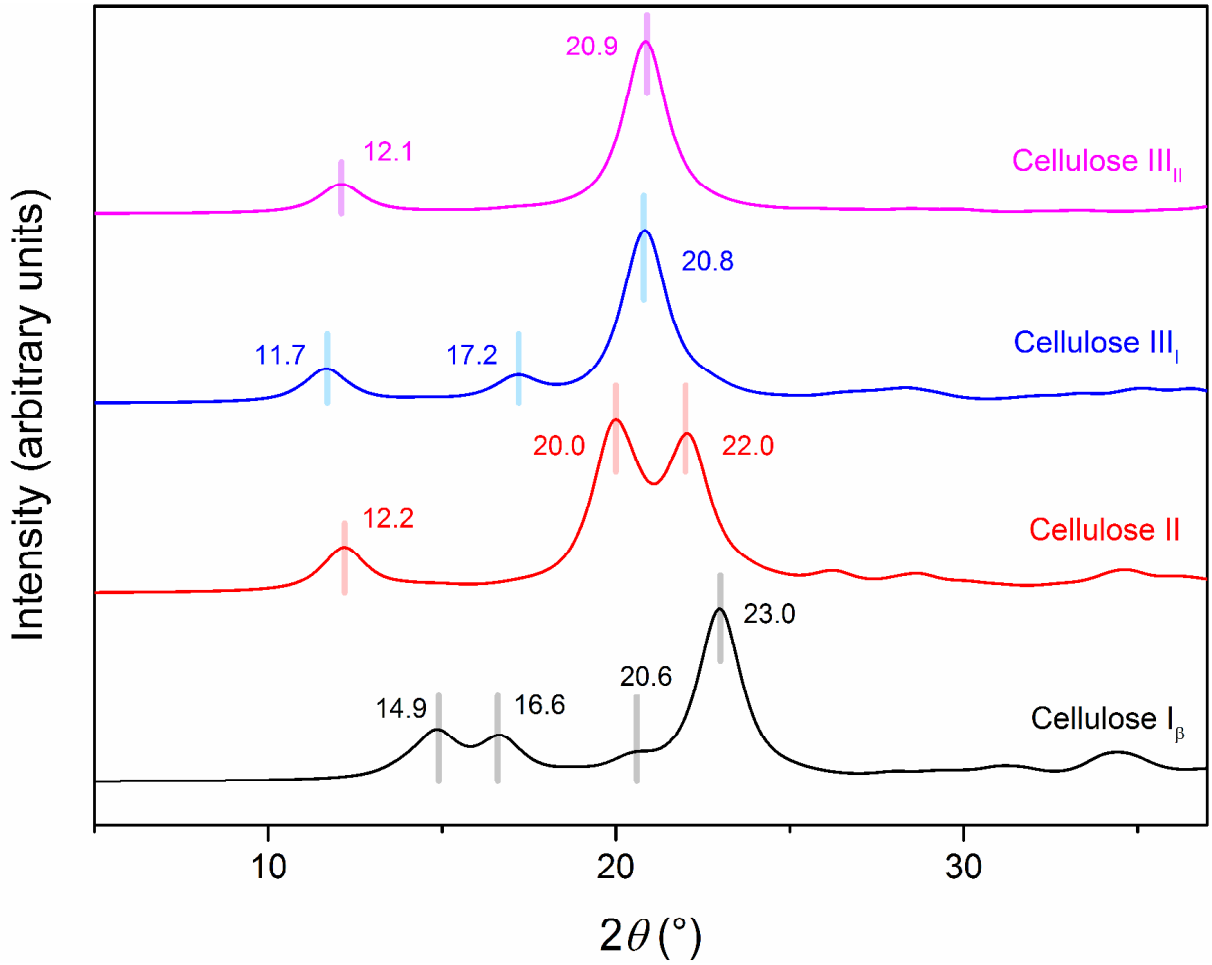
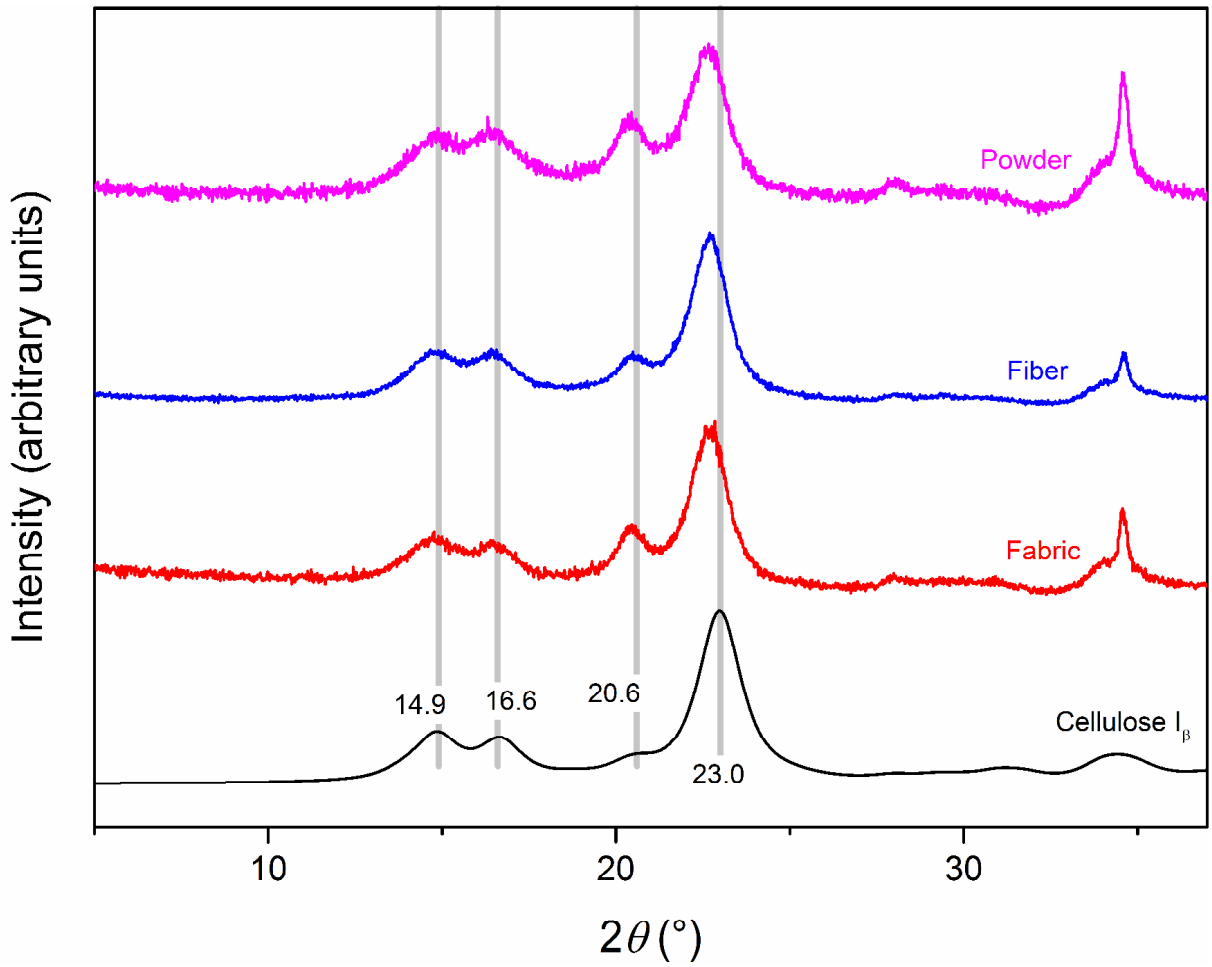
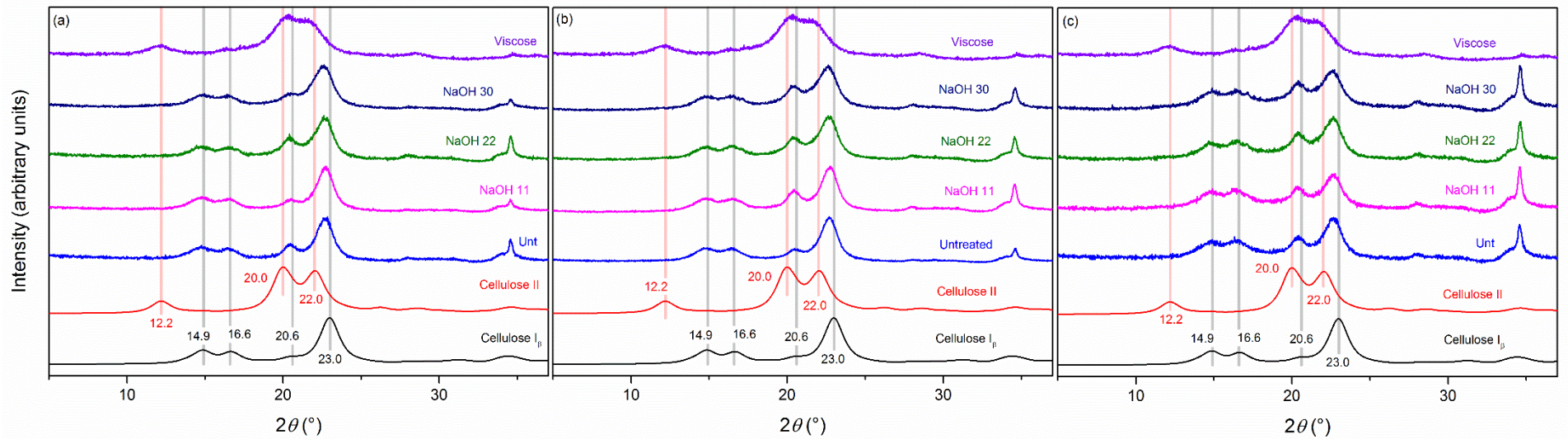


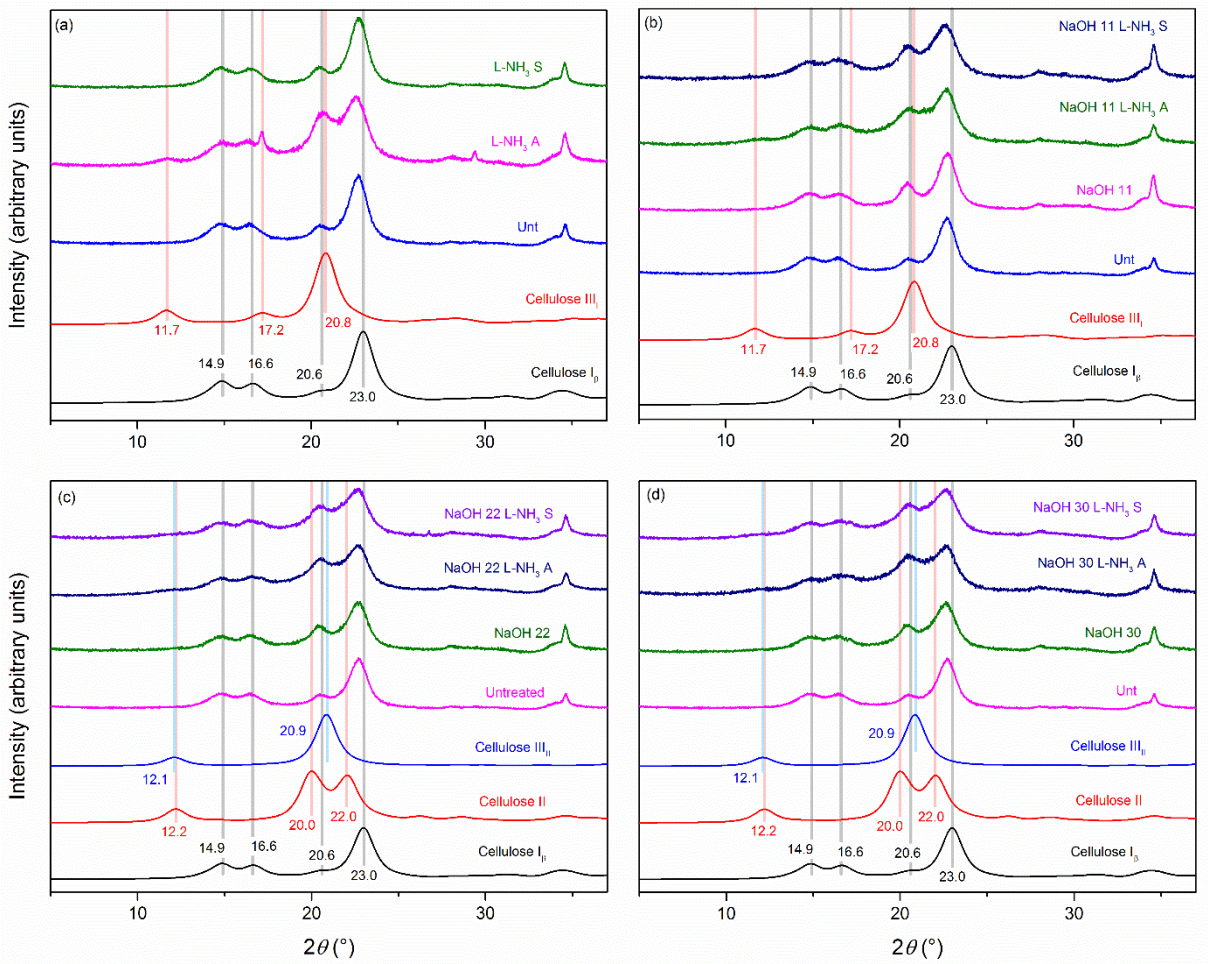
Supplementary Figure 1. Model X-ray diffractograms calculated