

TECHNICAL NOTE

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A New Trace Metal Detection Reagent

When a person handles a metallic object such as a firearm, metal traces are often transferred to the hands. The method of making this metallic pattern visible is called the trace metal detection technique (TMDT) [1].

The existing TMDT procedure involves spraying the subject's hands with a 0.2% solution of 8-hydroxyquinoline in isopropanol. The metallic residues will fluoresce when viewed with an ultraviolet light. Disadvantages with the 8-hydroxyquinoline reagent are the necessity of using ultraviolet light, long photographic exposure times, and the need for special filters [2]. Further, 8-hydroxyquinoline reacts with a variety of metals, some showing very similar colors. This background can confuse or even obliterate correct results.

A new compound that eliminates all of the above problems is 2-nitroso-1-naphthol, which produces a deep green color in the presence of iron (steel), a red to blackish-brown color with copper (brass), and an orange color with zinc (galvanized).

Method and Materials

The experimental results in this study were obtained by holding objects made of steel, brass, aluminum, pot metal, lead, tin, or galvanized iron for a period of seconds to minutes, followed by spraying the hands. A 0.5% solution of 2-nitroso-1-naphthol (ICN Pharmaceuticals K & K Laboratories) is made up in acetone and sprayed on the skin. To avoid the color running on the skin, two light sprayings rather than one heavy spraying are used. The color reaction appears immediately and is maximized within a few minutes (Fig. 1).

Discussion

Because the reaction colors contrast well with the natural reddish color of the skin and no ultraviolet light is required, the results may be photographed with normal lighting.

2-Nitroso-1-naphthol was found to be as sensitive to iron and copper as 8-hydroxyquinoline. It is approximately 100 times less sensitive to zinc. No interference has been observed with the other metals listed above.

The material is not a skin irritant; however, it should be used with adequate ventilation and the hands washed after the test is complete.

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FIG. 1—Pattern on a hand after holding a 9-mm Radon. Note the split back strap.

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References

- [1] "Trace Metal Detection Techniques in Law Enforcement," Pamphlet No. 71-1, National Institute of Law Enforcement and Criminal Justice, LEAA, Washington D.C., 1970.
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