DEVELOPMENT OF LATENT FINGERPRINTS ON VARIOUS SURFACES BY USING THE RTX METHOD

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ABSTRACT: In this report results are described of the RTX (ruthenium tetraoxide) method to develop latent prints on cartridges, coins, adhesive tapes, polymeric materials. An advantage of the RTX method is simultaneous visualisation of the latent prints on both sides of the adhesive tape. The prints after the RTX development were compared with prints obtained by other methods (porous surface – cyanoacrylate, sticky surface – sticky side powder). We prefer to use the RTX rather than the cyanoacrylate method for work with polymer materials surfaces. The prints are stable, the friction ridges are conspicuous and contrast is sufficient for taking photographs.

KEY WORDS: Forensic science; Fingerprints; Adhesive tape; Latent print detection; Ruthenium tetroxide.

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RTX – ruthenium tetraoxide – is a rarely used method for developing latent prints. There was wide discussion on the advantages and disadvantages of the RTX method in scientific publications at the beginning of the 1990s. RTX can be used to develop latent prints on porous as well as on nonporous surfaces. Forensic scientists have found that RTX develops latent prints on various materials, including metals, polymeric materials, thermal paper, cardboard, sticky surfaces.

In this report, results are described of the RTX method to develop latent prints on cartridges, coins, adhesive tapes, and polymeric materials. An advantage of the RTX method is simultaneous visualisation of the latent prints on the both sides of the adhesive tape. The print residues contain unsaturated fatty acids which react with the ruthenium tetraoxide. The friction ridges of the latent print residues upon reaction with vapor of the RTX become dark gray.

The RTX method is a simple procedure to use for latent print development. RTX can be applied in different ways. It is possible to dissolve ruthenium tetra oxide in water and afterwards to treat the sample by spraying, swabbing or dipping. However, a more effective result can be achieved if ruthenium tetra oxide is dissolved in halogen-containing saturated hydrocarbon.

In our practice we prefer the method of ruthenium tetra oxide synthesis during the surface treatment process. The equal volumes of the ruthenium chloride solution and ammonium cerium nitrate solution are mixed in the reaction container. Ruthenium chloride in water oxidises – the result of this is ruthenium tetraoxide vapor. We have found that there are needed 10 ml of working solution for a container of 0.7 l volume. The surface with latent prints is put in the ruthenium tetra oxide vapor for 20 to 60 minutes.

The best results have been obtained working with metallic surfaces. It should be emphasized that good prints have been visualized on greasy surfaces, when such methods as cyanoacrylate, selenius acid or modified physical developer could not be applied (Figure 1).

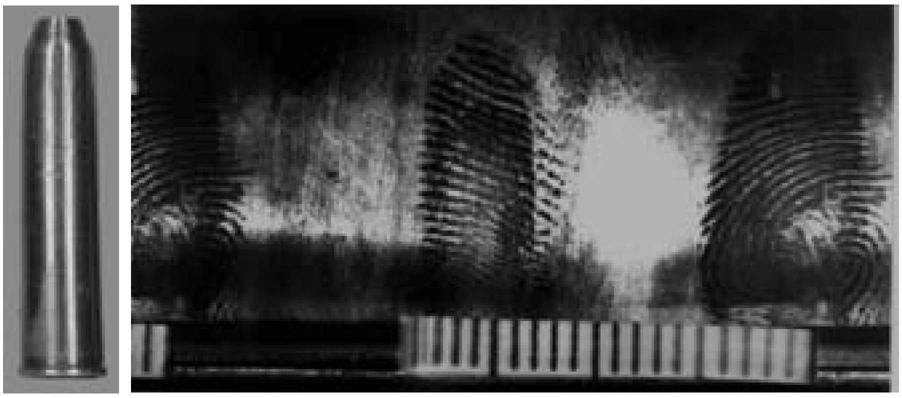

Fig. 1. RTX developed fingerprint on metallic surface (cartridge case).

Interesting results have been obtained with different adhesive tapes. Fingerprint residues form dark gray products upon reaction with RTX on the non-adhesive side of the sticky tapes in all cases (Figure 2).

