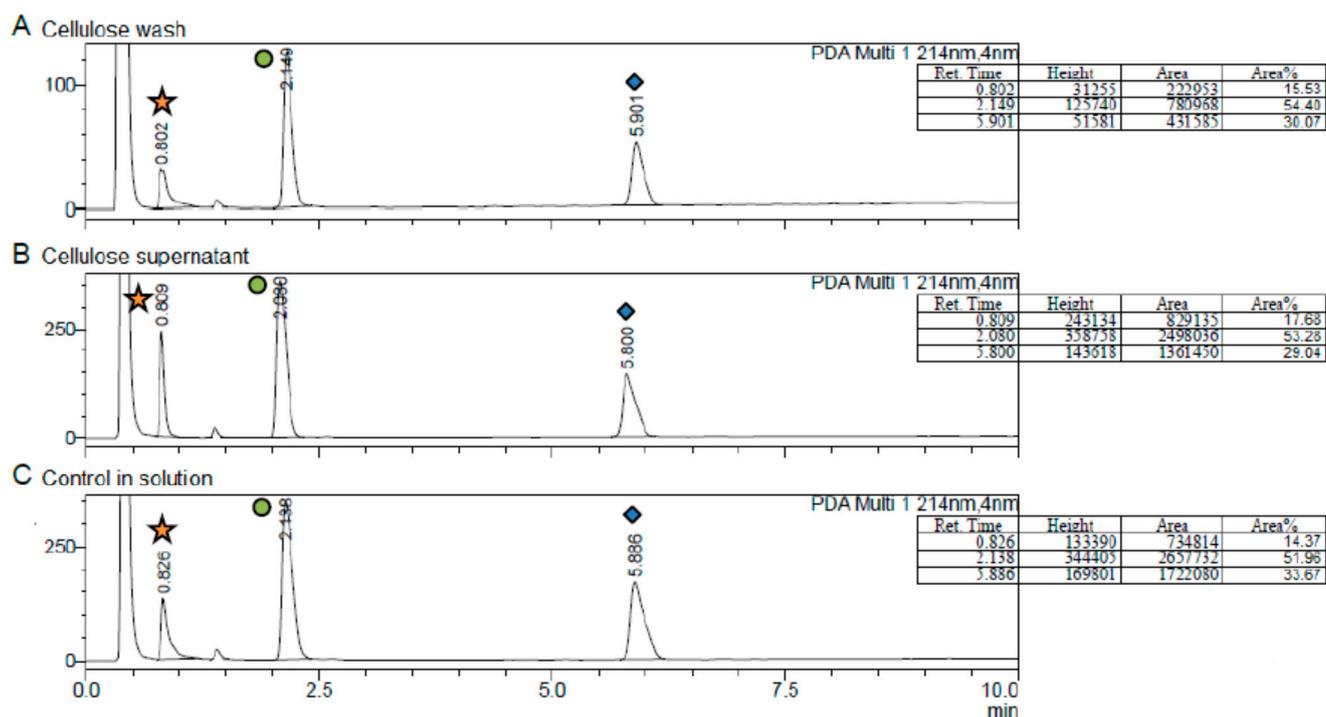


Figure S27. LC-MS chromatograms of the supernatants and washes of the experiments with L-histidine (His) in presence of cellulose in MilliQ water compared to the control library in solution. **A:** wash of the cellulose; **B:** supernatant of the library in presence of cellulose; **C:** control library in solution. Method II, monitored at 214 nm. Products: \blacklozenge Gua(OH)₂; \bullet Gua-His and \star Gua-His₂.

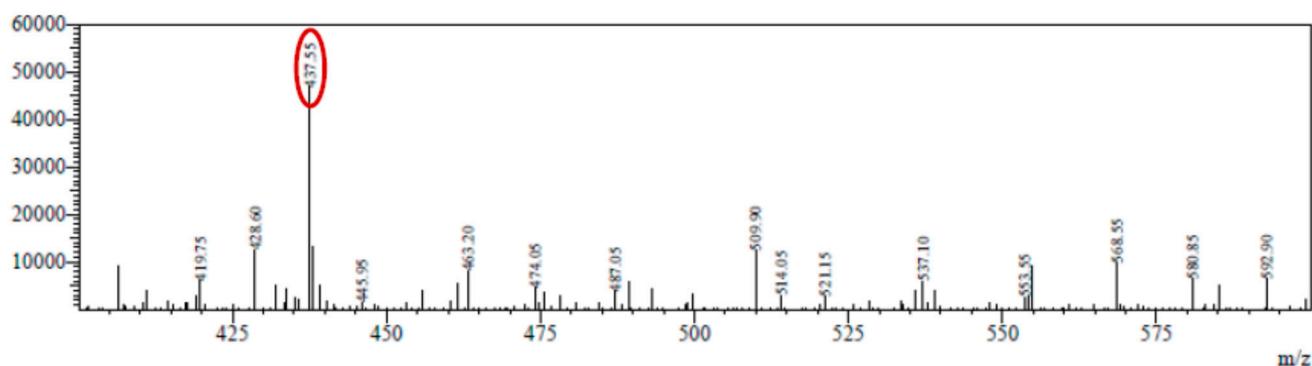


Figure S28. Extracted mass spectrum of the peak at 2.22 min in method II, corresponding to the product Gua-His. Calcd for C₂₃H₂₉N₆O₃⁺ ([M]⁺): 437.23, found: 437.55.

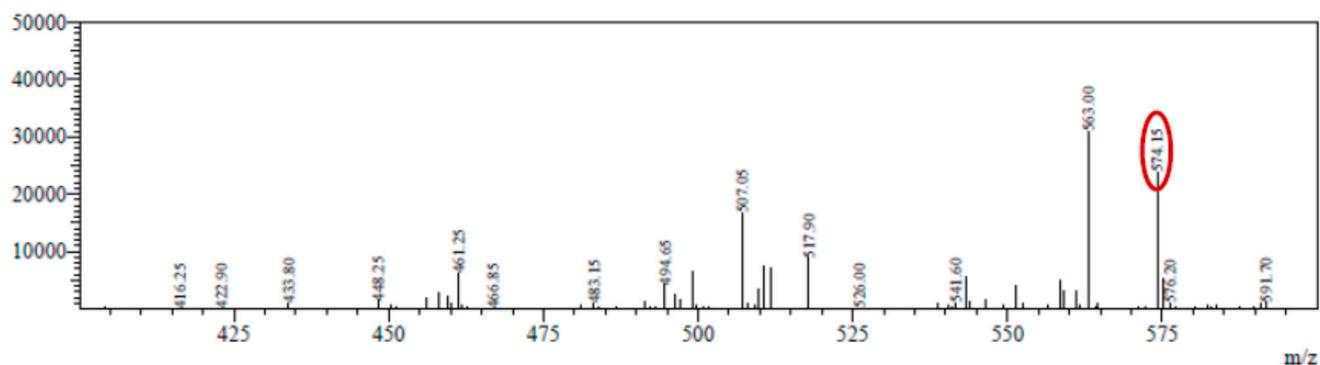


Figure S29. Extracted mass spectrum of the peak at 0.83 min in method II, corresponding to the product Gua-His₂. Calcd for C₂₉H₃₆N₉O₄⁺ ([M]⁺): 574.29, found: 574.15.