for the different cellulose allomorphs, obtained from *French AD (2014) Idealized powder diffraction patterns for cellulose polymorphs. Cellulose 21 (2):885-896*. https://doi.org/10.1007/s10570-013-0030-4



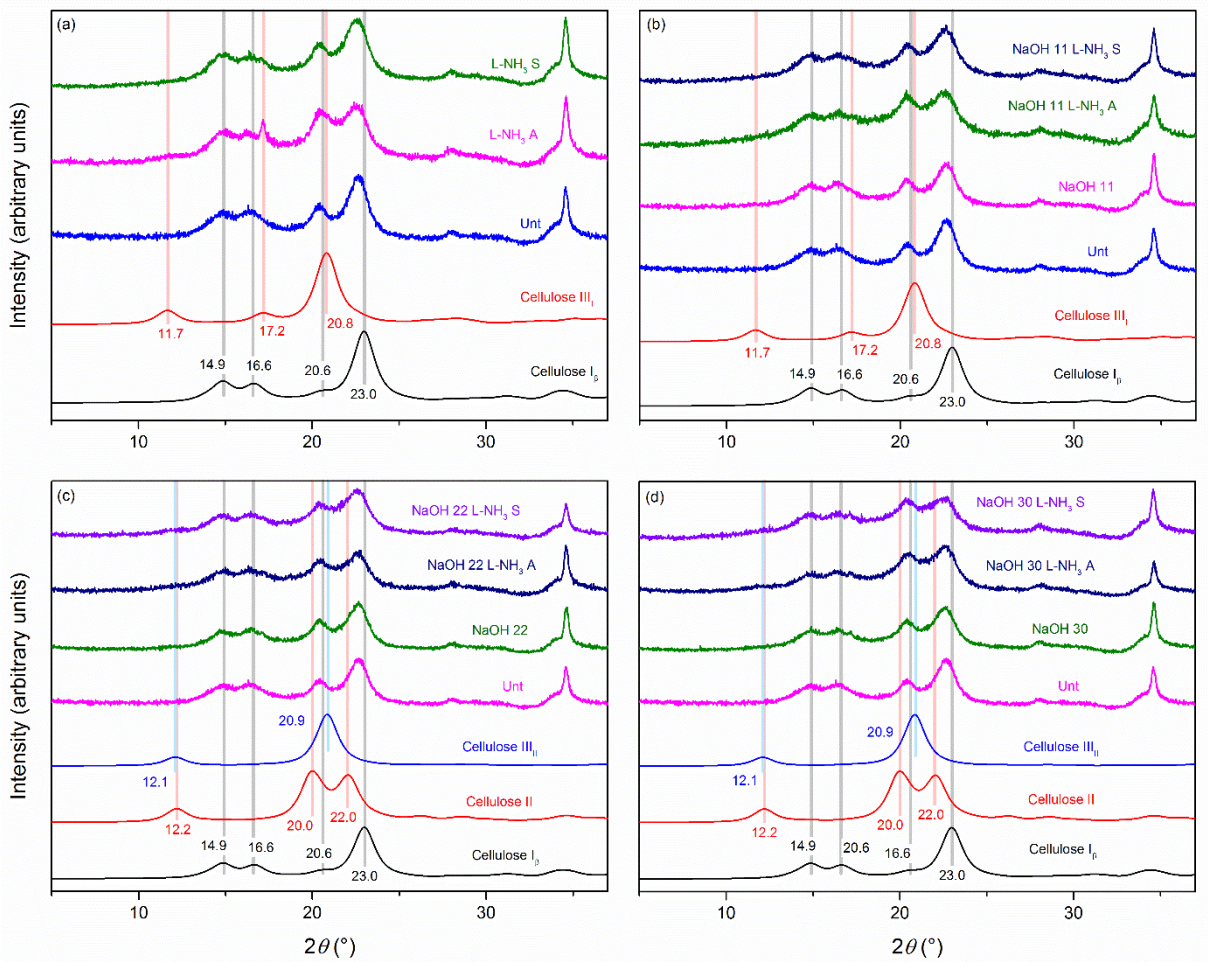
Supplementary Figure 2. Representative X-ray diffractograms measured on fabric, fiber and powder specimens of untreated samples. A model diffractogram of Cellulose I_β is included for comparisons.



