A Burning Question: Pour Pattern or Dropdown Fabric?

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Abstract

Fabric dropdown patterns are often confused with ignitable liquid pour patterns at the fire scene. A variety of fabric types used in making bedding, clothing, and curtains were burned inside a vacant house. The dropdown patterns were photographed, and both burned and unburned fabric samples were analyzed at the lab. The goal is to create a database of each fabric, the dropdown pattern created, and a spectrograph of the burned product to be distributed to all fire departments and laboratories.

Introduction

Discussions with several Ohio State Fire Marshals and local fire investigators have led to collaboration with YSU and YFD to gather research on fabric dropdown patterns. The goals of the project are to:

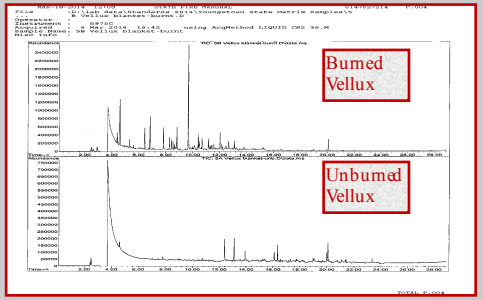
- Gather man-made, natural, and blend fabrics that might be used as clothing, bedding materials, curtains, or household furniture upholstery
- Burn so that the resulting dropdown patterns are realistic to a bedroom fire
- Photograph the resulting dropdown patterns on various flooring types,
- Recover burned fabrics, as well as samples of unburned fabric, and conduct GC/ MS chemical analysis
- Create a database for fire investigators and chemists, containing dropdown patterns and spectrographs of each type of fabric, burned and unburned

Methods

In order to create the most realistic dropdown patterns possible, all burning of fabric was completed in a room inside a vacant house. Mattresses, box springs, and bed frames were utilized and a 1 yard by 2 yard sized swatch of fabric was laid so the fabric was hanging off of the bed and almost touching the floor. All fabric was lit with a road flare and allowed to burn until it self-extinguished. The burning mattress materials were suppressed with water and every attempt was made to avoid the application of water onto the dropdown area. All dropdown patterns were photographed with an L scale and recovered with gloved hands into metal paint cans for analysis in the lab. To maintain a blind study, all cans were labelled with a number or letter only.

65% polyester/ 35% cotton fabric blend from Pakistan

Vellux blanket made in US



Dropdown in progress

Fabric types included:

- 100% cotton
- 100% polyester
- Spandex
- Nylon
- Linen
- Metallic lamé
- Cotton/ polyester blends
- Rayon
- Polypropylene
- Acrylic
- Silk

Household flooring samples obtained:

- Linoleum
- PVC (Polyvinyl composite
- Porcelain tile
- Pergo hardwood laminate
- Stone tile
- Natural hardwood
- Rubber tile

60% cotton/ 40% polyester bedskirt on porcelain tile

60% cotton/ 40% polyester on rubber tile

100% sheer polyester curtain

Dropdown on assorted flooring surfaces

Results

As predicted, natural fibers burned away cleanly and left little to no residue. Man-made materials left residues, and the higher the percentage of man-made material, the more notable the drop down pattern.

The flooring materials that the fabrics dropped down onto did not seem to make a critical difference within the drop down appearance. The only notable exception was the 100% polypropylene (sheer window curtain) and the 100% polyester fabrics (shower curtain) onto the porcelain tile, which showed small drops of liquid melting and immediately solidifying onto the tile.