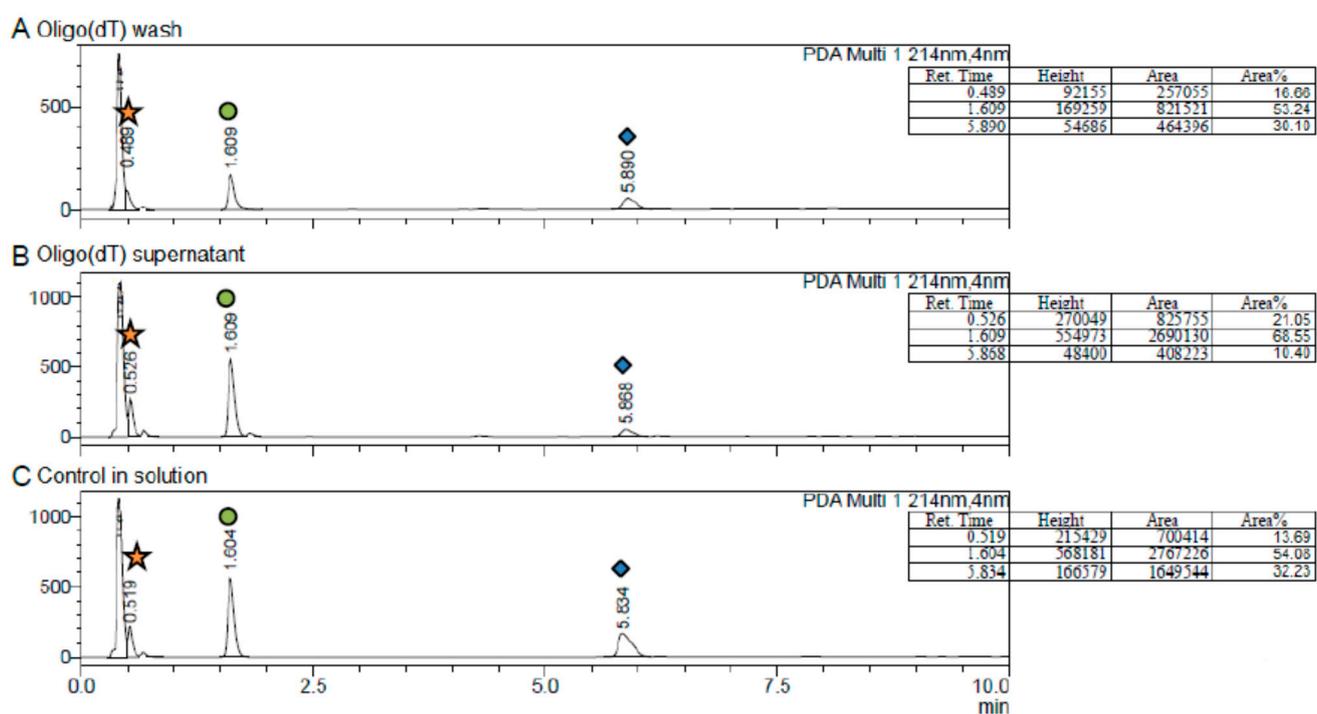


Figure S30. LC-MS chromatograms of the supernatants and washes of the experiments with L-cysteic acid (Cyst) in presence of oligo(dT) on cellulose in MilliQ water compared to the control library in solution. **A**: wash of the oligo(dT) on cellulose; **B**: supernatant of the library in presence of oligo(dT) on cellulose; **C**: control library in solution. Method II, monitored at 214 nm. Products: ♦ Gua(OH)₂; ● Gua-Cyst and ★ Gua-Cyst₂.

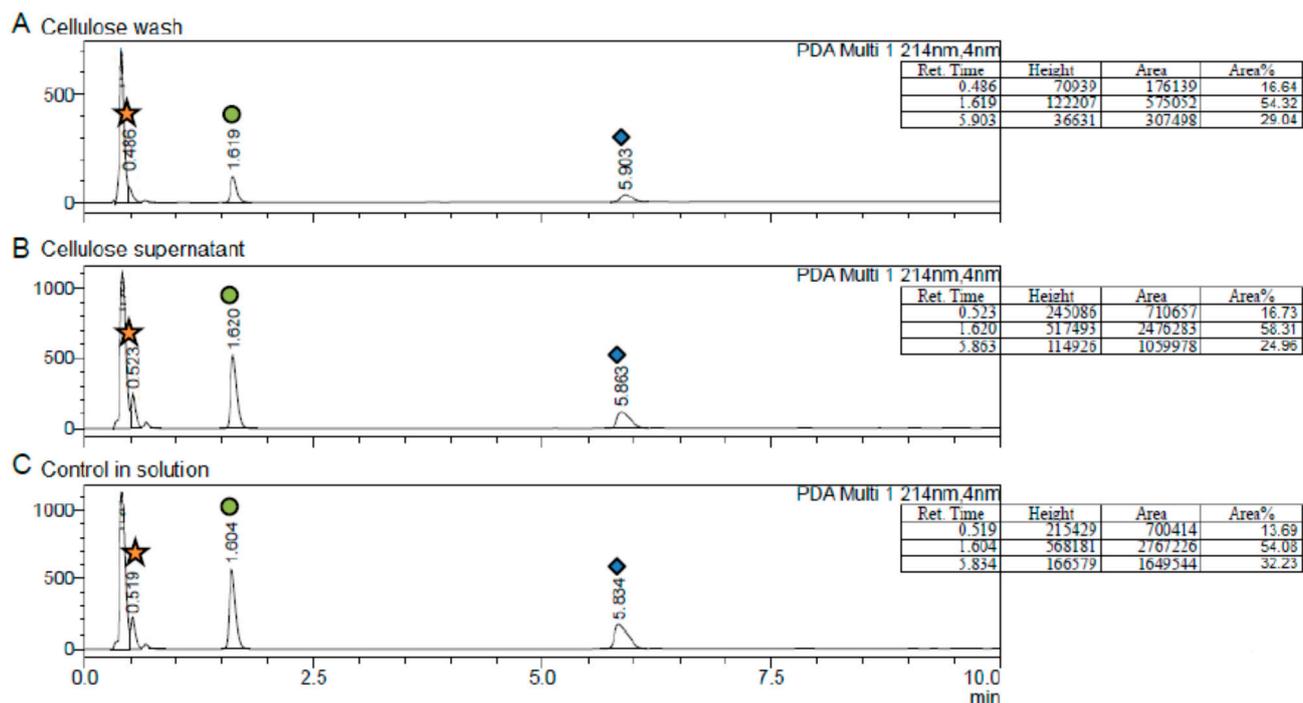


Figure S31. LC-MS chromatograms of the supernatants and washes of the experiments with L-cysteic acid (Cyst) in presence of cellulose in MilliQ water compared to the control library in solution. **A:** wash of the cellulose; **B:** supernatant of the library in presence of cellulose; **C:** control library in solution. Method II, monitored at 214 nm. Products: \blacklozenge Gua(OH)₂; \bullet Gua-Cyst and \star Gua-Cyst₂.

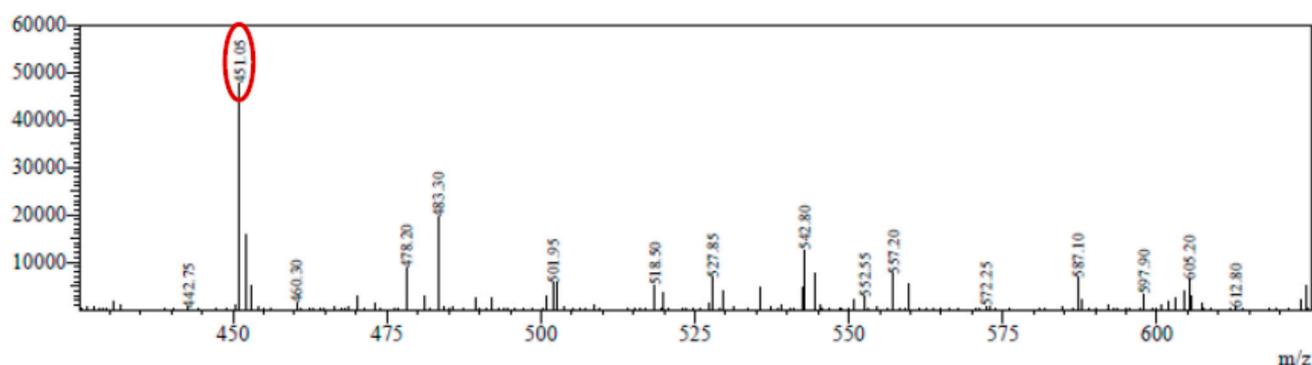


Figure S32. Extracted mass spectrum of the peak at 1.68 min in method II, corresponding to the product Gua-Cyst. Calcd for C₂₀H₂₇N₄O₆S⁺ ([M]⁺): 451.16, found: 451.05.

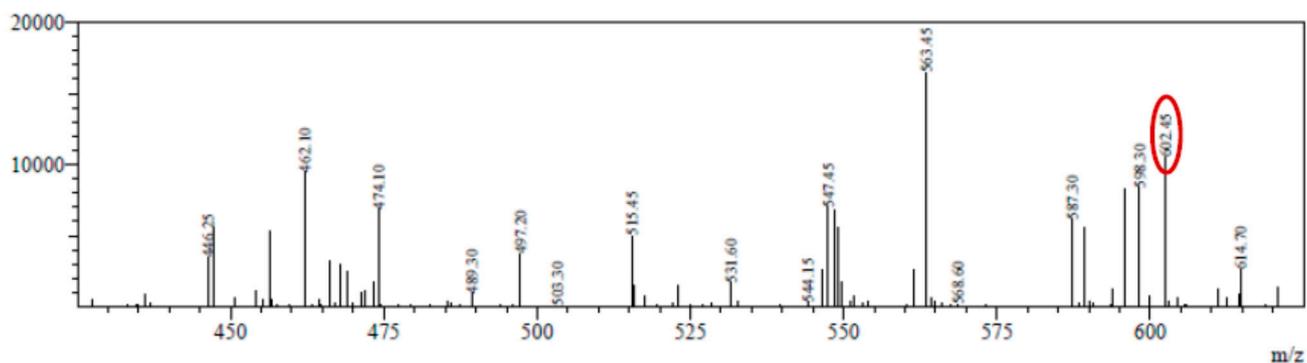


Figure S33. Extracted mass spectrum of the peak at 0.91 min in method II, corresponding to the product Gua-Cyst₂. Calcd for C₂₃H₃₂N₅O₁₀S₂⁺ ([M]⁺): 602.16, found: 602.45.