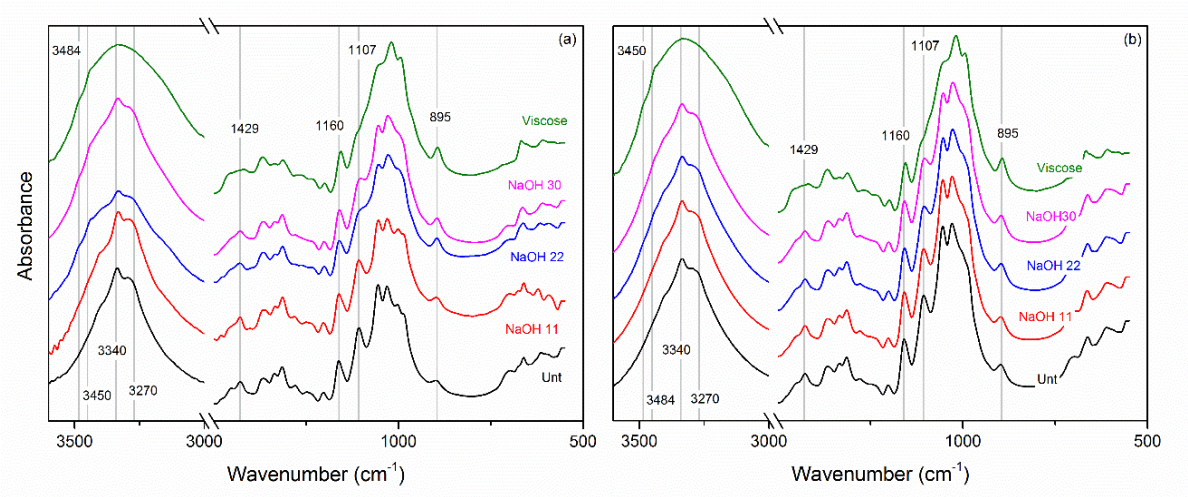
Supplementary Figure 3. X-ray diffractograms measured on (a) fabric, (b) fiber, (c) powder specimens from samples treated with 11% NaOH (w/w), 22% NaOH (w/w) and 30% NaOH (w/w). The plots include results from a viscose fabric (as reference), and model diffractograms of the Cellulose I_β and II allomorphs for comparison.



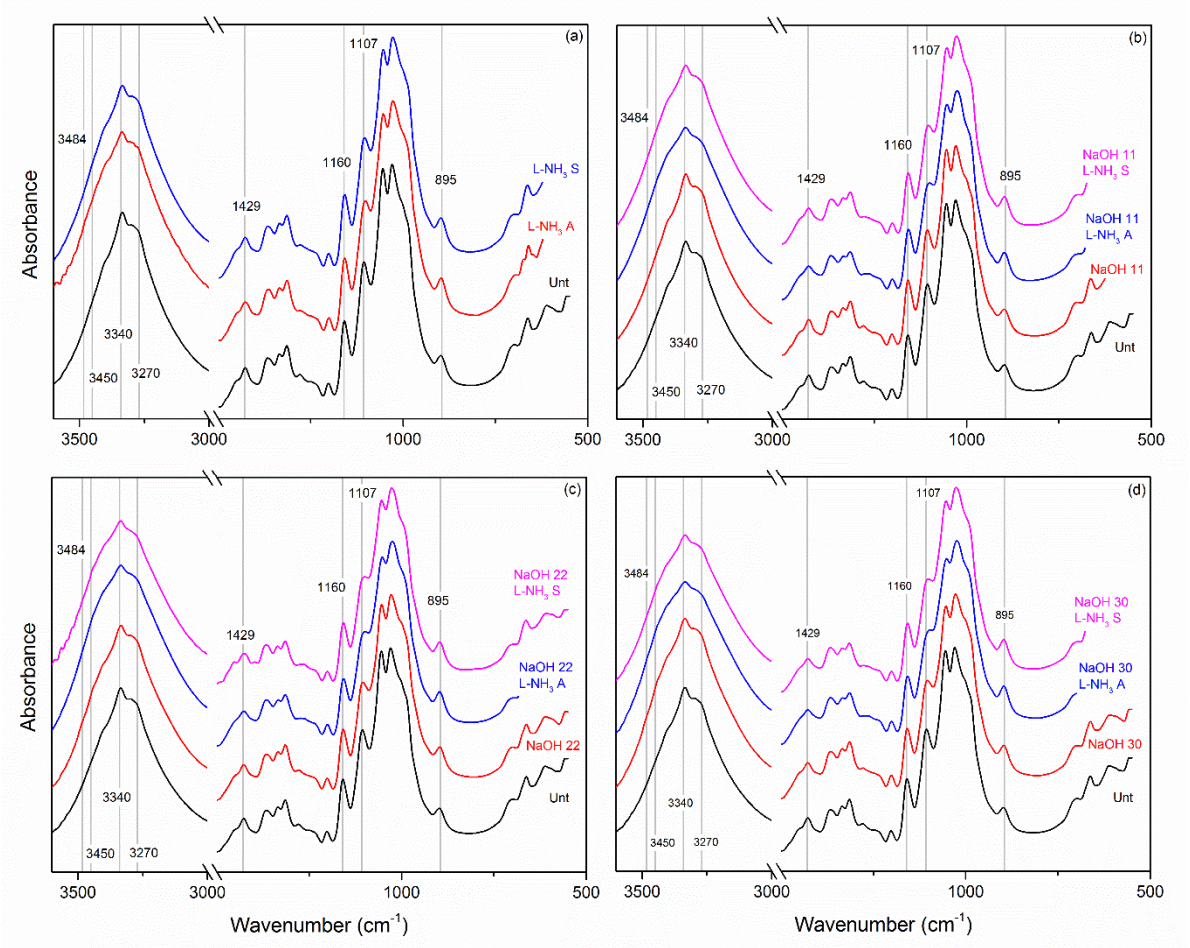
Supplementary Figure 4. Representative X-ray diffractograms from measurements on fiber specimens of samples treated with: (a) L-NH_3 alone (b) 11% NaOH (w/w), alone and followed by L-NH_3, (c) 22% NaOH (w/w), alone and followed by L-NH_3, (d) 30% NaOH (w/w), alone and followed by L-NH_3. The results from untreated specimens and model diffractograms of the Cellulose I_β, II, III_I and III_{II} allomorphs are included for comparison.



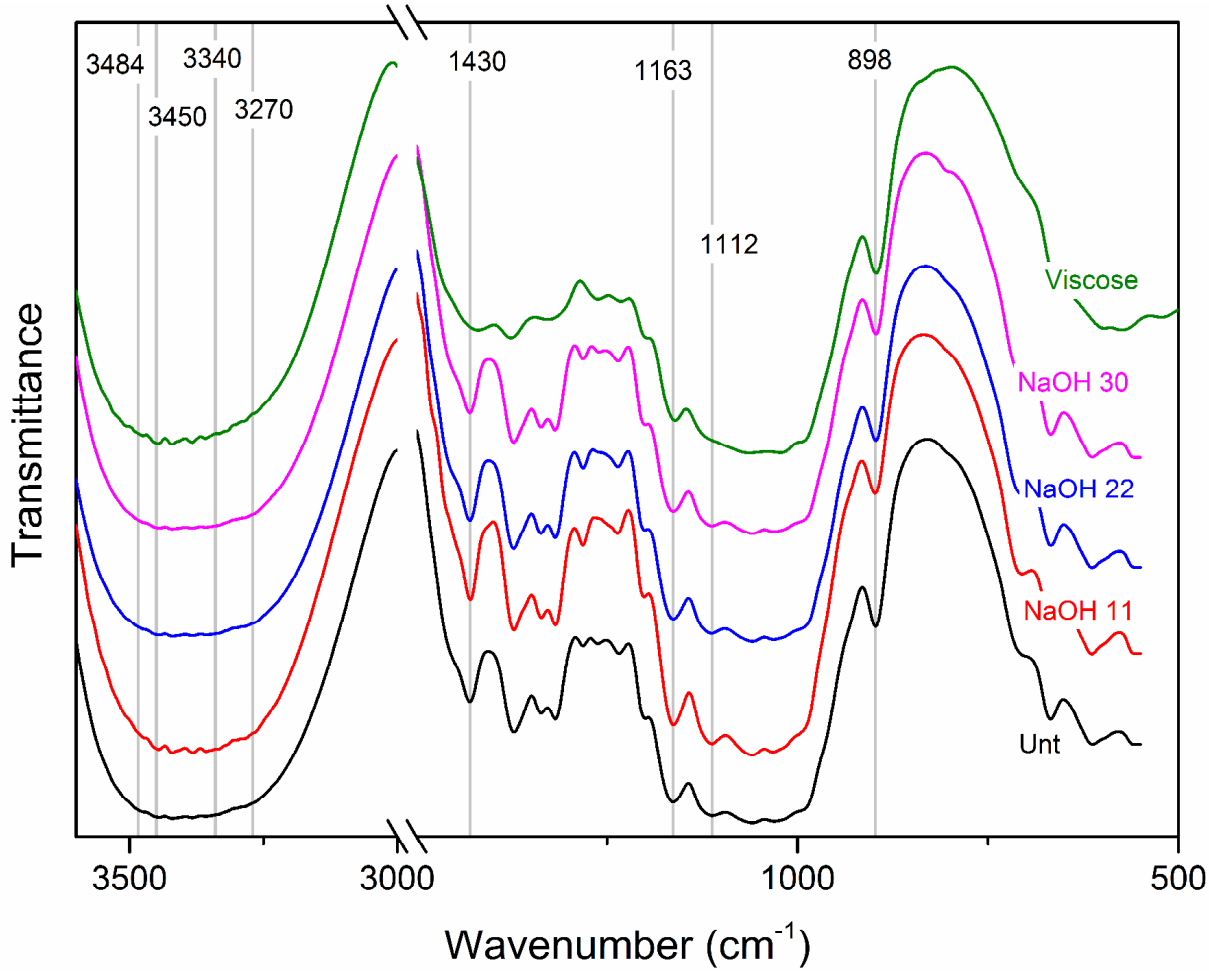
Supplementary Figure 5. Representative X-ray diffractograms from measurements on powder specimens of samples treated with: (a) L-NH_3 alone (b) 11% NaOH (w/w), alone and followed by L-NH_3, (c) 22% NaOH (w/w), alone and followed by L-NH_3, (d) 30% NaOH (w/w), alone and followed by L-NH_3. The results from untreated specimens and model diffractograms of the Cellulose I_β, II, III_I and III_{II} allomorphs are included for comparison.



