

X-ray Photoelectron Spectroscopy for Characterization of Wood Surfaces

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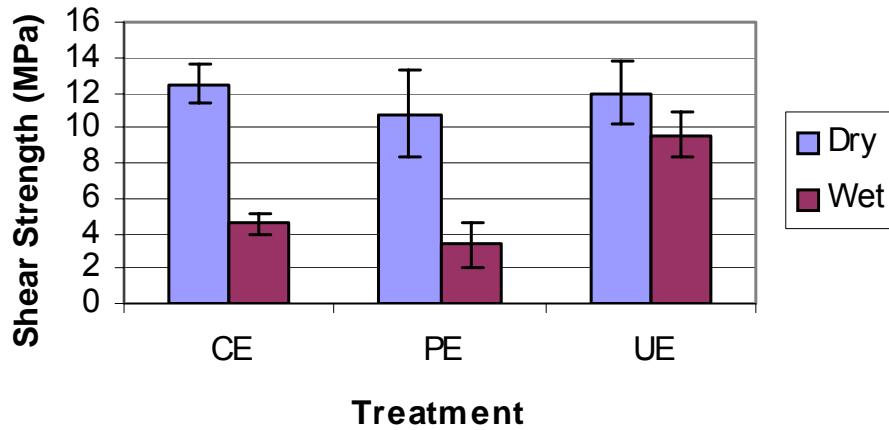


