Emission Reduction Using an Activated Carbon Supplement

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The purpose of this project was to reduce the emissions from an engine using activated carbon (AC) as a supplemental filter while a catalytic converter is warming up. This experiment measured the nitric oxide (NO) and nitrogen dioxide (NO2) emissions of a diesel engine at two different RPM's and two torque levels for two different types of AC. Additionally, this experiment explored how the amount of AC used changed emissions. The apparatus included: catalytic converter, filtration chamber, thermocouples, gas sampler, and two forms of AC. After a control run was done, other runs had various combinations of AC, RPM's, and torque loads. The catalytic converter was cooled back down to room temperature after each run. Levels of NO and NO2, and temperatures were collected at certain times. After completing the three trials of the experiment, I found my hypothesis was partly correct: activated carbon was effective as a filter for reducing emissions of an engine during a catalytic converter's warm-up phase; however, because Fibrous Activated Carbon (FAC) degraded at high temperatures, Granular Activated Carbon (GAC) proved to be the most effective by reducing the NOx by an average of -14.3% over all RPM and torque levels. My hypothesis was also correct that more mass of GAC would be more effective. The 100 g of GAC more than doubled the reduction of NOx during a catalytic converter's warm-up phase than 19 g of GAC by reducing the emissions by an average of -27.8% at a constant RPM and torque.

Awards Won:

Fourth Award of $500