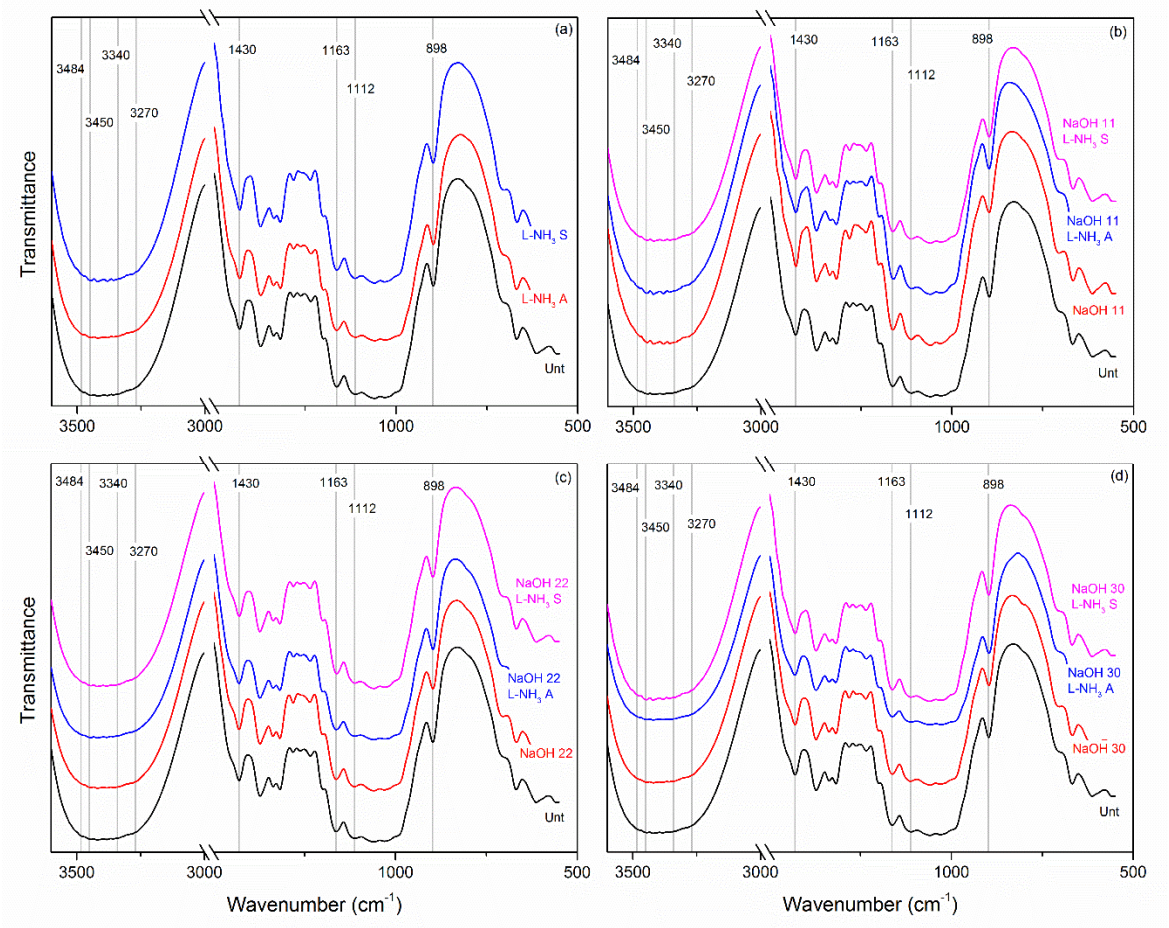
Supplementary Figure 6. Representative FTIR-ATR absorbance spectra measured on (a) fabric, (b) powder specimens from samples treated with 11% NaOH (w/w), 22% NaOH (w/w) and 30% NaOH (w/w). The plots also include results from a viscose fabric (as reference).