Acetylation

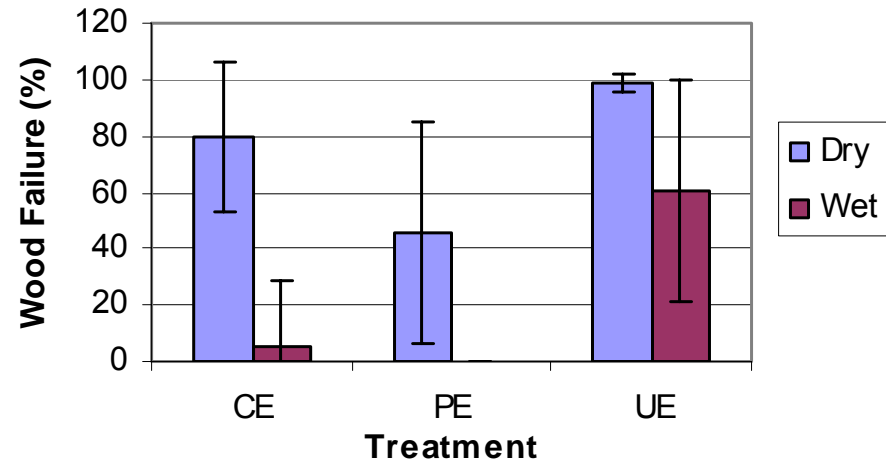


Durability of Epoxy/Poplar Bond

Epoxy Shear Strength



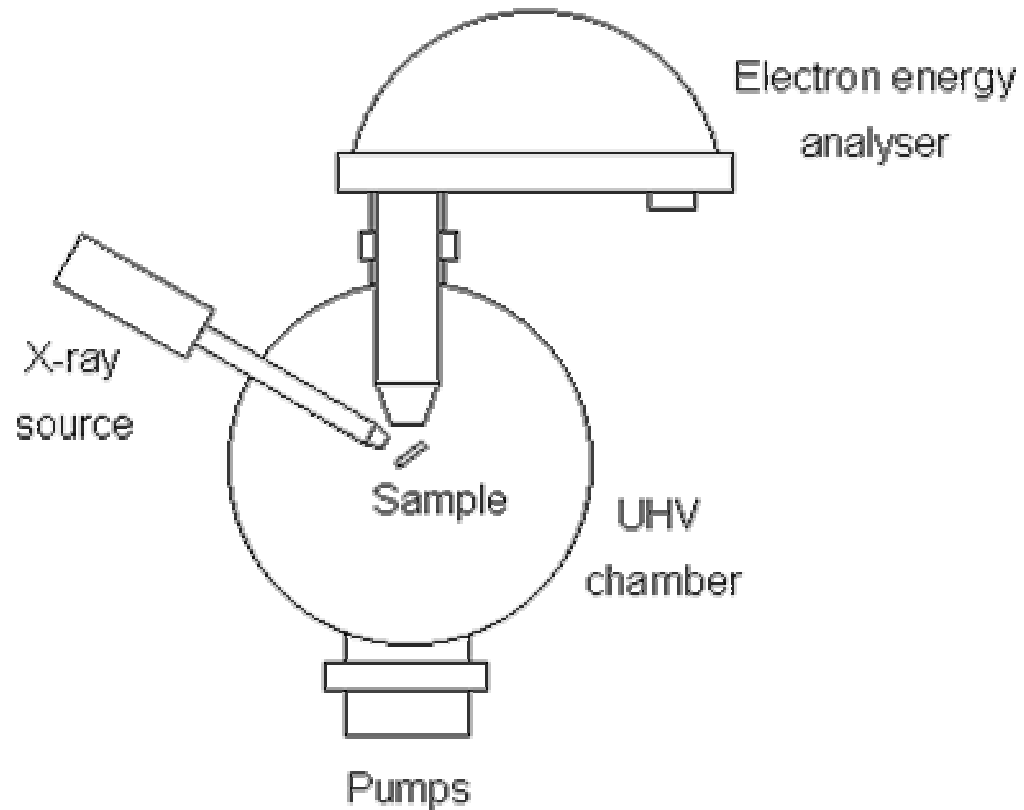
Epoxy Wood Failure



Questions:

- Yellow-poplar
 - Does acetylation modify all OH ?
 - Does planing reveal unmodified OH ?
 - Cellulose
 - Is cellulose acetylated ?
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X-ray Photoelectron Spectroscopy

