The Isolation of Lignin from Forages

The isolation of lignin is a multi-step process that takes several months from plant harvest to analysis by NMR.

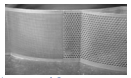
Start here

Alfalfa plant

Corn plants

30 g of plant material is harvested and dried.

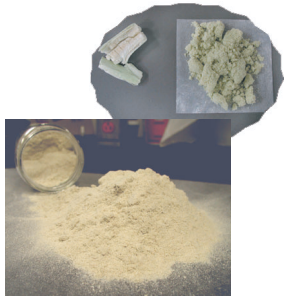
Wiley mill



1 mm and 2 mm screens

Udy mill

Samples are ground to pass through a 1 mm screen using various mills.

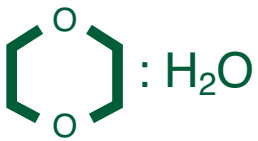


Plant material after grinding

Ground material is extracted extensively using a soxhlet apparatus. Cell walls remain.

Soxhlet apparatus

Broken cell walls are treated with a cellulase to get rid of remaining carbohydrates during cell wall digestion.



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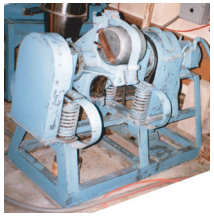
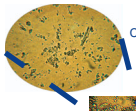
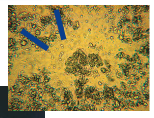
The lignin fraction is isolated from the digested cell walls using dioxane and water. The soluble lignin fraction is analyzed by NMR.

Ball-mill with canisters loaded





Cell walls as seen under a microscope after ball-milling



Steel ball-bearings and canister used in ball-milling process

Cell walls are broken apart by shaking material in canisters with steel ball-bearings. This process is refered to as ball-milling.

Samples ready for NMR analysis

360 MHz Nuclear Magnetc Resonance (NMR)

Finish

100 mg of isolated lignin is analyzed by NMR.