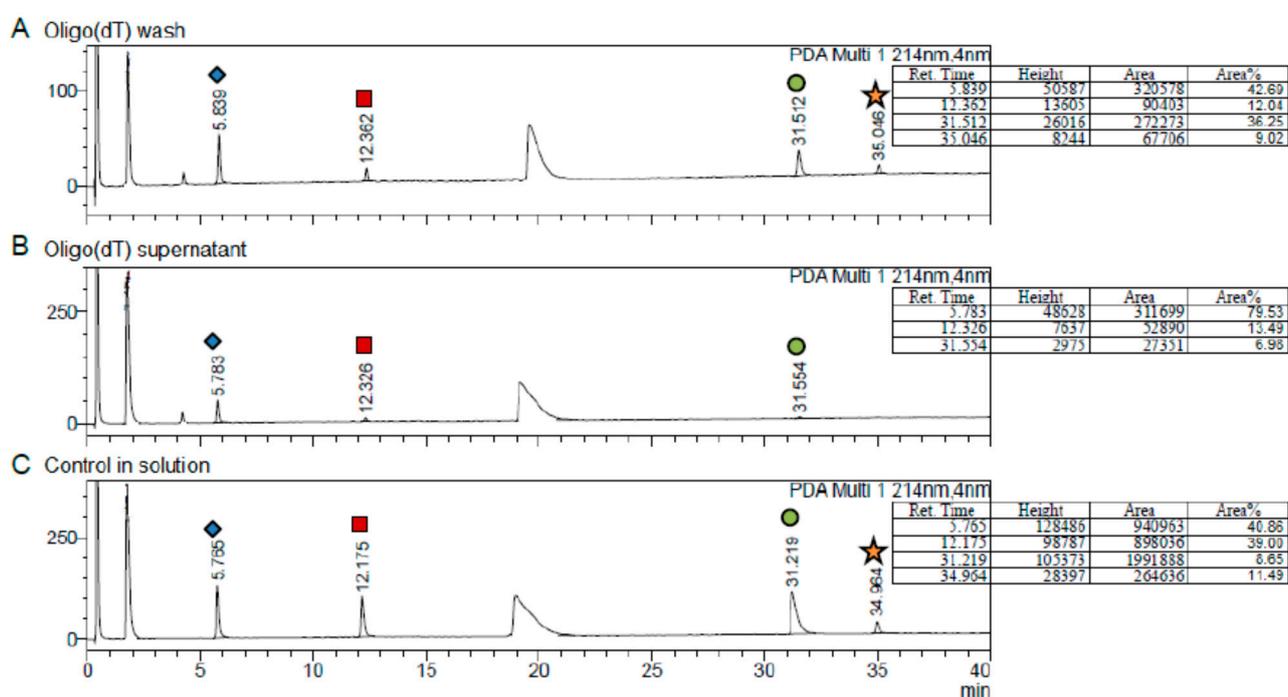


Figure S34. LC-MS chromatograms of the supernatants and washes of the experiments with Phe(OtBu) in presence of oligo(dT) on cellulose in MilliQ water compared to the control library in solution. **A:** wash of the oligo(dT) on cellulose; **B:** supernatant of the library in presence of oligo(dT) on cellulose; **C:** control library in solution. Method II, monitored at 214 nm. Products: \blacklozenge Gua(OH)₂; \blacksquare Gua-Phe; \bullet Gua-Phe(OtBu) and \star Gua-(Phe)(PheOtBu).

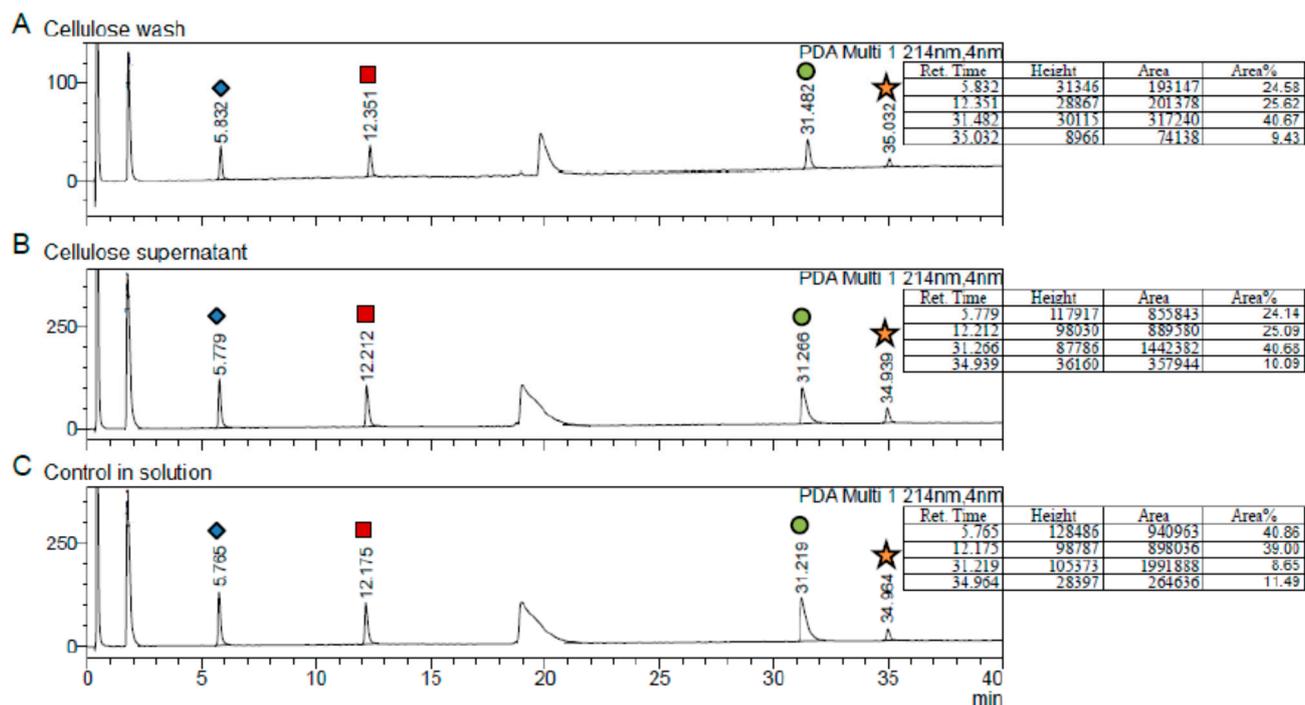


Figure S35. LC-MS chromatograms of the supernatants and washes of the experiments with Phe(OtBu) in presence of cellulose in MilliQ water compared to the control library in solution. **A:** wash of the cellulose; **B:** supernatant of the library in presence of cellulose; **C:** control library in solution. Method II, monitored at 214 nm. Products: \blacklozenge Gua(OH)₂; \blacksquare Gua-Phe; \bullet Gua-PheOtBu and \star Gua-(Phe)(PheOtBu).

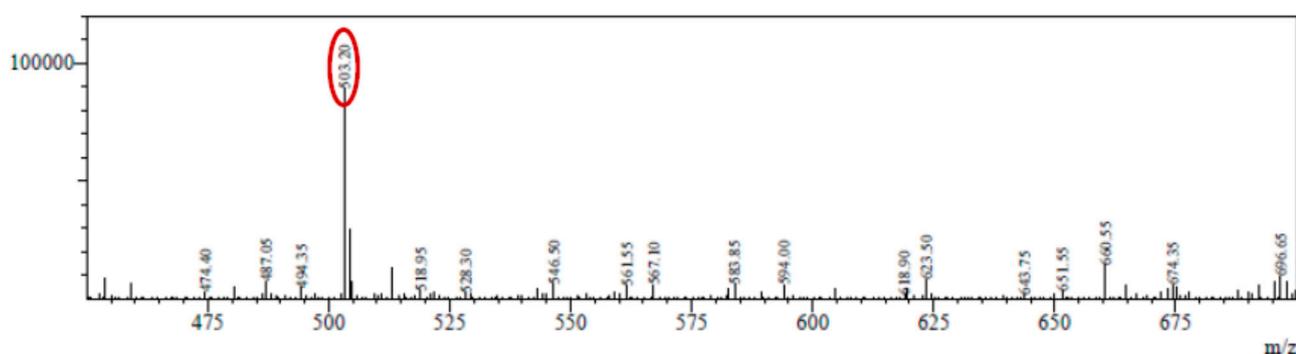


Figure S36. Extracted mass spectrum of the peak at 30.68 min in method II, corresponding to the product Gua-PheOtBu. Calcd for $C_{30}H_{39}N_4O_3^+$ ($[M]^+$): 503.30, found: 503.20.