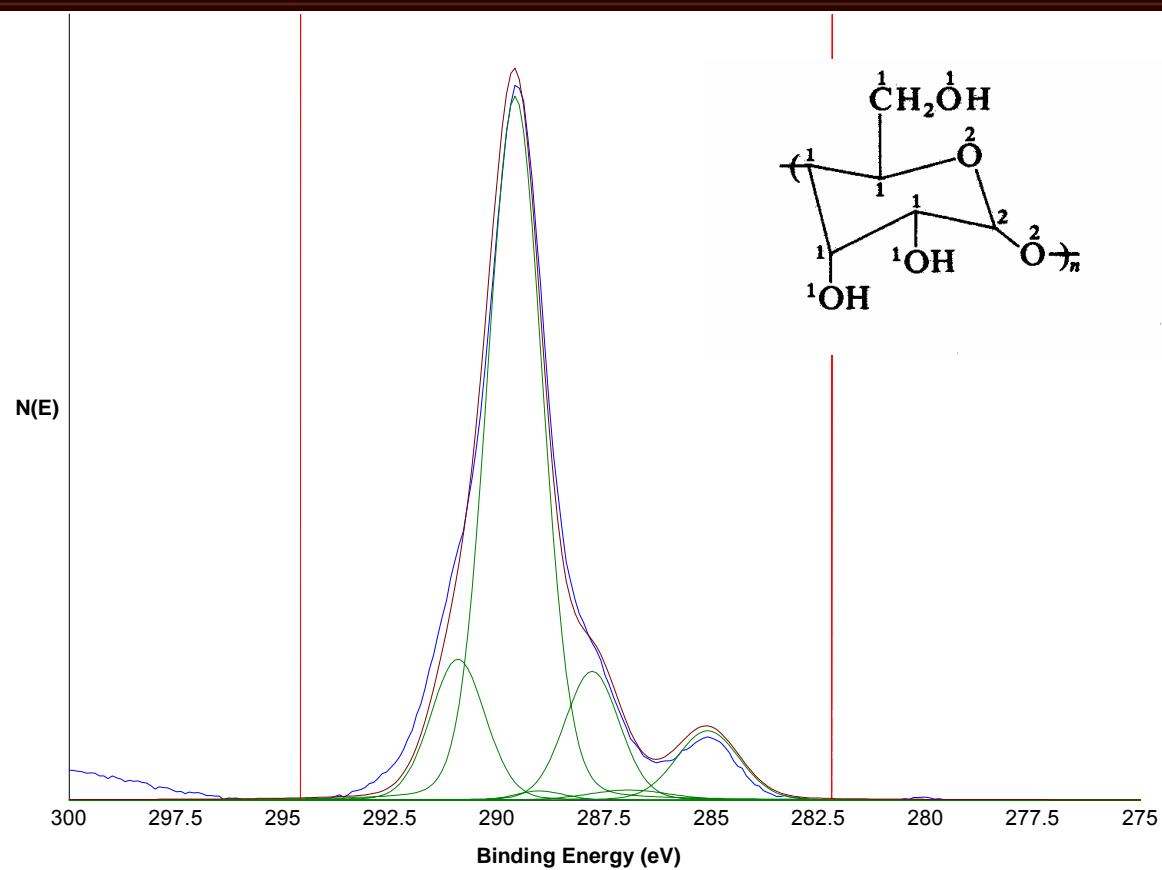


Trifluoroacetylation

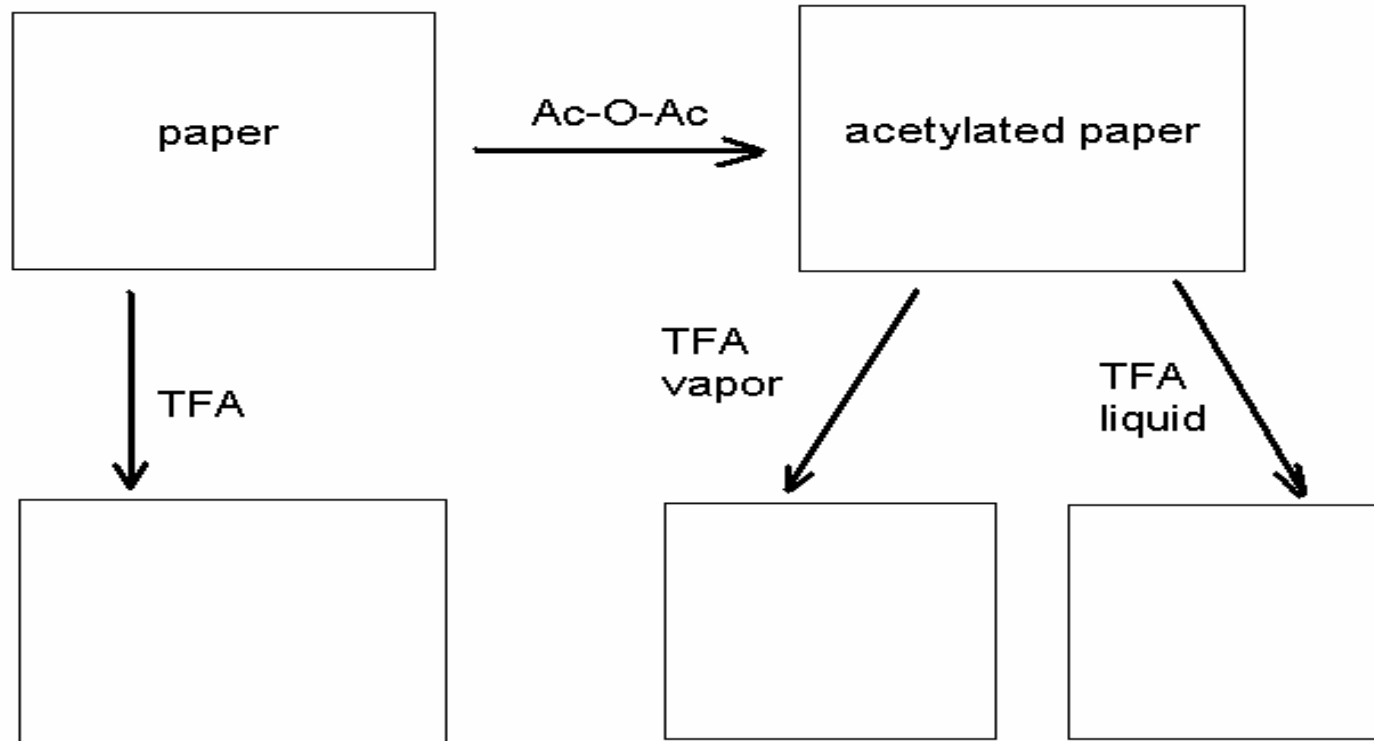


