



### A154 Performance Testing and Comparison of Different Fire Debris Bags

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After attending this presentation, attendees will know that a good alternative polymer bag has been found for the collection of fire debris samples for ignitable liquid analysis, as a replacement of the Kapak FireDebrisPAK™ bag that was taken of the market several years ago.

This presentation will impact the forensic science community by teaching more about the performance (advantages/disadvantages) of different types of commercially available fire debris bags.

World-wide, different containers are used to collect and store fire debris evidence for ignitable liquid analysis. A questionnaire circulated among the forensic institutes in Europe revealed the use of metal cans, glass jars, and a wide variety of polymer bags. Previously published test results showed that the polymer bag produced by Kapak was the best choice of all but because this bag was taken from the market several years ago, previous Kapak FireDebrisPAK™ users are searching for an alternative bag ever since.

A good alternative bag seems to have been found due to the release of a new fire debris bag in 2010. This bag has a similar polymer composition as the Kapak FireDebrisPAK™ bag. The performance of this new bag material has been studied and compared to the performance of the most commonly used polymer bags in Europe today. These are nylon-11 bags and two multilayer bags (four layers or more) with different layer composition, one of these multilayer bags is aluminium coated. The bags were tested on the presence or absence of background interference and on the retention ability of ignitable liquids. The latter involved a study of potential leak rate, of potential cross-contamination, of potential adsorption ability, and of the recovery of the ignitable liquids spiked. For the initial tests, gasoline was used and the performance of the bags was monitored over a period of seven weeks. The test results were obtained after dynamic headspace sampling on Tenax, followed by TD- GCMS analysis. The results demonstrate that the newly released bags perform best in all tests: they exhibit lowest background, do not leak, show no cross-contamination, and do almost not adsorb the gasoline spiked. A full gasoline pattern is recovered from the spiked bag, even after seven weeks and even when the spiked concentration is high. The nylon bags also do not release background compounds, but started

leaking several days after spiking which results in cross-contamination of other nylon bags. Both multilayer bags release interfering background compounds when heated at 70 degrees Celsius and also leak, but no cross- contamination is detected. The nylon and multilayer bags all adsorb the gasoline to a certain extent.

The newly released fire debris bag was additionally tested with the oxygenated product denatured spirits. As this product mainly contains ethanol, the analysis did not involve Tenax TD-GC/MS, but involved direct headspace GC/MS instead. The test results showed that the bags also perform well for these types of ignitable liquids.

For the performance tests, the bags were closed by a heat seal. As heat sealing is not easy to perform on-site, other closing techniques using tape, tie-rop, and plastic clamp sealing strips have been studied. The results demonstrate that the clamp sealing strips are easy to use and only start to leak steadily about six hours after closing. This offers the fire investigators enough time to bring the samples either to their office or straight to the laboratory to be heat sealed prior to the ignitable liquid analysis.

#### **Fire Debris Bag, Performance Testing, Ignitable Liquid Analysis**