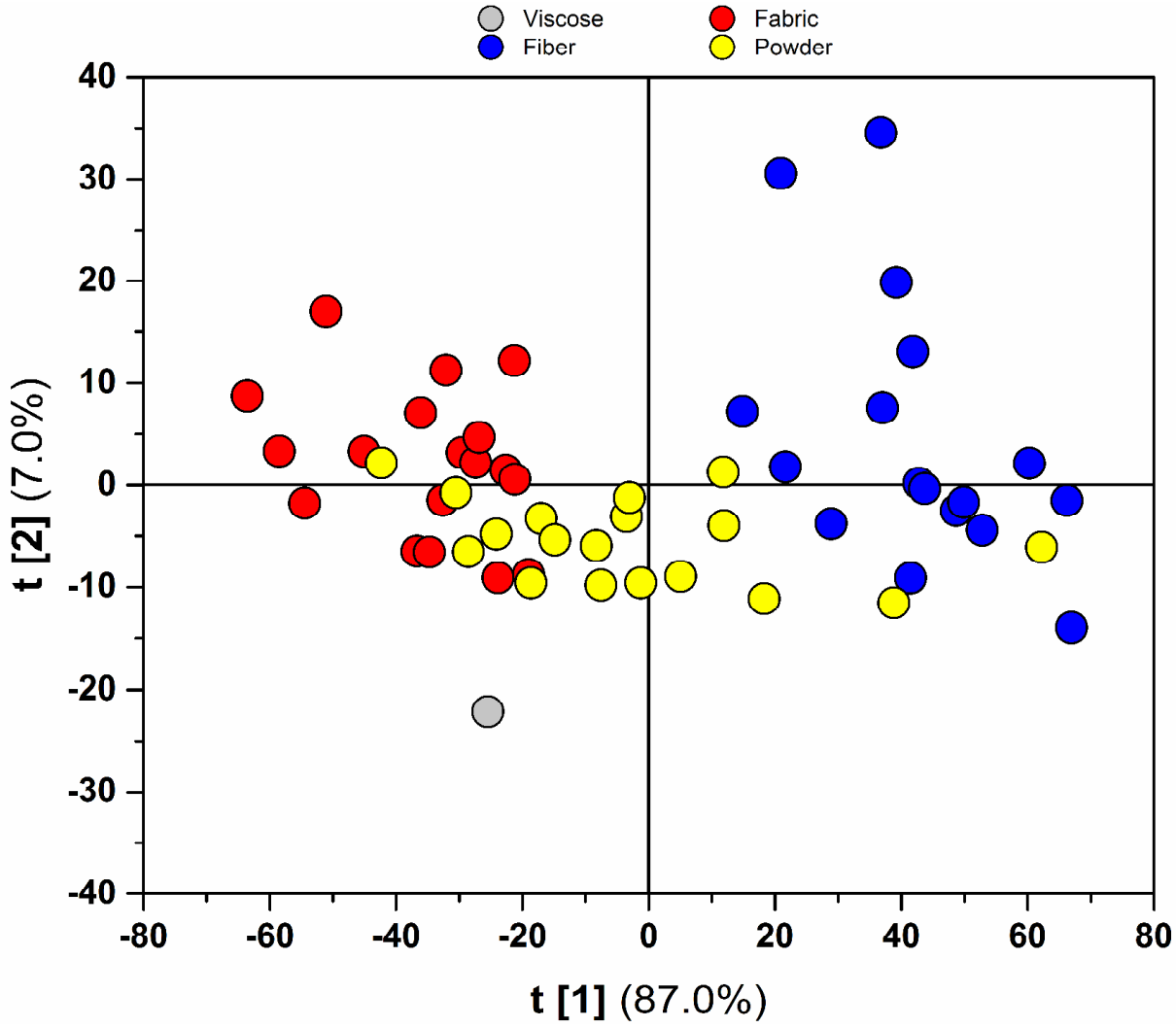
Supplementary Figure 7. Representative FTIR-ATR absorbance spectra from measurements on powder specimens of samples treated with: (a) L-NH3 alone (b) 11% NaOH (w/w), alone and followed by L-NH3, (c) 22% NaOH (w/w), alone and followed by L-NH3, (d) 30% NaOH (w/w), alone and followed by L-NH3.



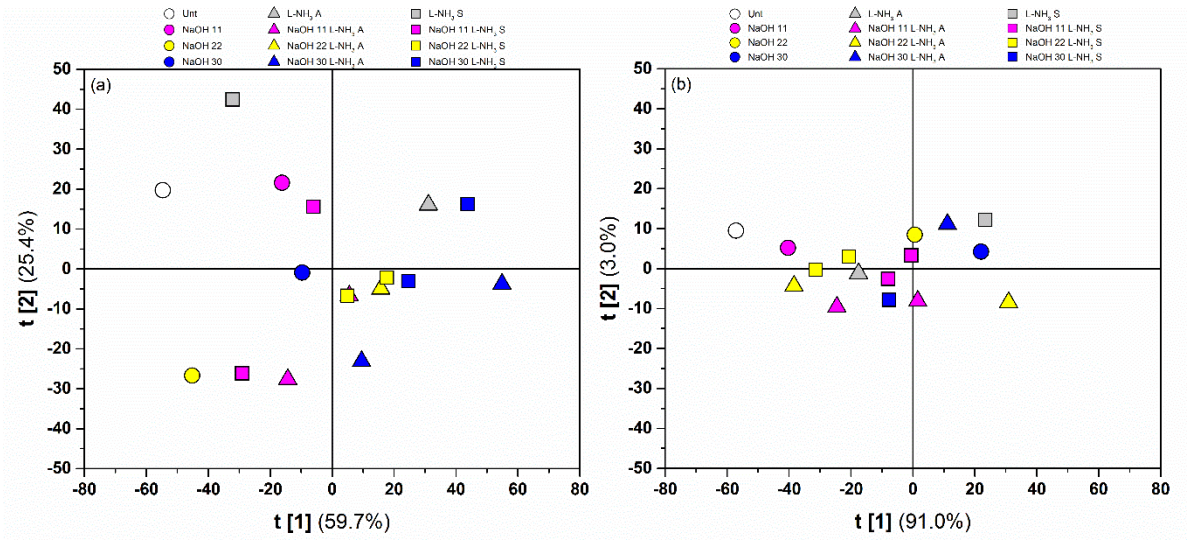
Supplementary Figure 8. FTIR transmittance measured with powder specimens from samples treated with 11% NaOH (w/w), 22% NaOH (w/w) and 30% NaOH (w/w). The plots also include results from a viscose powder (as reference).