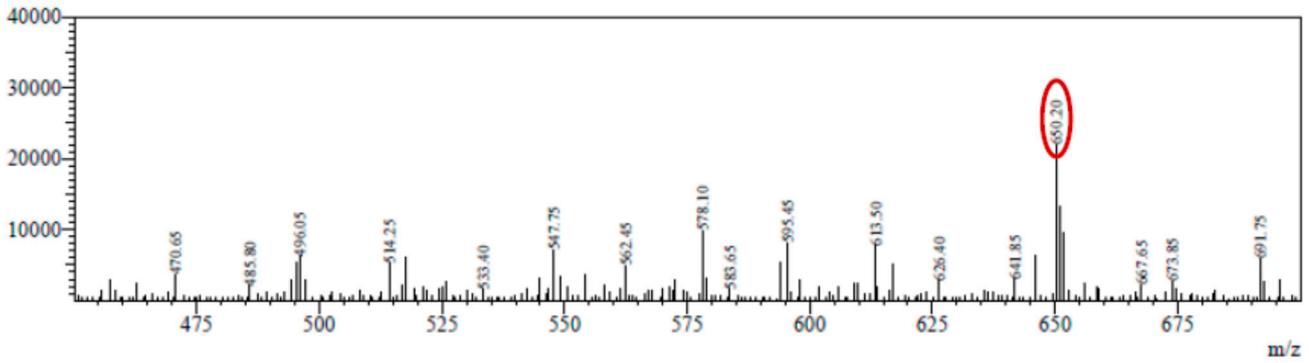


Figure S37. Extracted mass spectrum of the peak at 34.79 min in method II, corresponding to the product Gua-(Phe)(PheOtBu). Calcd for $C_{39}H_{48}N_5O_4^+$ ($[M]^+$): 650.37, found: 650.20.

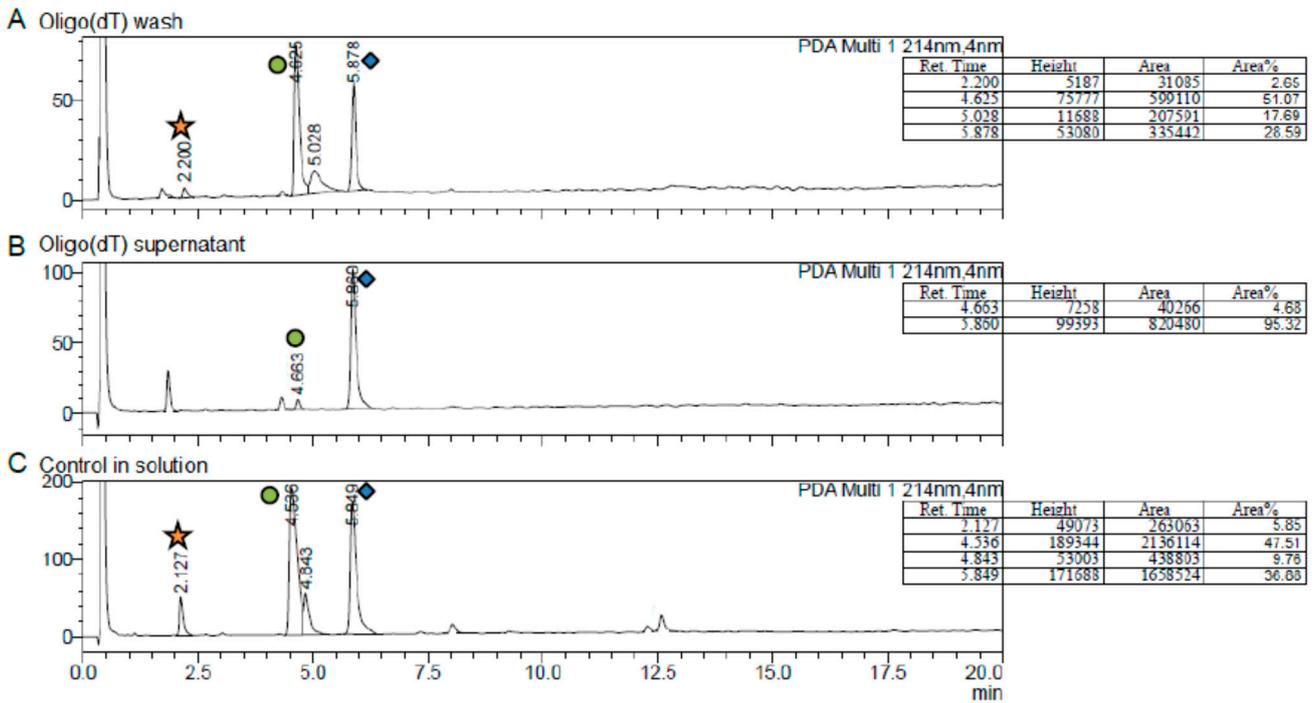


Figure S38. LC-MS chromatograms of the supernatants and washes of the experiments with agmatine (Agm) in presence of oligo(dT) on cellulose in MilliQ water compared to the control library in solution. **A:** wash of the oligo(dT) on cellulose; **B:** supernatant of the library in presence of oligo(dT) on cellulose; **C:** control library in solution. Method II, monitored at 214 nm. Products: \blacklozenge Gua(OH)₂; \bullet Gua-Agm and \star Gua-Agm₂.

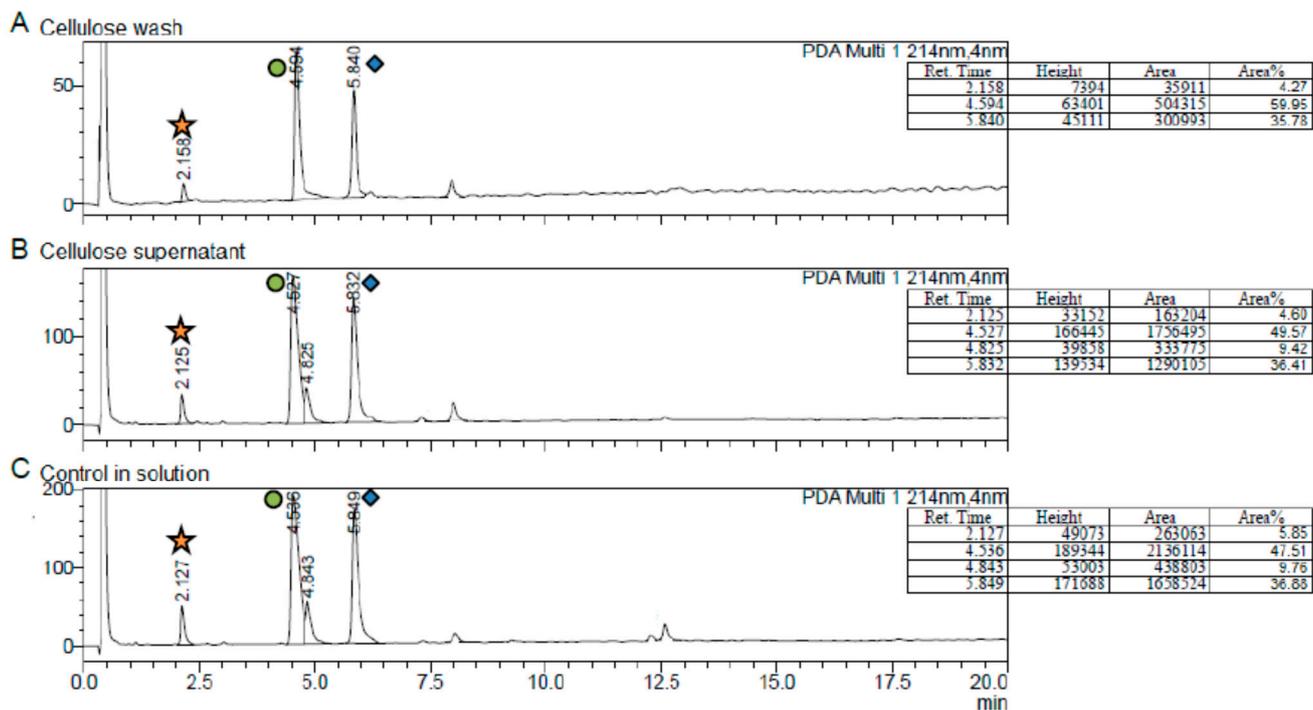


Figure S39. LC-MS chromatograms of the supernatants and washes of the experiments with agmatine (Agm) in presence of cellulose in MilliQ water compared to the control library in solution. **A:** wash of the cellulose; **B:** supernatant of the library in presence of cellulose; **C:** control library in solution. Method II, monitored at 214 nm. Products: \blacklozenge Gua(OH)₂; \bullet Gua-Agm and \star Gua-Agm₂.

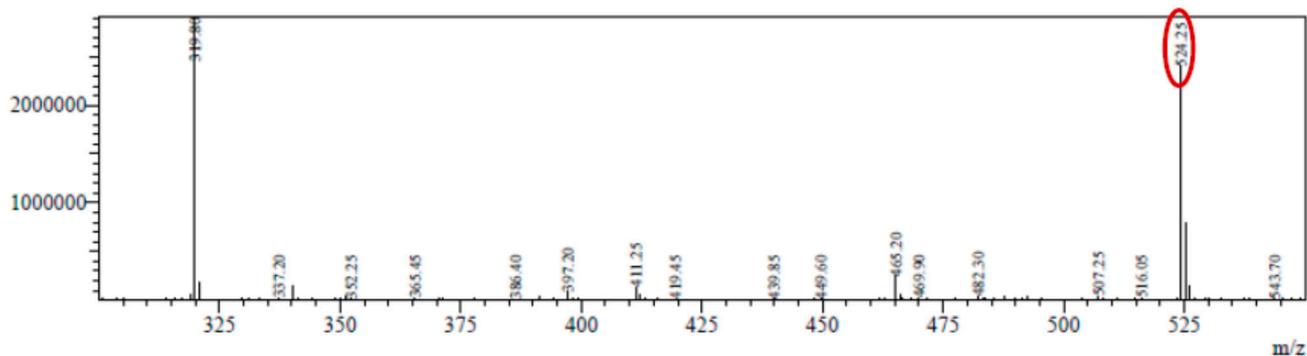


Figure S40. Extracted mass spectrum of the peak at 2.12 min in method II, corresponding to the product Gua-Agm₂. Calcd for C₂₇H₄₆N₁₁⁺ ([M - 2H]⁺): 524.39, found: 524.25.

