



## Why Pretreatment ?

Pretreatment is the process that breaks up wood's structure to expose the polysaccharide complexes (cellulose and hemicellulose) present within so that introduced enzymes can hydrolyze the polysaccharides and liberate the simple sugars.

Pretreatment also helps liberate the lignin from the cellulose and hemicellulose making it available for use in generating valuable co-products.

## Sulfite Process

The sulfite pretreatment process involves two fundamental steps. The first step mixes woodchips with an acidic aqueous sulfite solution. The mixture is then heated. This process separates most of the hemicelluloses from the lignocellulose and partially separates lignin.

The second step employs a mill to grind the pretreated solid cellulose/lignin rich material into fibers or fiber bundles. The remaining solids can easily be enzymatically hydrolyzed to generate simple sugars like glucose. The separated lignin fraction can be purified and further processed into co-products.

## Advantages

- Relatively versatile: Varying the temperature, time, pH or the amount of chemicals accommodates a variety of woody feedstock streams.
- Low amounts of enzymatic inhibitors are produced.
- Scale-up is straightforward due to an existing sulfite pulping industry.

Chemical compositions of major softwood species in PNW<sup>1</sup>

Major components	cellulose	hemicellulose	lignin	extractive
NARA regional softwoods <sup>2</sup>	41-49 %	17-25 %	25-30 %	2-5 %



<sup>1</sup> Handbook of Wood Chemistry and Wood Composites, Second Edition. Roger M. Rowell. CRC Press.

<sup>2</sup> Douglas-fir, grand fir, ponderosa pine, western hemlock and western larch.

NARA is led by Washington State University and supported by the Agriculture and Food Research Initiative Competitive Grant no. 2011-68005-30416 from the USDA National Institute of Food and Agriculture.



United States  
Department of  
Agriculture

National Institute  
of Food and  
Agriculture