SUPPORTING PILs

Levulinate amidinium protic ionic liquids (PILs) as suitable media for the dissolution and levulination of cellulose

Stefano Becherini, [a] Andrea Mezzetta, [a] Cinzia Chiappe, [a] and Lorenzo Guazzelli, *[a]

Supporting Information

Table of contents

[a] Dr A. Mezzetta, Mr S. Becherini, Prof. C. Chiappe, Dr L. Guazzelli
Department of Pharmacy
University of Pisa
Via Bonanno 6, Pisa (Italy)
*E-mail: lorenzo.guazzelli@unipi.it

Fig S1. ^{1}H NMR of **DBUHLev** at 25 °C

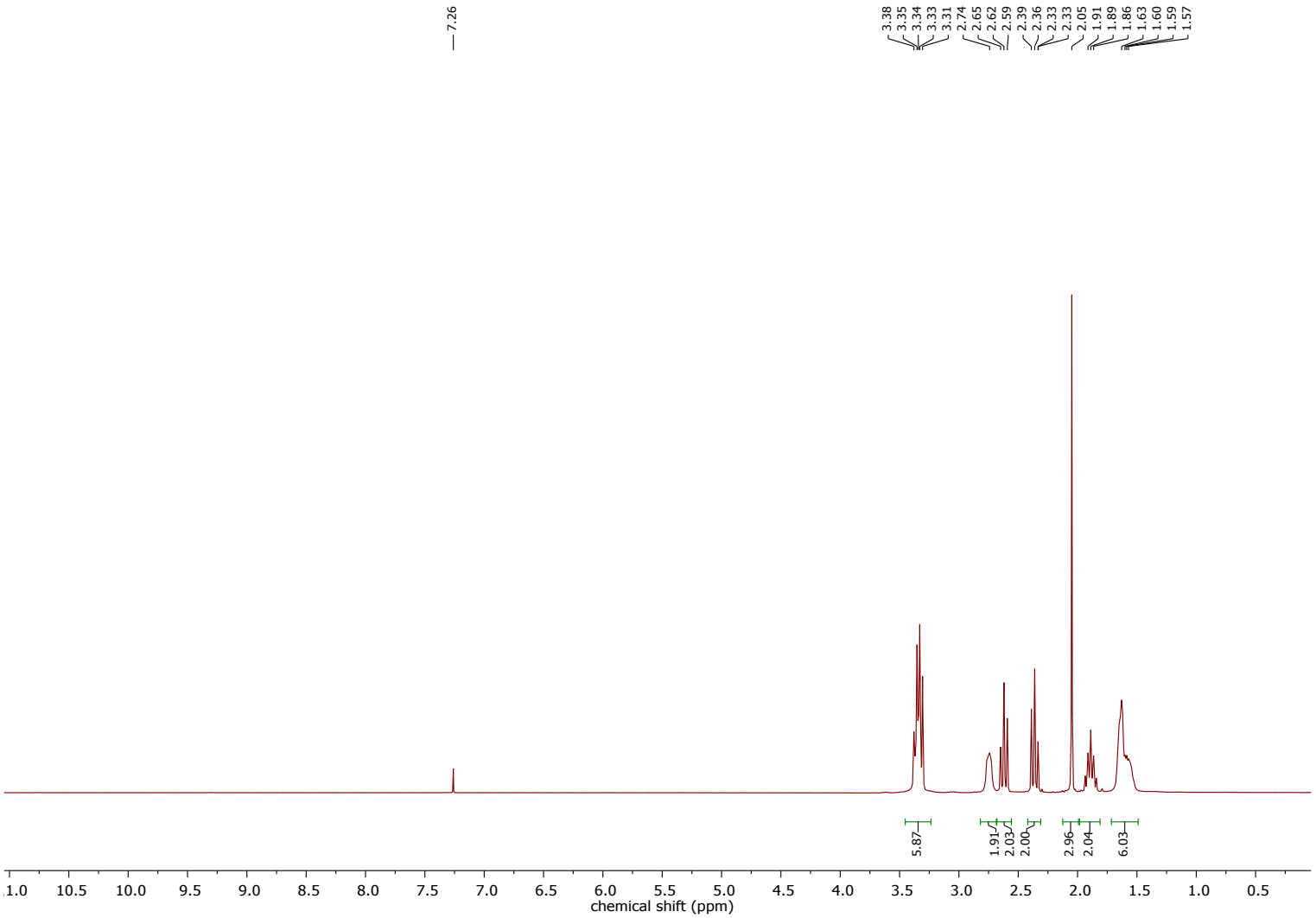


Fig S2. ^{13}C NMR of **DBUHLev** at 25 °C

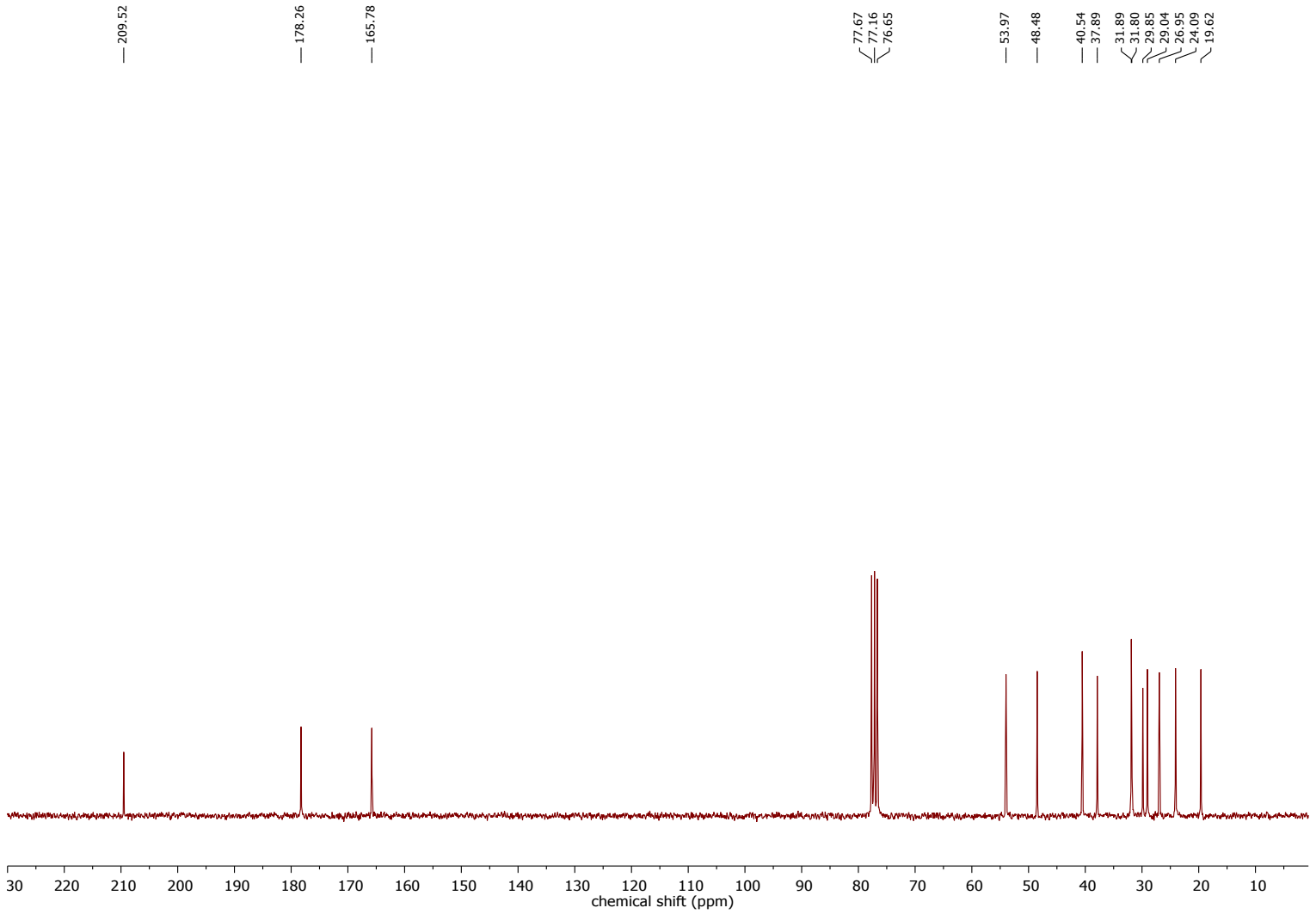


Fig S3. ^{1}H NMR of **DBNHLev** at 25 °C

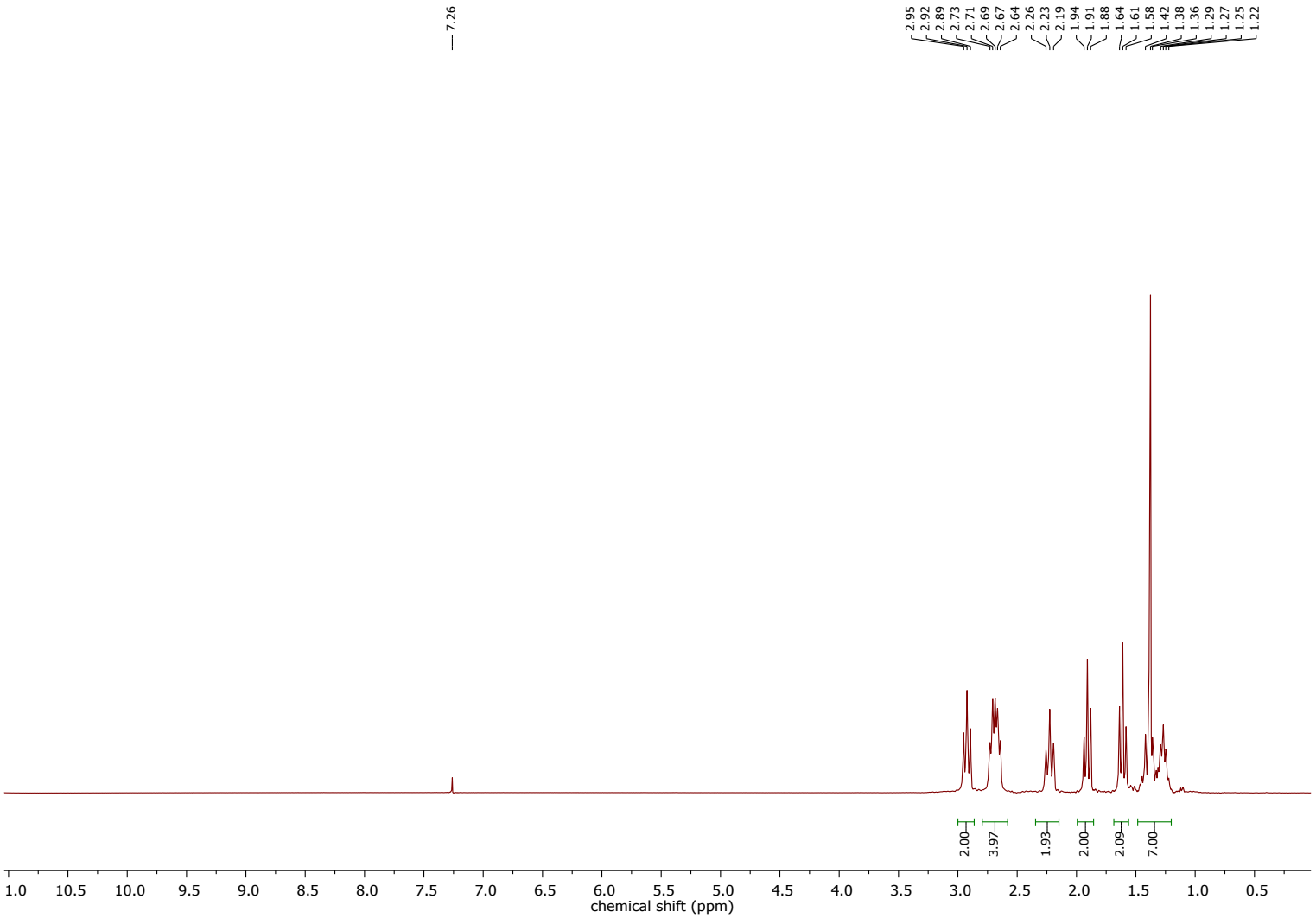


Fig S4. ^{13}C NMR of **DBNHLev** at 25 °C

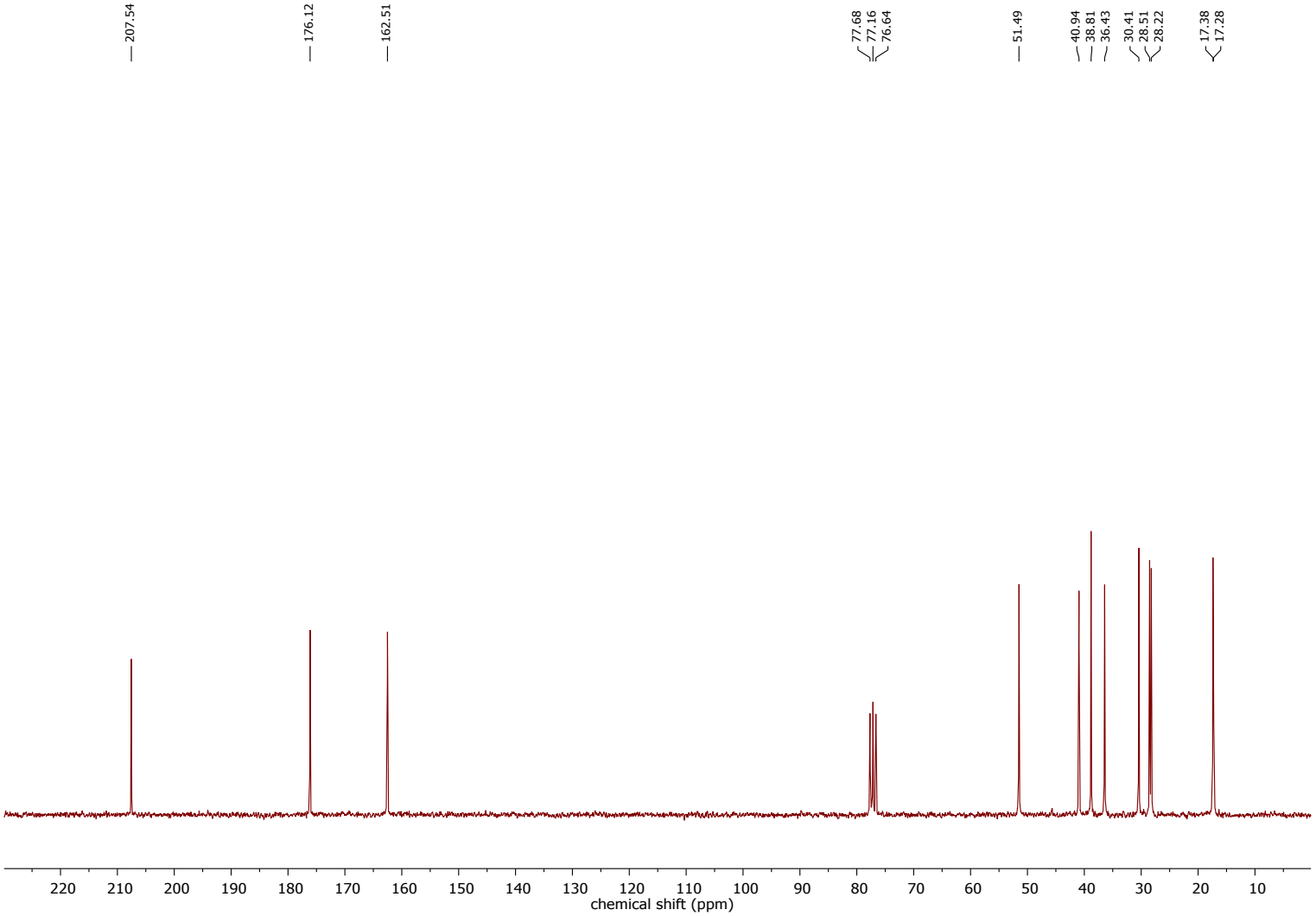


Fig S5. IR of **DBUHLev** at 25 °C

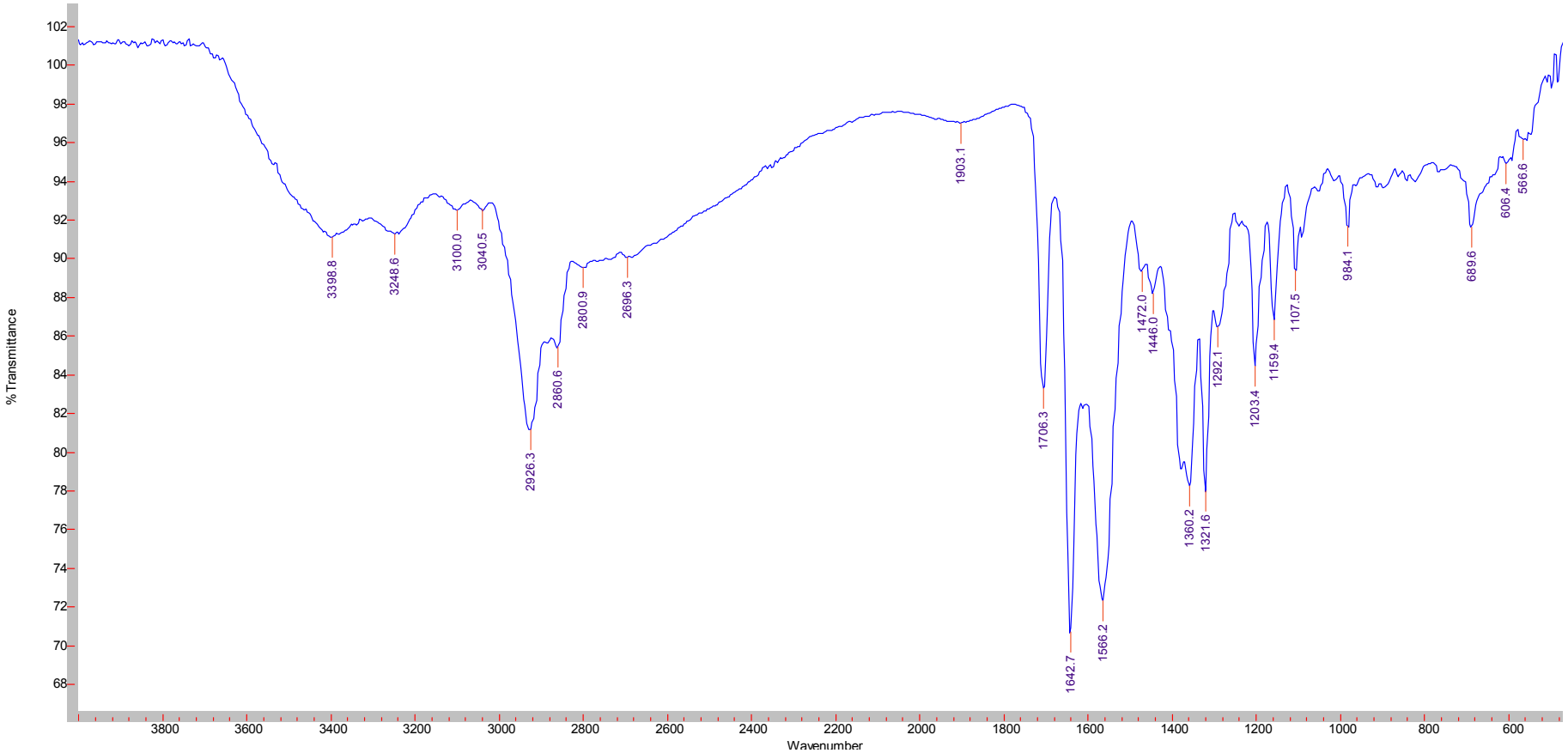


Fig S6. IR of **DBNHLev** at 25 °C

