Reducing Harmful Car Emissions by Interior Coating of a Non-Noble Metal Catalyst

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Automotive exhaust emissions are of much environmental concern due to toxic pollutants such as Carbon Monoxide (CO) and Hydrocarbons (HC). One role of the standard catalytic converter in an exhaust system is to oxidize said harmful emissions to CO2 and H2O. However, the reaction occurs only in the presence of a metal catalyst located inside the converter, giving the emissions a relatively small window of time to be oxidized. This project explores the possibility of “extending” the function of the metal catalyst beyond the scope of its current containment by coating the interior piping of the exhaust system with additional non-noble metal catalysts to give the emissions more opportunities to react. Used as replicates for exhaust pipes, steel pipes were coated with the metal catalyst, namely copper, through an electrodeposition process. Draeger Tubes were used to measure the concentrations of CO and HC of the exhaust emissions of each trial. The results show that the additional presence of a copper catalyst does not significantly reduce the emission concentration of HC but does, however, show a slight trend in the reduction of CO emission. In conclusion, the addition of a copper catalyst does appear to slightly improve the conversion rate of CO in exhaust systems, thereby potentially helping to reduce the environmental impact of automotive emissions.

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