MSc Thesis Defense

Modelling Volatile Organic Compounds in Passenger Vehicles

Shane Canaday

According to recent studies, Americans spend 90% of their time indoors. Significant research has appeared in the literature since the 1970s regarding so-called 'sick building syndrome' which can cause a variety of health effects owing to poor air circulation and exposure to volatile organic compounds (VOCs) released from the building materials.

The interior of new passenger vehicles can also be rich in many VOCs arising from the materials used during manufacture, we typically refer to this mixture of compounds as "New Car Smell." Recent work suggests that some individuals are experiencing similar symptoms to those associated with Sick Building Syndrome while travelling in new passenger vehicles and have negative responses to this "New Car Smell" This is especially true in the Asian market where costumers, for example in China, often complain about discomfort when driving new cars.

Currently, there is no regulation as to the levels of VOCs within new cars here in the USA. However, several countries in Asia have now mandated report levels of VOC within the cabins of new cars. As Asia is a growing market for US automakers, understanding the concentration of these species, how they change over time and how changes in the manufacturing process could lead to lower levels is highly motivating force.

Research described in this project will detail collaboration between the Department of Chemistry at Eastern Michigan University and USCAR, a conglomerate Ford, Chrysler and General Motors. In our work described in this talk will detail the tests of the model by using micro-chambers to simulate the automobile along with a specially developed polymer film that emits know concentrations of the VOC toluene as a function of time. We have shown that the model we have developed can simulate the VOC emission rate under a variety of conditions in the test chamber (e.g. static/dynamic flow, temperature, humidity etc). The next step is to use a combination of the polymer films and the model to test real automobiles.

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