Exhausted: Reducing Pollution from Vehicle Emissions (Year 3)

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Improving air quality is a goal of the United States Environmental Protection Agency (EPA). The purpose of this study was to reduce pollutants in car exhaust using a filter designed and constructed by the researcher out of galvanized stainless steel sheeting. The researcher used activated charcoal and pulverized mussel shells as filter media. A 2006 Toyota Highlander was used to test four different filter configurations: Activated charcoal only Pulverized mussel shells only Activated charcoal followed by mussel shells Mussel shells followed by activated charcoal The dependent variables were levels of carbon monoxide (CO), formaldehyde (HCHO), Total Volatile Organic Compounds (TVOC), and Particulate Matter 2.5, 1.0, and 10. Results from t-test analyses of means indicated that the filter containing charcoal followed by mussel shells significantly reduced all air quality measures when compared to the control group ($p<.05$). This filter configuration brought air quality measures to levels that were equal to or lower than those obtained with the other three filters. It also brought HCHO and TVOC levels from the harmful to normal range. The other three filters were also able to significantly reduce some of the outcome measures. However, not all of the measures were lowered consistently, or to the same degree. This study was designed to be the first step in building an affordable attachment aimed at reducing vehicle emissions and making the air cleaner. The researcher hopes to test additional materials and complete a more effective and customizable filter attachment in the future.

Awards Won: