

Abstract

The importance of the environment, especially air pollution, has taken hold in recent decades. However, transport scores rather low on emissions. This translates into the increase of lower emission zones and the use of alternative fuels such as electricity, gas and possibly biodiesel. Biodiesel is a mono-alkyl ester containing saturated and unsaturated fatty acids. Scientists generally agree that emissions of CO₂, CO and particulates are lower than conventional diesel. However, it is the NO_x that does not perform as desired. This research focuses on emissions of particulate matter, NO, and NO₂ depending on the length of saturated fatty acids. Four different mixtures are made by separately adding 70g laureate, myristate, palmitate and stearate to 2.5L RME (rapeseed methyl ester). Measurements are then made over a range of powers. Consequently, to interpret the cumulative emissions from the engine over the entire power output, the area under the curve (AUC) was calculated for both the raw data and the molar data. The ANOVA test results indicate that a significant difference exists between the mean AUC for each emission and both data. The post hoc analysis was done using the Tukey test. This also indicated that there are significant differences between the chain lengths for the different emissions. Finally, another regression analysis was done to see if there is a linear relationship between emissions and chain lengths. A linear relationship can only be appreciated for the molar data for NO₂ emissions. From the full statistical analysis, we can conclude that chain length has no direct impact on emissions, but rather will affect the physical properties of biodiesel and subsequently the emissions studied. However, the results did show that lower chain lengths are better for both NO, NO₂ and particulate matter.