

ABSTRACT

Formaldehyde is a compound of an aldehyde group, which is widely used as raw material and auxiliary material in various industries. The global market for formaldehyde is expected to grow at a CAGR (compound annual growth rate) of 4,9% in 2020 -2027 (Report Linker, 2020). Therefore, the establishment of this factory aims to meet domestic needs while excess production is used to meet world needs.

The formaldehyde plant from methanol is designed with a capacity of 65.000 tons/year and operates continuously for 330 days/year and 24 hours/day. To achieve the desired formaldehyde product capacity, it takes 3,288.38 kg/hour CH_3OH obtained from PT. Kaltim Methanol Industry, 4.94 kg/hour H_2O from seawater desalination and 11,245.53 kg/hour atmospheric air.

The formaldehyde synthesis process uses the Metal Oxide process. This process is carried out by reacting methanol and oxygen in a Fixed Bed Multitube Reactor at a temperature of 230°C and a pressure of 1.5 atm using a Fe-Mo oxide catalyst, a mixture of MoO_3 and Fe_2O_3 . Dowtherm A is used as a reactor coolant because the reaction is exothermic. The gas from the reaction is then absorbed using water in the absorber and produces a formaldehyde product of 37% by weight as much as 3,036.62 kg/hour.

This factory will be established in Bontang, East Kalimantan. The required land area is 120.000 m^2 and employs 156 employees to operate it. The water demand is 20.000,84 kg/hour, the need for coal (fuel) is 2.217,34 kg/hour, and the instrument air requirement is $9.658,02 \text{ Nm}^3/\text{hour}$.

The fixed capital investment for the establishment of a formaldehyde factory from methanol is $\$7,807,932.45 + \text{Rp}71,661,822,958.09$ with a total production cost of $\$20,544,687.42 + \text{Rp}40,151,29299.67/\text{year}$. This factory is classified as low risk and several feasibility analysis parameters used are ROI (Return on Investment) before tax showing a value of 28.88%, POT (Pay Out Time) before tax of 2.57 years, BEP (Break Even Point) of 56.55%, SDP (Shut Down Point) of 35.49% and DCFRR of 38.74%. So, it can be concluded that this factory is economically attractive.

Keywords : Formaldehyde, Methanol, Factory, Metal Oxide Process