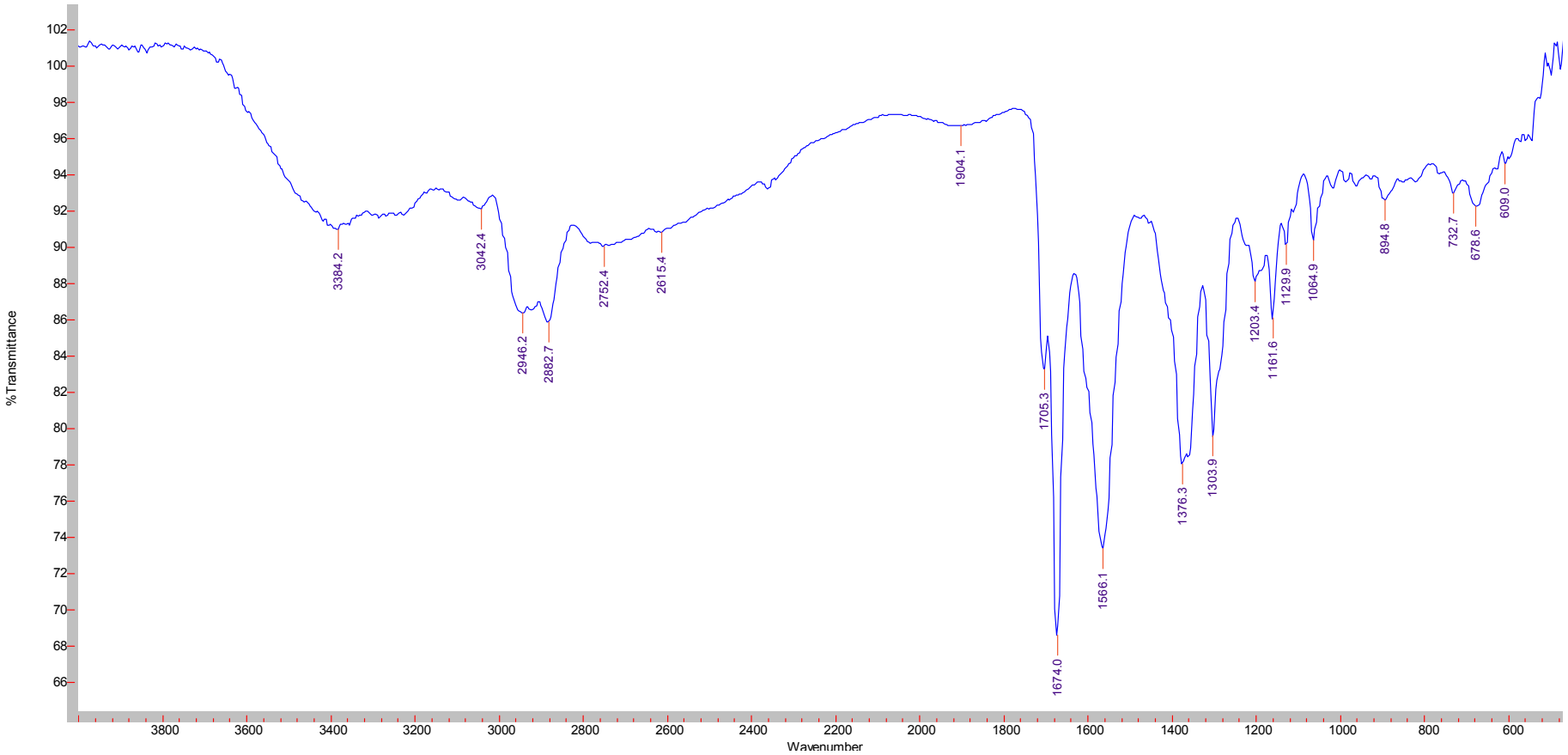


Fig S7. Thermal gravimetric analysis (TGA) of **DBUHLev**

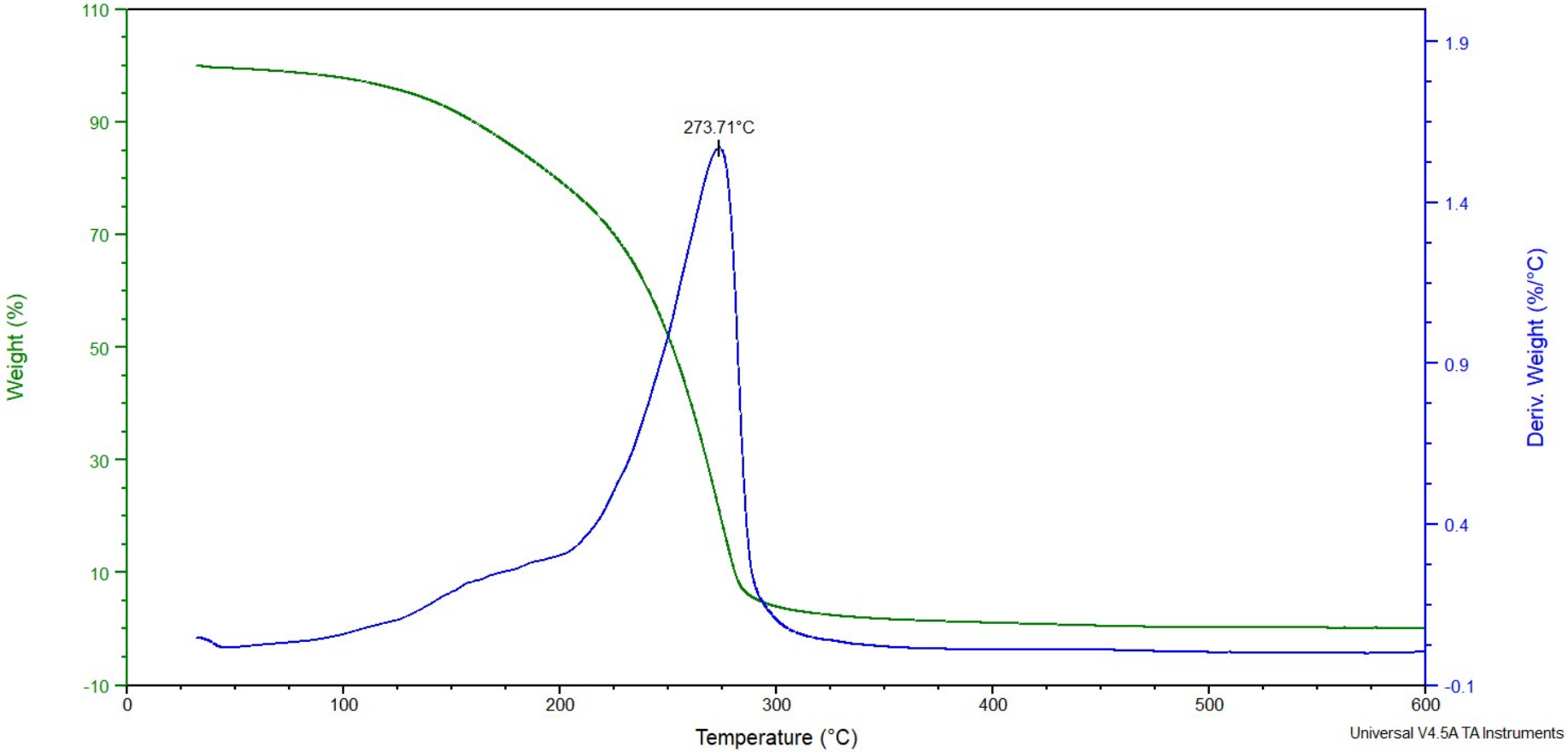


Fig S8. Thermal gravimetric analysis (TGA) of **DBNHLev**

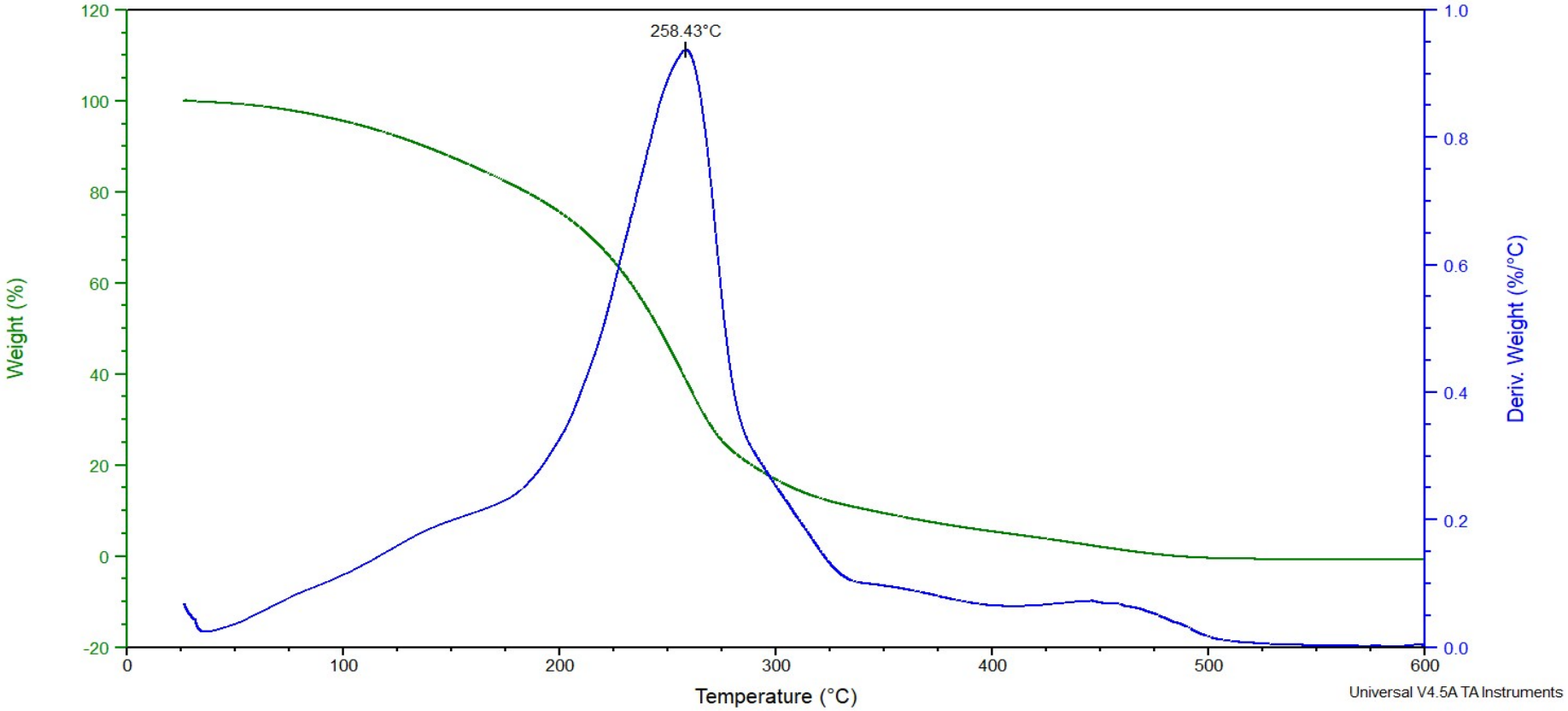


Fig S9. Pictures of dissolved MCC in **DBUHLev**: 80 °C, 12.5 wt% (**A**); 100 °C, 15 wt%(**B)**

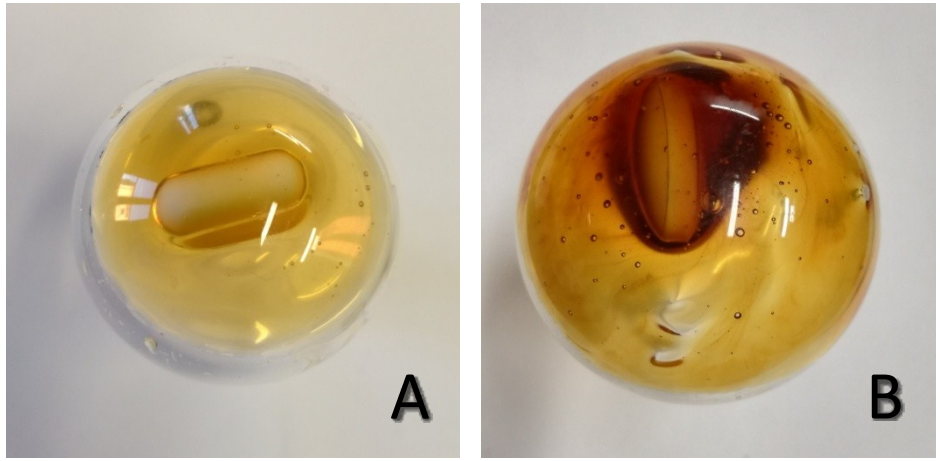


Fig S10. Pictures of dissolved MCC in **DBNHLev**: 60 °C, 12 wt% (**A**); 80 °C, 16 wt% (**B**); 100 °C, 20 wt%(**C**)

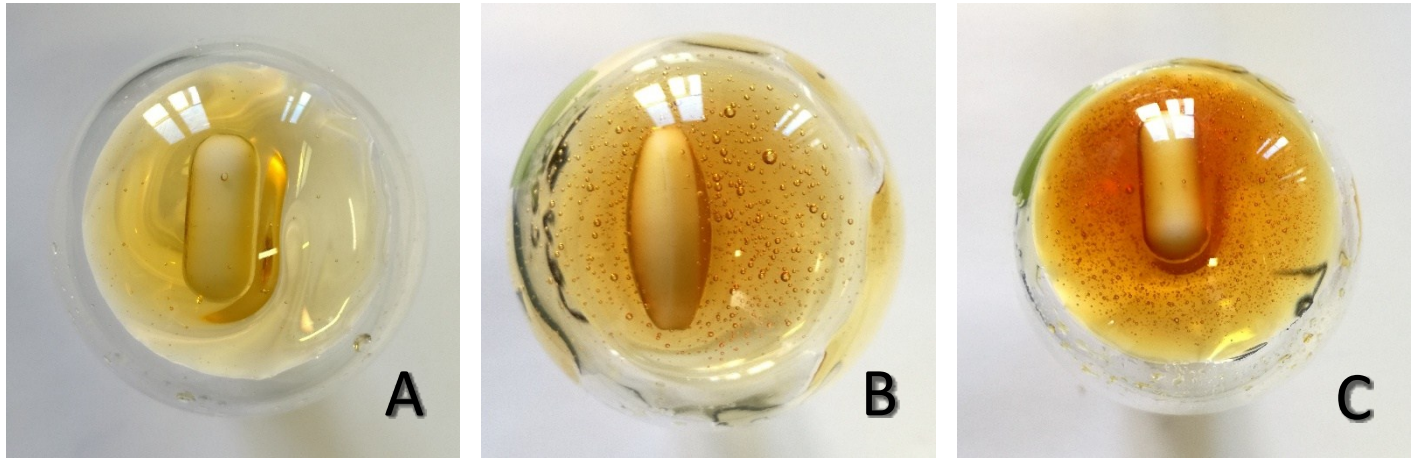
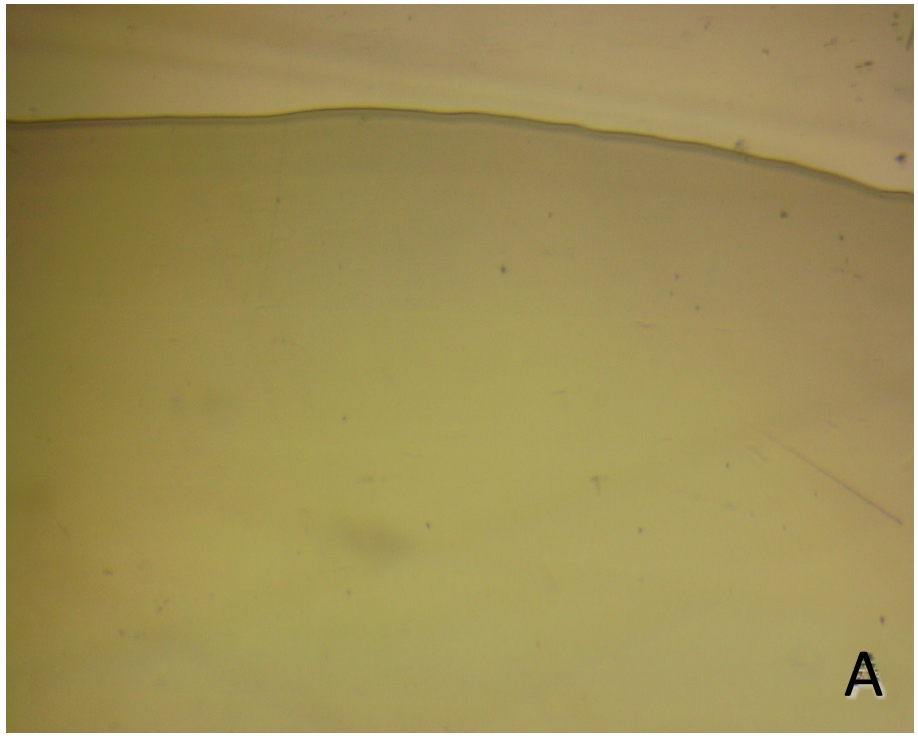


Fig S11. Optical microscopy of microcrystalline cellulose dissolved in **DBNHLev** (100 °C, 20 wt%), 4x(**A**) and 15x (**B**)



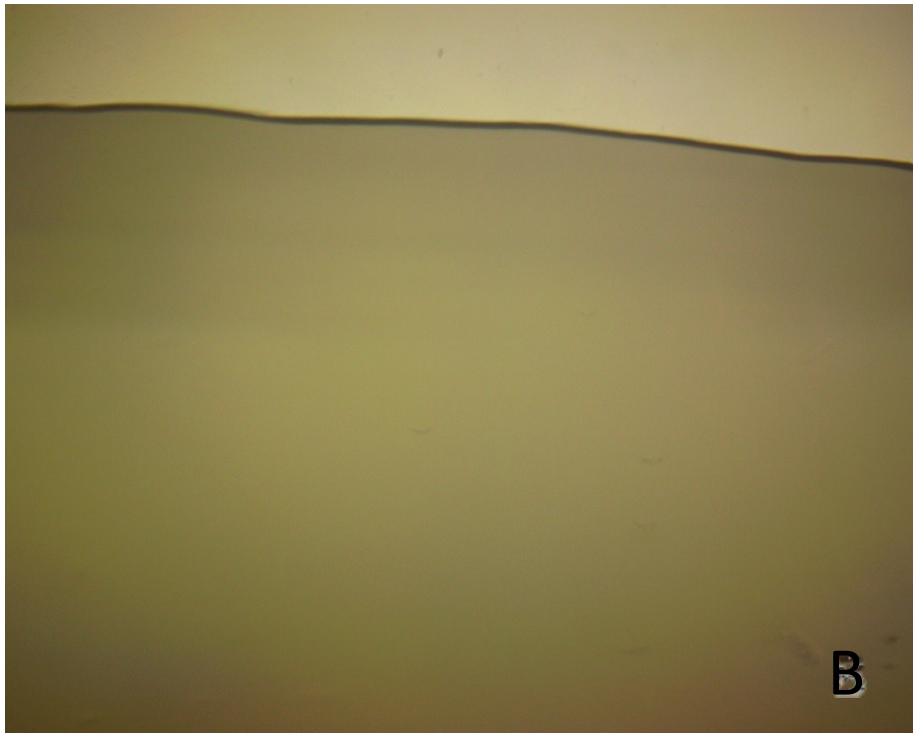


Fig S12. Optical microscopy of microcrystalline cellulose dissolved in **DBUHLev** (100 °C, 15 wt%), 4x(**A**) and 15x (**B**)