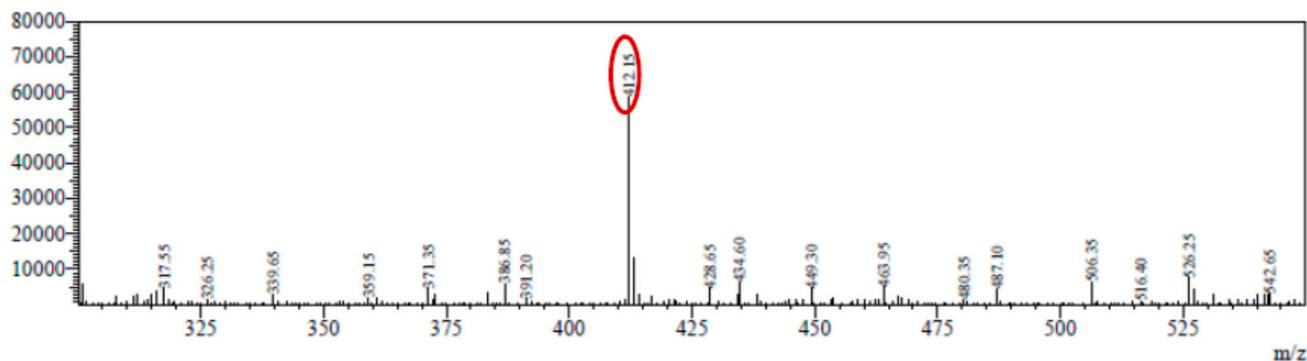


Figure S41. Extracted mass spectrum of the peak at 4.57 min in method II, corresponding to the product Gua-Agm. Calcd for $C_{22}H_{34}N_7O^+$ ($[M - H]^+$): 412.28, found: 412.15.

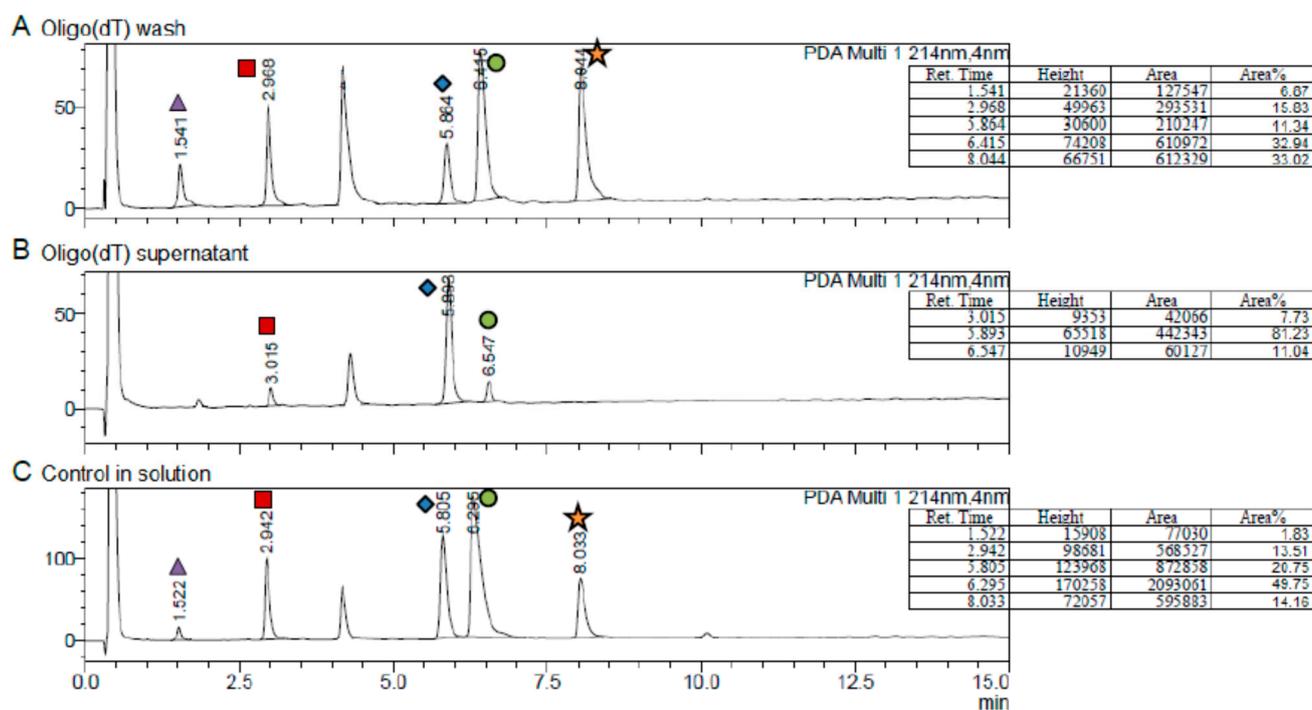


Figure S42. LC-MS chromatograms of the supernatants and washes of the experiments with Arg(OMe) in presence of oligo(dT) on cellulose in MilliQ water compared to the control library in solution. **A:** wash of the oligo(dT) on cellulose; **B:** supernatant of the library in presence of oligo(dT) on cellulose; **C:** control library in solution. Method II, monitored at 214 nm. Products: \blacktriangle Gua-Arg₂; \blacksquare Gua-Arg; \blacklozenge Gua(OH)₂; \bullet Gua-ArgOMe and \star Gua-ArgOMe₂.

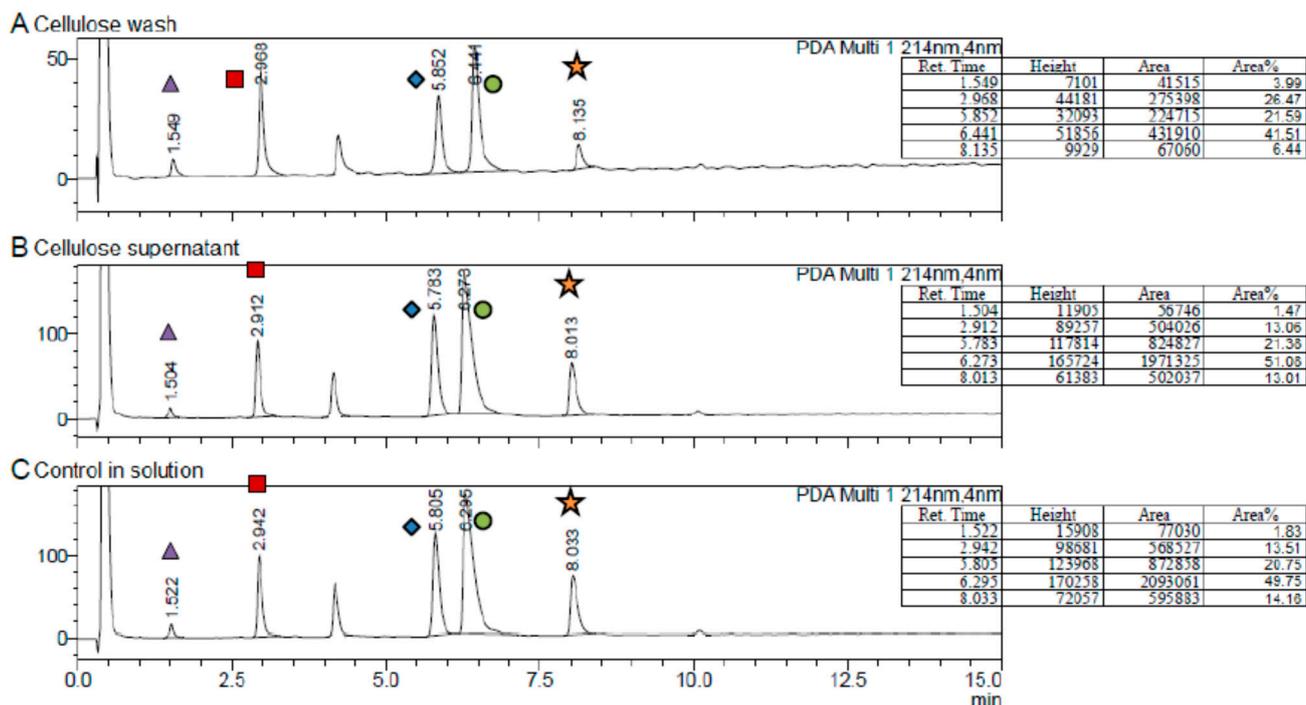


Figure S43. LC-MS chromatograms of the supernatants and washes of the experiments with Arg(OMe) in presence of cellulose in MilliQ water compared to the control library in solution. **A:** wash of the cellulose; **B:** supernatant of the library in presence of cellulose; **C:** control library in solution. Method II, monitored at 214 nm. Products: \blacktriangle Gua-Arg; \blacksquare Gua-Arg; \blacklozenge Gua(OH)₂; \bullet Gua-ArgOMe and \star Gua-ArgOMe₂.