X-ray Photoelectron Spectroscopy

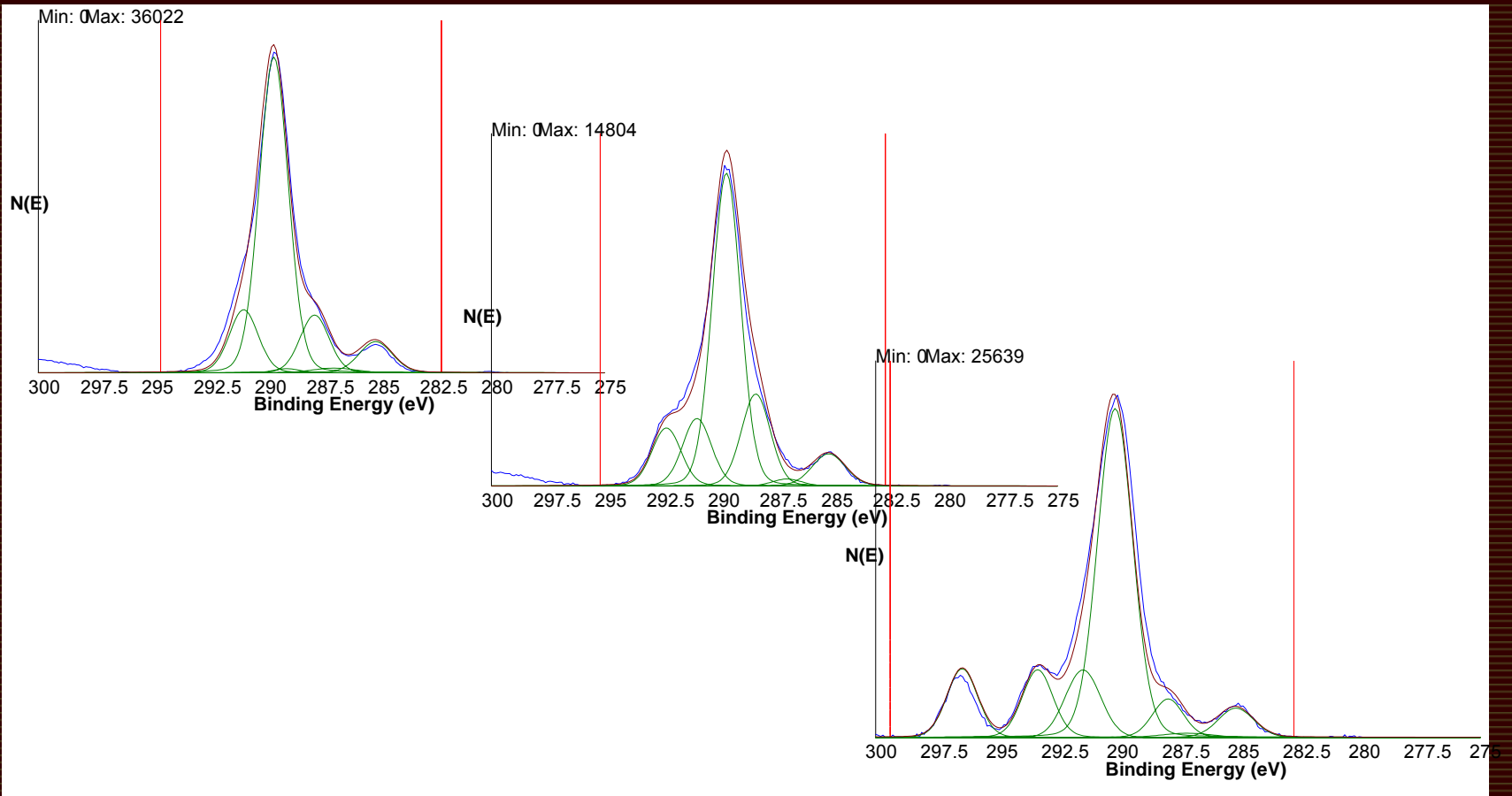