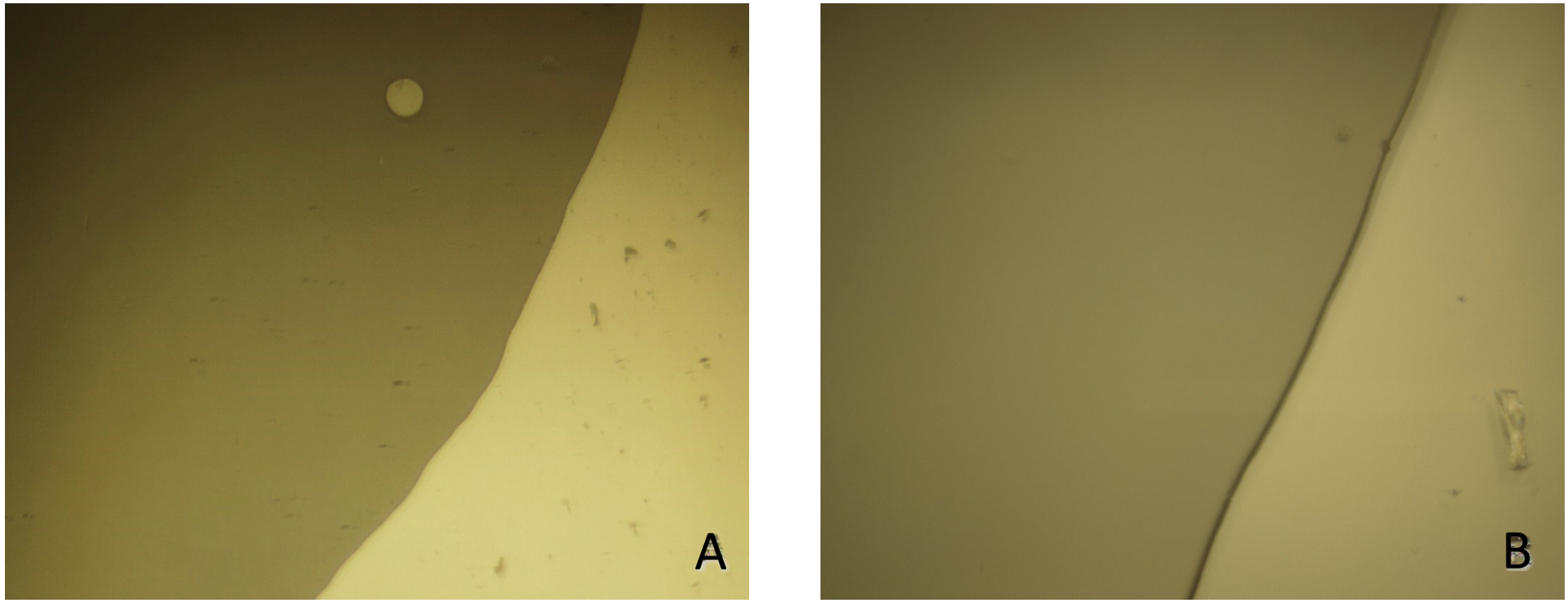


Fig S13. IR of MCC

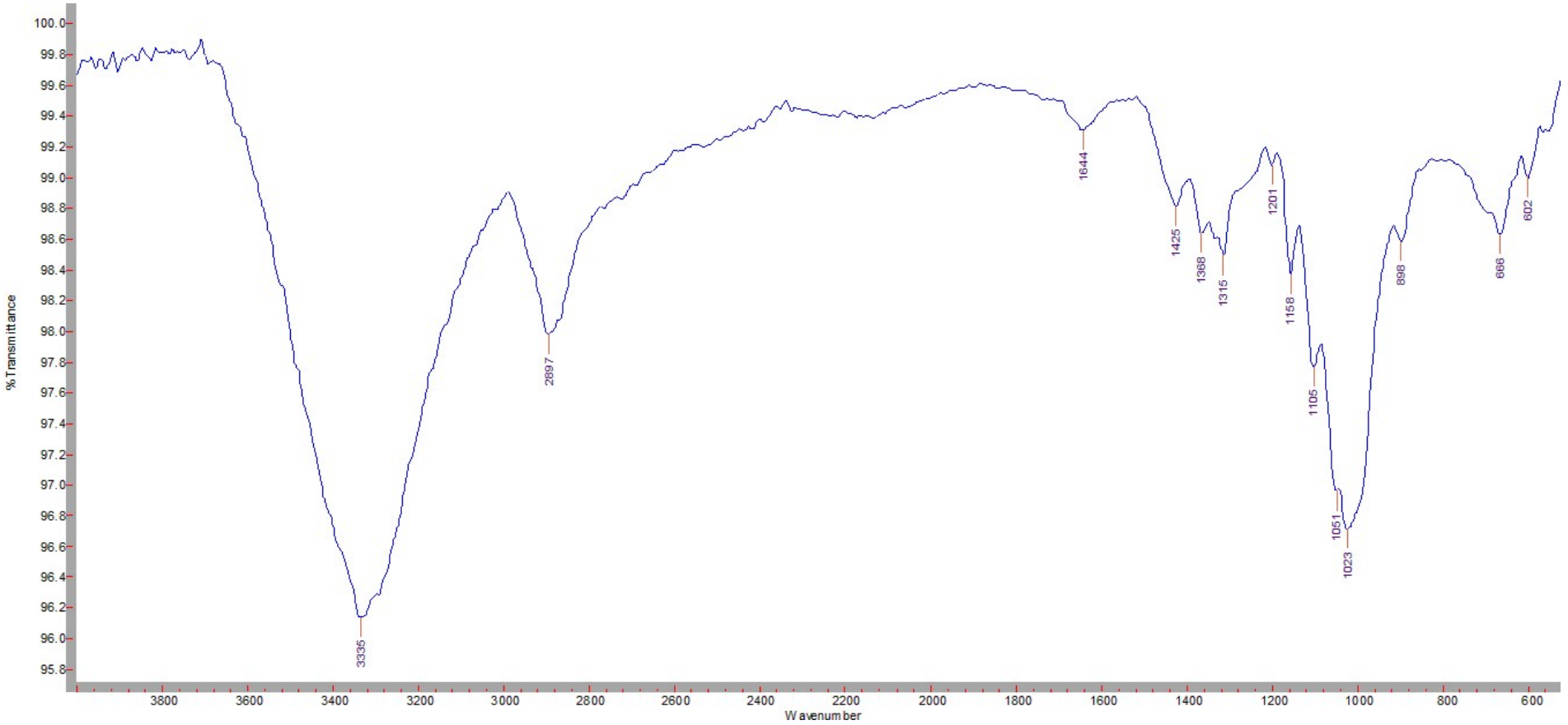


Fig S14. IR of regenerated cellulose after dissolution in **DBUHLev** at 100 °C

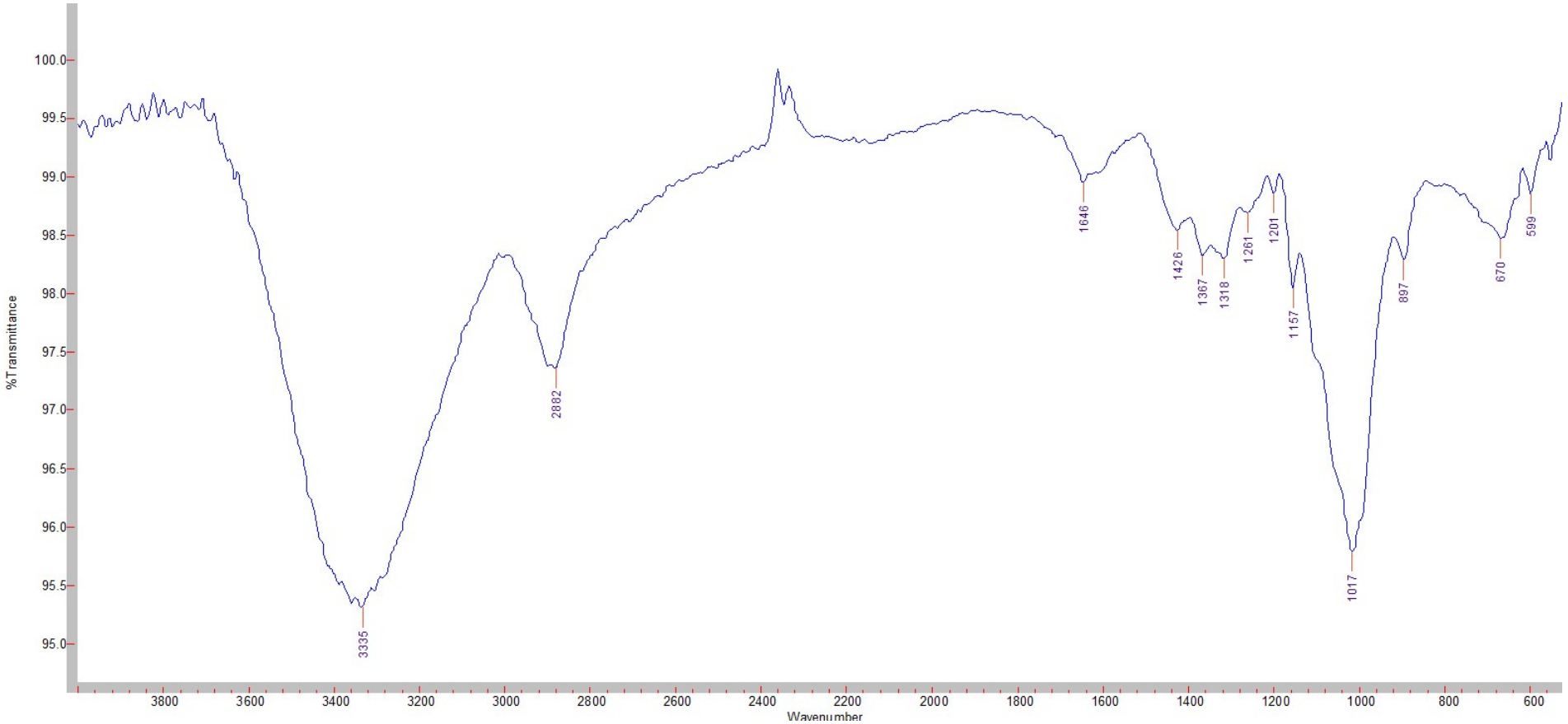


Fig S15. IR of regenerated cellulose after dissolution in **DBNHLev** at 100 °C

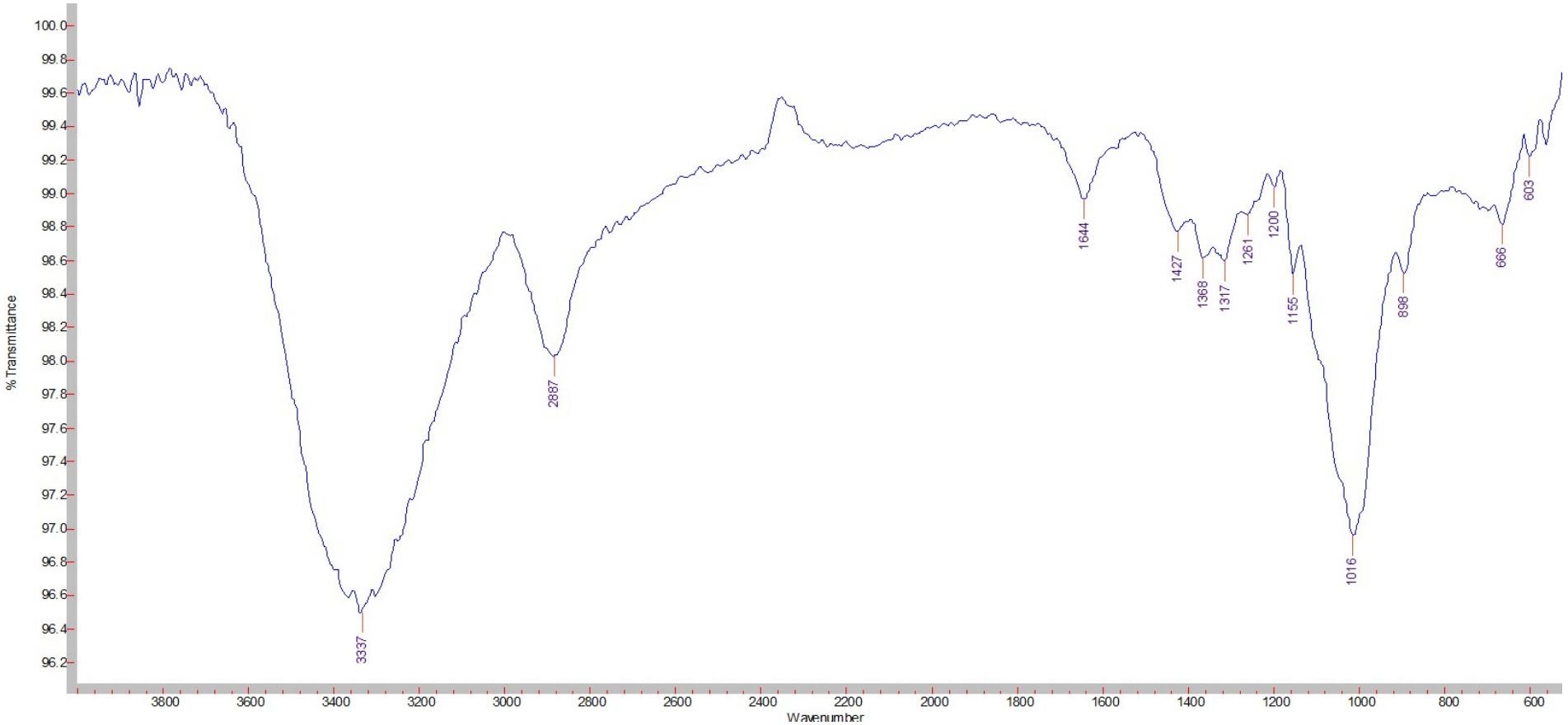


Fig S16. ^{1}H-NMR of Levulinic Anhydride

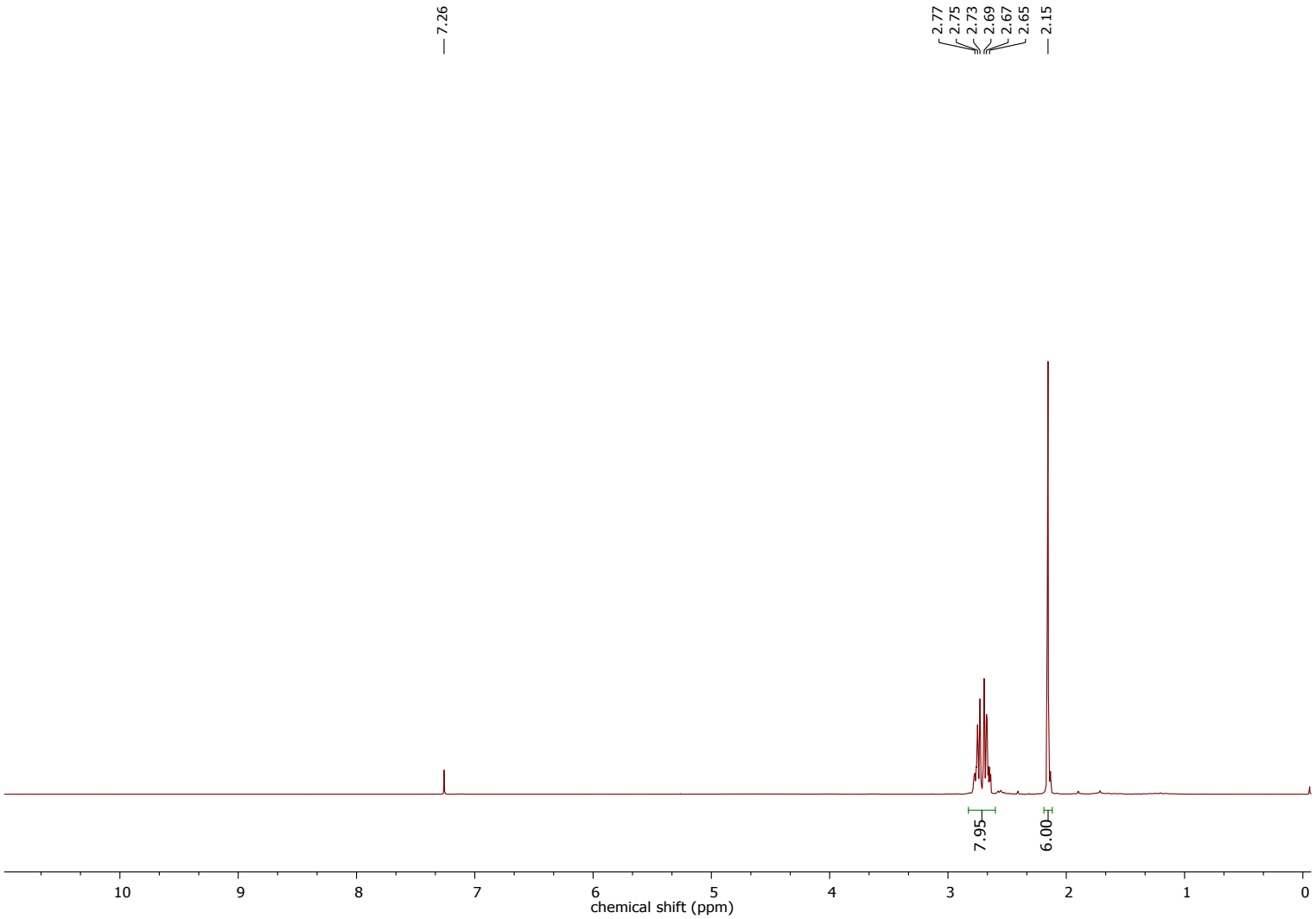


Fig S17. ^{13}C-NMR of Levulinic Anhydride at 25 °C

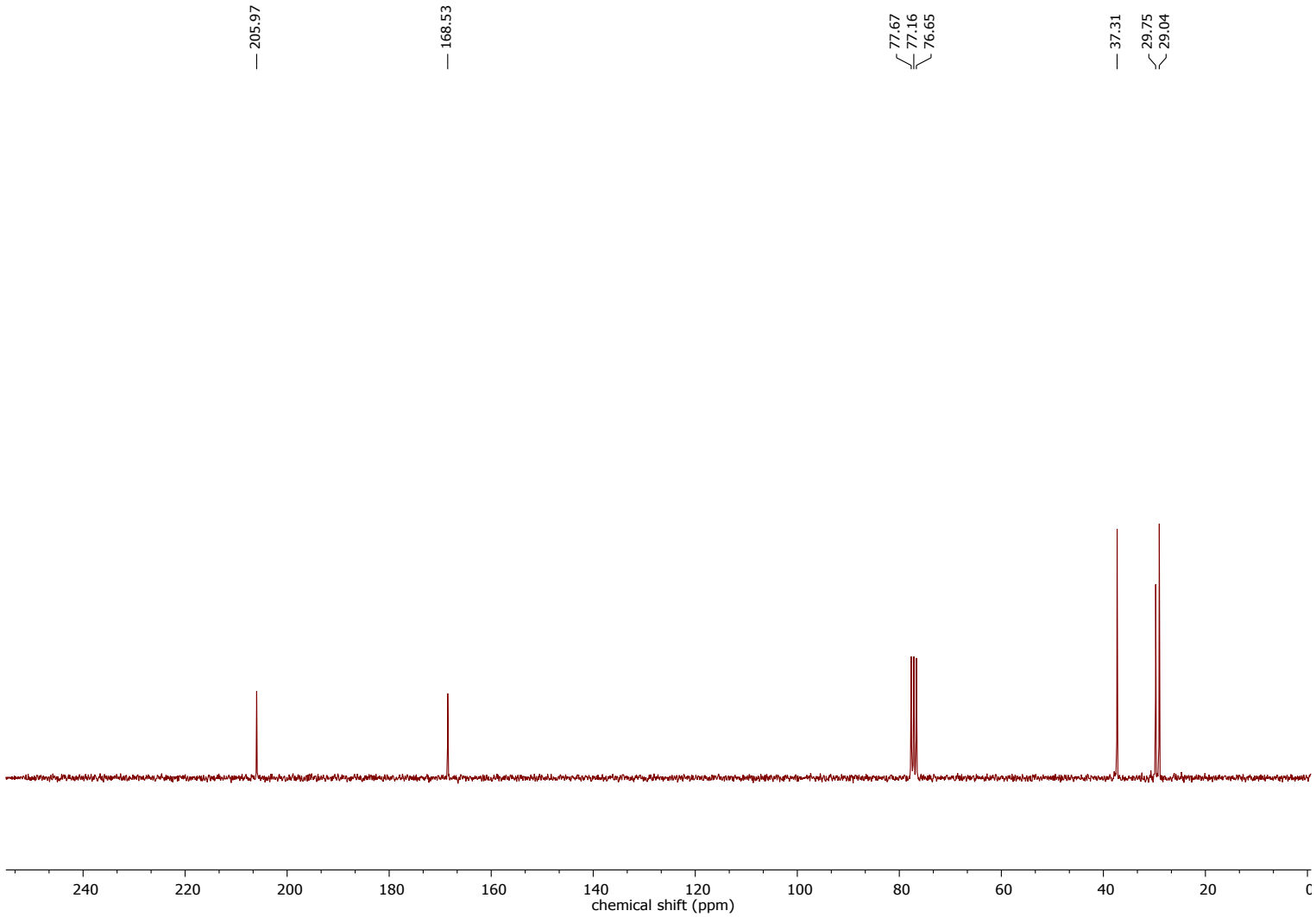


Fig S18. IR of cellulose levulinate from **DBNHLev**, 20 eq Lev_2O, 80°C, 0.5 ml DMSO

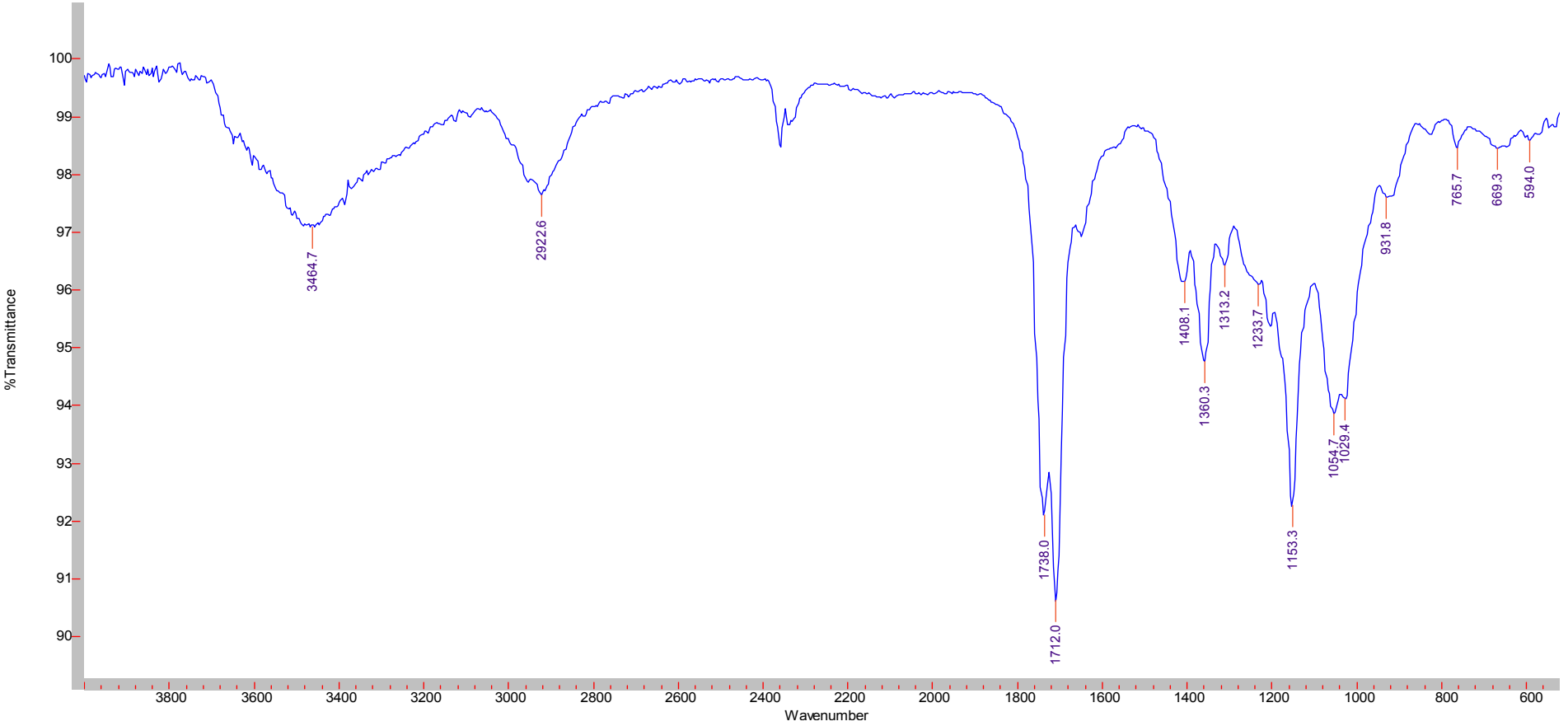


Fig S19. IR of cellulose levulinate from **DBNHLev**, 10 eq Lev_2O, 80°C, 0.5 ml DMSO

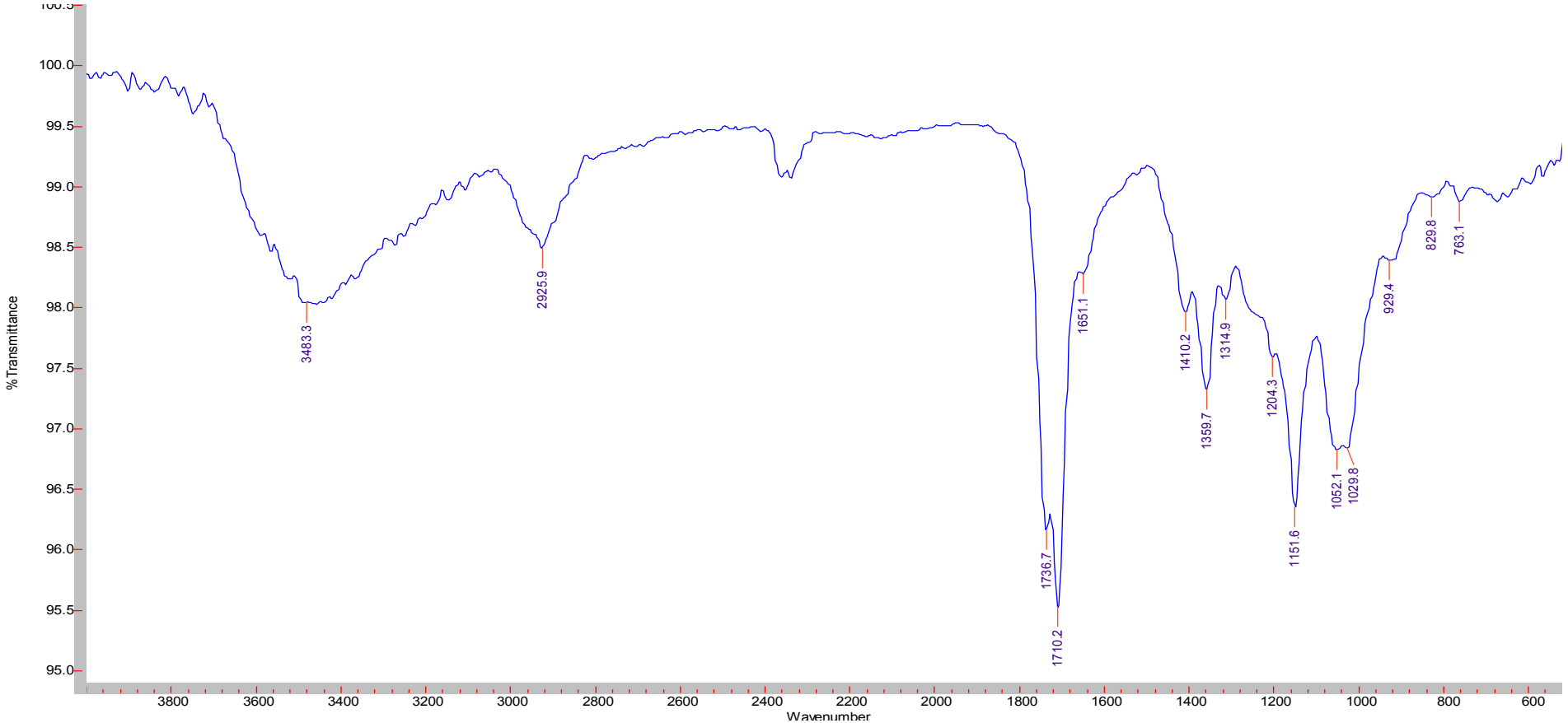


Fig S20. IR of cellulose levulinate from **DBNHLev**, 10 eq Lev_2O, 50°C, 0.5 ml DMSO