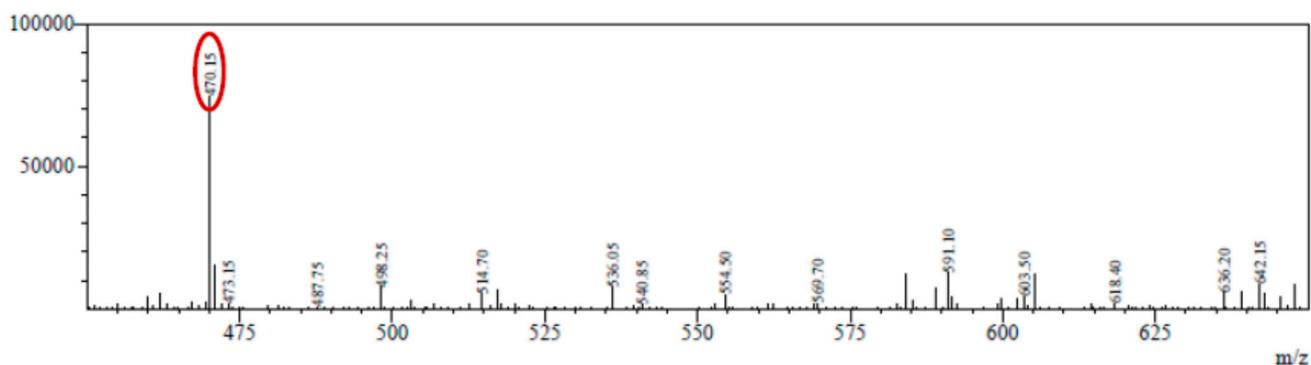


Figure S44. Extracted mass spectrum of the peak at 6.02 min in method II, corresponding to the product Gua-ArgOMe. Calcd for C₂₄H₃₆N₇O₃⁺ ([M - H]⁺): 470.29, found: 470.15.

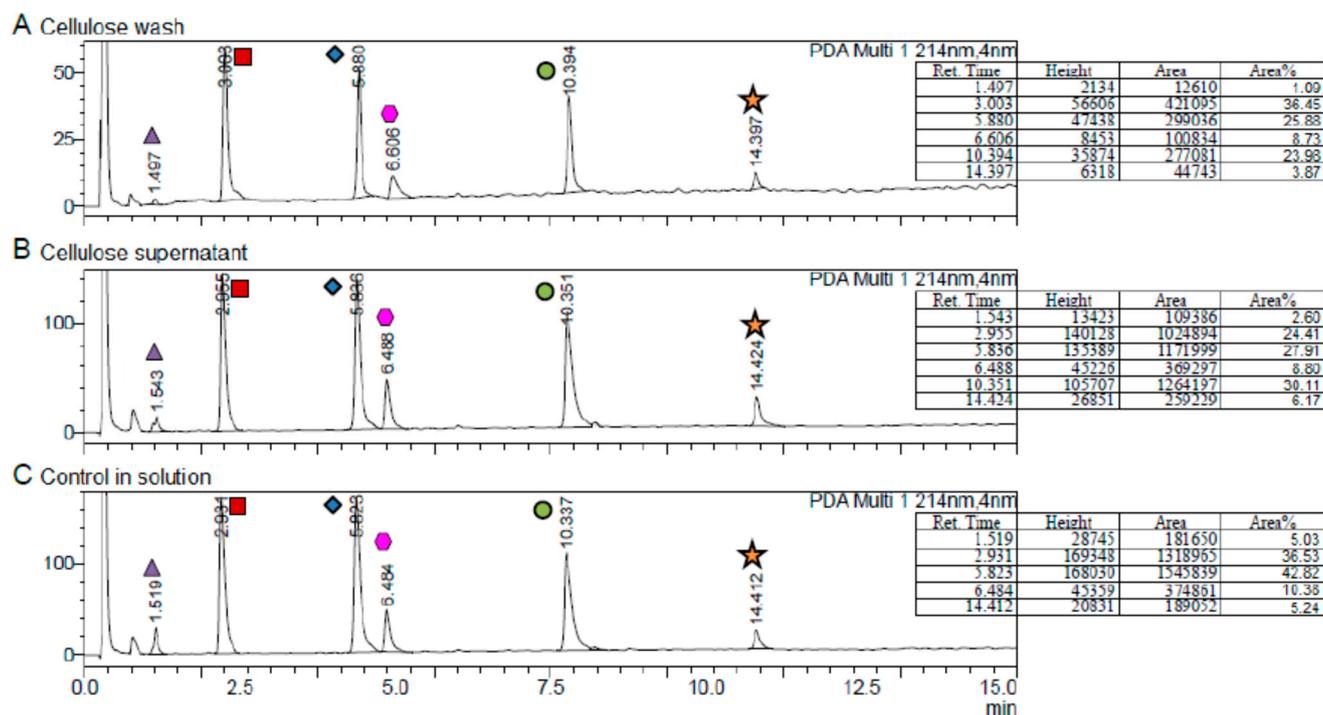


Figure S47. LC-MS chromatograms of the supernatants and washes of the competition experiments with L-leucine (Leu) and L-arginine (Arg) in presence of cellulose in MilliQ water compared to the control library in solution. **A:** wash of the cellulose; **B:** supernatant of the library in presence of cellulose; **C:** control library in solution. Method II, monitored at 214 nm. Products: \blacktriangle Gua-Arg₂; \blacksquare Gua-Arg; \blacklozenge Gua(OH)₂; \blacklozenge Gua-(Leu)(Arg); \bullet Gua-Leu and \star Gua-Leu₂.

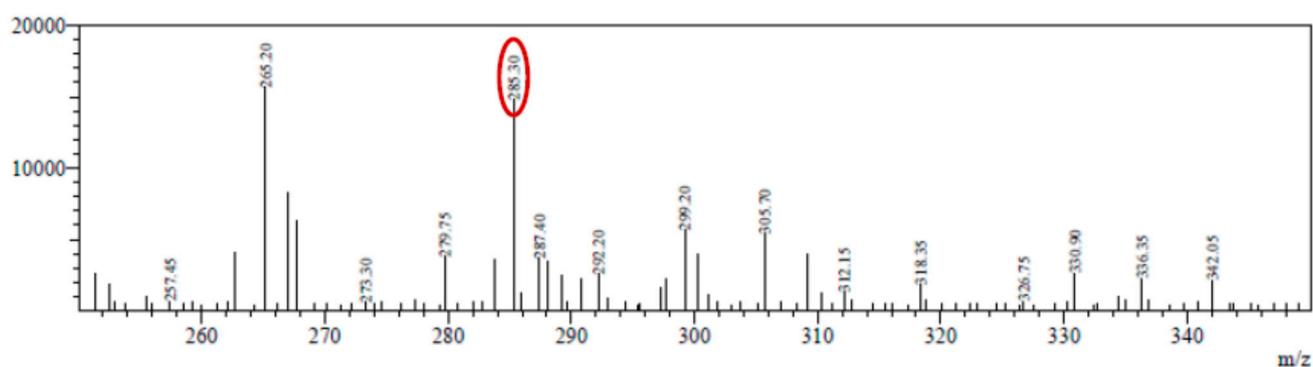


Figure S48. Extracted mass spectrum of the peak at 6.30 min in method II, corresponding to the product Gua-(Arg)(Leu). Calcd for $C_{29}H_{46}N_8O_4^{2+}$ ($[M]^{2+}$): 285.18, found: 285.30.

