Birch Bark Processing for Betulin Extraction

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INTRODUCTION

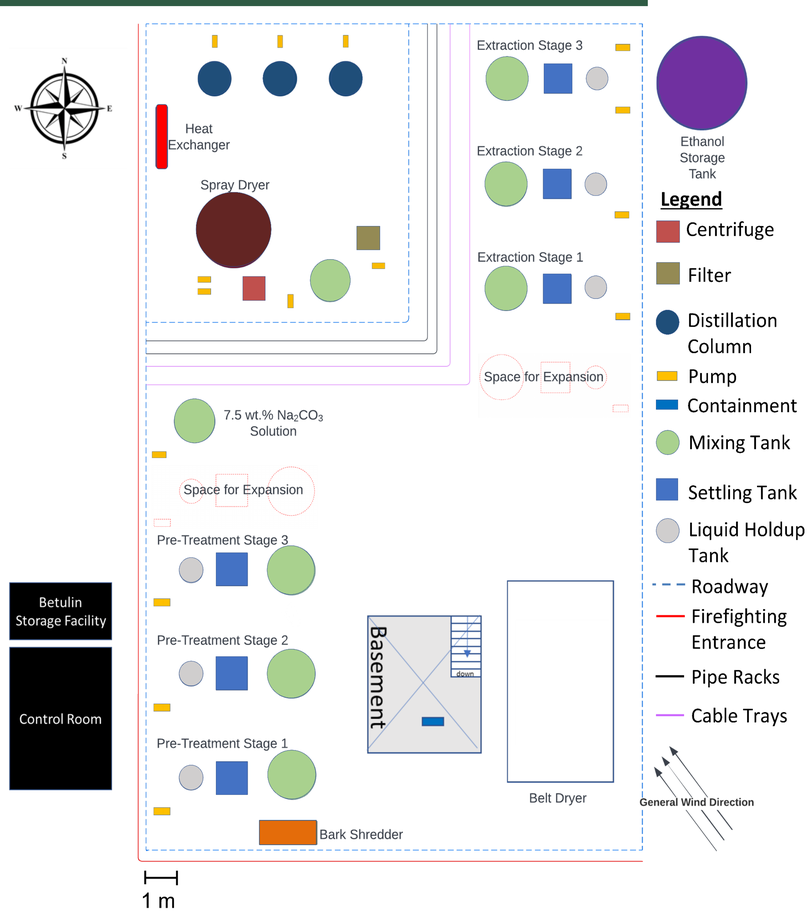
This project aims to valorize birch bark by extracting Betulin from it. As of now, bark is considered as waste and usually combusted. However, bark contains up to 30 wt% of Betulin, which is a versatile bioactive component used in pharmaceutical and cosmetics industry.

SOCIETAL NEEDS

Anti-HIV, Antitumor, Skin Restorer Products

Proposed Plant Capacity: 338 tonnes/y of Betulin

PLANT LAYOUT



PROCESS DESCRIPTION

Birch Bark

Bark Pre-treatment 1

Bark is shredded and pre-treated with a 7.5 wt% Na_2CO_3 solution to remove polar admixtures.

Filtration and Drying 2

The slurry exiting pre-treatment is filtered and dried further with a belt dryer to remove excess moisture from the bark.

Ethanol Extraction 3

Betulin is leached from the bark using ethanol through a counter-current multistage extraction system.

Precipitation 4

Betulin extractives are precipitated using H_2O and dried into powder form with a purity of 82.6%.

Ethanol Recovery 5

Ethanol is recovered and recycled back into the process using extractive distillation with ethylene glycol.

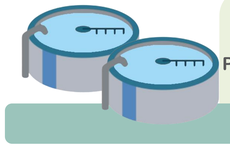
Wood Waste Combustion 6

Exhausted bark is sent to the mill's incinerator which produces steam used for energy generation.

ENVIRONMENTAL ASSESSMENT

Gas

Flue Gas
Pollutants: CO_2, NO_x,CH_4
Exhaust
Pollutants: Ethanol
→ Scrubber, Biofiltration → Atmosphere



Liquid

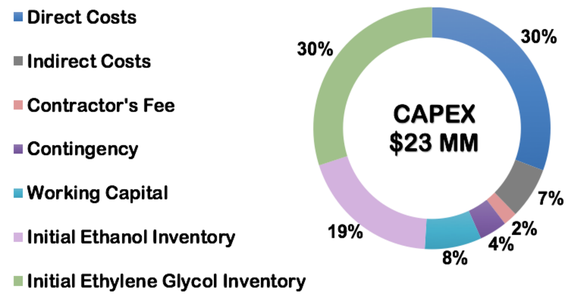
Liquid Effluent
Pollutants: Na_2CO_3, Phenols, Monosaccharides, Ethylene Glycol , Ethanol
→ Neutralization, Biological Treatment → St. Charles River

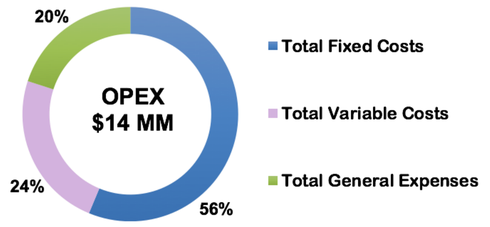
Solid

Hot Ash
→ Electrostatic Precipitator, Cooler → Landfill

PROCESS ECONOMICS

$50/kg	20 years	10%
Selling Price	Plant Life	Interest Rate





NPV: $12MM

IRR: 16%

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