Increasing of energy consumption and landfill waste are two issues that come up along with economic population growth. To overcome this problem, especially plastic waste, many research in plastic waste treatment was conducted by scientists and Indonesian government. Pyrolysis process was chosen as an alternative way to recycle plastic waste. The purpose of this experiment was to determine the effect of temperature, time and amount of catalyst on the pyrolysis to produce fraction $\leq C_9$ of hydrocarbons. The process of pyrolysis was conducted by a closed semi-batch reactor unstirred stainless steel with capacity of 3.5 dm$^3$. This process operated at atmospheric pressure and added nitrogen injection. 50 gram plastic of polypropylene (PP) was filled in pyrolysis reactor, and then was added by catalysts as much as 5%, 10% or 20% weight of natural zeolite per weight of plastic waste samples. Temperature variables of this pyrolysis were 400, 450, or 500 °C and pyrolysis time variables were 0, 15 or 30 minutes. The final step was condensation of gas pyrolysis products. Liquid product was analyzed by gas chromatography-mass spectrometry (GC-MS), gas uncondensed was analyzed by gas chromatography (GC-TCD/FID) and solid residual pyrolysis process was analyzed using Fourier Transform Infra Red Spectrophotometer (FTIR). The result showed that the optimum conditions to produce pyrolysis fraction $\leq C_9$ of hydrocarbons, approached the standard gasoline with at a temperature of 450 °C, pyrolysis time of 30 minutes and 20% weight of catalyst per weight of plastic waste samples. The concentration of $\leq C_9$ hydrocarbon was 29.16% n-paraffin, cycloparaffin 9.22%, 61.64% aromatic, without olefin and isoparaffin.

Keywords: pyrolysis, natural zeolite, plastic waste of polypropylene