

ABSTRACT

The design of this soda ash (sodium carbonate) plant project aims to meet the continuously increasing domestic demand and reduce dependency on imports for its application in various industrial sectors such as glass, detergents, and ceramics. The plant is designed with a production capacity of 300,000 tons/year and is planned to be located in the Bontang Industrial Estate, East Kalimantan. The production process utilizes the Dual Process (Solvay Modification) method, with primary raw materials consisting of industrial salt (NaCl), ammonia (NH_3), carbon dioxide (CO_2), and water. Carbonation and metathesis reactions take place inside a Carbonation Tower at a temperature of 60°C and a pressure of ± 3 atm to produce a sodium bicarbonate (NaHCO_3) precipitate, which is subsequently calcined at 200°C into the main product, soda ash (Na_2CO_3), with a purity of 99.99%. This process also yields a byproduct of ammonium chloride (NH_4Cl), which holds high economic value as a fertilizer.

In terms of economic feasibility analysis, the establishment of this plant is considered highly feasible. Investment parameters indicate an after-tax Return on Investment (ROI) of 19.34% and an after-tax Pay Out Time (POT) of 3.65 years. The plant exhibits a safe level of financial risk, with a Break Even Point (BEP) at 46.07% of production capacity and a Shut Down Point (SDP) of 23.10%. The plant's Internal Rate of Return (IRR) reaches 30.48%, far exceeding the minimum feasibility interest rate of 12%.

Keywords: Soda Ash, Sodium Carbonate, Dual Process, Solvay Method, Calcination, Economic Feasibility.