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### **DEVELOPMENT OF FINGERPRINT USING POWDER METHOD**

Fingerprints have often been and still are considered one of the most valuable types of physical evidence in identification.

- There are, in general, three forms of fingerprint evidence that may be found at a crime scene: **visible (or patent) prints, impression (or plastic) prints, and latent prints.**
- In more recent years, new dimensions have been opened in latent print processing techniques, revolutionizing the field of fingerprint identification. New techniques have been developed not only for latent fingerprint detection, but also for fingerprint identification. These developments have significantly improved the efficiency of criminal investigation and personal identification.
- In the past, powder dusting, ninhydrin spraying, iodine fuming, and silver nitrate soaking were the four most commonly used techniques of latent print development.
- These conventional techniques are quite effective in the recovery of latent prints under many ordinary circumstances. However, latent prints can be deposited on objects or surfaces with unique characteristics: wet surfaces, surfaces with multicolored backgrounds, surfaces contaminated with blood or other body fluids, objects with unusual shapes or contours, waxed surfaces, fabrics or untreated wood, varnished surfaces, human skin, cardboard boxes, and other porous or nonabsorbent surfaces.
- Under these conditions, traditional methods of latent print detection are often ineffective. At times, application of the wrong techniques may even result in the destruction of potential latent print evidence.
- For years, fingerprint scientists have sought new methods or tried to improve existing methods for the visualization of latents. Although a complete understanding of all individual components in latent print residue and their quantities has not been attained, many of the compounds present are known.
- Some methods target water-soluble components while others target lipids. The best method, then, depends on the latent, the surface, and any environmentally induced changes.
- At another level, enhancement methods exploit the chemistry of latent residue components and their potential reactions and interactions. Efforts have focused on the development of techniques that may be successfully applied to unique and difficult surfaces and that offer increased sensitivity over conventional techniques.

**The newer procedures can be divided into three major categories:**

- (1) new chemical reagents for latent print visualization;

(2) optical and illumination methods for the development or enhancement of latent prints;

(3) combinations of chemical and illumination methods.

Finally, there are systematic approaches, involving not only combinations of methods, but careful consideration of their order of application.

visualization of latent fingerprints, and also provide some of the reagent formulations and procedures used.

### **Powder Dusting**

The simplest and most commonly used procedure for latent fingerprint development is powder dusting. Powder dusting is a “physical” method of enhancement that relies on the mechanical adherence of fingerprint powder particles to the moisture and oily components of skin ridge deposits. Application of powder to latent prints by brushing is a simple technique and yields instantly apparent prints, but it also has disadvantages. Contact of the brush with the fingerprint ridges has an inevitably destructive effect. The use of fingerprint powders dates back to the early nineteenth century. In general, there are four classes of fingerprint powders: regular, luminescent, metallic, and thermoplastic.

Following are some of the most commonly used fingerprint powder formulas:

#### **Black Fingerprint Powder Formulas:**

##### **Ferric oxide powder**

Black ferric oxide 50%

Rosin 25%

Lampblack 25%

##### **Manganese dioxide powder**

Manganese dioxide 45%

Black ferric oxide 25%

Lampblack 25%

Rosin 5%

### **Lampblack powder**

Lampblack 60%

Rosin 25%

Fuller's earth 15%

### **White Fingerprint Powder Formulas**

#### **Titanium oxide powder**

Titanium oxide 60%

Talc 20%

Kaolin lenis 20%

#### **Chalk-titanium oxide powder**

Chalk 15%

Kaolin lenis 15%

Titanium oxide 70%

### **Gray Fingerprint Powder Formulas**

#### **Chemist gray powder**

Chemist gray 80%

Aluminum powder 20%

#### **Lead Carbonate Powder**

Lead carbonate 80%

Gum arabic 15%

Aluminum powder 3%

Lampblack 2%

In addition, there are many different types of colors or metallic fingerprint powders commercially available. Some of the chemical substances used in fingerprint powders are toxic or pose other potential health hazards, including antimony trisulfide, antimony powder, cobalt oxide, copper powder, cupric oxide, lead carbonate, lead iodide, lead oxide, lead sulfide, manganese dioxide, mercuric oxide, mercuric sulfide, tin powder, and titanium dioxide. Safety procedures and caution should be exercised when preparing or using powders containing these chemicals. In recent years, researchers have further improved the mechanism and technique of powder dusting latent fingerprints by coating the fingerprint powder onto fine quartz powder and/or small plastic particles. Different sizes of fingerprint powder-coated particles can be used for different purposes in processing.

White powder Dolomite, starch powder Gray powder Kaolin, aluminum flake powder

The following factors should ordinarily be considered in the selection of a fingerprint powder:

1. The surface should be suitable for powder dusting and not itself attractive to fingerprint powder (such as polyethylene).
2. The color of the fingerprint powder should be selected to give maximum contrast with the surface on which the latent print was deposited.
3. The powder must adhere well to the deposits left by the friction skin ridges of a finger or palm.
4. The particle size of the powder should be fine enough to yield good, clear ridge patterns.

Generally, fingerprint powder is applied to the surface bearing the latent print with a fingerprint brush. These brushes are distinguished according to the types of fibers used to make them. Occasionally, powder can be applied to the surface by means of an atomizer, aerosol spray, or electrostatic apparatus. When applying powder with a fingerprint brush, extreme care should be taken to avoid damaging the latent print. Valuable fingerprint evidence is occasionally destroyed by carelessness in the application of powder.

**The following is a generalized procedure for developing latent prints with fingerprint powder:**

1. Visually search the surface to identify possible latent print deposits.
2. If a fingerprint is found, it should be photographed using an appropriate photographic technique.
3. Select an appropriate fingerprint powder and brush. When in doubt, make a test print to help in choosing the best powder and brush for the circumstances.
4. Carefully apply the powder to the surface with a light brushing action.

5. Remove the excess powder by dusting the surface with a gentle, smooth motion until the best fingerprint image has been developed.
6. Photograph useful fingerprints in situ. The photograph should contain all the necessary case information and the latent print number.
7. Apply a suitable fingerprint lifting tape and carefully lift the powdered latent print from the surface.
8. Examine the latent lift and if necessary reprocess or relift the original latent print.