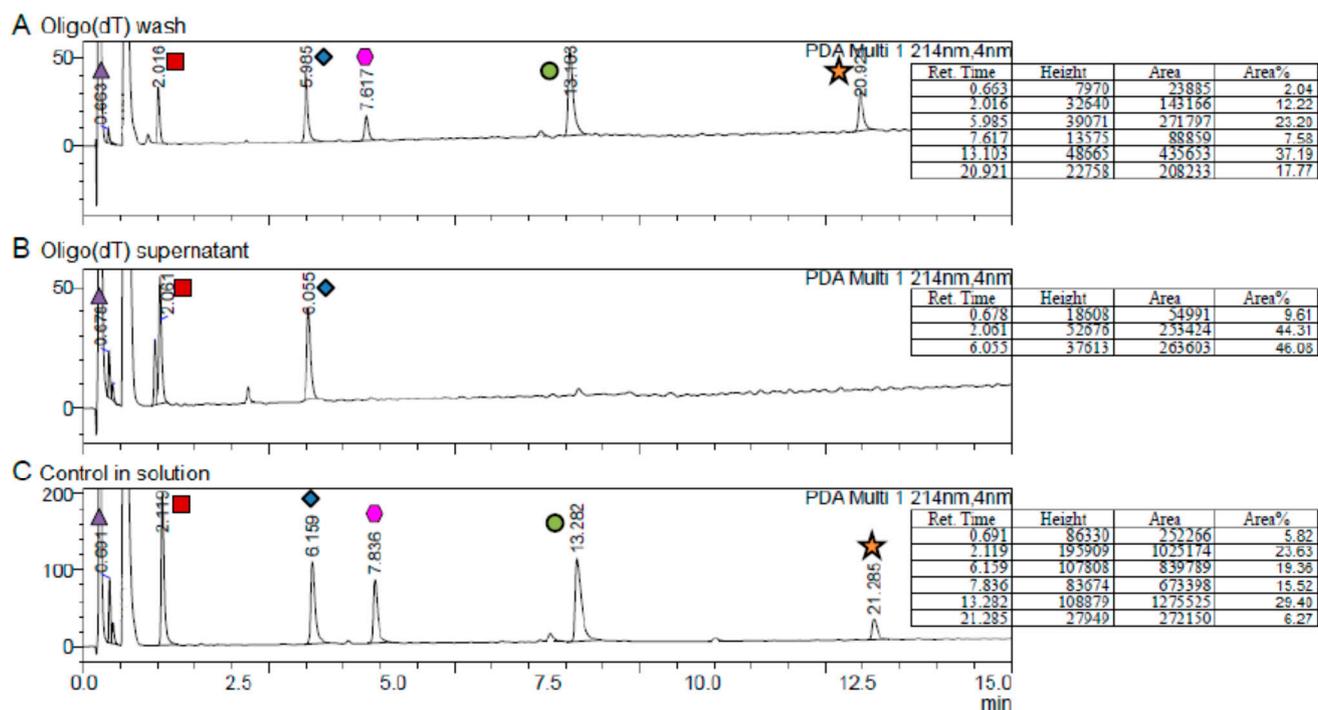


Figure S49. LC-MS chromatograms of the supernatants and washes of the competition experiments with benzylamine (Benz) and taurine (Taur) in presence of oligo(dT) on cellulose in MilliQ water compared to the control library in solution. **A:** wash of the oligo(dT) on cellulose; **B:** supernatant of the library in presence of oligo(dT) on cellulose; **C:** control library in solution. Method II, monitored at 214 nm. Products: \blacktriangle Gua-Taur₂; \blacksquare Gua-Taur; \blacklozenge Gua(OH)₂; \blacklozenge Gua-(Taur)(Benz); \bullet Gua-Benz and \star Gua-Benz₂.

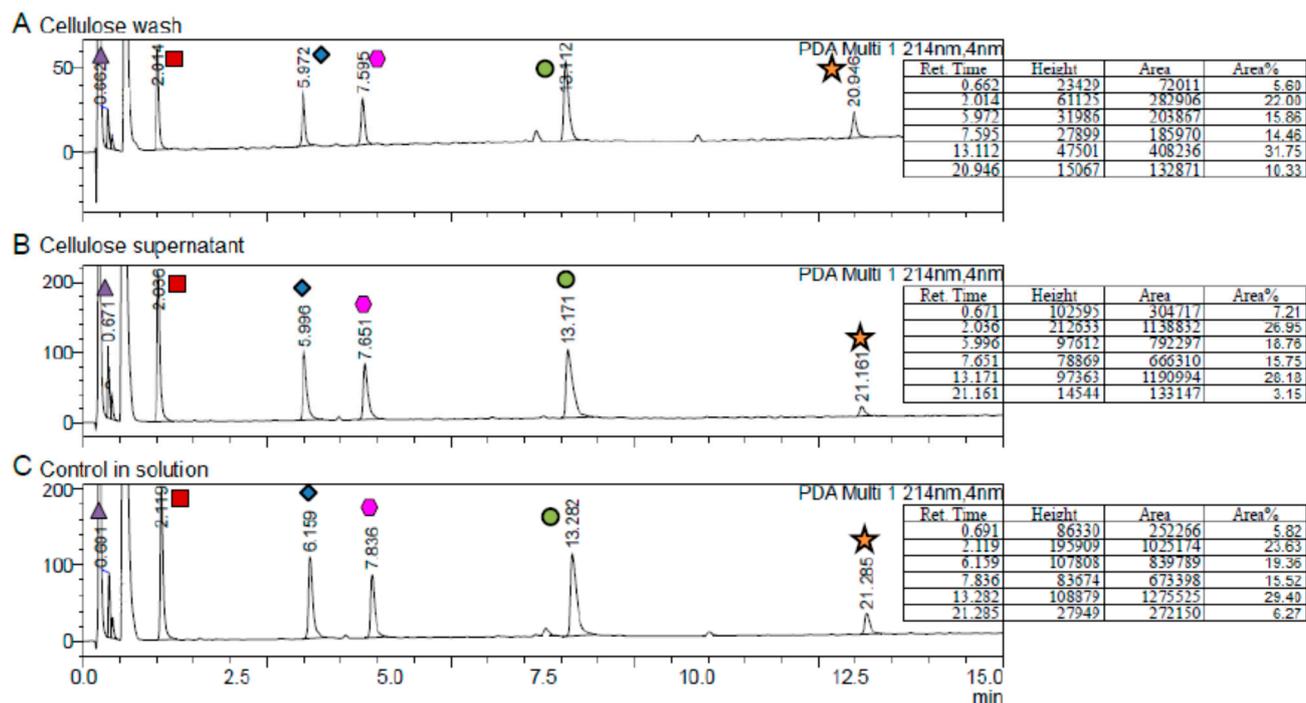


Figure S50. LC-MS chromatograms of the supernatants and washes of the competition experiments with benzylamine (Benz) and taurine (Taur) in presence of cellulose in MilliQ water compared to the control library in solution. **A:** wash of the cellulose; **B:** supernatant of the library in presence of cellulose; **C:** control library in solution. Method II, monitored at 214 nm. Products: \blacktriangle Gua-Taur₂; \blacksquare Gua-Taur; \blacklozenge Gua(OH)₂; \blacklozenge Gua-(Taur)(Benz); \bullet Gua-Benz and \star Gua-Benz₂.

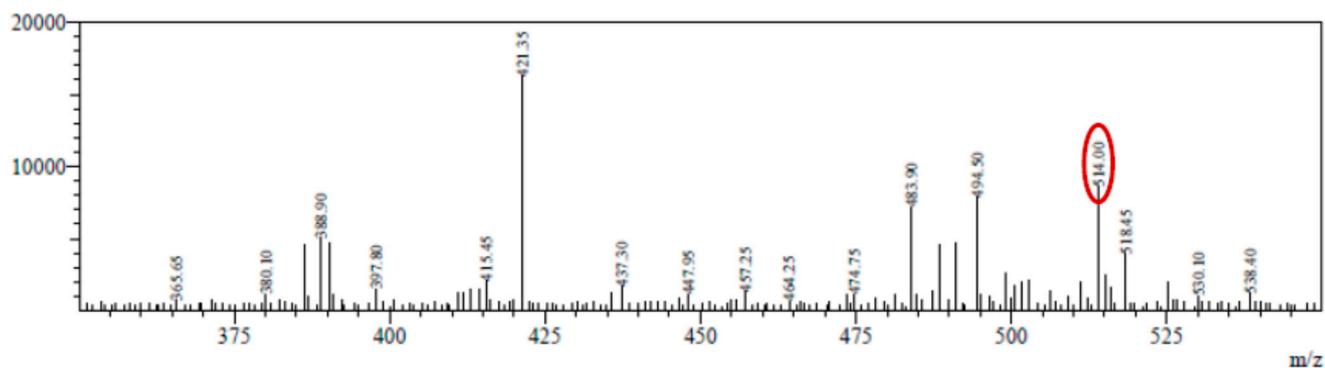


Figure S51. Extracted mass spectrum of the peak at 0.75 min in method II, corresponding to the product Gua-Taur₂. Calcd for C₂₁H₃₂N₅O₆S₂⁺ ([M]⁺): 514.18, found: 514.00.

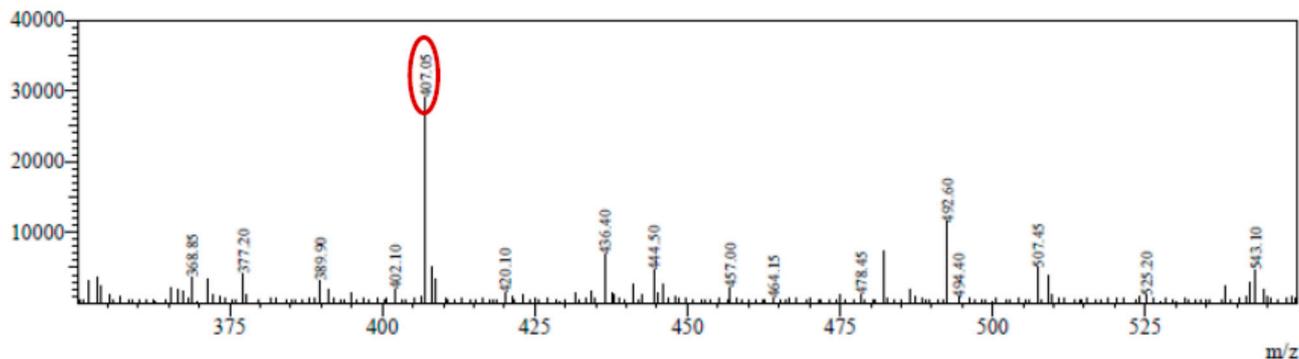


Figure S52. Extracted mass spectrum of the peak at 1.93 min in method II, corresponding to the product Gua-Taur. Calcd for $C_{19}H_{27}N_4O_4S^+$ ($[M]^+$): 407.17, found: 407.05.