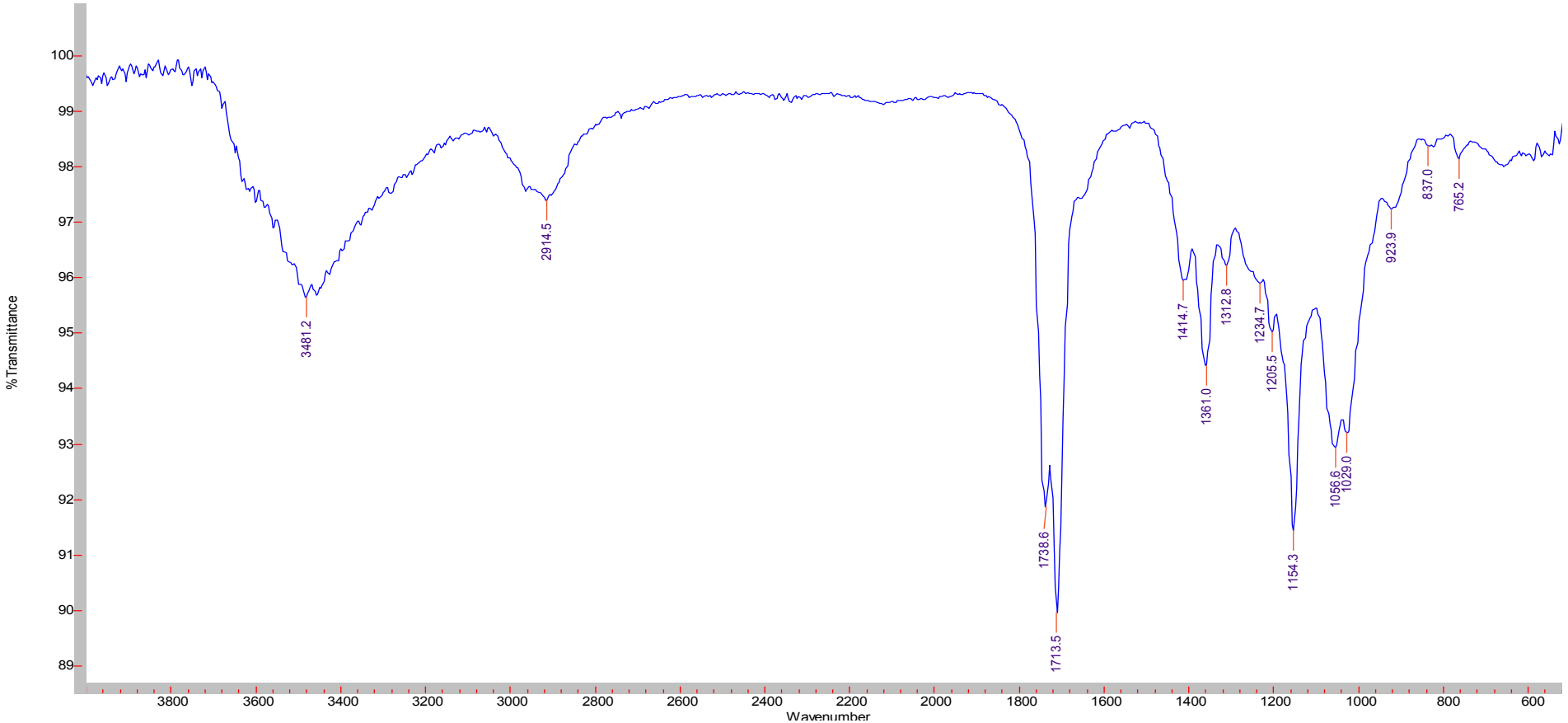


Fig S21. IR of cellulose levulinate from **DBNHLev**, 10 eq Lev_2O, 25°C, 0.5 ml DMSO

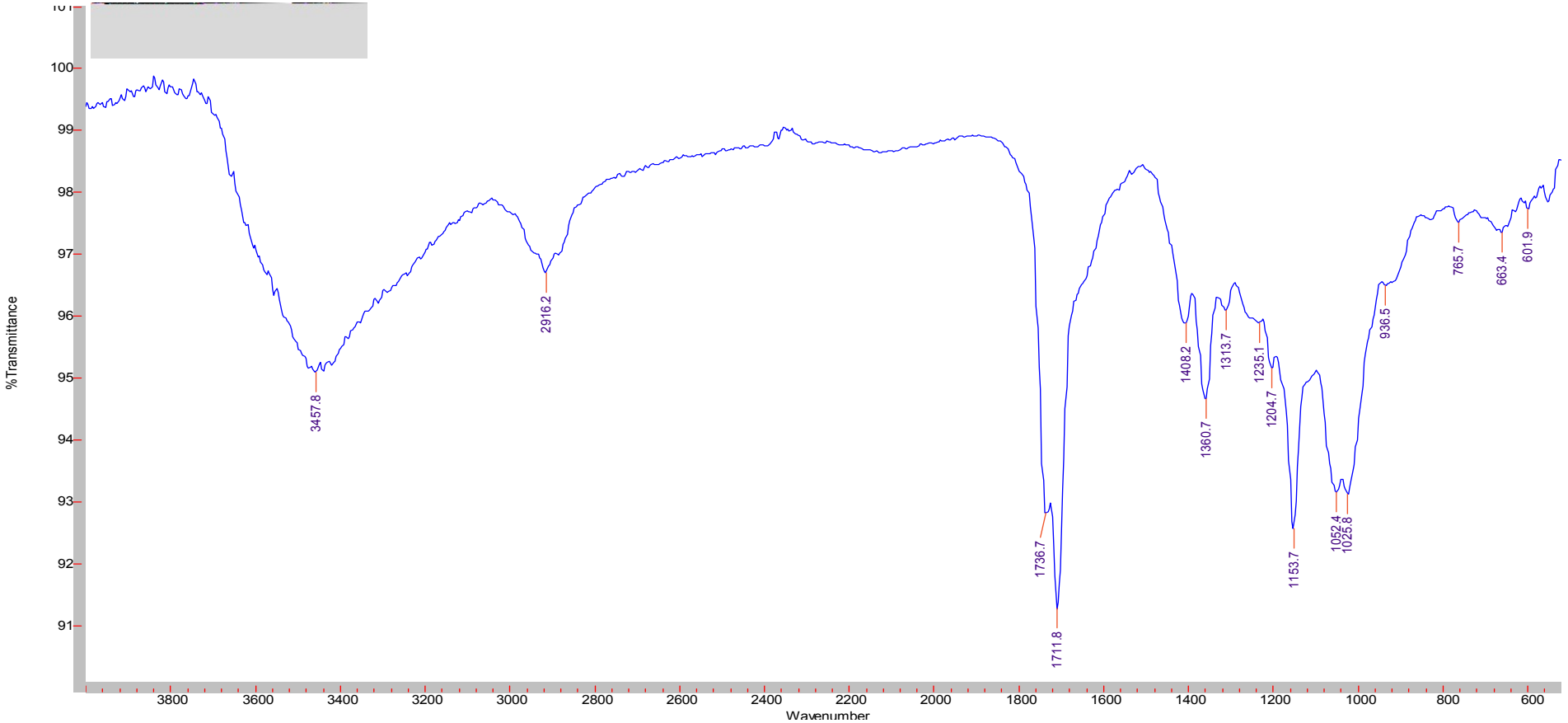


Fig S22. IR of cellulose levulinate from **DBNHLev**, 3 eq Lev_2O, 80°C, 0.5 ml DMSO

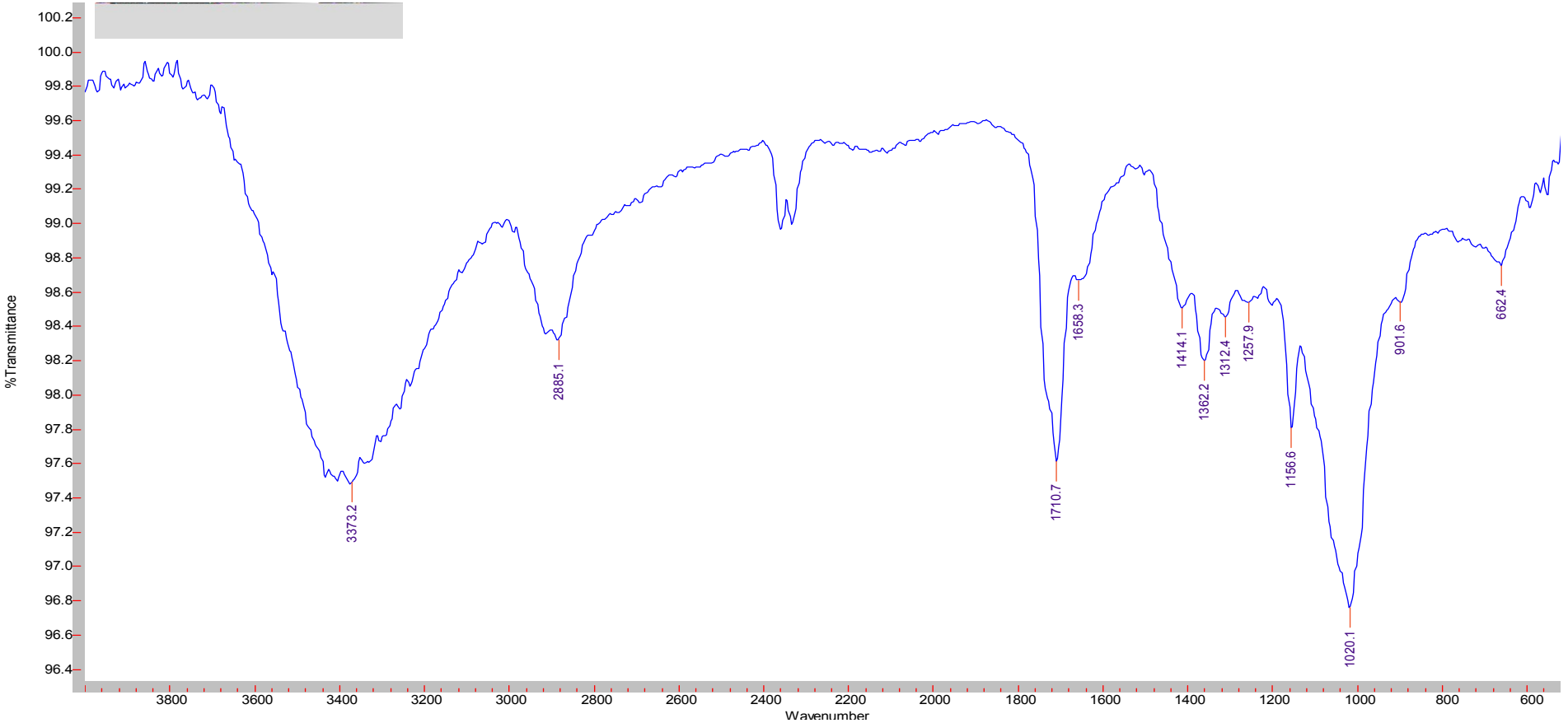


Fig S23. IR of cellulose levulinate from **DBNHLev**, 20 eq Lev_2O, 80°C, 0.5 ml γ- valerolactone

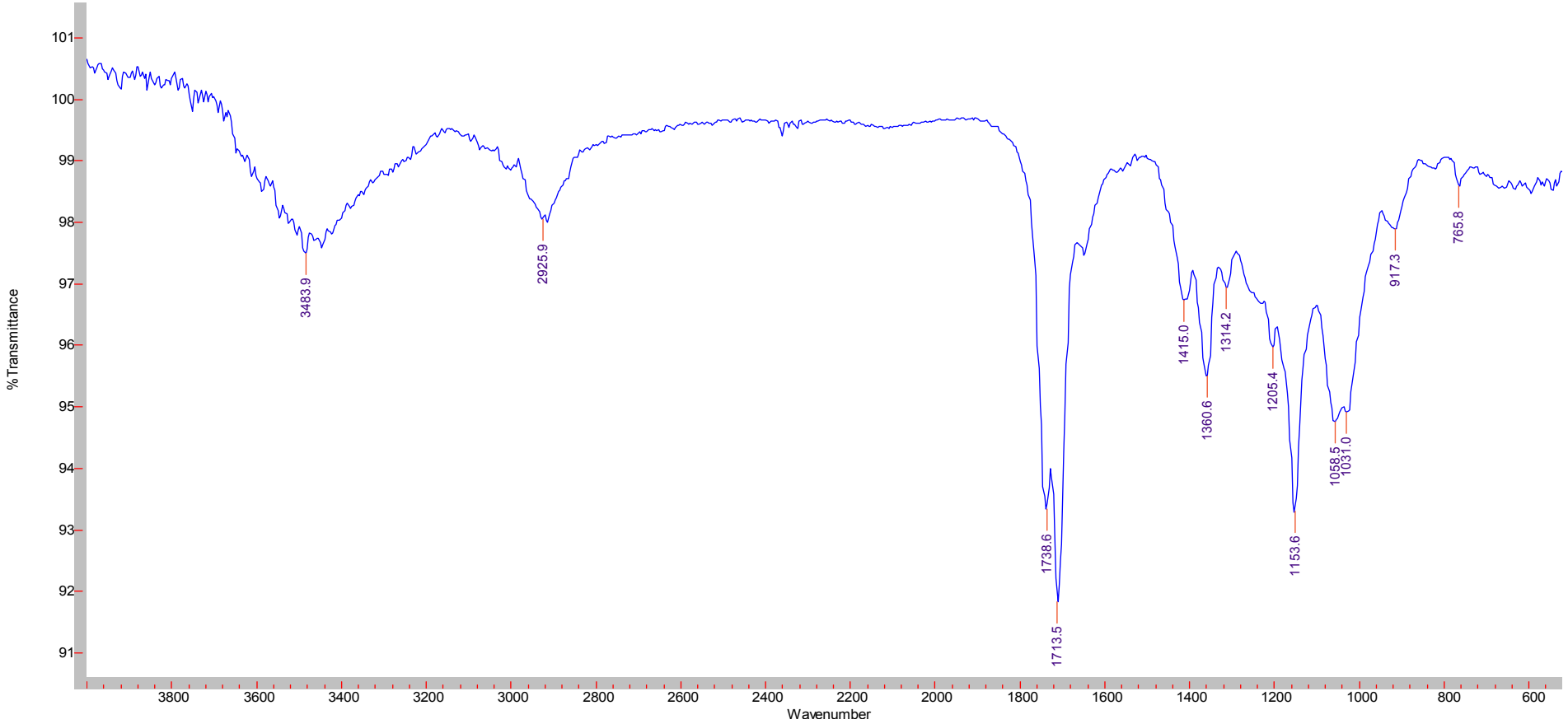


Fig S24. IR of cellulose levulinate from **DBNHLev**, 10 eq Lev_2O, 80°C, 0.5 ml γ- valerolactone

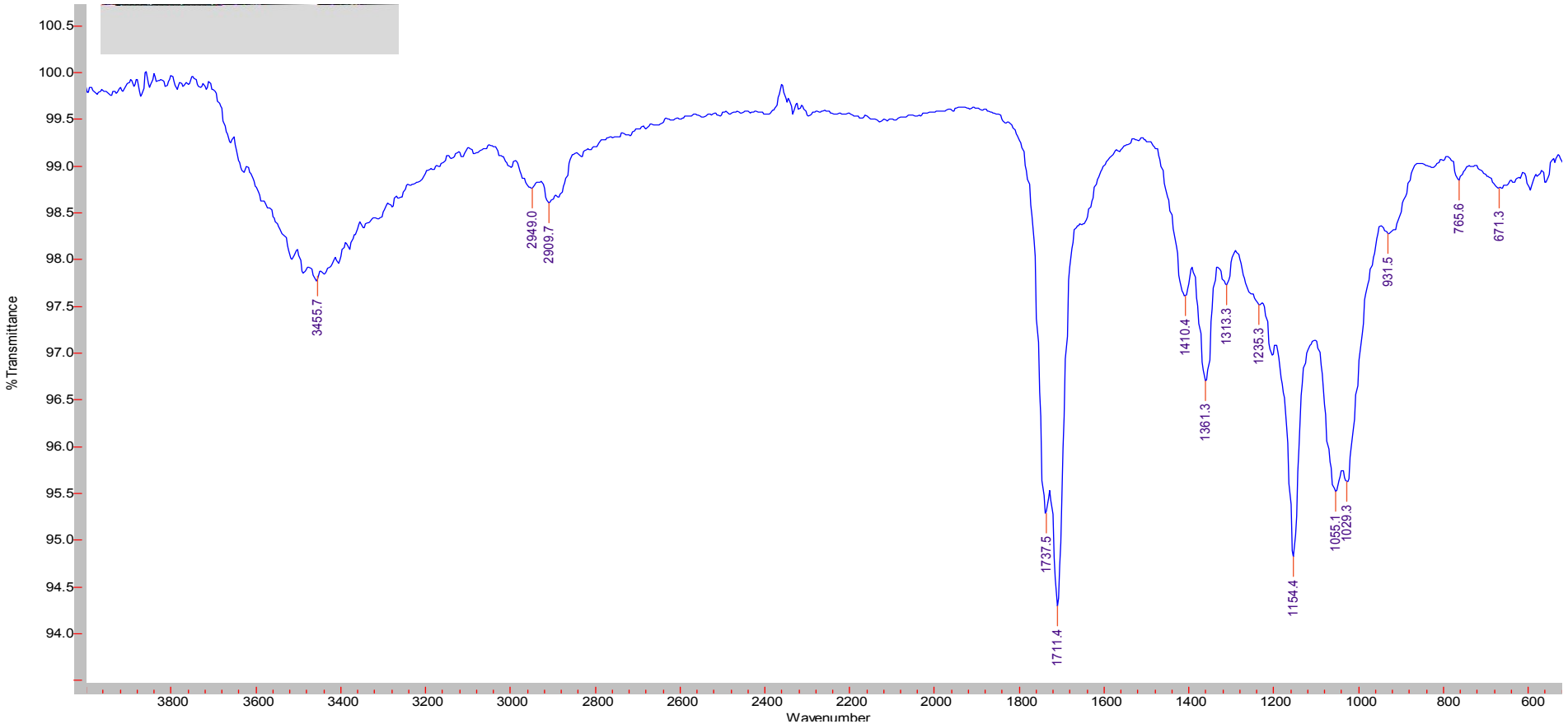


Fig S25. IR of cellulose levulinate from **DBNHLev**, 10 eq Lev_2O, 50°C, 0.5 ml γ- valerolactone

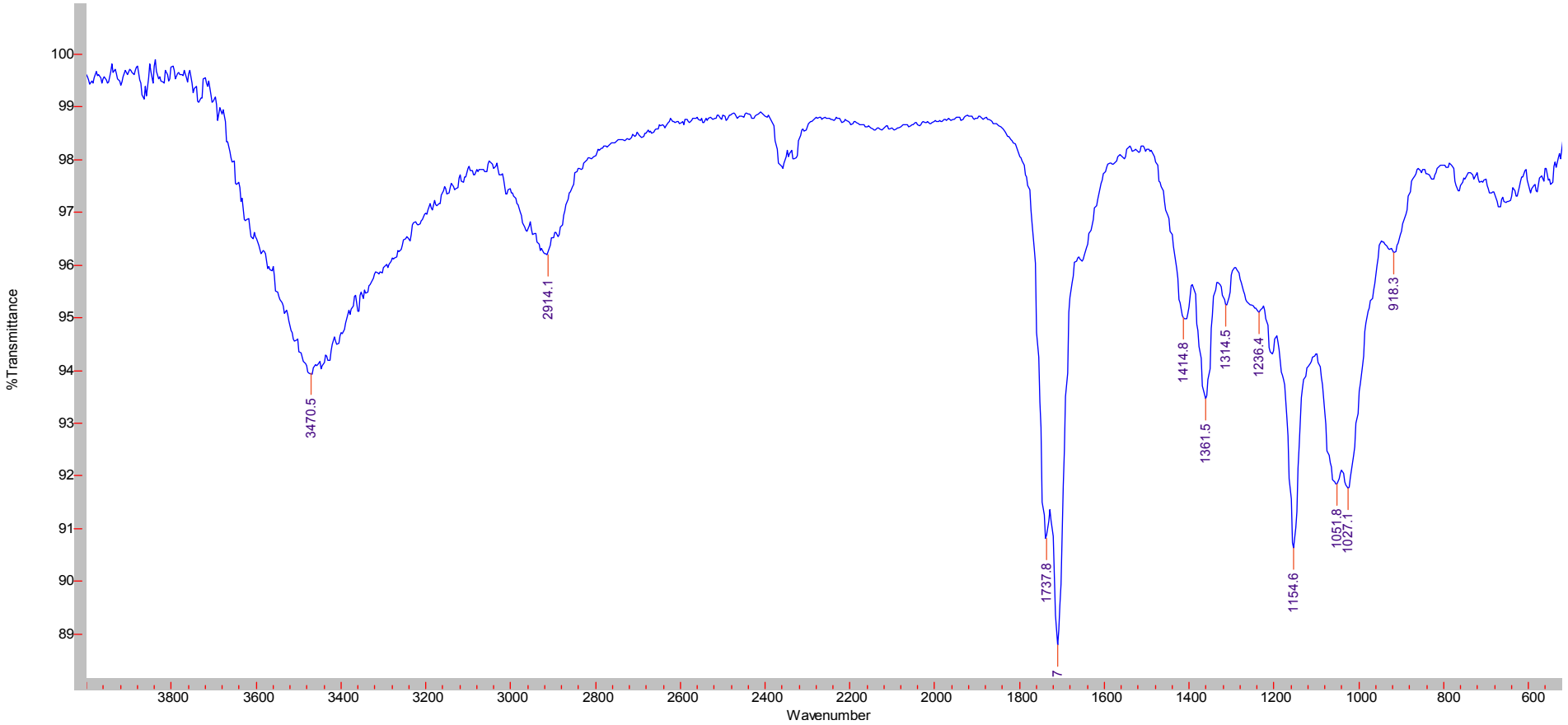


Fig S26. IR of cellulose levulinate from **DBNHLev**, 10 eq Lev_2O, 25°C, 0.5 ml γ- valerolactone