Min: 0 Max: 36022



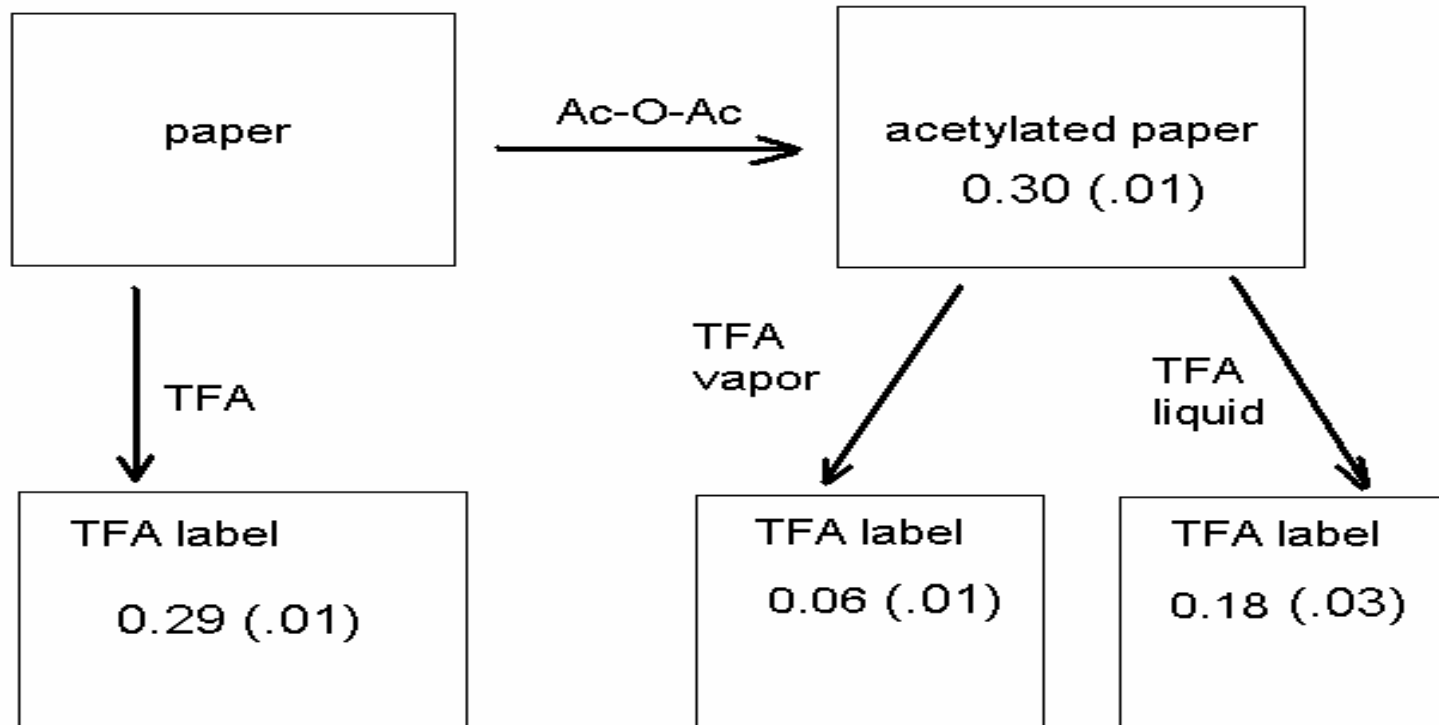
Acetylation of Cellulose



