

ABSTRAK

Metil iso butil keton (MIBK) merupakan *solvent* yang digunakan dalam pembuatan cat. Kebutuhan akan bahan baku cat yaitu *solvent* akan semakin meningkat seiring dengan berkembangnya industri cat di dunia. Metil iso butil keton (MIBK) bisa diproduksi menggunakan bahan baku aseton dan hidrogen.

Pabrik ini dirancang dengan kapasitas 45.000 ton/tahun dan beroperasi secara kontinyu selama 330 hari/tahun dan 24 jam/hari. Bahan baku yang digunakan merupakan aseton 96% sebanyak 18.076,30 kg/jam dan gas hidrogen murni sebanyak 2398,7904 m³/jam. Bahan pendukung yang digunakan adalah sebagai berikut, yaitu Ba(OH)₂.8H₂O sebanyak 31,95 kg/jam, larutan H₂SO₄ 98% sebanyak 2.304,33 kg/jam, dan katalis nikel sebanyak 88,04 kg/jam.

Proses yang dipilih penulis untuk memproduksi MIBK dengan kemurnian yang tinggi adalah metode three-step process. Reaksi yang terjadi pada proses ini ada tiga, yaitu reaksi kondensasi aseton menjadi diaseton alkohol dengan bantuan katalis Ba(OH)₂.8H₂O di *Slurry Reactor-01*, reaksi dehidrasi diaseton alkohol menjadi mesitil oksida dengan bantuan katalis larutan H₂SO₄ di *Reactive Distillation-01*, dan reaksi hidrogenasi mesitil oksida menjadi metil isobutil keton menggunakan katalis nikel di *Slurry Reactor-02*.

Pabrik direncanakan untuk didirikan di Kawasan Industri Cilegon, Banten dengan luas lahan sebesar 6,7 ha dan mempekerjakan 264 orang karyawan. Kebutuhan energi untuk menjalankan pabrik ini meliputi kebutuhan listrik yang akan di suplai oleh PLN sebanyak 327 KWh, kebutuhan air sebanyak 14.794,9413 kg/jam, dan kebutuhan bahan bakar *fuel* sebanyak 2219,8782 kg/jam.

Untuk menjalankan produksi, pabrik ini membutuhkan modal tetap sebesar Rp 404.305.175.088,28 + \$ 19.576.107,71 dan modal kerja sebesar Rp 17.770.681.330,88 + \$ 46.579.289,95. Pabrik metil iso butil keton ini tergolong *high risk* dengan ROI *before tax* 52,63 % dan *after tax* 26,32%, POT *before tax* 1,61 tahun dan *after tax* 2,80 tahun, BEP 48,13%, SDP 36,73%, dan DCFRR 24,67%. Berdasarkan evaluasi ekonomi tersebut, pabrik ini dinilai menarik dan layak untuk dikaji lebih lanjut.

Kata kunci: Aseton, Hidrogen, Metil Iso Butil Keton, *Three-step Process*

ABSTRACT

Methyl iso butyl ketone (MIBK) is a solvent used in the manufacture of paints. The need for paint raw materials, namely solvents, will increase along with the development of the paint industry in the world. Methyl iso butyl ketone (MIBK) can be produced using acetone and hydrogen as raw materials.

This plant is designed with a capacity of 45,000 tons/year and operates continuously for 330 days/year and 24 hours/day. The raw materials used are acetone 96% as much as 18,076.30 kg/hour and pure hydrogen gas as much as 2398.7904 m³/hour. The supporting materials used were as follows, namely 31.95 kg/hour of Ba(OH)₂·8H₂O, 2,304.33 kg/hour of 98% H₂SO₄ solution, and 88.04 kg/hour of nickel catalyst.

The process chosen by the author to produce MIBK with high purity is a three-step process method. There are three reactions that occur in this process, namely the condensation reaction of acetone to diacetone alcohol with the help of a Ba(OH)₂·8H₂O catalyst in Slurry Reactor-01, the dehydration reaction of diacetone alcohol to mesyl oxide with the help of a catalyst H₂SO₄ solution in Reactive Distillation-01, and hydrogenation reaction of mesityl oxide to methyl isobutyl ketone using a nickel catalyst in Slurry Reactor-02.

The factory is planned to be built in the Cilegon Industrial Area, Banten with a land area of 6.7 ha and employs 264 employees. The energy requirements to run this factory include the need for electricity to be supplied by PLN as much as 327 KWh, the need for water as much as 14,794.9413 kg/hour, and the need for fuel as much as 2219.8782 kg/hour.

To run production, this factory requires fixed capital of IDR 404,305,175,088.28 + \$ 19,576,107.71 and working capital of IDR 17,770,681,330.88 + \$ 46,579,289.95. This methyl iso butyl ketone factory is classified as high risk with ROI before tax of 52.63% and after tax of 26.32%, POT before tax of 1.61 years and after tax of 2.80 years, BEP of 48.13%, SDP of 36.73 %, and DCFRR 24.67%. Based on the economic evaluation, this factory is considered attractive and worthy of further study.

Keywords: Acetone, Hydrogen, Methyl Iso Butyl Ketone, Three-Step Process