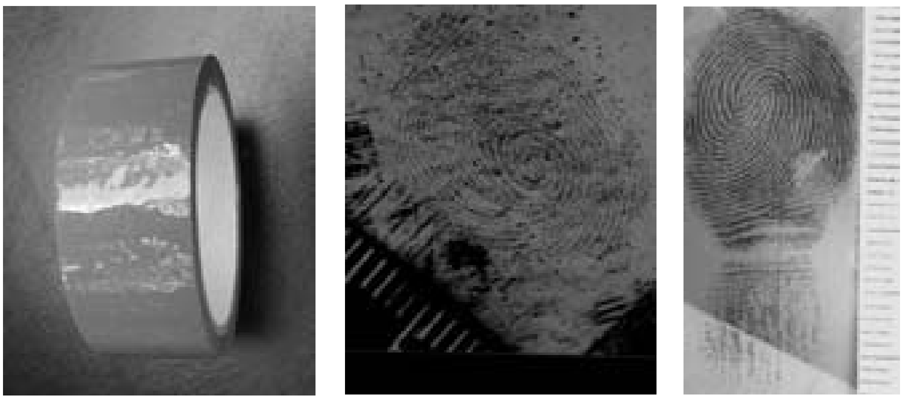

Fig. 2. Fingerprint developed on non-adhesive side of sticky tapes (left – cyanoacrylate/right – RTX).

In the case of polyizoprene glue, the RTX vapors react with the fingerprint residues giving dark gray prints in a short time (Figure 3).

If the latent print is placed on polyacrylic glue, prints appear in a white color, but the glue surface is black (Figure 4).

We prefer to use the RTX rather than the cianoacrylate method for work with polymer materials surfaces. The prints are stable, the friction ridges are conspicuous and the contrast is sufficient for taking photographs (Figure 5).

Fig. 3. Fingerprint developed on adhesive side of sticky tapes coated with polyizoprene glue (left – RTX/right – sticky side powder).

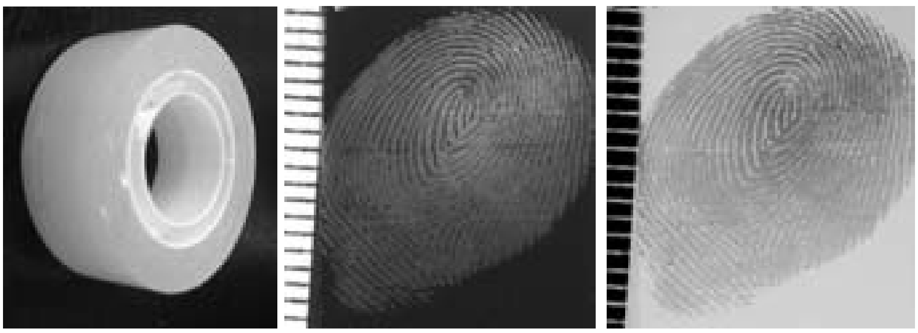

Fig. 4. RTX developed fingerprint on polyacrylic glue.

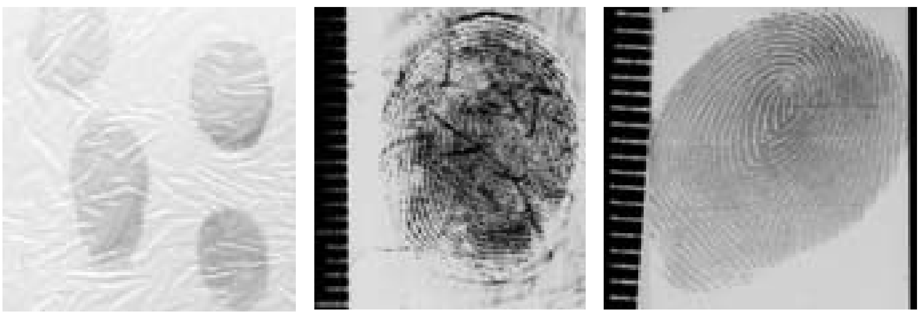

Fig. 5. Fingerprint developed on polymer material surface (left – cyanoacrylate/right – RTX).