Aluminum Sulphate Plant from Bauxite with Modifications of Bayer and Giulini Process

Name: Ricco Aditya Setiyo W.
NRP: 2310 030 044
Name: Rieska Foni Yuniar
NRP: 2310 030 075
Department: Diploma III of Chemical Engineering ITS
Supervisor: Ir. Elly Agustiani, M.Eng

ABSTRACT

Aluminum Sulphate is commonly used as a bleaching agent and coagulant of water treatment industries. Aluminum Sulphate plant with a capacity of 30,000 tons/year, was established in Gresik, East Java because the needs of consumers in these locations is very high. The plant uses raw materials of bauxite from Riau Islands (containing Al₂O₃ 57.5%), with the modification of Bayer and Giulini Process.

Aluminum sulphate production process is divided into three stages. The first stage is a digestion process that operates at a temperature of 160°C and a pressure of 1 atm with the addition of NaOH 55% solution. The second stage is a precipitation process that operates at a temperature of 70°C and a pressure of 1 atm to produce Al(OH₃). Then, the next treatment is the addition of sulfuric acid 66% solution in a reactor at a temperature of 170 °C and a pressure of 5 atm to produce liquid of aluminum sulphate. The third stage is a Crystallization process of aluminum sulphate solution in a Crystallizer Belt. Then, aluminum sulphate crystals go into hammer mill to get the size of 200 mesh aluminum sulphate with a purity of 18%.

The capacity of production can be reached by using raw materials 7687.68 tons/year of bauxite, 11801.79 tons/year of NaOH and 7122.53 tons/year of H₂SO₄. The necessity of utility in aluminum sulphate plant is including of cooling water 71.283 m³/year, boiler feed water 14.557.29 m³/year, sanitation water 5.392.2 m³/year and water process 712.866m³/year. The plant will operate semi-continuously process for 24 hours/day and 330 days/year.

Kata kunci: Bauxite, Aluminum sulphate, Giulini.