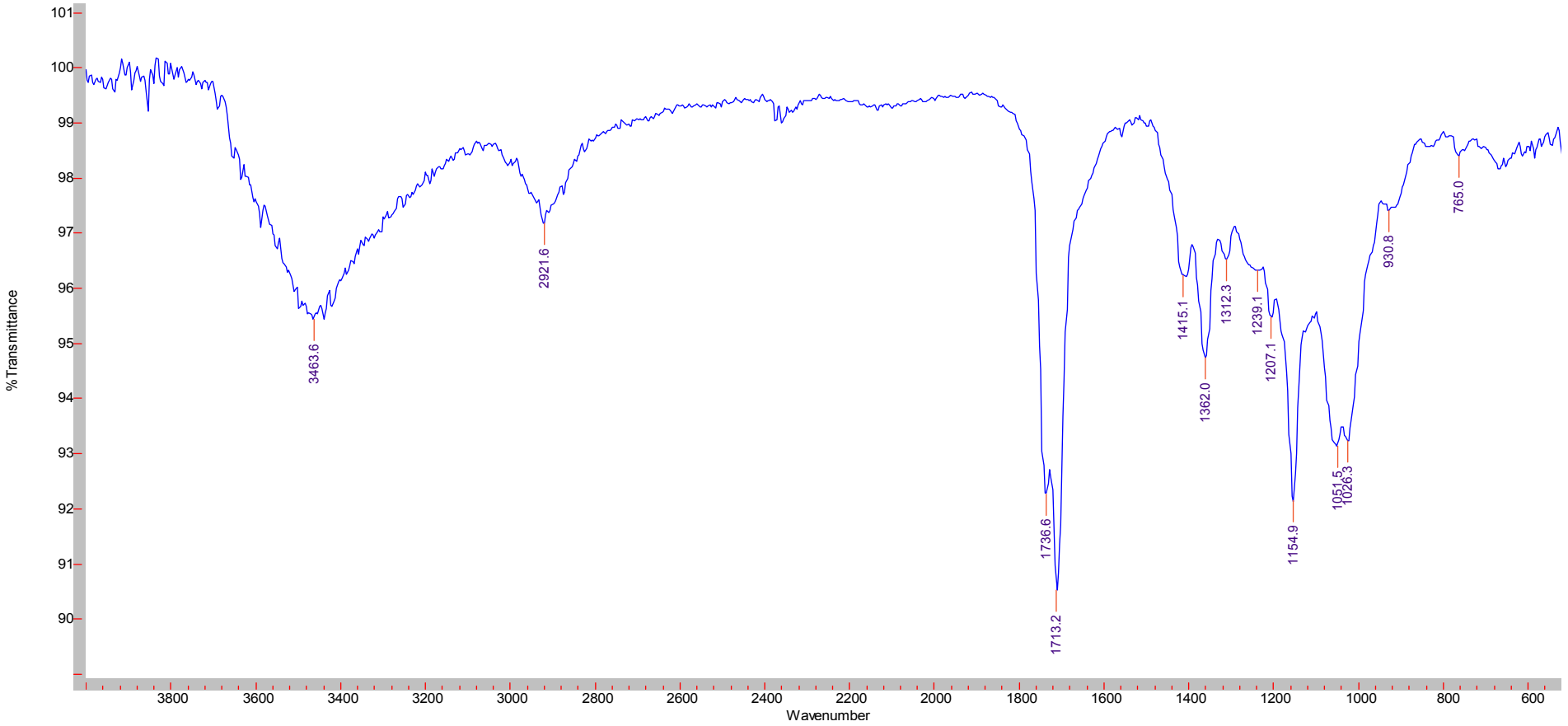


Fig S27. IR of cellulose levulinate from **DBNHLev**, 10eq Lev_2O, 80°C, 3.5gr DMSO

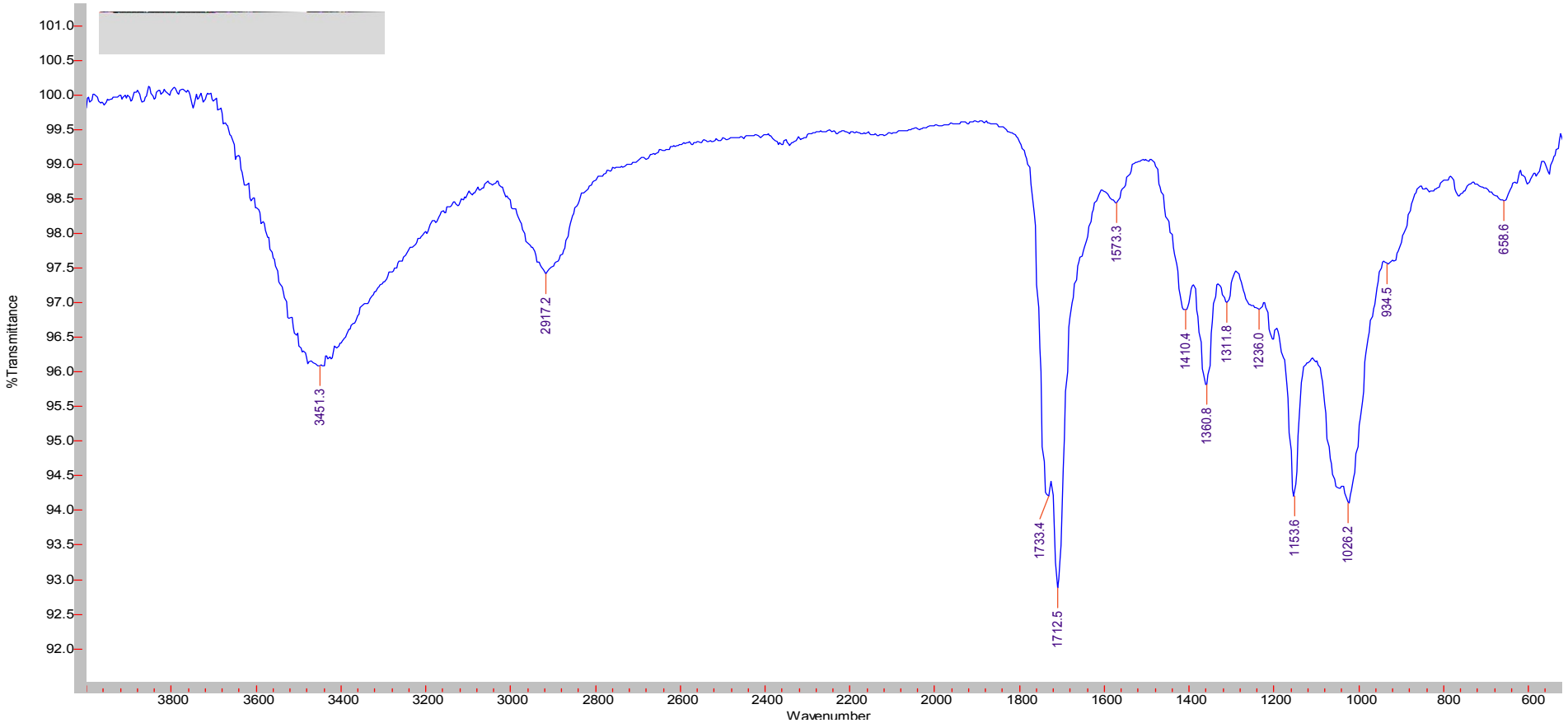


Fig S28. IR of cellulose levulinate from **DBUHLev**, 10 eq Lev_2O, 80°C, 0.5 ml DMSO

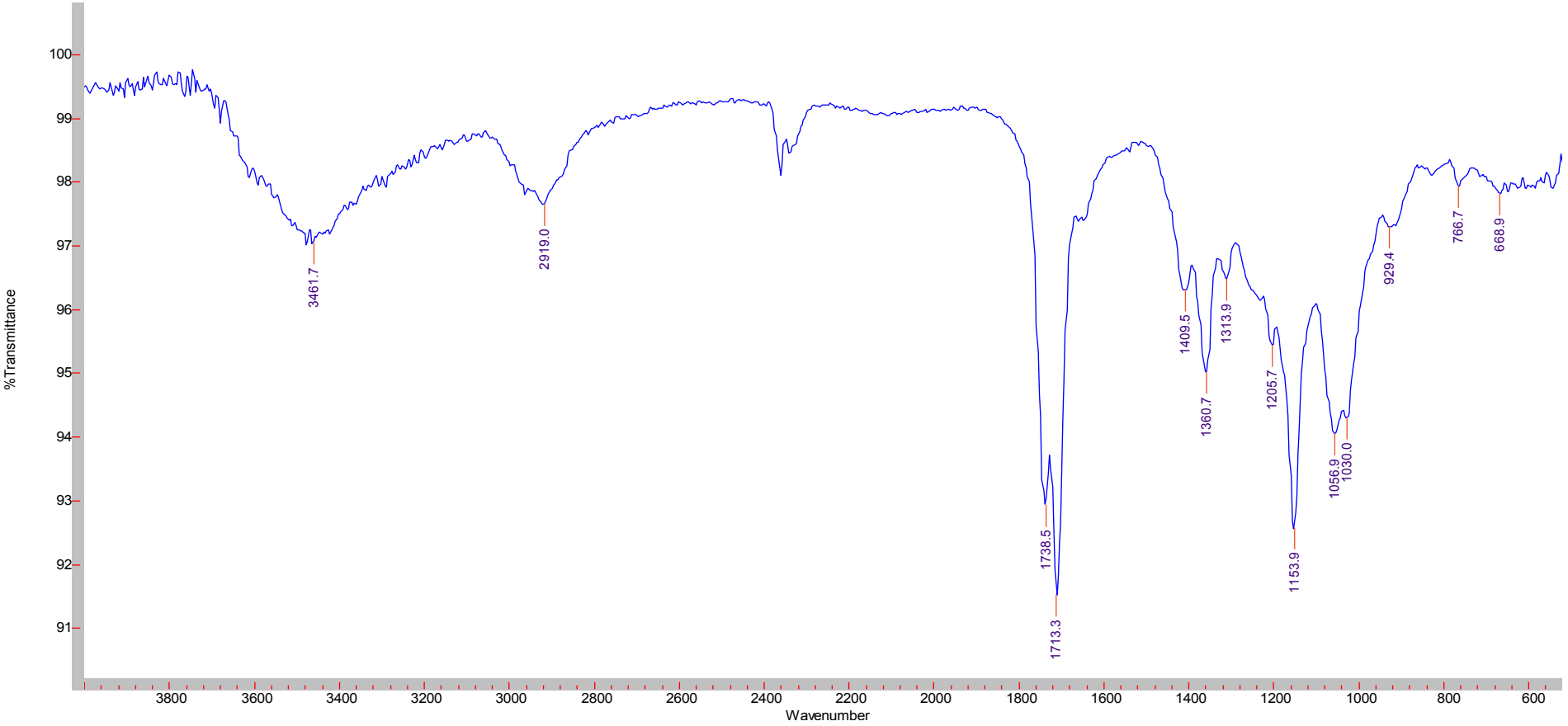


Fig S29. IR of cellulose levulinate from **DBUHLev**, 10 eq Lev_2O, 80°C, 0.5 ml DMSO

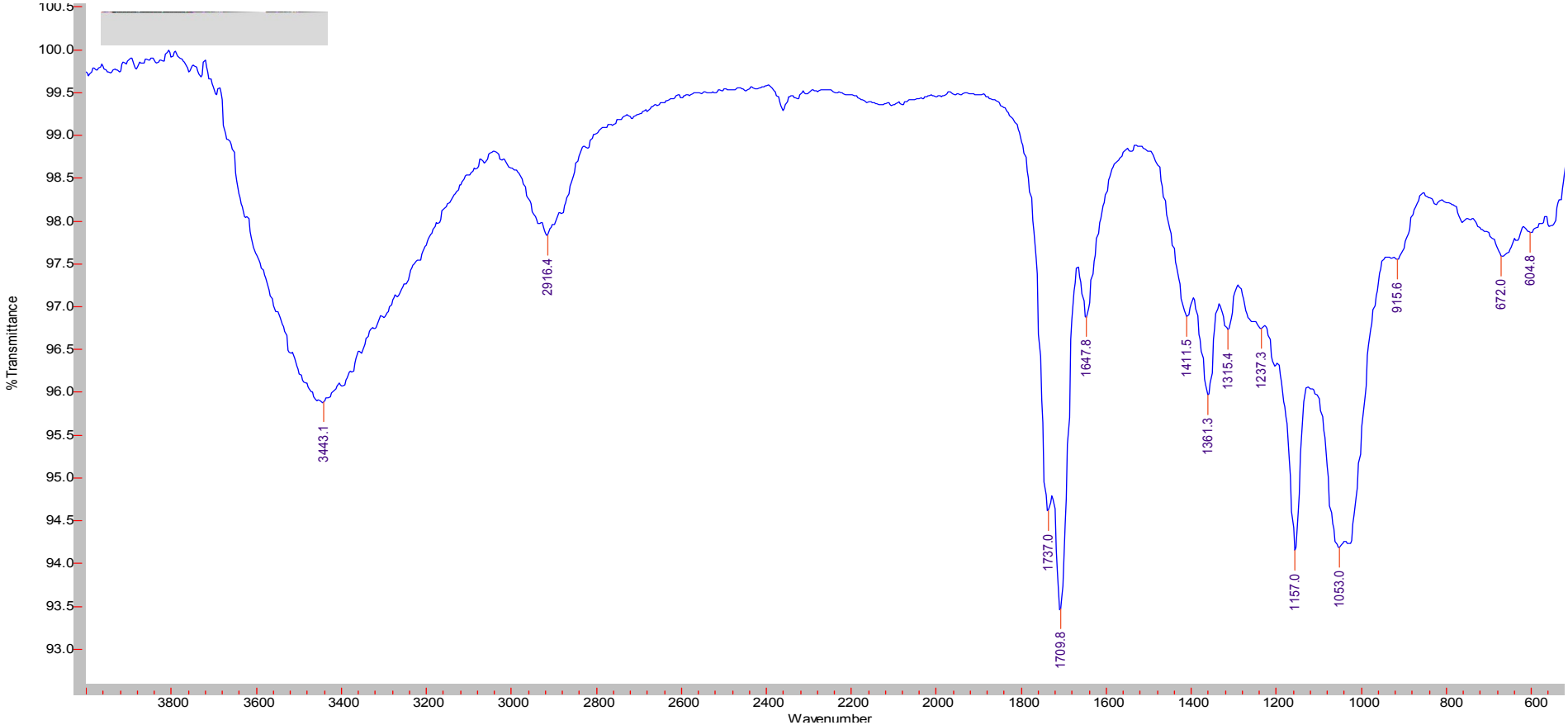


Fig S30. IR of cellulose levulinate from **DBUHLev**, 10 eq Lev_2O, 50°C, 0.5 ml DMSO

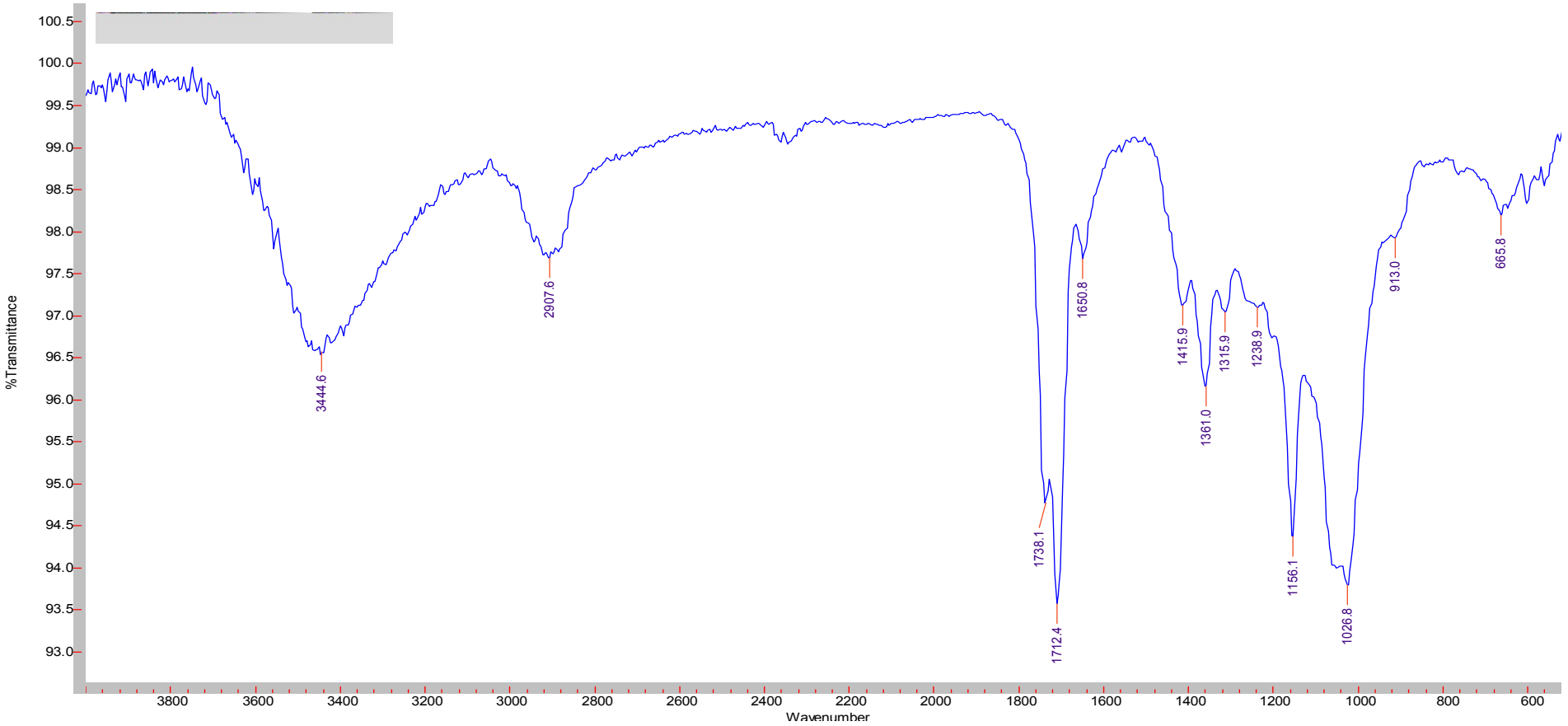


Fig S31. IR of cellulose levulinate from **DBUHLev**, 10 eq Lev_2O, 25°C, 0.5 ml DMSO

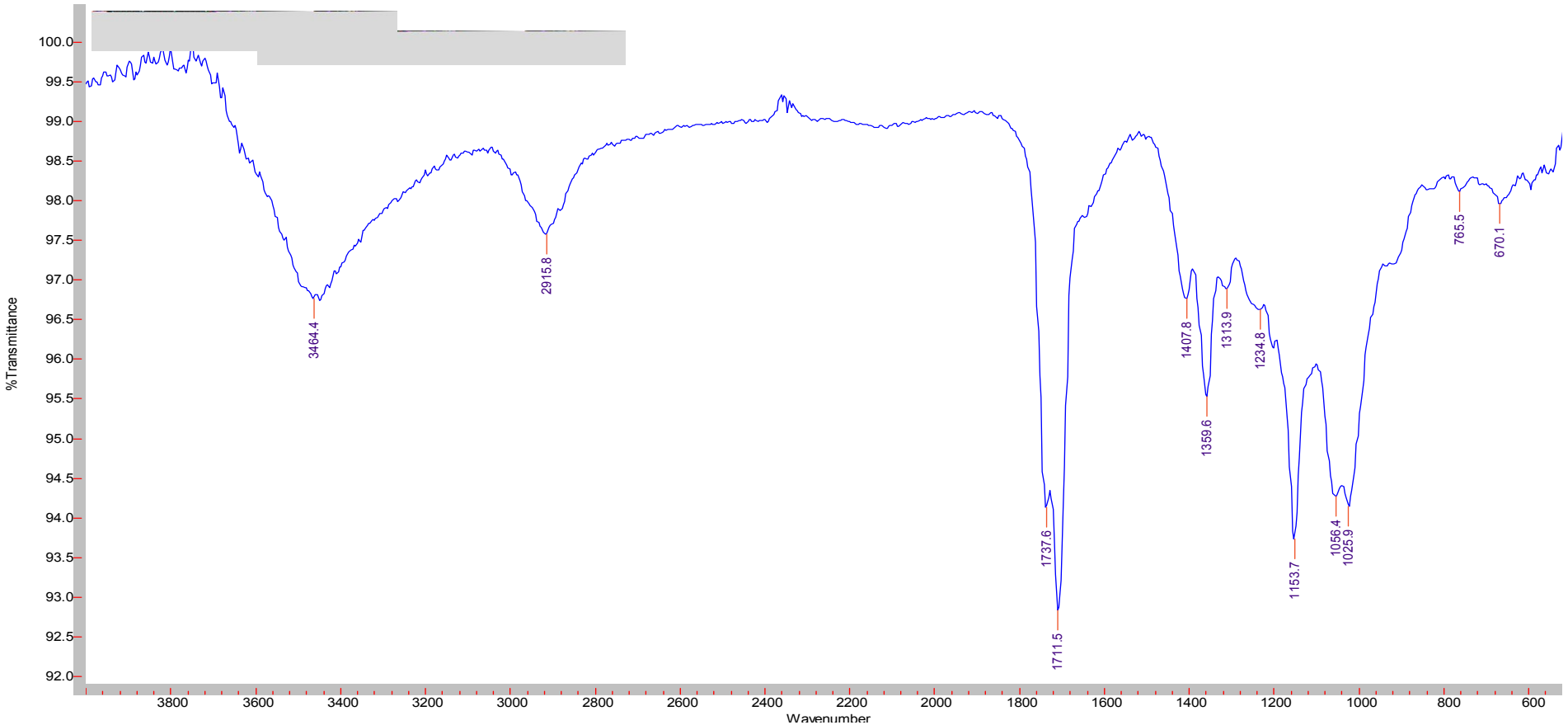


Fig S32. IR of cellulose levulinate from **DBUHLev**, 3 eq Lev_2O, 80°C, 0.5 ml DMSO

