

## INTISARI

Asam hidrofluorat (HF) dibuat salah satunya dengan cara mereaksikan asam sulfat dengan fluorspar. Tahap awal pembuatannya yaitu pengecilan ukuran batuan fluorspar menggunakan ball mill. Selanjutnya fluorspar direaksikan di dalam *rotary kiln* dengan asam sulfat sehingga diperoleh hasil berupa campuran gas mengandung HF dan padatan sisa keluar rotary kiln. Proses pemurnian HF dalam campuran gas hasil reaksi dilakukan dengan beberapa tahap yakni proses penyerapan, pengembunan dan distilasi sehingga diperoleh Asam Hidrofluorat dengan kemurnian 99,9% sebanyak 100.000 ton/tahun. Padatan sisa keluar rotary kiln direaksikan dengan batu kapur sehingga menghasilkan kalsium sulfat sebagai produk samping. Selain kalsium sulfat, dari proses pemurnian juga didapatkan produk samping berupa Asam Fluorosilik ( $H_2SiF_6$ ) 30 % sebanyak 5.345,767 ton/tahun.

Bahan baku pembuatan asam hidrofluorat ini terdiri dari bahan baku utama yaitu batuan fluorspar sebanyak 218.774,38 ton/tahun, asam sulfat 98 % sebanyak 286.710,11 ton/tahun dan bahan pembantu berupa oleum sebanyak 118.661,161 ton/tahun. Sebagai penunjang, unit utilitas menyuplai kebutuhan air sebanyak 125.084,5 kg/jam, listrik sebesar 6.997,5 kW dan udara tekan sebanyak 100 m<sup>3</sup>/jam

Pabrik ini akan didirikan di Kawasan Industri Surabaya, Kota Surabaya, Jawa Timur dengan pertimbangan *raw material oriented*. Kawasan tersebut dekat dengan industri asam sulfat dan dekat dengan pelabuhan sehingga mempermudah pengadaan bahan baku fluorspar yang didatangkan dari China dan serta pemasaran produk asam hidrofluorat. Pabrik ini didirikan di area seluas 151.556 m<sup>2</sup> dengan luas bangunan 150.000 m<sup>2</sup> dan jumlah karyawan sebanyak 300 orang.

Perhitungan evaluasi ekonomi memberikan hasil modal tetap yang dibutuhkan sebesar \$24.462.415,69 dan Rp13.489.070.520,92 dan modal kerja \$56.447.415,30 + Rp1.826.162.476.559,15. Pada kapasitas 100 % produksi, ROI before dan after tax sebesar 37,83 dan 18,91 %. Pay out time (POT) before dan after tax sebesar 2,09 dan 3,46 tahun dengan BEP sebesar 48,69 %, SDP sebesar 38,18 %, dan DCFRR sebesar 18,61 %. Berdasarkan hasil analisis ekonomi tersebut, Pabrik Asam Hidrofluorat dengan kapasitas 100.000 ton/tahun ini layak untuk dikaji lebih lanjut

## Abstract

Hydrofluoric acid (HF) is made one by reacting sulfuric acid with fluorspar. The early stages of manufacture is fluorspar rock size reduction using a ball mill. Furthermore fluorspar is reacted in the rotary kiln with sulfuric acid in order to obtain results in the form of a gas mixture containing HF and residual solids out of the rotary kiln. HF purification process results in the gas mixture is performed in the several stages of the process of absorption, condensation and distillation to obtain hydrofluoric acid with a purity of 99.9% as much as 100,000 tons / year. Out rotary kiln residual solids reacted with limestone to produce calcium sulfate as a by-product. In addition to calcium sulfate, from the refining process are also obtained in the form of acid byproducts Fluorosilik ( $H_2SiF_6$ ) 30% as much as 5345.767 tons / year.

Raw material for hydrofluoric acid is composed of a main raw material fluorspar rock as much as 218,774.3898 tons / year, 98% sulfuric acid as 286,710.1162 tons / year and as much supporting material in the form of oleum 118,661.1613 tons / year. As a support, a utility unit to supply the needs of water by 3996635,2 kg / hour of electricity at 3885,11 kW and compressed air as much 100 m<sup>3</sup> / h

This plant will be built in Kawasan Industri Surabaya, Surabaya City, East Java with consideration of raw material oriented. That region is close to sulfuric acid industry and port so that facilitate the procurement of raw material fluorspar were imported from China and as well as product marketing hydrofluoric acid. The factory is established in an area with a building area of 151.556 m<sup>2</sup> and the number of employees 300 people.

Calculation of economic evaluation results a number of fixed capital needed \$24.462.415,69 + Rp13.489.070.520,92 and working capital \$56.447.415,30 + Rp1.826.162.476.559,15 . At 100% production capacity, the ROI before and after tax of 37,83 and 18,91%. Pay out time (POT) before and after tax of 2,09 and 3,46 years and BEP of 48,69% , SDP by 38,18% and 18,61% of DCFRR. Based on the results of the economic analysis, hydrofluoric acid plant with a capacity of 100,000 tonnes / year deserve to be studied further