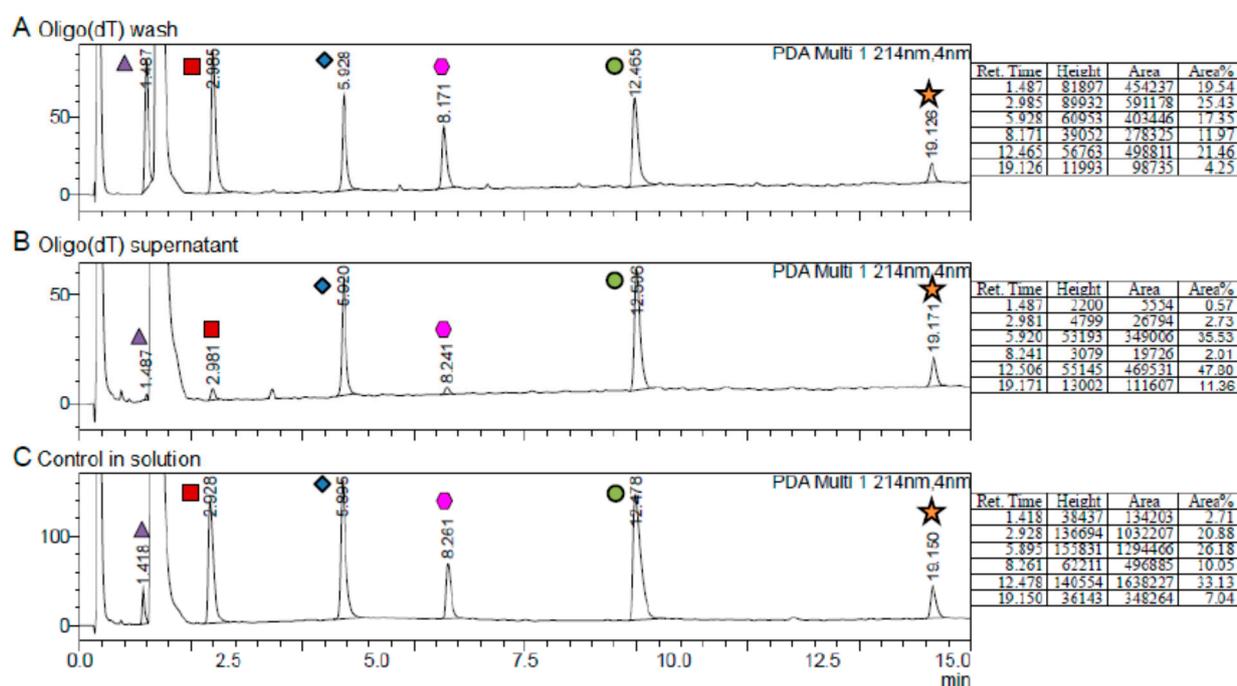


Figure S53. LC-MS chromatograms of the supernatants and washes of the competition experiments with L-phenylalanine (Phe) and L-arginine (Arg) in presence of oligo(dT) on cellulose in MilliQ water compared to the control library in solution. **A:** wash of the oligo(dT) on cellulose; **B:** supernatant of the library in presence of oligo(dT) on cellulose; **C:** control library in solution. Method II, monitored at 214 nm. Products: \blacktriangle Gua-Arg₂; \blacksquare Gua-Arg; \blacklozenge Gua(OH)₂; \blacklozenge Gua-(Phe)(Arg); \bullet Gua-Phe and \star Gua-Phe₂.

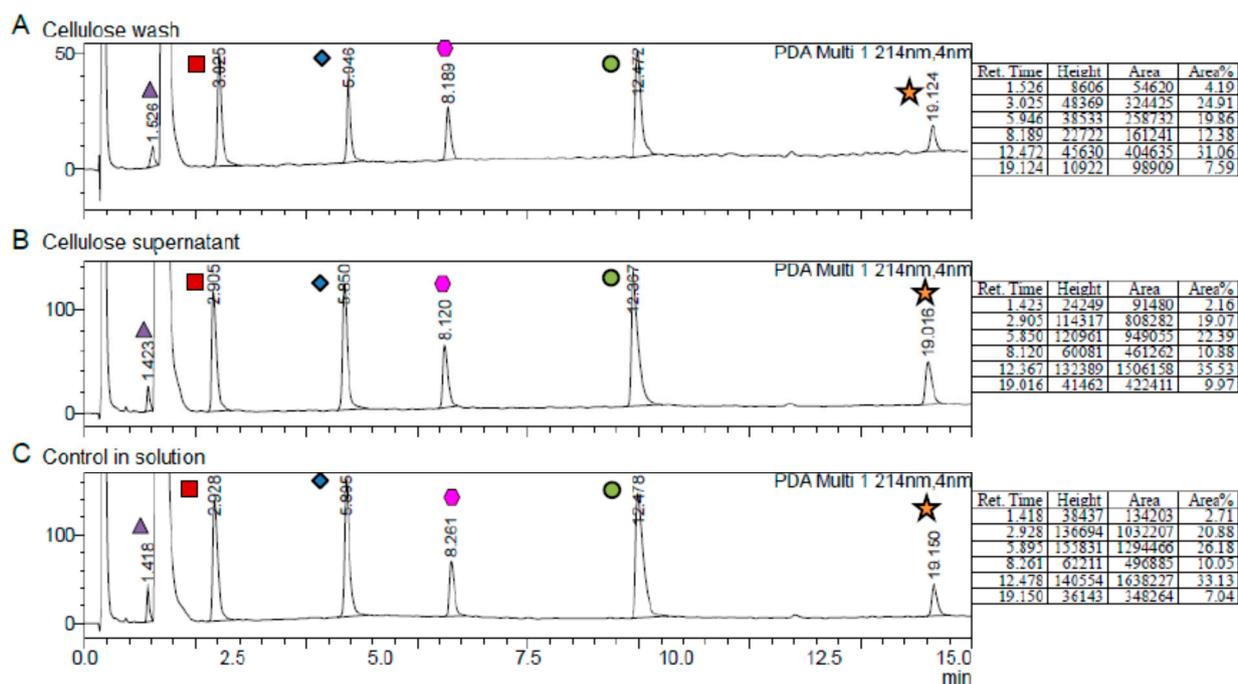


Figure S54. LC-MS chromatograms of the supernatants and washes of the competition experiments with L-phenylalanine (Phe) and L-arginine (Arg) in presence of cellulose in MilliQ water compared to the control library in solution. **A:** wash of the cellulose; **B:** supernatant of the library in presence of cellulose; **C:** control. Method II, monitored at 214 nm. Products: \blacktriangle Gua-Arg₂; \blacksquare Gua-Arg; \blacklozenge Gua(OH)₂; \blacklozenge Gua-(Phe)(Arg); \bullet Gua-Phe and \star Gua-Phe₂.

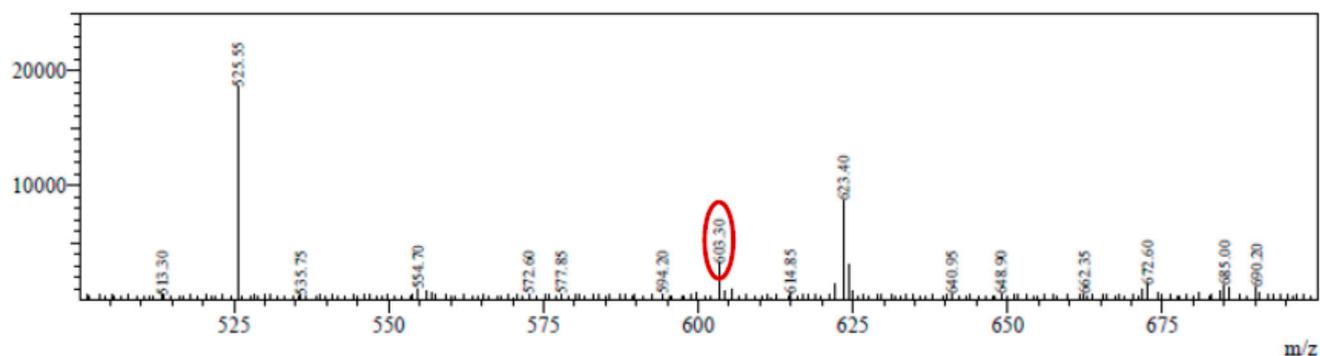


Figure S55. Extracted mass spectrum of the peak at 8.37 min in method II, corresponding to the product Gua-(Phe)(Arg). Calcd for C₃₂H₄₃N₈O₄⁺ ([M]⁺): 603.34, found: 603.30.