



## ABSTRACT

*Polyethylene terephthalate (PET) plant was designed with capacity of 90.000 tons/years and located on Cilegon, Banten. It will be operated for 330 days/year. The purity of polyethylene terephthalate is 90 % with bis-hydroxyethyl terephthalate and  $Sb_2O_3$  as impurities. Raw materials are ethylene glycol and terephthalic acid. Byproduct are steam that can be used for heating and ethylene glycol can be reused as raw material.*

*All the main raw materials are mixed in the mixing tank. The outlet of mixing tank are pumped to 4.5 atm and then heated up to 250 ° C and then fed to the esterification reactor (R1-n). Esterification reaction byproduct is steam. Steam then flows into the steam production unit. While the bottom product will be depressurized until 1 atm using valve (V). At this condition (1 atm, 250 °C), ethylene glycol will be transformed from liquid to vapor, hence needs to separated using phase separator (PS-1).  $Sb_2O_3$  catalyst was added into bottom product of PS-1 and then fed into polymerization reactor (R2-n). In the polymerization reactor, BHET decomposes into polyethylene terephthalate (PET) and ethylene glycol. Ethylene glycol vapor then condensed in the condenser to be reused as raw material. While PET is processed further in underwater pelletizing system to be cooled and formed into pellets, the size is 3 mm.*

*Terephthalic acid price is \$ 0.6 / kg, and the price of ethylene glycol is \$ 1.4 / kg. PET product has a price range of 2-3 \$ / kg. From calculation of Economic evaluation with the selling price of PET \$ 2 / kg is obtained the following parameters: fixed capital amounted Rp232.769.612.400; working capital amounted Rp541.481.704.000; production costs amounted Rp2.844.739.891.000. Retrieved profit before tax and profit after tax is Rp130.161.217.859 and Rp65.080.608.929. Return of Investment (ROI) before tax is 55,92 %, ROI after tax is 27,96%. Pay Out Time (POT) before tax is 1,52 years, after tax is 2,63 years. Break Even Point (BEP) is 59,74 %. Shut Down Point (SDP) is 50,54 %. Discounted Cash Flow Rate of Return (DCFRR) is 36,28 %. Based on calculations of the economic evaluation, the polyethylene terephthalate plant with a capacity of 90,000 tons / year is interesting to be studied further.*

**Keywords : Polyethylene Terephthalate, Terephthalic Acid, Ethylene Glycol**