**Adsorbing Volatile Organic Compounds and PM2.5 from Barbecue Smoke With Activated Carbon**

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**ABSTRACT**

BBQ smoke contains volatile organic compounds (VOCs) and particle masses (e.g., PM2.5) that are hazardous to health. Carbon activated scrubbers (filters) have been used in industries to adsorb them in industries. However, differential scrubbing of BBQ smoke leaving behind the sweet-smelling compound, Syringol, has not been attempted. Coincidentally, Syringol is a polar molecule. And activated carbon is more effective at removing non-polar molecules because it is non-polar. Therefore, it was hypothesized that BBQ smoke can be cleaned of toxic compounds leaving some Syringol behind that prompts barbecuing.

A modified grill carried the smoke via hoses to scrubbers of various concentrations (0, 25, 50,75, 100%), to TVOC/PM2.5 meters, and to portals for olfactory sampling and smoke visibility measurements. Energy sources were either wood chips, charcoal, or propane. Up TO 20 trials for each condition were performed with randomization.

Differential adsorption was dramatic. For example, for woodchips using a 50% scrubber concentration, the percent remaining Syringol was 60% compared to 6% for TVOC - a 10 fold difference (p< 0.05 Mann-Whitney U). Compared to ambient air, invisible smoke was associated with some unhealthy TVOC/PM 2.5 levels. Half of the PM2.5 values were above the unhealthy level (p<0.05).

It is not unreasonable to redesign the average BBQ grill to incorporate a carbon scrubber such that only filtered smoke reaches the food and the BBQ user. Future research is planned and involves the use of gas spectroscopy to quantify the Syringol vs the other VOCs as a result of carbon scrubbing.