A165 Migration of Ignitable Liquids in Pour Patterns on Carpet

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After attending this presentation, attendees will understand the migration of gasoline in carpet during a fire, and where the best place is to sample when a pour pattern is evident.

This presentation will impact the forensic science community by providing arson investigators with the knowledge of where to sample a suspected pour pattern in order to obtain the best results possible concerning the use of an ignitable liquid.

When an ignitable liquid is used as an accelerant in a fire, a pattern is created where the ignitable liquid is poured. Only the edge of the pour pattern burns in a fire due to that being the location where the ignitable liquid turns to vapor and mixes with the air, the mixture being what actually burns. Arson investigators differ in opinion as to whether chances are better to detect any ignitable liquid at the center of a pour

pattern or at the edge of the pour pattern where the fire is burning. Sampling the edge of the pour pattern involves sampling across the edge to obtain both burned and unburned material. Investigators who believe the edge of the pattern is better base their belief on the assumption that the ignitable liquid migrates to the edge of the pattern as the fire burns, which causes there to be a greater concentration of the liquid at the edge. The theory that the center is the best place to sample is based on the assumption that the edge burning causes the fire to move slowly inward and that too much of the ignitable liquid burns off at the edge to get conclusive results, therefore the center should be sampled.

In order to test the theories of edge versus center sampling, an experiment was designed to sample from the center to past the edge of a pour pattern in carpet samples that varied from unburned to burned until self-extinguishment. One quart of gasoline was poured on each of five two-foot by two-foot squares of carpet. One square remained unburned, one square was allowed to burn itself out (approximately ten minutes), one was burned for two and a half minutes, another was burned for five minutes, and the last was burned for seven and a half minutes. Samples were taken in four directions, labeled north, south, east, and west.

Solvent extraction with n-pentane was used to extract any remaining gasoline from the carpet samples for analysis by GC/MS. The peak area of 2-methylnaphthalene, a compound found in gasoline, was compared with the peak area of 3-phenyltoluene as an internal standard in order to find the ratio between the two. The ratios were then compared to ratios of 2-methylnapthalene/3-phenyltoluene for known concentrations of neat gasoline in order to approximate the amount of gasoline in that sample.

The pour pattern for the gasoline appeared to be about 25-30 cm (10- 12 in.) in diameter on the surface of the carpet; however, when lit the pour pattern appeared to roughly double in size due to gasoline spreading out on the bottom of the carpet due to gravity. The lack of pattern in the unburned carpet square is most likely due to the pattern in the carpet allowing gasoline in some areas to flow farther than in others when poured. The trend lines for each of the carpet squares suggest that the best place to sample is from the center out to approximately 10 cm (4 in). **Gasoline, Fire, Arson**

 ** Presenting Author*