TECHNICAL NOTE

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Using Absorbents to Collect Hydrocarbon Accelerants from Concrete

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ABSTRACT: Certain finely divided powders are demonstrated to be effective for recovering accelerants from concrete. Flour and calcium carbonate are suggested as absorbents. Guidelines for absorbent use are suggested, and effectiveness is reported.

KEYWORDS: criminalistics, arson, accelerants, evidence collection

This paper evaluates materials readily available to fire investigators as absorbents for collecting accelerant samples from concrete. Guidelines for their use are suggested.

Normally, if investigators take samples for laboratory analysis from concrete, they will collect pieces of spalled concrete, chip the concrete away, or drill core samples. The literature has reported the use of calcium carbonate, as an absorbent, by ATF agents and the Houston Arson Bureau [*1*]. That note did not explain the principle involved, how to use the absorbent, or the results obtained. These points will be addressed here.

Experimental Procedure

Three absorbents were evaluated:

flour	40–60 mesh ASTM,
calcium carbonate	40–60 mesh ASTM, and
sweeping compound	less than 30 mesh ASTM.

The flour was non-self-rising. The calcium carbonate was agricultural lime. The sweeping compound was the kind used for dusting floors and is primarily sand and sawdust.

Four sets of experiments were conducted. A 50:50 mixture of gasoline and diesel fuel was used in the study to simulate the range of accelerants normally encountered in arson cases. In the first experiment 30 mL of the accelerant were poured on concrete and allowed to soak in for 1 h. After the standing time, the absorbent was applied to cover the area stained by the accelerant. Three collection times of 15, 30, and 60 min were evaluated. After the appropriate collec-

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tion time, the absorbent was swept into a clean, new paint can. This procedure was repeated for each absorbent three times. As a second set of experiments, the entire process was duplicated using 0.5 mL of the accelerant mixture.

In the third trial, flour was the absorbent, and the same collection procedures were used. Thirty millilitres of the accelerant mixture were poured on the concrete, ignited, and allowed to self-extinguish.

A final trial was performed to simulate the elapsed time required in excavating a major fire scene. Thirty millilitres of the accelerant mixture were poured on the concrete and allowed to stand for five days before applying the absorbent.

All the tests were conducted outdoors with temperature ranging between 15.6 and 26.7°C (60 and 80°F). The samples were examined using the charcoal tube sorption/carbon disulfide elution technique and gas chromatography [*2,3*]. The performance criteria was whether the accelerants were or were not detected.

Results and Discussion

Concrete is a porous and absorbent material. Applying a finely divided powder with a greater absorptivity than the concrete allows recovery of the accelerant.

The results of the first two trials are shown in Table 1. In each case, both gasoline and diesel fuel were detected. A collection time longer than 30 min did not significantly enhance the appearance of the chromatogram obtained. In some cases, the more volatile components decreased in quantity with a 60-min collection time. Based on these results, 30 min was chosen as the optimum collection time.

In the third test both accelerants were detected using flour as the absorbent and a 30-min absorption time.

In the fourth experiment it was again possible to detect both gasoline and diesel fuel. The gasoline was highly evaporated as would be anticipated after five days of exposure.

Guidelines for Use

All of the absorbents performed equally well in recovering the accelerants. Most sweeping compounds will be scented, usually with a pine oil, which can unnecessarily complicate chromatographic interpretation. Flour and calcium carbonate are readily available and inexpensive, and are thus the absorbents of choice. Make sure that the flour used is *NOT* self-rising flour which could release carbon dioxide and burst evidence containers. Calcium carbonate is available as lime in most hardware stores.

TABLE 1—*Effectiveness of absorbents.*[a]

	Collection Time, min		
Absorbents	15	30	60
Flour	both	both	both
Calcium carbonate	both	both	both
Sweeping compound	both	both	both

[a]Both = gasoline and diesel fuel detected. Thirty millilitres of a 1:1 mixture of gasoline and diesel fuel were placed on concrete; the accelerant was allowed to soak for 1 h; the absorbents were applied for various times and the results are shown. The tests were repeated using 0.5 mL of the accelerant mixture. The results were identical.

The suggested use of these absorbents is as follows:

1. Remove all debris from the floor area to be sampled. Avoid using a strong stream of water. It may force any accelerant from the concrete and wash the evidence away.
2. Sweep away excess moisture from the area to be sampled.
3. Sprinkle a sufficient amount of absorbent to cover completely the concrete area containing suspected accelerant.
4. Allow the material to stand for 30 min.
5. Sweep the absorbent into a vapor tight container.
6. Submit the evidence container and a "control" sample of the absorbent used to a laboratory. Contamination of the absorbent will not be a problem if new bags of flour or calcium carbonate are used. "Controls" are essential for other absorbent materials. The tool used to sweep up the absorbent should also be sent to the laboratory because it will contain large amounts of the absorbent.

Summary

This limited study demonstrates that this procedure is effective, simple, and inexpensive. When fire damage is extensive and other samples are not available, or when large concrete surface areas are involved, these absorbents are an effective evidence collection tool.

References

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