



## INTISARI

Pabrik Metil Laktat ini dirancang dengan kapasitas produksi 30.000 ton/tahun, menggunakan Metil laktat adalah Asam laktat yang diperoleh dari Mushasino Chemical, China dan Methanol diperoleh dari PT. Kaltim Methanol Industri, Bontang. Rencana pabrik akan didirikan di kawasan industri Bontang, Kalimantan Timur. Luas tanah yang diperlukan adalah 403.693 m<sup>2</sup> dengan total tenaga kerja yang diserap 159 orang. Pabrik beroperasi 330 hari efektif selama 24 jam/hari.

Bahan baku yang terdiri dari Asam Laktat 44% sejumlah 8175,9707 kg/jam dari Musashino Chemical, China dan Asam Sulfat 98% sejumlah 940,7379 kg/jam dari PT Indonesian Acid Industry, Bekasi, Jakarta Timur dan Metanol 99,85% sejumlah 1231,4078 kg/jam dari PT Kaltim Metanol Industri, Bontang, Kalimantan Timur masing-masing menuju ke tangki (T-01), tangki (T-02) dan tangki (T-03). Kemudian bahan baku dipanaskan menggunakan heater (HE-01), heater (HE-02), dan heater (HE-03) sampai suhunya sesuai kondisi operasi dan dialirkan menuju Reaktor (R-01) untuk direaksikan. Jenis reaktor yang digunakan adalah reaktor alir tangki berpengaduk dengan kondisi operasi 220 °C dan tekanan 21 atm. Reaksi bersifat endotermis, sehingga dibutuhkan steam sebagai pemanas untuk menjaga kondisi operasi pada keadaan isothermal. Hasil dari reaktor (R-01) berupa metil laktat dan sisa hasil reaksi dialirkan menuju cooler (CL-01) untuk diturunkan suhunya menjadi 62,97 °C kemudian diturunkan tekanannya menggunakan pressure reducer menjadi 1 atm, yang selanjutnya dialirkan menuju netralizer (N-01) untuk menetralkan asam sulfat digunakan natrium hidroksida sejumlah 1834,3276 kg/jam yang dilairkan dari tangki (T-04). Hasil dari netralizer (N-01) berupa campuran metanol, air, sodium laktat, metil laktat dan natrium sulfat diartirkan menuju menara distilasi (MD-01) untuk dilakukan pemisahan dari metanol. Hasil atas menara distilasi (MD-01) berupa metanol dan air dengan suhu 64,9 °C dan tekanan 1 atm akan direcycle kembali dan hasil bawahnya yang berupa sedikit metanol, air, sodium laktat, asam laktat dan natrium sulfat yang kemudian diumpankan menuju kristalizer (CR-01) untuk mengkristalkan natrium sulfat menjadi kristal padatan. Hasil atas kristalizer (CR-01) berupa metanol dan air dibawa menuju unit pengolahan lanjut. Sedangkan hasil bawah kristalizer (CR-01) berupa air, sodium laktat, metil laktat dan kristal padatan natrium sulfat dipisahkan menggunakan centrifuge (CF-01). Padatan yang dihasilkan centrifuge (CF-01) berupa natrium sulfat yang kemudian diangkut menuju unit pengolahan lanjut. Sementara itu filtratnya dialirkan menuju menara distilasi (MD-02), sehingga dihasilkan produk atas berupa air, sodium laktat dan sedikit metil laktat dengan suhu 127 °C dan tekanan 1 atm didinginkan menuju cooler (CL-02) untuk dibawa menuju unit pengolahan lanjut. Sedangkan hasil bawah menara distilasi (MD-02) berupa produk utama metil laktat dengan pengotor sodium laktat pada suhu 144 °C dan tekanan 1,1 atm akan didinginkan menuju cooler (CL-03) agar produk utama dapat disimpan ke dalam tangki penyimpanan (T-05) pada kondisi suhu 35 °C dan tekanan 1 atm. Utilitas yang diperlukan untuk pendirian pabrik ini meliputi air, listrik, bahan bakar, dan udara tekan. Kebutuhan air total yang diperlukan pada prarancangan pabrik Metil laktat sebesar 38008,86 Kg/jam dan kebutuhan listrik berdasarkan yang dipenuhi dari PLN sebesar 500 KW, digunakan generator ketika terjadi pemadaman listrik.