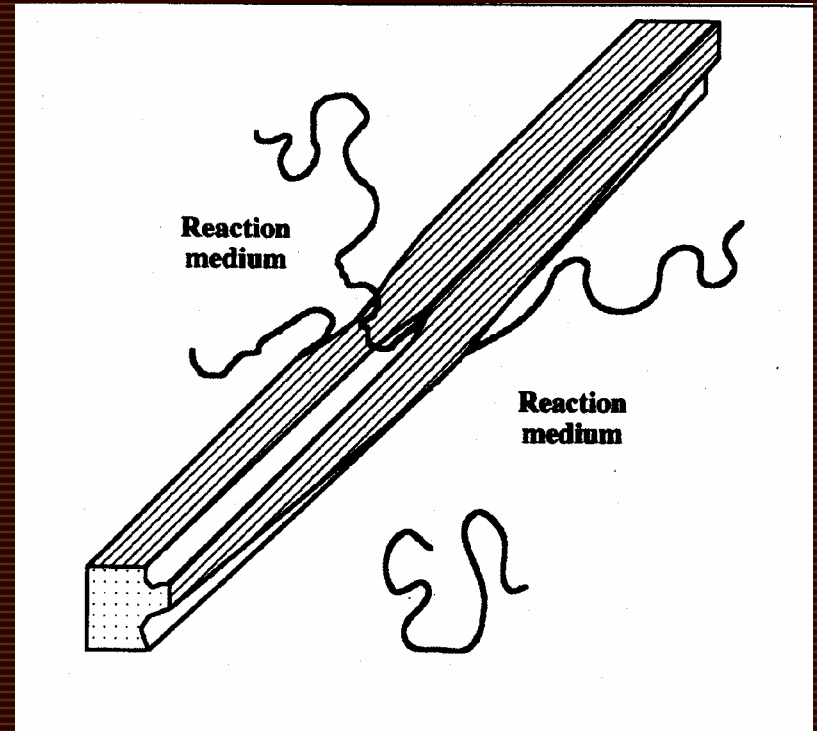
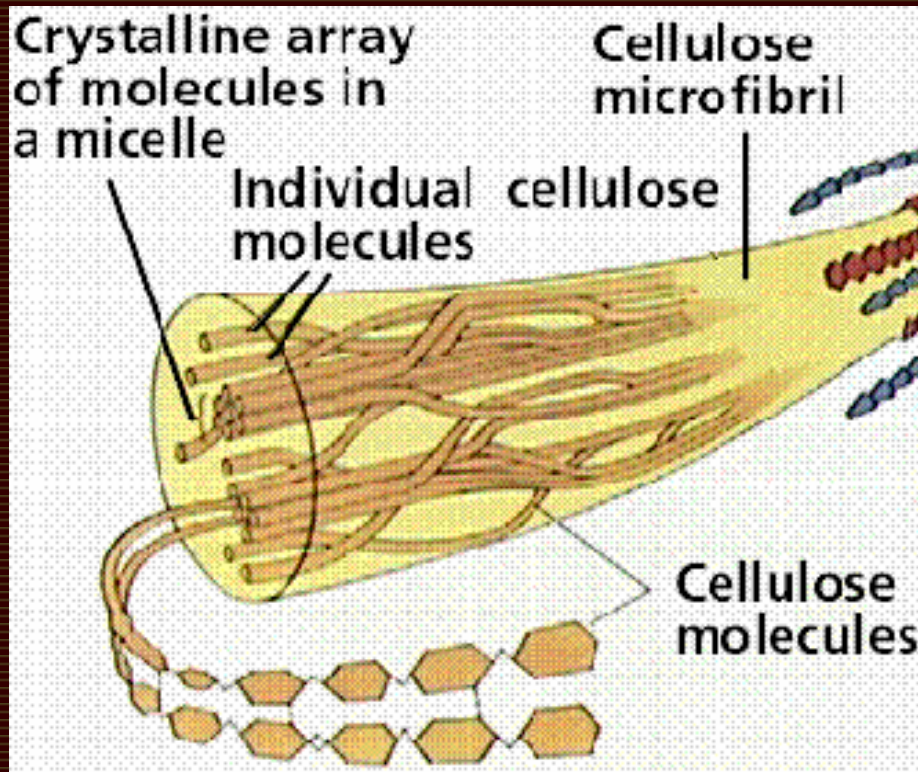
Acetylation of Cellulose



