## ANALYSIS OF THE EFFECT OF MIXING ETHANOL AND PERTALITE ON EXHAUST GAS EMISSIONS: CASE STUDY OF USING SHELL AND TUBE TYPE HEAT EXCHANGER FUEL PREHEATER

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## ABSTRACT

Currently, the use of gasoline motors continues to increase every year, which causes the consumption of petroleum fuels to increase. It also results in increased air pollution, hence the need for alternative fuels to reduce air pollution. That is a mixture of pertalite and ethanol that can reduce exhaust emissions. The purpose of this study is to determine the ethanol mixture that can reduce exhaust emissions by preheating the fuel (Shell and Tube Type Heat Exchanger). Pertalite and ethanol mixture variations, namely 20ml, 30ml, and 40ml. The shell and tube type heat exchanger is used to heat the fuel before entering the combustion chamber, with an initial temperature (Tin) of 28,5°C and a final temperature (Tout) of  $41,3^{\circ}$ C. Exhaust emission testing was carried out using a gas analyzer to measure CO (Carbon Monoxide) and HC (Hydrocarbon) levels. The results showed that the mixture of Pertalite and ethanol with preheating using a shell and tube type heat exchanger can reduce exhaust emission levels. The lowest CO emission levels of 0.02% and HC of 168.33 ppm were achieved in a mixture of 40ml ethanol. The higher the percentage of ethanol in the mixture, the lower the exhaust emissions. Preheating the fuel also improves combustion efficiency, thereby reducing CO and HC emissions. This study proves that the use of ethanol as an alternative fuel and fuel preheating can be an effective solution to reduce air pollution from motor vehicles.

Keywords: Combustion, heat exchanger, exhaust emissions, HC, CO