



INTISARI

Tugas prarancangan pabrik ini akan mengkaji Pabrik Pewarna Alami dari Kulit Kayu Tanaman Mangrove. Pabrik ini menggunakan proses ekstraksi sebagai proses utama. Bahan baku kulit kayu dipreparasi pada unit *pretreatment*. Selanjutnya, tanin diekstrak dari kulit kayu menggunakan solven etanol 96% pada rangkaian alat Mixer-Settler dengan 5 *stage* secara *counter current*. Ekstrak yang diperoleh kemudian dipadatkan dan dikeringkan agar diperoleh hasil akhir berupa serbuk pewarna alami.

Pabrik ini akan memiliki kapasitas 1700 ton/tahun dengan kadar tanin pada pewarna sebesar 70%. Untuk memperoleh kapasitas produksi yang dirancang, dibutuhkan kulit kayu mangrove sebanyak 13.931,96 ton/tahun dan *fresh* etanol 96% sebanyak 650,47 ton/tahun.

Utilitas yang diperlukan pabrik ini adalah air serta bahan bakar untuk *boiler* dan generator. Kebutuhan air untuk utilitas pabrik ini sebesar 15.718,12 kg/jam. Kebutuhan bahan bakar generator sebesar 109,50 kg/jam. Kebutuhan bahan bakar *boiler* dipenuhi oleh ampas kulit kayu mangrove dengan tambahan *fuel oil* sebanyak 24,88 kg/jam.

Pabrik pewarna alami ini direncanakan akan didirikan Distrik Babo, Kabupaten Teluk Bintuni, Papua Barat berdekatan dengan sumber bahan baku kulit kayu mangrove yang diperoleh dari PT Bintuni Utama Murni Wood Industries (PT BUMWI). Tanah yang diperlukan seluas 36.000 m². Pabrik ini akan mempekerjakan 256 orang untuk menjalankan pabrik dan manajemennya.

Pabrik ini memerlukan modal tetap \$8.673.814,60+Rp 38.309.735.462,67, modal kerja sebesar \$1.814.129,90+Rp 18.560.237.883,90, dan *production cost* sebesar \$5.262.614,76 + Rp 141.498.960.908,54. Pabrik pewarna alami dari kulit kayu mangrove ini tergolong *low risk*. Berdasarkan evaluasi ekonomi diperoleh nilai POTb 3 tahun, POTa 4 tahun, ROIt 23,8%, ROIta 15%, BEP 50,44%, SDP 21,96%, dan DCFRR 21,96%. Berdasarkan uraian diatas, dapat disimpulkan bahwa pabrik ini menarik secara ekonomi dan layak untuk dikaji lebih lanjut.



ABSTRACT

This assignment is about preliminary design of Natural Dyes Plant from Mangrove Bark. This plant will use extraction as the main process for extracting tannin (main component in red-brown natural dyes). Mangrove bark need to be prepared in pretreatment unit before the extraction. Tannin extraction from bark uses ethanol 96% as the solven. The extraction hold in 5 stage counter current Mixer-Settlers. Then, the extract from extraction unit is concentrated by evaporating the solven. Natural dyes powder is made by drying the extract using spray dryer.

The capacity of the plant is 1,700 tons/year natural dyes with tannin purity about 70% of the dyes. The bark used for making the natural dyes product is 13,931.96 tons per year. For the solvent make up, this plant need 650.47 tons ethanol 96% per year.

Water, gasoline and fuel oil are the utility used in this plant. Water usage for utility is 15,718.12 kg per hour. The need of gasoline for generating electricity in the plant is 109.50 kg per hour. Fuel oil is used to complement the fuel for boiler beside the use of after-extraction bark. The need of fuel oil is 24.88 kg per hour.

This plant is planned to be constructed in Babo District, Teluk Bintuni, Papua Barat. This plant is located near the source of raw material (mangrove bark) obtained from PT Bintuni Utama Murni Wood Industries (PT BUMWI). The area for the whole plant is designed about 36,000 m². This plant will employ 256 persons for operating the plant and managing the main company.

The fixed capital for the plant is \$8,673,814.60+ Rp 38,309,735,462.67. The working capital is \$1,814,129.90+Rp 18,560,237,883.90. The production cost is \$5,262,614.76 + Rp 141,498,960,908.54per year. This plant is low risk for the process. Base on the ecomomic evaluation, the pay out time (POT) before tax is 3 years and POT after tax is 4 years. The return of investment is 23,8% before tax and 15% after tax. The plant's BEP at 50,44% with SDP 21,96%. The DCFRR is 21,77%. From the economic evaluation's parameters, the plant is feasible to build and need to be evaluated more in the detailed design.