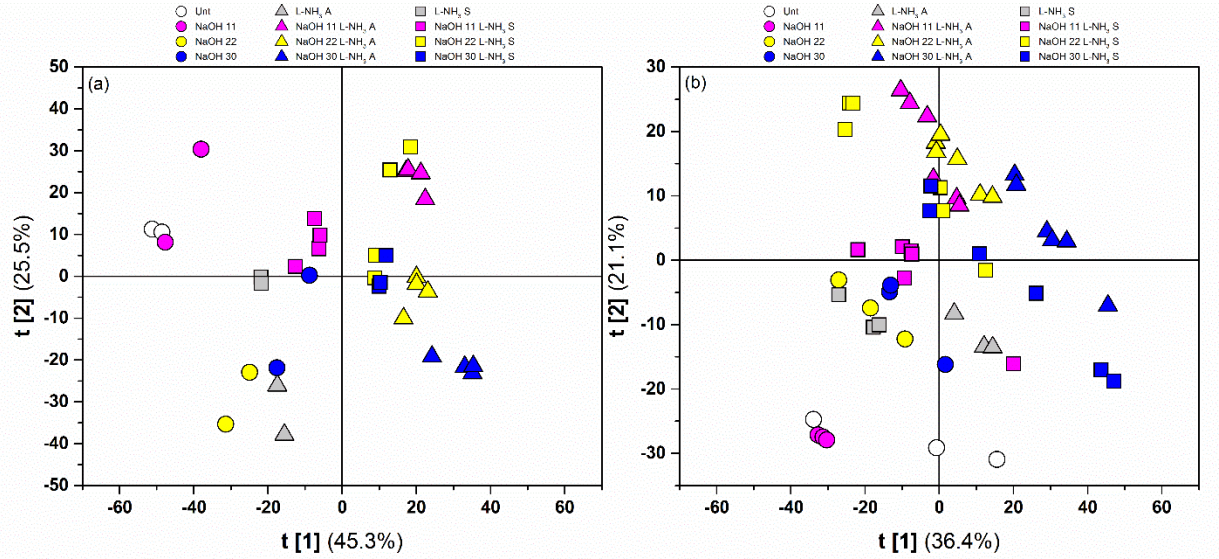
Supplementary Figure 9. FTIR transmittance measured with powder specimens from samples treated with (a) L-NH_3, (b) 11% NaOH (w/w) + L-NH_3, (c) 22% NaOH (w/w) + L-NH_3, (d) 30% NaOH (w/w) + L-NH_3.



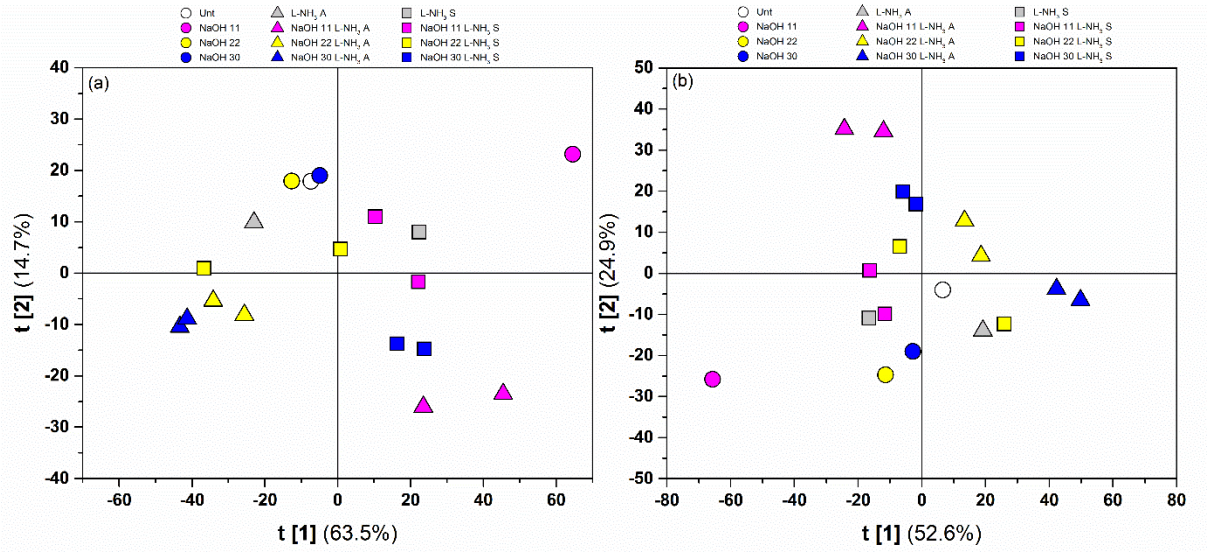
Supplementary Figure 10. Score-score plot of the first two PCs from a combined analysis of all measured diffractograms.



Supplementary Figure 11. Score-score plots of the first two PCs from analysis of diffractograms measured on (a) fiber and (b) powder specimens.



Supplementary Figure 12. Score-score plots of the first two PCs from analysis of the 1500–400 cm^{-1} region in FTIR-ATR spectra measured on powder specimens from the (a) Invenio S and (b) Vertex 70 spectrometers.



Supplementary Figure 13. Score-score plots of the first two PCs from analysis of FTIR transmittance spectra of the (a) 3675–2600 cm^{-1} and (b) 1500–400 cm^{-1} regions.