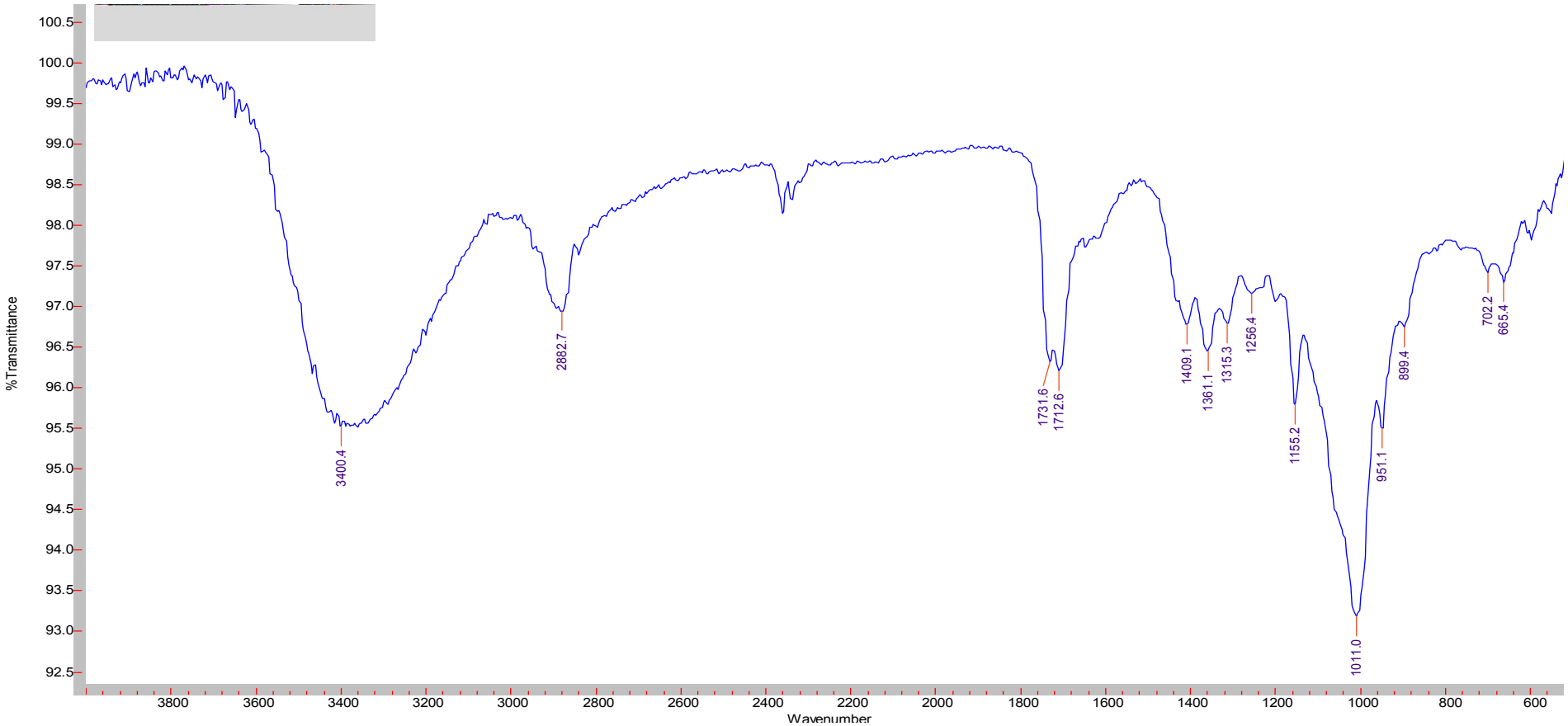


Fig S33. IR of cellulose levulinate from **DBUHLev**, 10eq Lev_2O, 80°C, 3.5gr DMSO

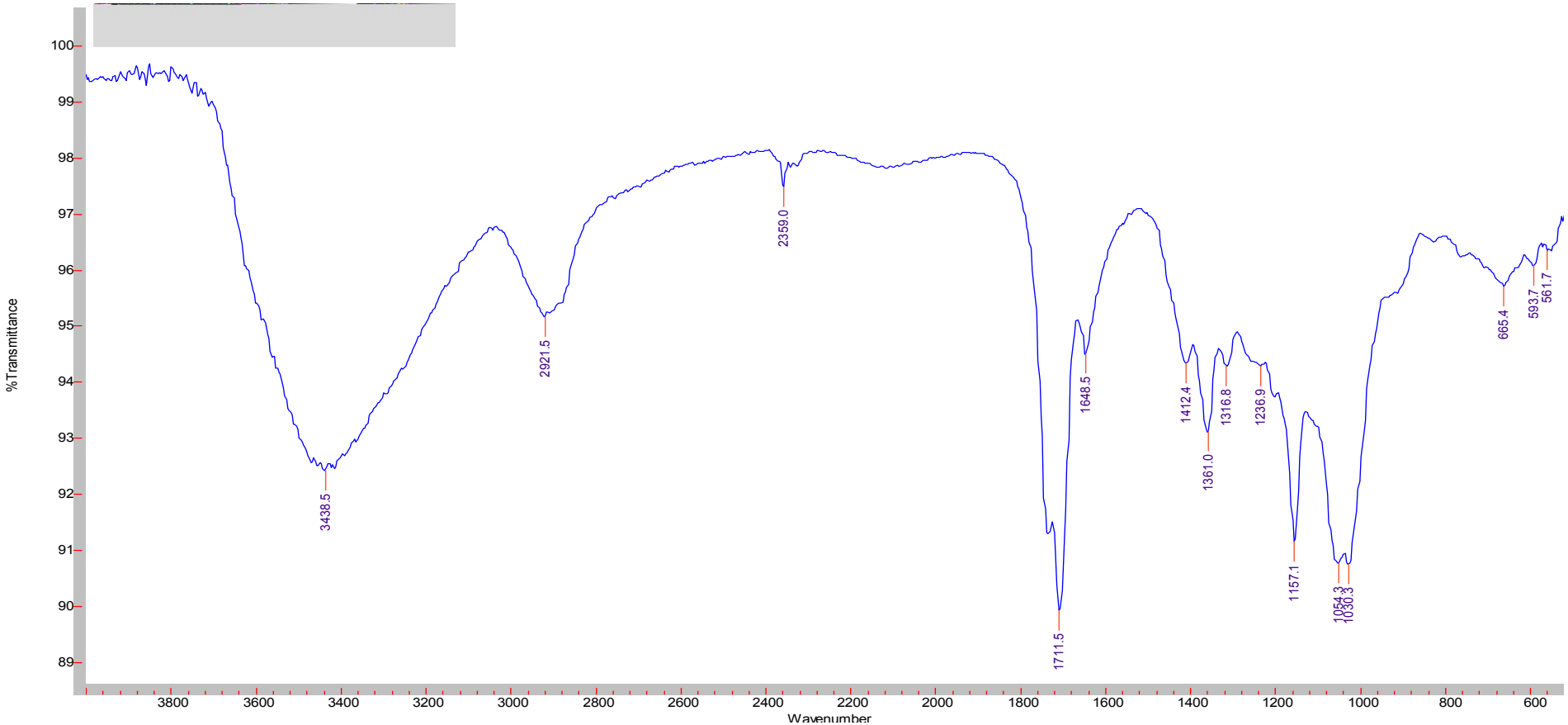


Fig S34. ^{1}H NMR of propionyl-levulinyl cellulose from **DBNHLev**, 10 eq Lev_2O, 80°C, 0.5 ml DMSO

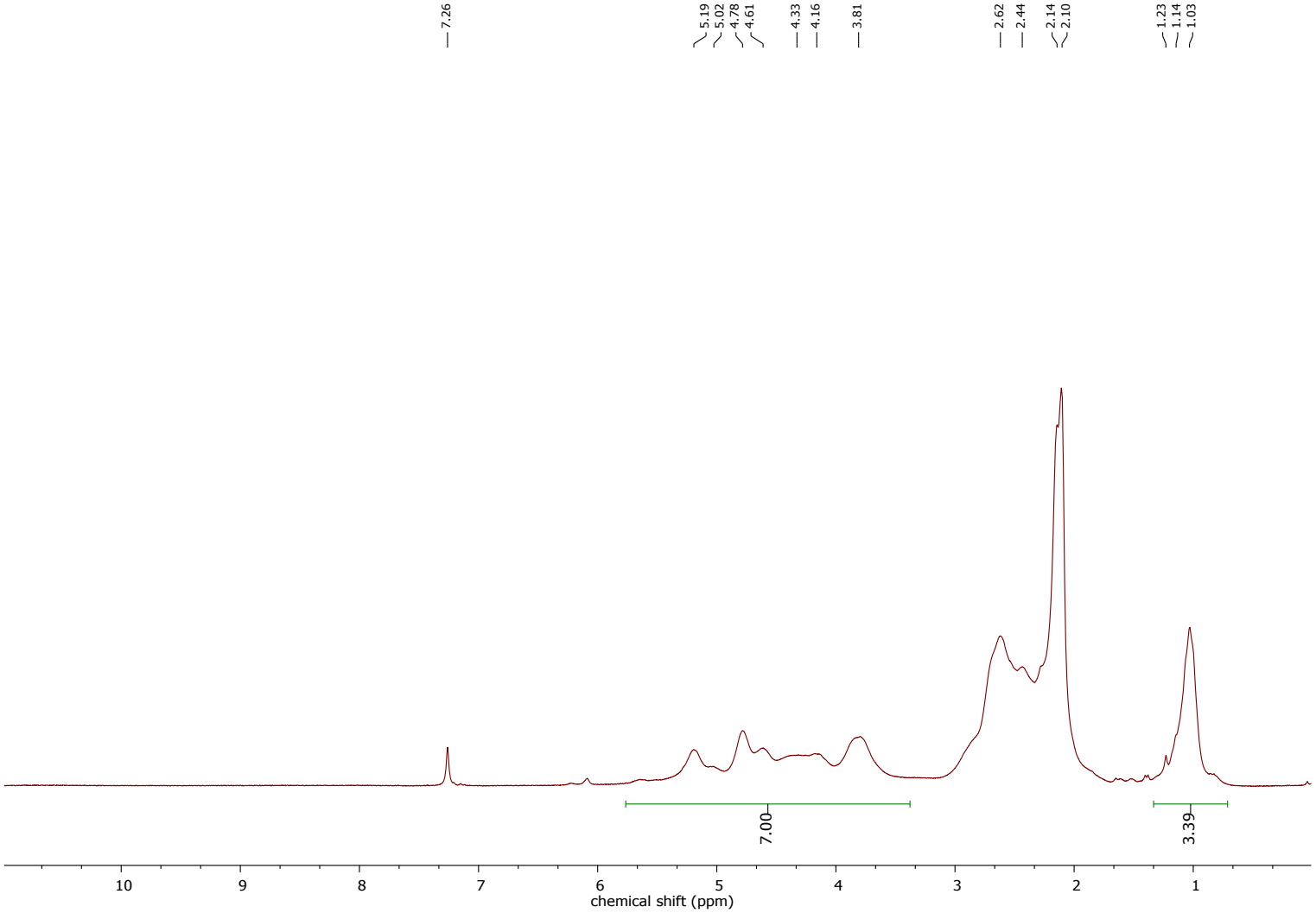


Fig S35. ^{1}H NMR of propionyl-levulinyl cellulose from **DBNHLev**, 10 eq Lev_2O, 80°C, 0.5 ml DMSO

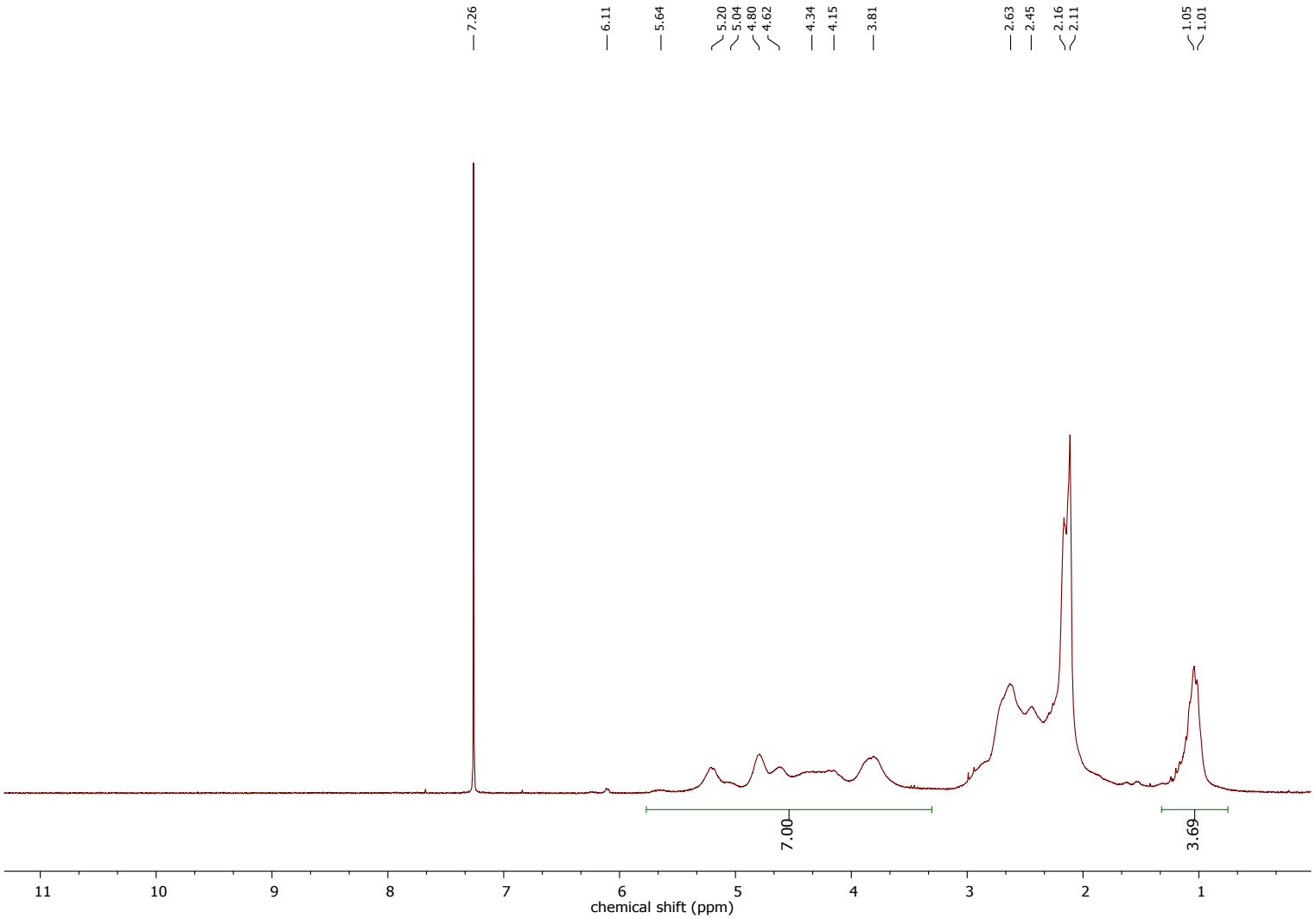


Fig S36. ^{1}H NMR of propionyl-levulinyl cellulose from **DBNHLev**, 10 eq Lev_2O, 50°C, 0.5 ml DMSO

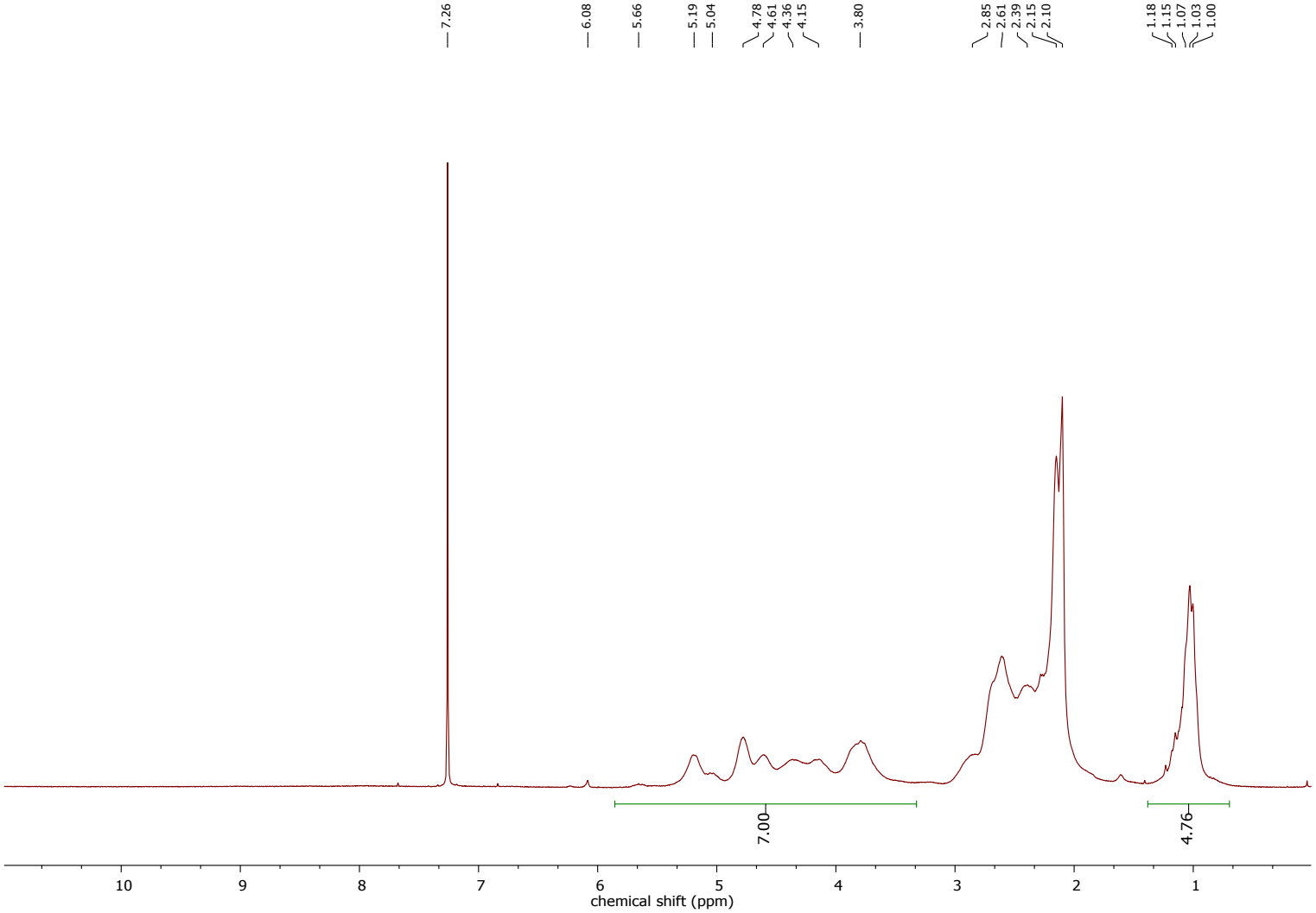


Fig S37. ^{1}H NMR of propionyl-levulinyl cellulose from **DBNHLev**, 10 eq Lev_2O, 25°C, 0.5 ml DMSO

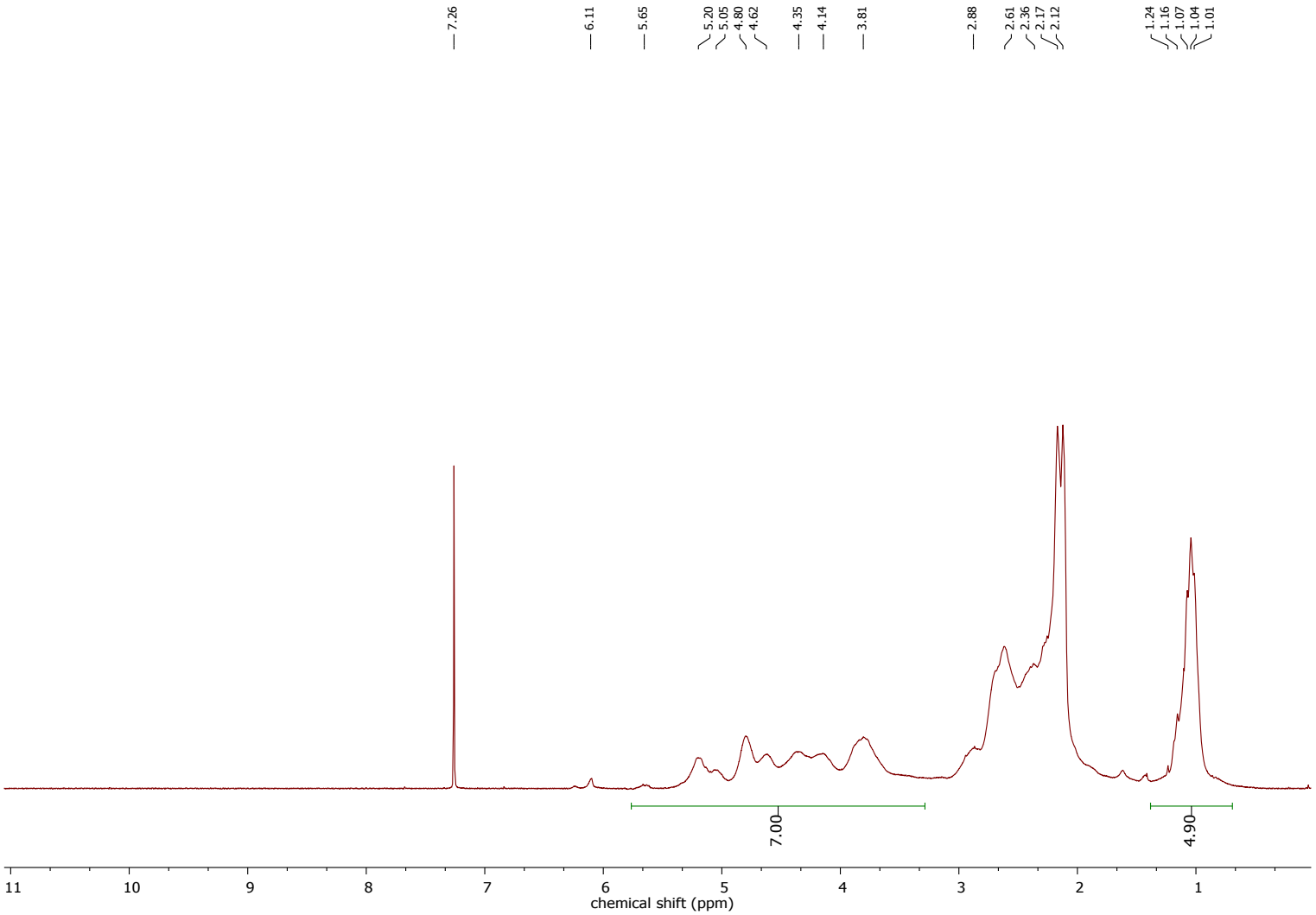


Fig S38. ^{1}H NMR of propionyl-levulinyl cellulose from **DBNHLev,** 3 eq Lev_2O, 80°C, 0.5 ml DMSO

