

FORENSIC SCIENCE

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FINGERPRINT VISUALIZATION

- **The Iodine fuming** technique for visualizing latent fingermarks has been used for almost a century.
- Iodine is a crystalline solid, which upon heating sublimates into violet vapors. The vapors are absorbed by the sweat deposition of the latent imprint thereby revealing the ridge pattern.
- Initially, it was believed that iodine can be added chemically and reversibly, to double bonds of the unsaturated fatty acids present in the fingerprint residue.
- However, it was later suggested that the mechanism of the reaction involved physical absorption of iodine on the fatty acid content. The iodine-fatty acid interaction imparts a yellowish brown color to the ridge pattern.
- Iodine fuming is a simple procedure of developing latent fingerprints.

Latent fingerprints may be developed by iodine fuming technique by one of the following experimental procedures:

a. Fuming Gun Method

- An iodine-fuming gun is made of either glass or plastic.
- The butt-end of the gun contains a dehydrating agent, usually calcium chloride. There is also a mouthpiece for blowing air at this end.



b. Fuming Cabinet Method

A china dish containing about 1g iodine crystals is placed in a fuming cabinet. The object bearing the latent prints is suspended from the roof of the cabinet. Iodine crystals are gently heated to about $^{\circ}50\text{ C}$ using a heating block. After a few minutes latent fingerprints begin to appear. The object is exposed to the fumes till maximum contrast has been achieved between the prints and the background. The developed fingerprints are immediately photographed.

c. Powder Dusting Method Iodine crystals are pulverized into a fine powder. The powder is spread out over the surface bearing the latent fingerprints by a camel hair brush.



A sample fingerprint developed by iodine fuming method

Silver nitrate technique is one of the oldest methods of detecting latent fingerprints on porous items like paper, cardboard and wood.

- The method is based on the reaction of silver ions with the chloride content of sweat residue.
- The reaction product, silver chloride, is relatively unstable and, when exposed to ultraviolet radiation or sunlight, decomposes into finely divided silver, visualizing the ridges as a dark hue, usually black or brown.

Mechanism

- Detection of the latent fingerprints by silver nitrate is based on the premise that the said reagent undergoes chemical interaction with the chloride content of sweat residue.
- This reaction produces a precipitate of light sensitive silver chloride. When white colored, insoluble silver chloride is exposed to either sunlight or ultraviolet radiation, it gets reduced to metallic silver.

The silver nitrate reagent develops fingerprints on porous surfaces, such as papers of different varieties, cardboard and raw (unpolished) wood.

- The reagent is dissolved in distilled water or in a mixture of distilled water and methanol.
- Tap water is not used since it invariably contains chloride ions which transform silver nitrate to silver chloride.
- The concentration of silver nitrate in test solution may vary from 1-10%.
- However, a 3% solution (w/v) is considered to be the best choice. The latent fingerprint-bearing item is treated with the test solution either by dipping or by spraying.



. 1 Reaction of silver nitrate with chloride content of sweat residue