



### **B170 The Identification of Prohibited Treatments on Racing Tires by Solid Phase Microextraction (SPME)**

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The goal of this presentation is to provide attendees with an understanding of SPME as applied to the detection of racing tire treatments.

This presentation will impact the forensic science community by highlighting the area of trace tire treatment analysis in automotive racing.

In the realm of automotive racing, many competitors will do whatever it takes to win a race. In several racing leagues, it is prohibited to alter tires in an attempt to increase the “grip” or ability of the tire to maintain contact with the track. The most common way that competitors will attempt to alter tires is by applying “tire treatments,” mixtures of chemicals that either swell or soften the rubber to increase the surface area in contact with the track. Tire treatments are commercially available and are allowed in some racing leagues. The commercial treatments fall into two categories — “plasticized” and “petroleum distillate.” Many of the products used in leagues that prohibit them are labeled as “undetectable,” implying that they would not be found by testing post-race. Some competitors will use their own mixtures that are typically based on petroleum distillate products and can resemble or contain common ignitable liquids.

Tire samples provided by the United States Auto Club (USAC) were prepared for analysis by placing a cut piece of tire into a 20mL headspace vial. The sample is then heated to 40°C and volatiles are extracted using a Poly(DiMethyl)Siloxane (PDMS) SPME fiber for five minutes, followed by analysis using Gas Chromatography/Mass Spectrometry (GC/MS). Thus far, qualitative analyses have been sufficient to determine treated tires from untreated tires. The “plasticized” treatments typically give off compounds such as diethyl pentanedioate and 2-ethyl-1-hexanol. Tires treated with “petroleum distillate” products typically give off complex chromatograms that resemble those of common ignitable liquids. Tires have been seen to have been treated with gasoline as well as medium-heavy aromatics, among others.

Since the beginning of this project, 201 samples have been analyzed. Of those samples, 23 have been flagged as having been treated. A small number of those flagged appeared to have been soaked in gasoline. The minimally destructive nature of the testing has allowed repeat analyses of samples in certain instances. Unless rules change, detection of tire treatments will continue to be an area of interest. SPME is, and will continue to be, a powerful tool within this area of analysis.

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#### **Solid Phase Microextraction, Tire Treatments, GC/MS**