Alternate Light Source (ALS) for Examination of Stains on Multi-colored Textile[1]

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The purpose of this presentation is to present the results of an experiment that evaluated the use of an ALS for locating sixty stained areas on dark multi-colored carpet. The examination was conducted with both direct and oblique white light at 30 cm and five different wavelengths using a 400-watt ALS with direct illumination at distances of 10 cm (3.94 in), 20 cm (7.87 in), and 30 cm. (11.81in).

An important factor in conducting crime scene investigations is locating trace evidence. To facilitate searching for trace evidence, investigators use an ALS. Trace evidence, such as physiological stains, may be common on textiles. However, the investigator may also locate stains from other origins. Once a stain is located it may be collected, analyzed and identified.

Sample pieces of carpet measuring 91.44 cm (36 in) by 91.44 cm (36 in) were marked into grids 15.24 cm (6 in) by 15.24 cm (6 in) for staining. Sixty common products were selected to stain the carpet to determine their visibility with an ALS. Each section was stained and marked for identification with a known product. The stains were allowed to dry for two hours before testing and then separated into two groups for analysis. Thirty were food products and thirty were nonfood products. The detection levels were noted if the product absorbed or fluoresced light and made the stain visible.

The stains were illuminated with direct white light, oblique white light at 30 cm (11.81 in), 365 nm UV with no filter, 365 nm UV with yellow filter, 415 nm with orange filter, 415 nm with red filter, 445 nm with orange filter, 445 nm with red filter, 515 nm with orange filter, 515 nm with red filter, shortpass 540 nm with orange filter, and a shortpass 540 with red filter at three distances. The stains were examined at distances of 10 cm (3.94 in), 20 cm (7.87 in), and 30 cm. (11.81).

Of the sixty stains examined, 25% (15) were visible in direct white light and 23% (14) were visible in white oblique lighting. Of the thirty food product stains examined, 40% (12) were visible in direct white light and 30% (9) were visible in white oblique light. Of the thirty nonfood product stains examined, 10% (3) were visible in direct white light and 16% (5) were visible in white oblique light. Considering the combination of light wavelengths and filters used to examine the sixty stains, the 365 nm UV light with no filter at a distance of 10 cm (3.94 in) and 20 cm (7.87 in) located the most stains. This combination located 26% (16) of the stains. Of the thirty food stains examined at a distance of 30 cm (11.81in), no stains were visible with the following combination of light wavelengths and filters: 415 nm light with an orange filter, 415 nm light with a red filter, 515 nm light with an orange filter and a shortpass 540 nm light with a red filter.

In conclusion, of the sixty stains examined, 50% (30) that were not detected by direct or oblique lighting also were not detected by any combination of light wavelengths and filters. When separated into food and nonfood stain categories, 56% (17) of the food stains that were not detected by direct or oblique lighting also were not detected by any combination of light wavelengths and filters. 46% (14) of the nonfood stains that were not detected by direct or oblique lighting also were not detected by any combination of light wavelengths and filters. Therefore the 365 nm UV light with no filter at distances of 10 cm (3.94 in) and 20 cm (7.87 in) performed best in detecting non-physiological stains on multi-colored carpet. Even though the ALS may be more preferable for locating physiological stains it can be useful in locating some food and nonfood product stains.

[1]Abstract from the 57th American Academy of Forensic Sciences Conference, New Orleans, Louisiana, 2005.