



Range of services and equipment

Processing of
Lignocellulose

Range of services

The focus in the area of raw material processing is on the extraction and pulping of biomass, in particular the fractionation of lignocellulosic feedstock into the components lignin, sugars and pulp. An integrated pilot plant is available for the research and development of fractionation technologies. Here, up to 70 kilograms (dry weight) of wood can be processed daily.

We offer

- Scale-up of processes
- Integrated process development and optimization (energy and raw material efficiency)
- Process analytics
- Process and product expertise in the area of Organosolv pulping

Product portfolio

- Supplying products from the Organosolv process
 - Sulfur-free high-purity lignin
 - Pulp
 - Glucose
 - Hemicelluloses



Tank for enzymatic hydrolysis of pulp

Equipment

- Fixed-bed reactor (460 liters, 36 bar, ATEX compliant) with forced circulation and separate supply and discharge tanks
- Precipitation tanks (up to 1200 liters, can be cooled and stirred, with continuous solvent evaporation, ATEX compliant)
- Equipment for disintegration, washing and dewatering of pulp
- Tanks for enzymatic hydrolysis and extraction of pulp with spiral agitators for high solid loadings (2 x 800 liters, pH and temperature control)
- Falling film evaporator for the concentration of sugar solutions
- Rectification for the recovery of solvents (1500 liters, ATEX compliant plant)

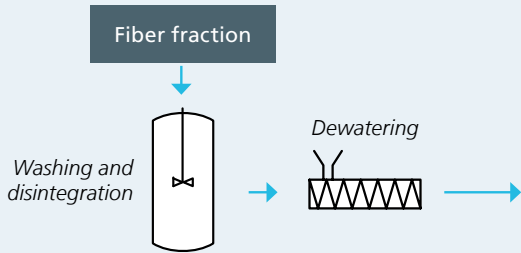
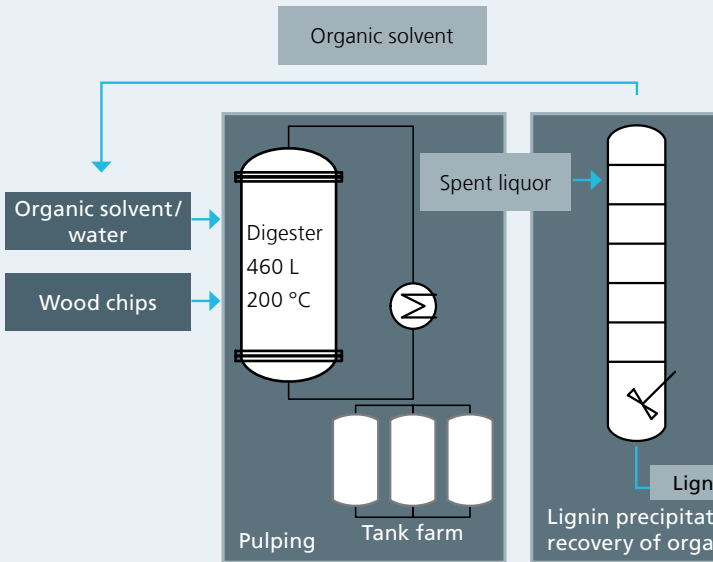
Core competence

Organosolv

- 1. Pulping of lignocellulosic feedstock** is carried out in a 460 liter fixed-bed reactor at temperatures up to 200°C, during which lignin and hemicelluloses are dissolved in a mixture of water and organic solvent, such as ethanol.
- 2. Additional tanks and heat exchangers** allow efficient displacement washing of pulp at reaction conditions.
- 3. Lignin is precipitated from the spent liquor** via the continuous LigniSep distillation of the organic solvent, filtered, washed and dried.
- From the filtrate, the **organic solvent** is completely recovered by distillation while the **hemicellulosic sugars** remain in aqueous solution.
- 5. The pulp is disintegrated, washed and dewatered.** If requested, the pulp can be mixed with enzymes and hydrolyzed at high solid loadings in specially designed stirred reactors. **Glucose solution** is obtained after a subsequent filtration step and concentrated to a syrup for stabilization using falling-film evaporation.

Wood chips used as raw material for the Organosolv process



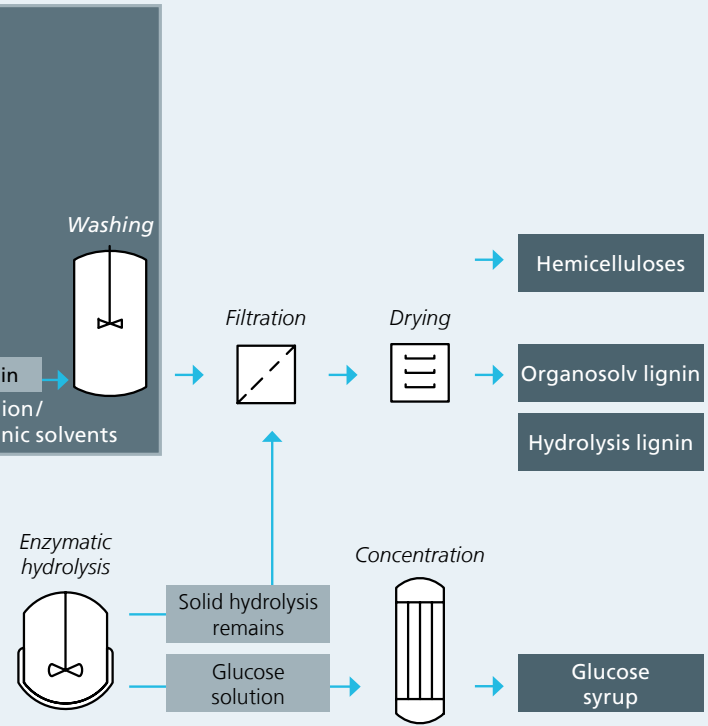


Variety of starting materials

- Beech
- Spruce
- Birch
- Waste wood
- Eucalyptus
- Wheat straw
- Miscanthus
- Bark (different species)



Process scheme



References

Pulping and extraction

- Soda pulping in cooperation with the Technische Universität Dresden as part of the ERA-IB2 project “Products from lignocellulose”
- FABIOLA™: low temperature process based on aqueous acetone, developed by TNO – Netherlands Organisation for Applied Scientific Research
- Alkaline ethanol-based Organosolv digestion of wheat straw on behalf of the Annikki GmbH, Raaba-Grambach, Austria, developer and owner of the process
- Alkaline extraction of hemicellulose from paper pulp in cooperation with the University of Hamburg in the framework of the FP7-funded CarboPrec project

Equipment for continuous lignin precipitation



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