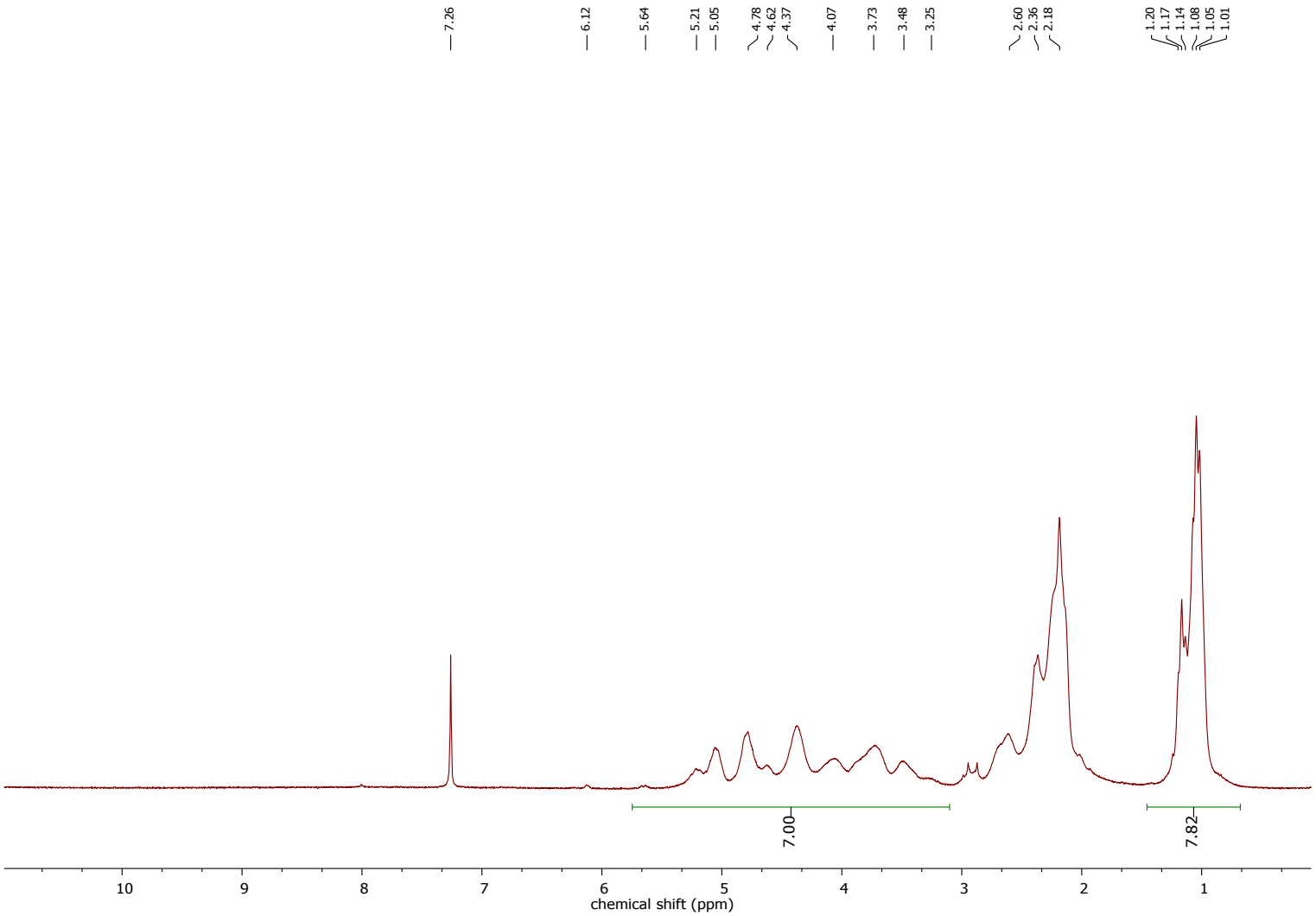


Fig S39. ^{1}H NMR of propionyl-levulinyl cellulose from **DBNHLev**, 20 eq Lev_2O, 80°C, 0.5 ml γ- valerolactone

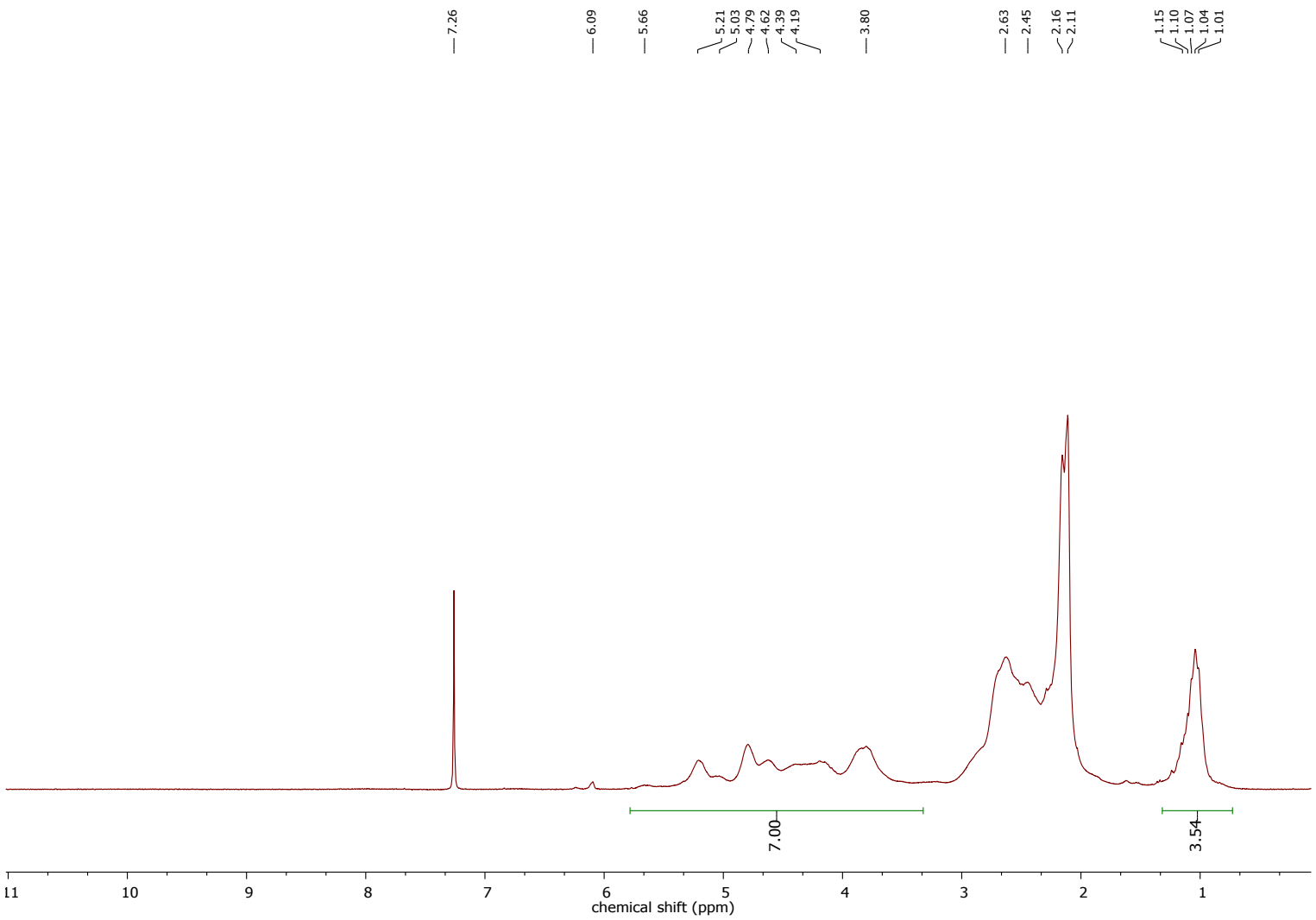


Fig S40. ^{1}H NMR of propionyl-levulinyl cellulose from **DBNHLev**, 10 eq Lev_2O, 80°C, 0.5 ml γ- valerolactone

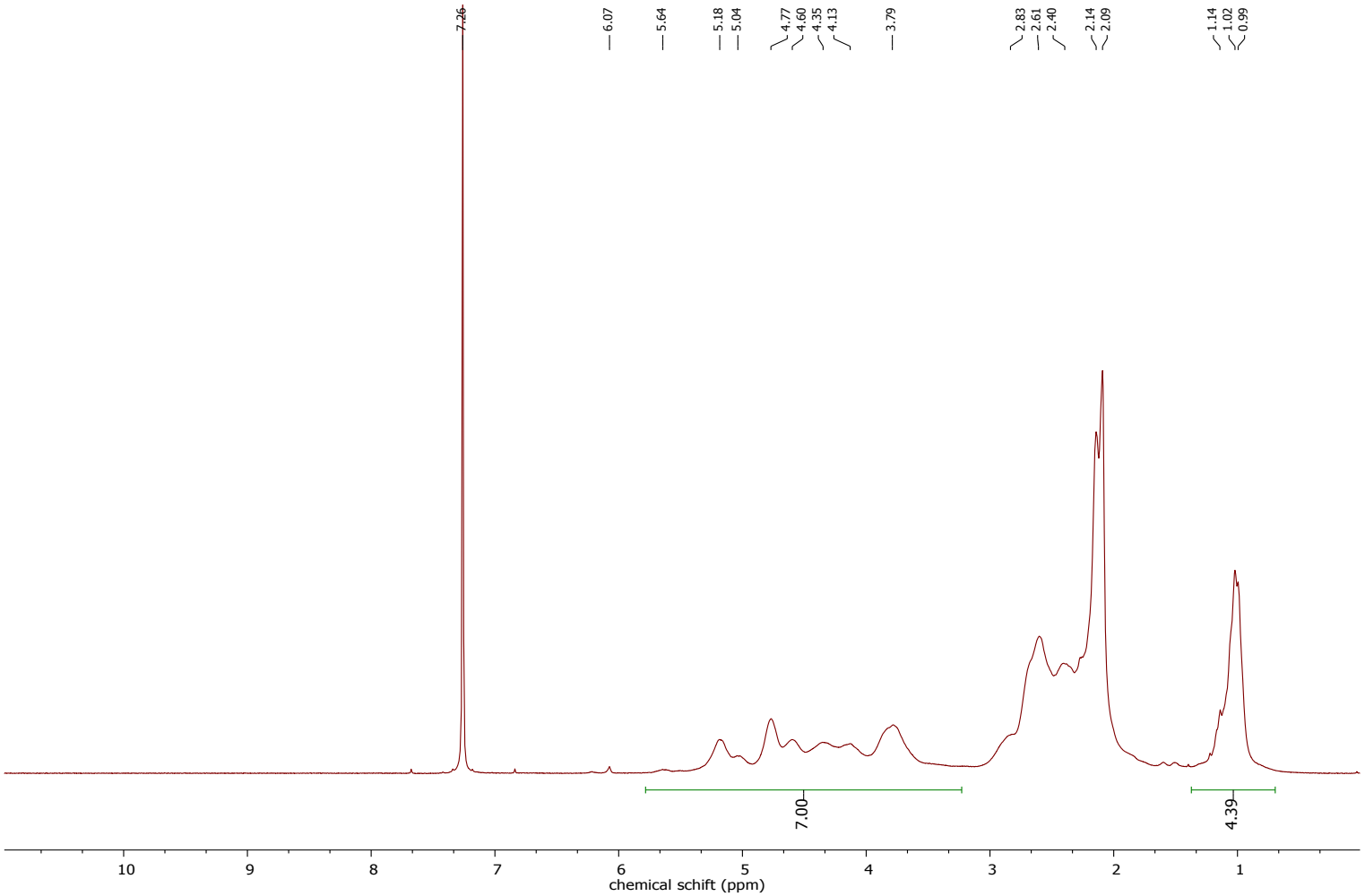


Fig S41. ^{1}H NMR of propionyl-levulinyl cellulose from **DBNHLev**, 10 eq Lev_2O, 50°C, 0.5 ml γ- valerolactone

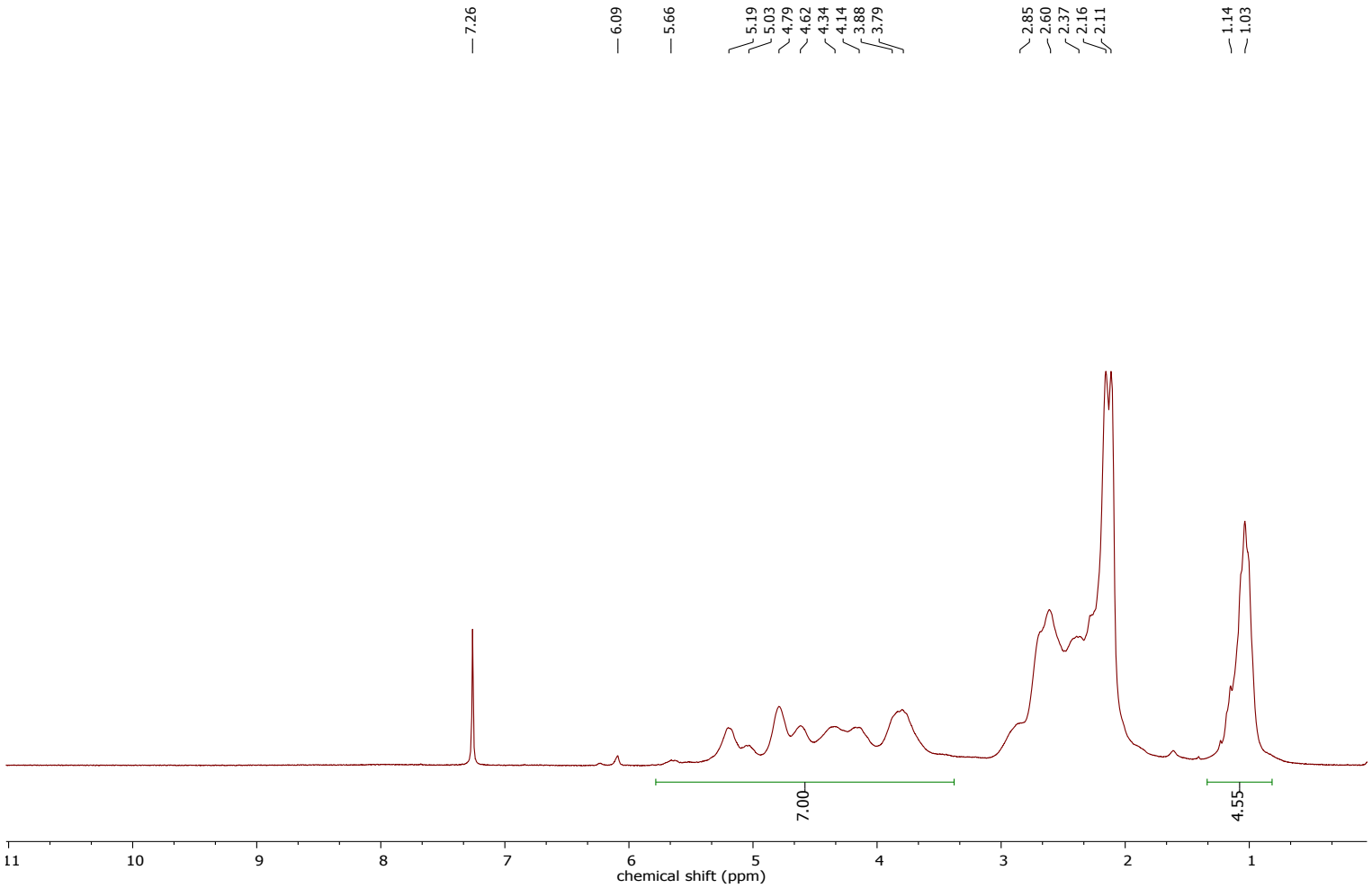


Fig S42. ^{1}H NMR of propionyl-levulinyl cellulose from **DBNHLev**, 10 eq Lev_2O, 25°C, 0.5 ml γ- valerolactone

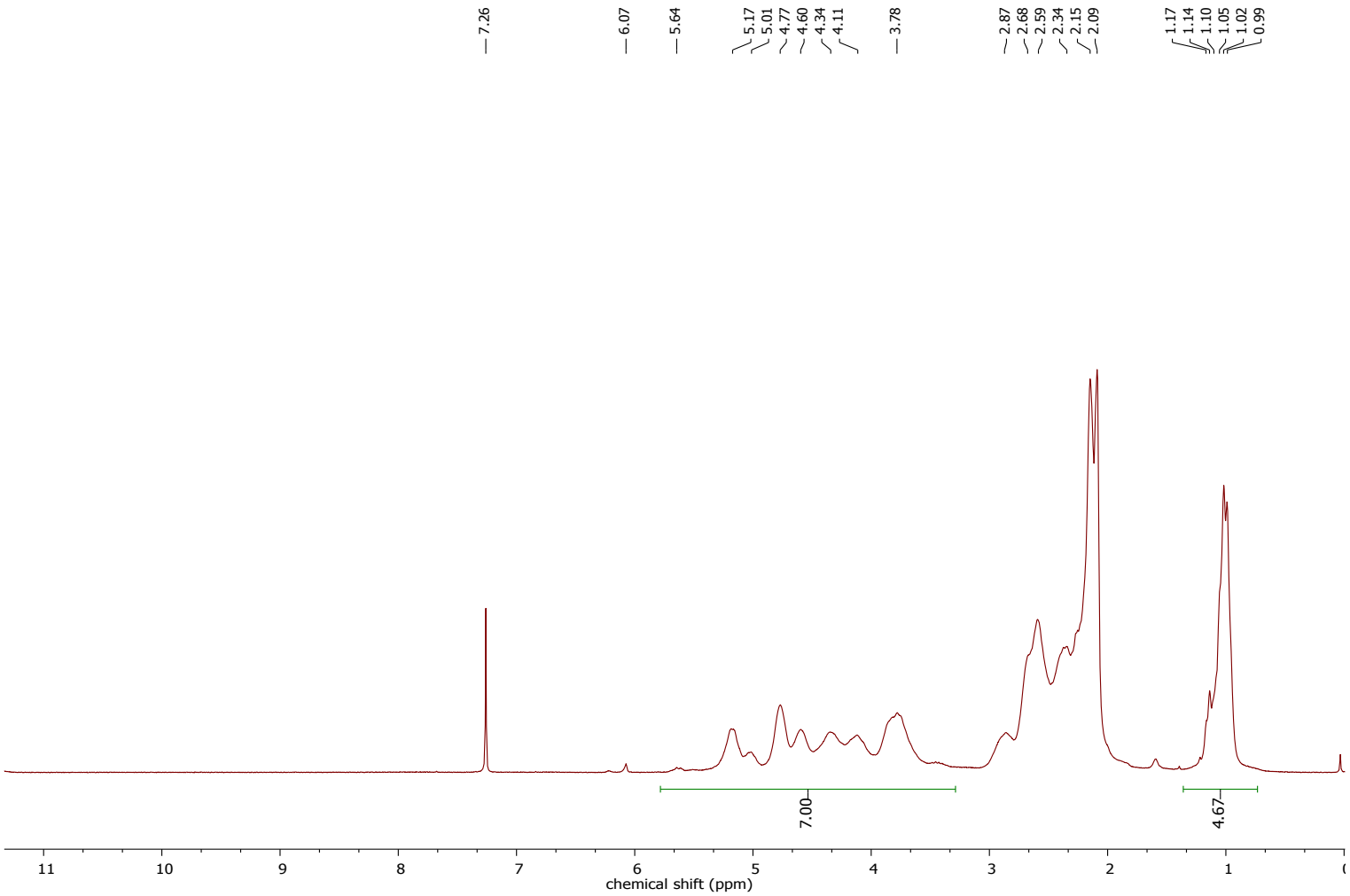


Fig S43. ^{1}H NMR of propionyl-levulinyl cellulose from **DBNHLev**, 10eq Lev_2O, 80°C, 3.5gr DMSO