Berdasarkan perhitungan evaluasi ekonomi diperoleh modal tetap yang diperlukan sebesar Rp2.002.324.695.500 dan US\$ 16.990.492. serta modal kerja sebesar Rp. 2.242.672.195.500. Percent Return of Investment (ROI) sebelum pajak 30,57% dan setelah pajak 29,40%. POT sebelum pajak 2,46 tahun dan sesudah pajak 2,54 tahun. BEP 45% , SDP 22,97% dan DCFR 38,67%. Jadi berdasarkan pertimbangan teknis dan ekonomi sebagaimana diatas maka pabrik metil laktat layak dikaji lebih lanjut.



## ABSTRACT

*This Methyl Lactate factory was designed with a production capacity of 30,000 tons / year, using Methyl lactate which is lactic acid obtained from Mushasino Chemical, China and Methanol obtained from PT Kaltim Methanol Industri, Bontang. It is planned that the factory will be established in the Bontang industrial area, East Kalimantan. The land area required is 403,693 m<sup>2</sup> with a total workforce of 159 people. The factory operates 330 days effective for 24 hours/day.*

*Raw materials consisting of 44% Lactic Acid amount of 8175.9707 kg/hour from Musashino Chemical, China and 98% Sulfuric Acid in the amount of 940.7379 kg/hour from PT Indonesian Acid Industry, Bekasi, East Jakarta and 99.85% Methanol. 1231.4078 kg/hour from PT Kaltim Methanol Industri, Bontang, East Kalimantan to tank (T-01), tank (T-02) and tank (T-03) respectively. Then the raw materials are heated using a heater (HE-01), heater (HE-02), and heater (HE-03) until the temperature is in accordance with the operating conditions and flowed to the reactor (R-01) to be reacted. The type of reactor used is a stirred tank flow reactor with an operating condition of 220 °C and a pressure of 21 atm. The reaction is endothermic, so that steam is needed as a heater to maintain operating conditions in isothermal conditions. The result of the reactor (R-01) is in the form of methyl lactate and the rest of the reaction is flowed to the cooler (CL-01) to reduce the temperature to 62.97 °C then lower the pressure using a pressure reducer to 1 atm, which is then flowed to the neutralizer (N-01) to neutralize sulfuric acid used sodium hydroxide in the amount of 1834.3276 kg / hour which was diluted from the tank (T-04). The result of the neutralizer (N-01) in the form of a mixture of methanol, water, sodium lactate, methyl lactate and sodium sulfate is flowed to the distillation tower (MD-01), for separation from methanol. The top product of the distillation tower (MD-01) in the form of methanol and water with a temperature of 64.9 °C and a pressure of 1 atm will be recycled again and the bottom product in the form of a small amount of methanol, water, sodium lactate, lactic acid and sodium sulfate which is then fed to the crystallizer (CR-01) to crystallize sodium sulfate into solid crystals. The result of the crystallizer (CR-01) in the form of methanol and water is brought to the further processing unit. Meanwhile, the bottom product of the crystallizer (CR-01) in the form of water, sodium lactate, methyl lactate and sodium sulfate solid crystals were separated using a centrifuge (CF-01). The solid produced by the centrifuge (CF-01) is in the form of sodium sulfate which is then transported to the further processing unit. Meanwhile the filtrate is flowed to the distillation tower (MD-02), so that the top product is produced in the form of water, sodium lactate and a little methyl lactate with a temperature of 127 °C and a pressure of 1 atm cooled to the cooler (CL-02) to be brought to the further processing unit. While the bottom product of the distillation tower (MD-02) is the main product of methyl lactate with sodium lactate impurity at a temperature of 144 °C and a pressure of 1.1 atm which will be cooled to a cooler (CL-03) so that the main product can be stored in a storage tank (T-05) at a temperature of 35 °C and a pressure of 1 atm. The utilities required for the establishment of this factory include water, electricity, fuel and compressed air. The total water requirement required in the Methyl lactate factory design is 38008.86 Kg/hour and the electricity requirement based on what is met by PLN is 500 KW, a generator is used when there is a power cut.*

*Based on the calculation of the economic evaluation, the required fixed capital is Rp. 2,002,324,695,500 and US \$ 16,990,492, and the working capital is Rp. 2,242,672,195,500. The Percent Return of Investment (ROI) before tax is 30.57% and after tax is 29.40%. POT before tax 2.46 years and after tax 2.54 years. BEP 45%, SDP 22.97% and DCFR 38.67%. Thus based on the technical and economic considerations as mentioned above, the methyl lactate factory deserves to be studied further.*