Acetylation of Cellulose

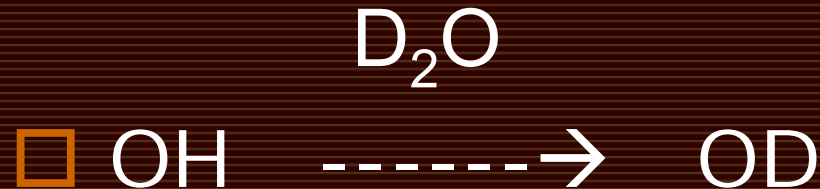


Accessible Hydroxyls



Accessible Hydroxyls

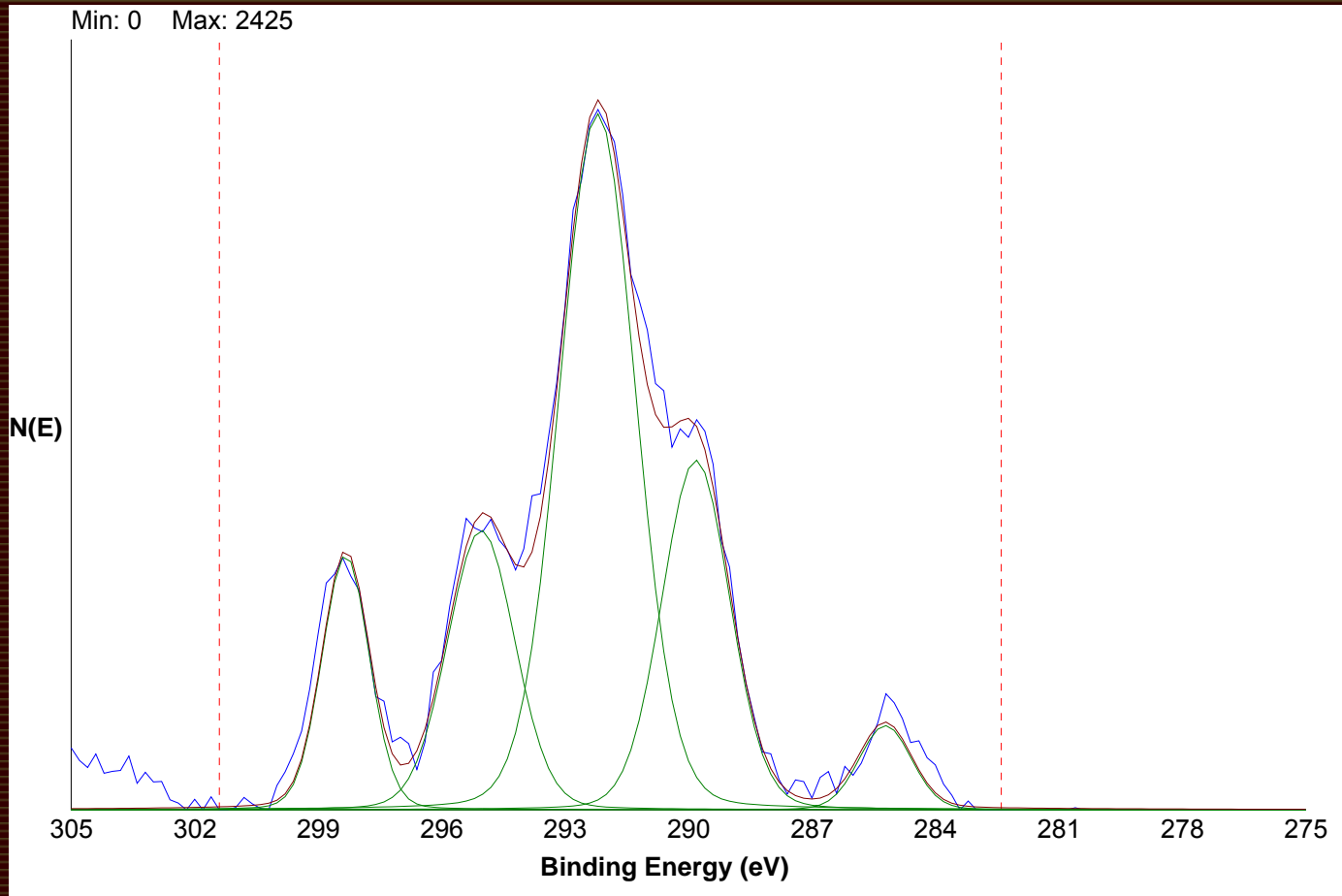
- Other observations



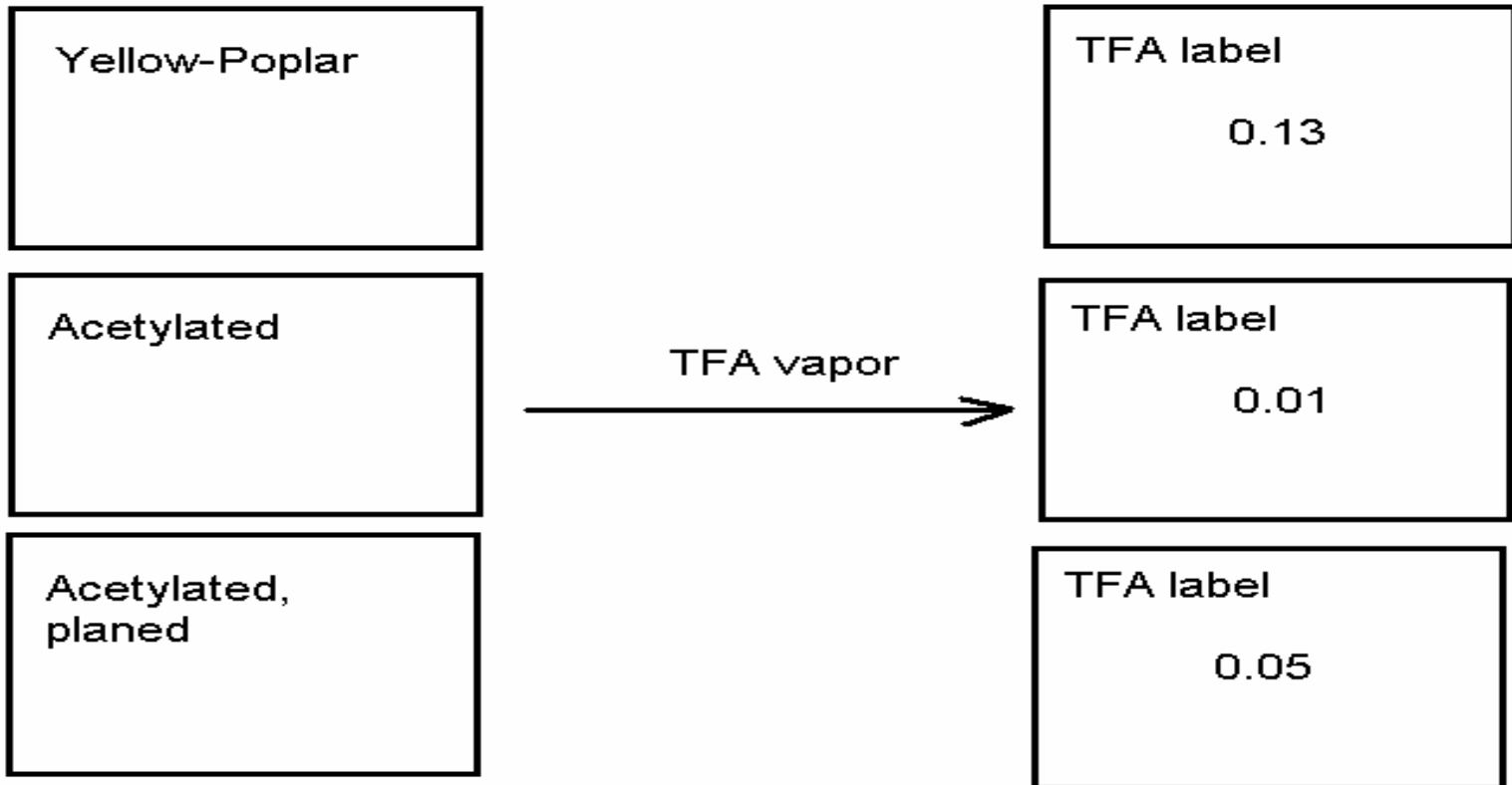
- NMR Child, T. F., Jones, D. W., (1973) *Cellulose Chem. Technol.*, 7 525-534.

- 0.3

Acetylation of Yellow-Poplar



Acetylation of Yellow-Poplar



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□ Conclusions

- About 1/3 of cellulose hydroxyl groups near the surface are acetylated
 - Planing acetylated wood exposes unmodified hydroxyl groups
 - These unmodified hydroxyls may weaken the adhesive bond
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