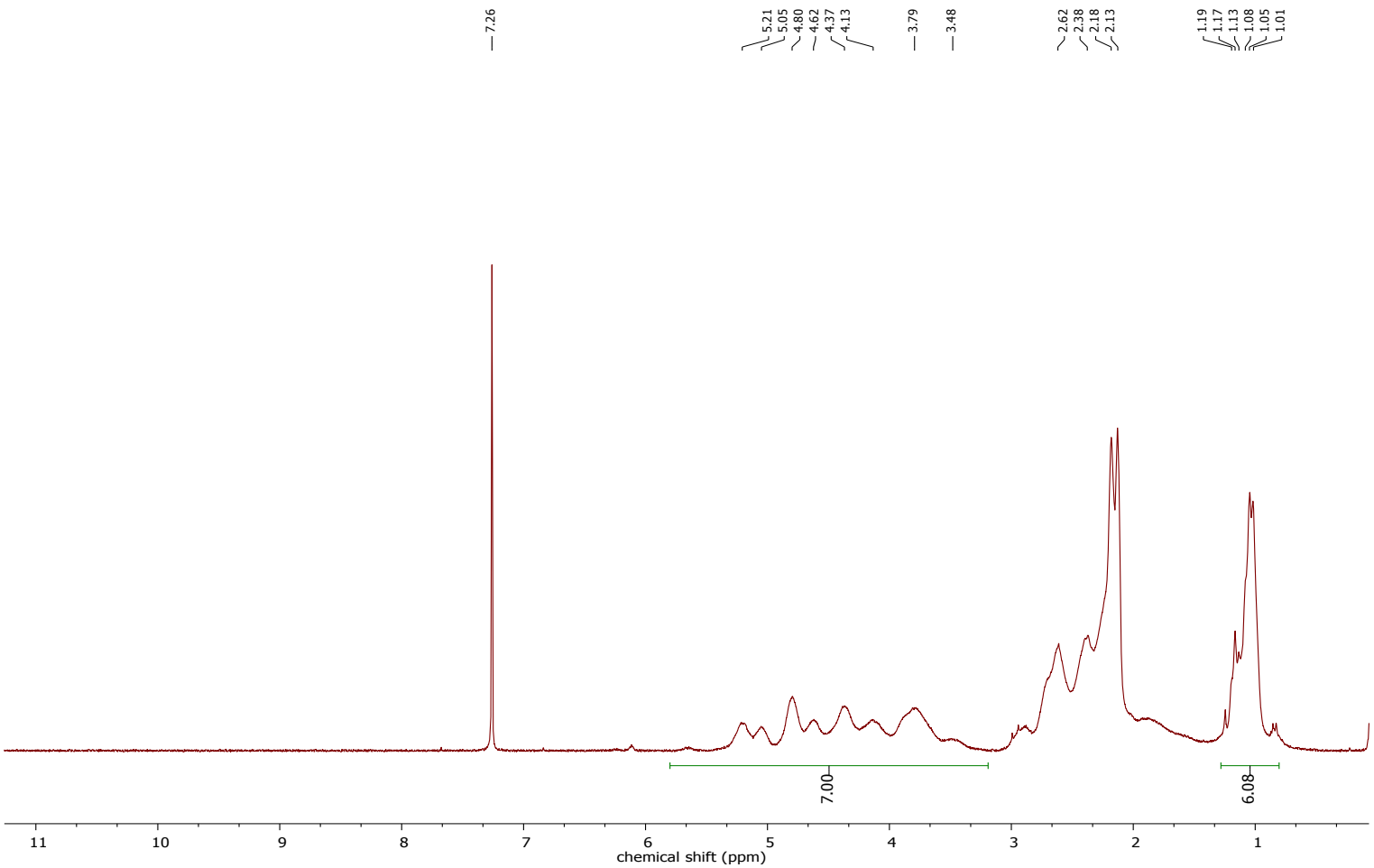


Fig S44. ^{1}H NMR of propionyl-levulinyl cellulose from **DBUHLev**, 20 eq Lev_2O, 80°C, 0.5 ml DMSO

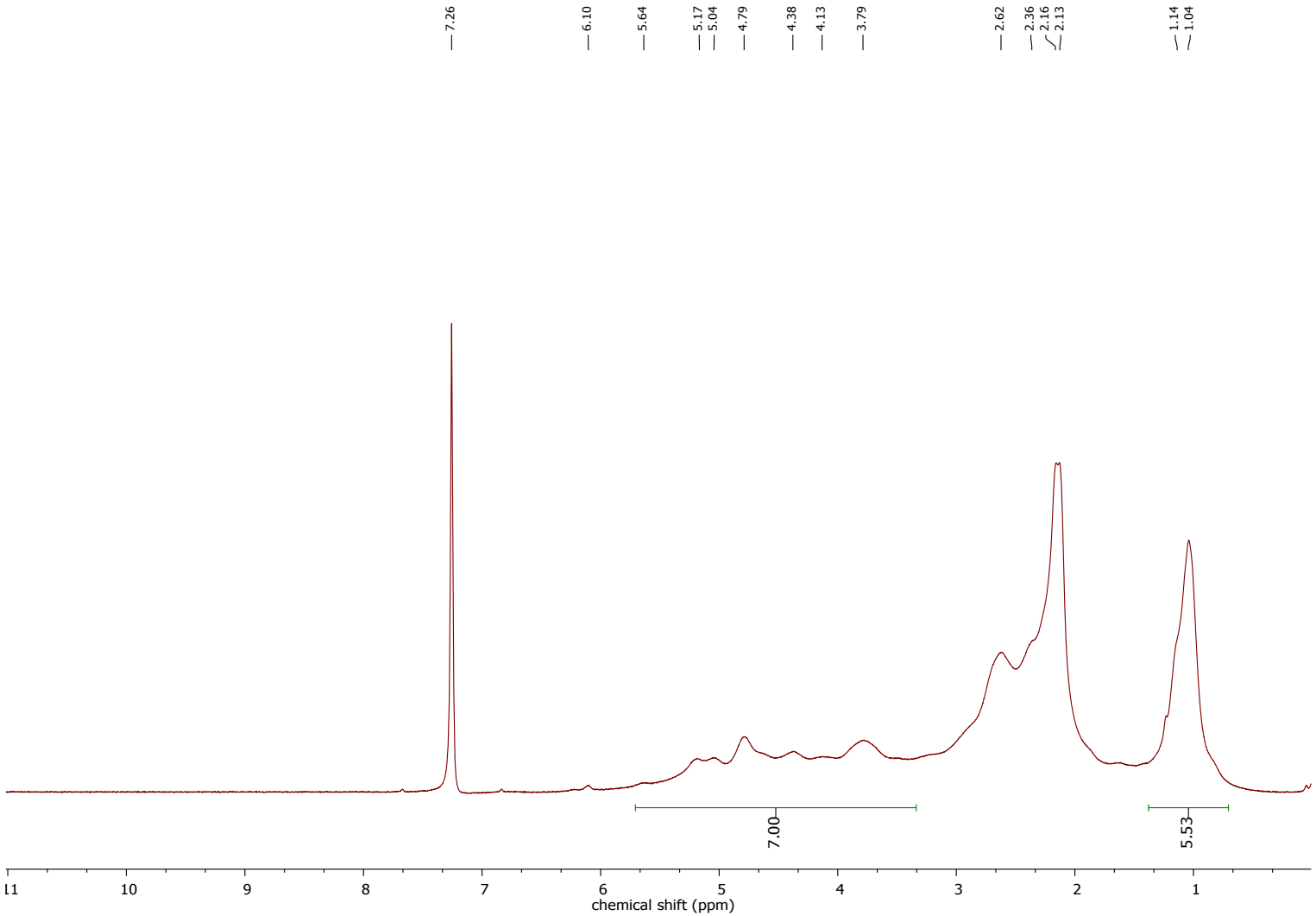


Fig S45. ^{1}H NMR of propionyl-levulinyl cellulose from **DBUHLev**, 10 eq Lev_2O, 80°C, 0.5 ml DMSO

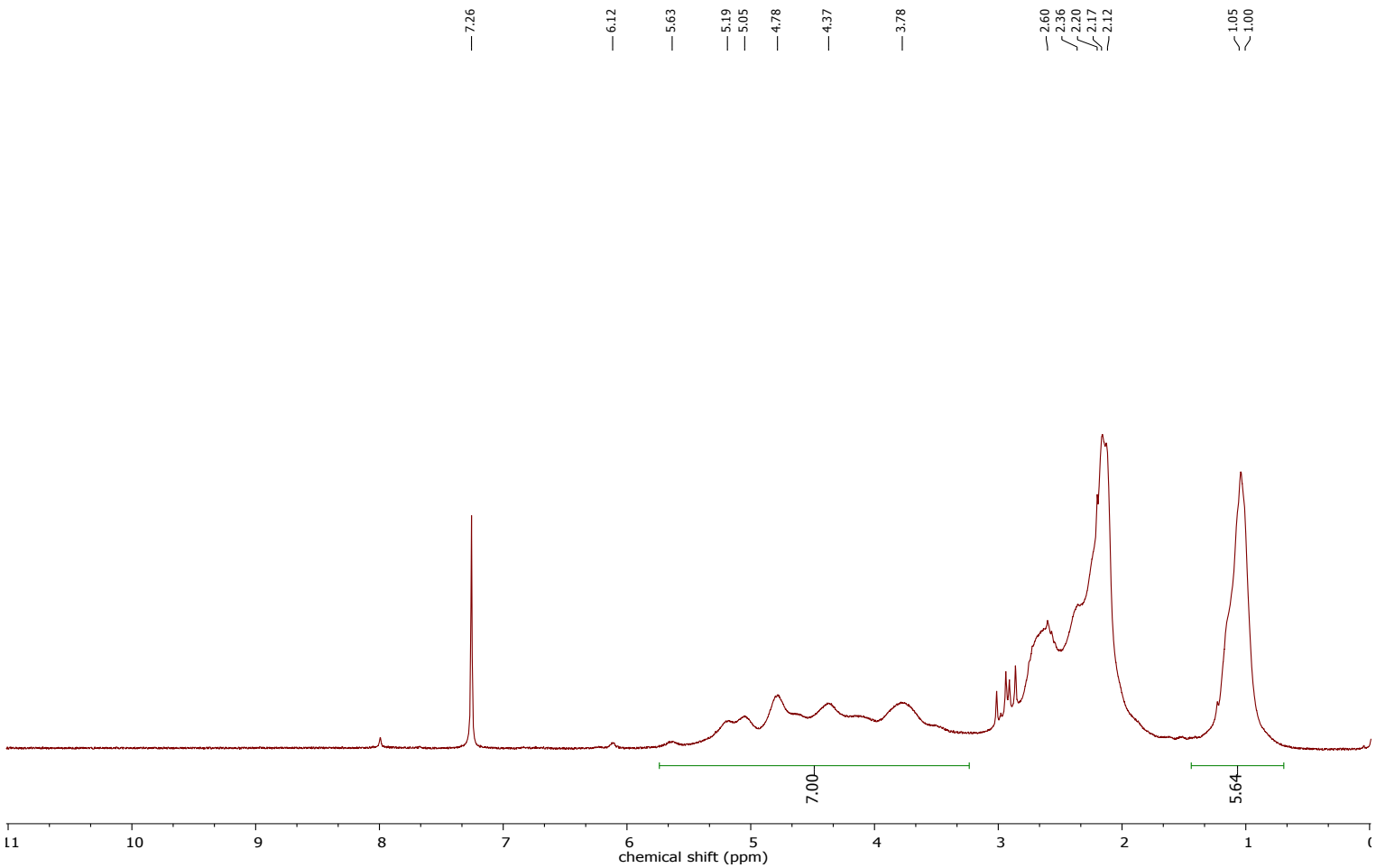


Fig S46. ^{1}H NMR of propionyl-levulinyl cellulose from **DBUHLev**, 10 eq Lev_2O, 50°C, 0.5 ml DMSO

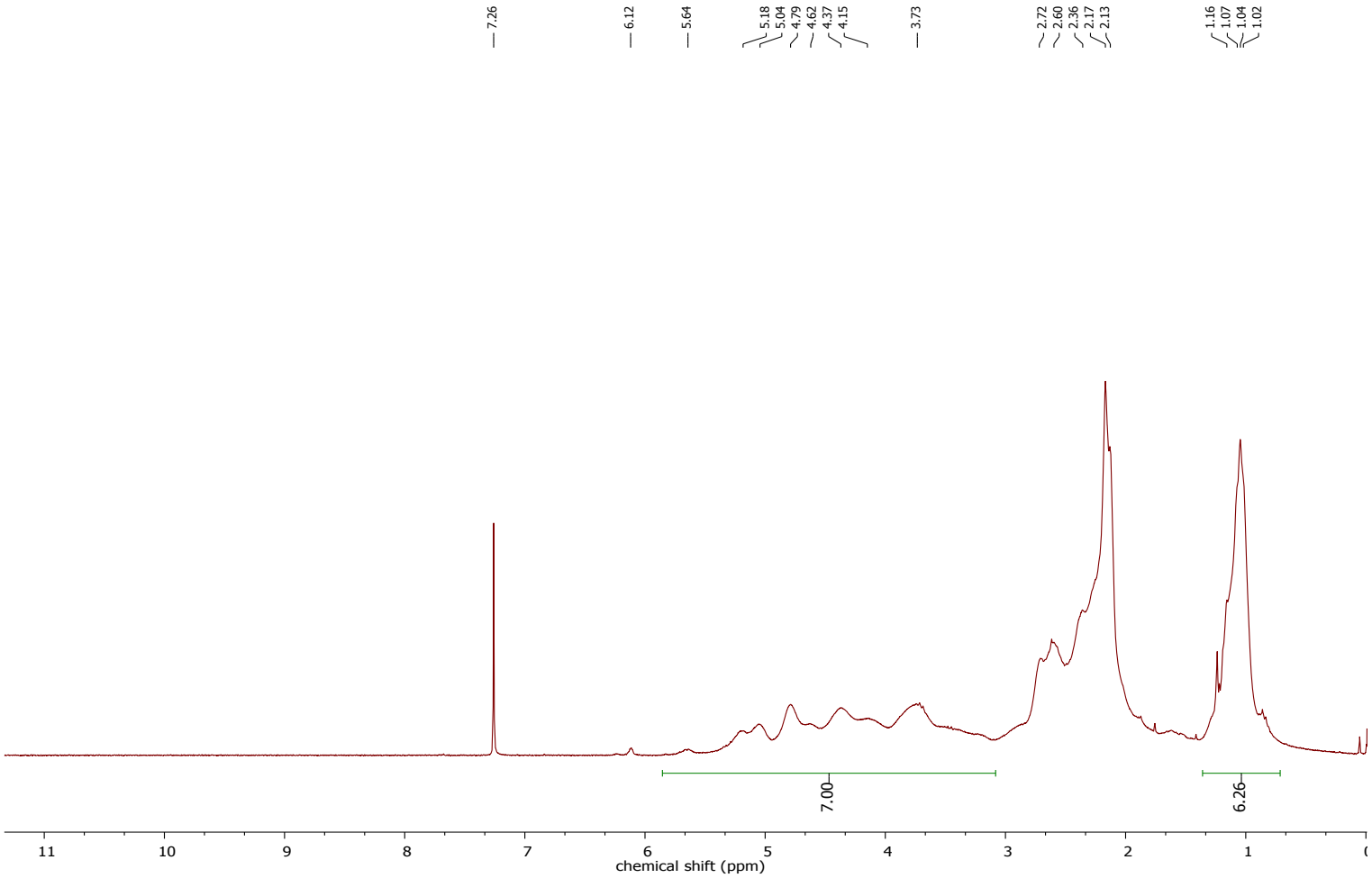


Fig S47. ^{1}H NMR of propionyl-levulinyl cellulose from **DBUHLev**, 10 eq Lev_2O, 25°C, 0.5 ml DMSO

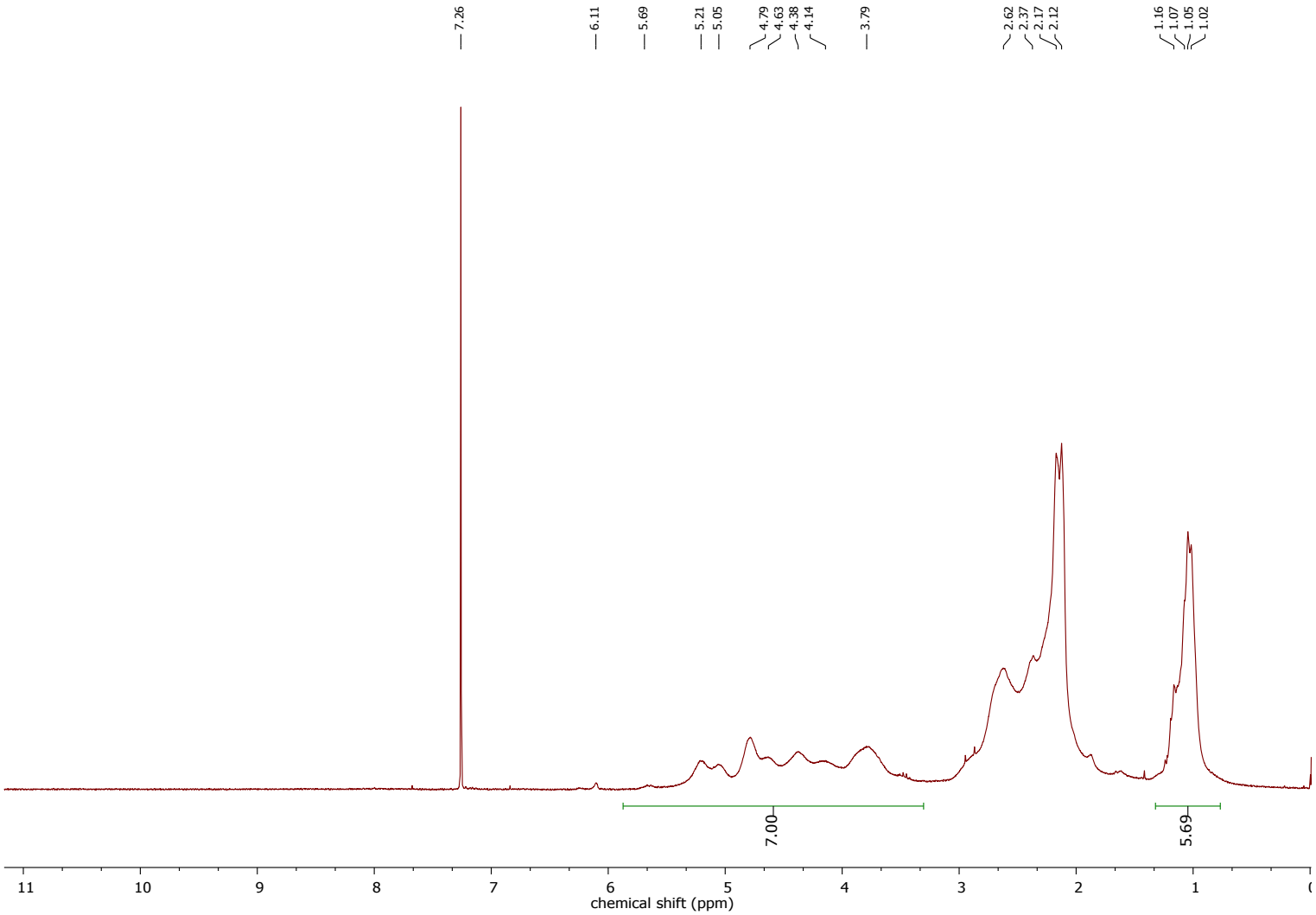


Fig S48. ^{1}H NMR of propionyl-levulinyl cellulose from **DBUHLev,** 3 eq Lev_2O, 80°C, 0.5 ml DMSO

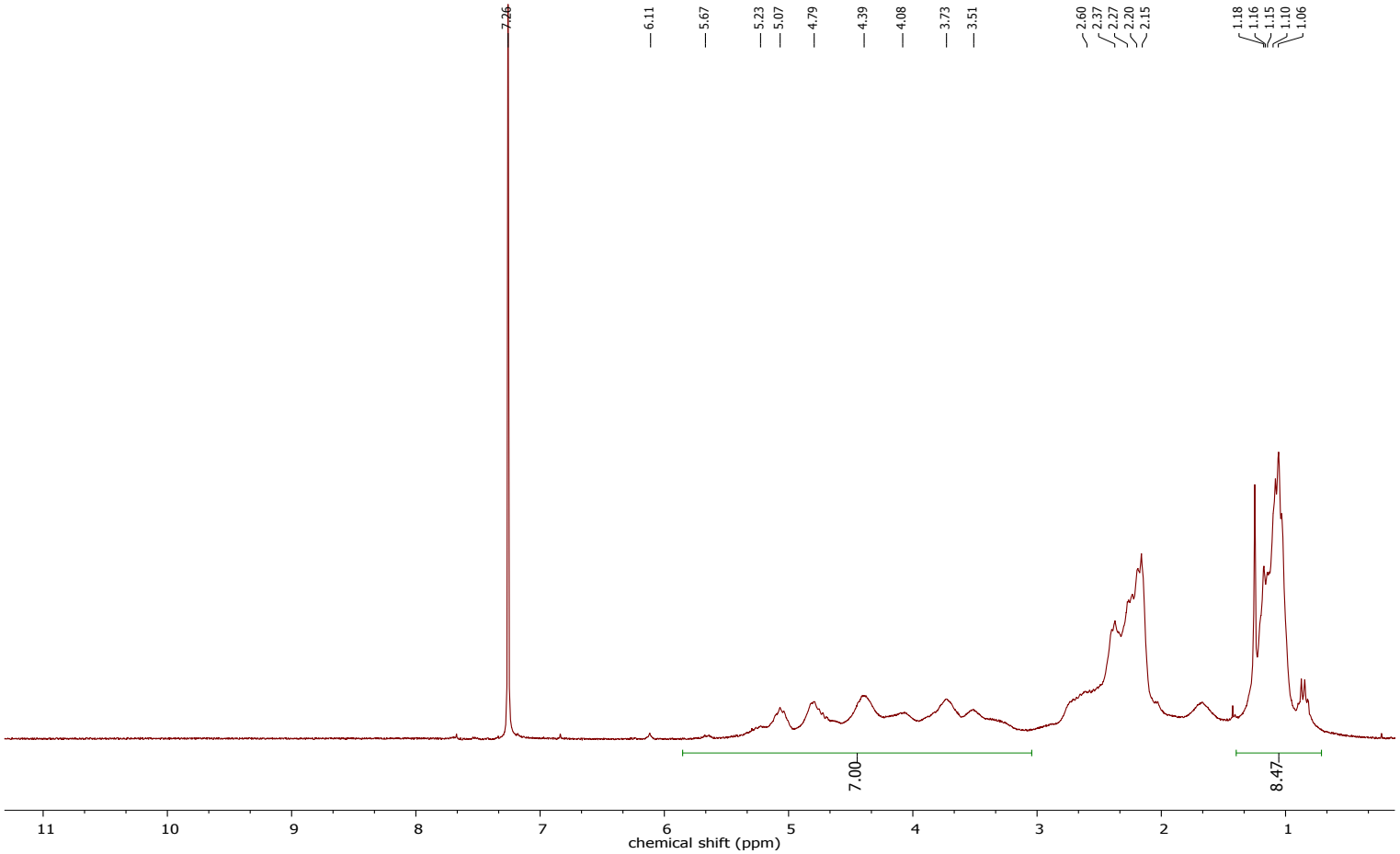


Fig S49. ^{1}H NMR of propionyl-levulinyl cellulose from **DBUHLev**, 10eq Lev_2O, 80°C, 3.5gr DMSO