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TECHNICAL NOTE

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Super Glue®, A Modified Technique for the Development of Latent Fingerprints

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ABSTRACT: Numerous techniques and methods as well as commercially prepared kits have recently been developed using cyanoacrylate-type (Super Glue®) adhesives to develop latent fingerprints on nonporous surfaces such as glass, plastics, and metals. Of these various methods, it is felt that the use of heat makes the most efficient use of the glue and reduces the time required for development of latent prints.

KEYWORDS: criminalistics, fingerprints, polymerization retardants, heat

A number of articles have recently been published concerning the development of fingerprints by fuming with cyanoacrylate esters (Super Glue® type adhesives). While a number of techniques and conditions have been described, it was decided to make a more basic study of the process starting with some of the physical properties of the chemicals involved to see if a more efficient technique could be developed. It was noted that the cyanoacrylates have a relatively low boiling point [*1*] and it would seem reasonable that if they were heated above their boiling points, a high concentration of glue vapors would rapidly be produced which would react more rapidly with any fingerprint residue. Although, as previously noted, higher temperatures çaused undesirable polymerization. A *polymerization retardant* [*2*] permits the use of temperatures much higher than the listed boiling point of the esters and produces latent impressions in a relatively short amount of time with a minimal amount of cyanoacrylate.

The polymerization could be retarded by several different substances including: maleic acid [*3*], *P*-toluene sulfonic acid,[2] oxalic acid (each at a concentration of less than 0.1%), and free aluminum metal [*3*]. The aluminum was found to be the most convenient of the substances tested because the aluminum foil not only provides a container for the glue, but also acts as a polymerization retardant. Several heat sources were tried [*4*], but the light bulb [*5*] provided a rapid means of volatilizing the adhesives as well as generating convection

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current within the chamber so as to distribute the vapors evenly. Several different types of cyanoacrylates were tried with methyl monomers working slightly better.

Experimental Procedure

Materials

The fuming chamber consisted of:

(1) a glass chamber, a clean small glass aquarium for small items, a larger aquarium for larger items;
(2) chamber sealant: standard foam rubber weather stripping, 9.5 mm (3/8 in.) wide and 4.8 mm (3/16 in.) thick with adhesive on one side;
(3) a piece of plate glass slightly larger than the aquarium dimensions; and
(4) a roll of aluminum foil, heavy-duty-type, used to line the chamber, and used to make a small dish to hold the Super Glue.

The vapor source was:

(1) ceramic light socket with screw-type base;
(2) electrical cord;
(3) A 40-W light bulb, a GE extended service type was used;
(4) a piece of metal flue pipe 76 mm (3 in.) in diameter, cut 140 mm (5 1/2 in.) long with a 12.7- by 12.7-mm (1/2- by 1/2-in.) slot at base;
(5) aluminum foil dish used to hold the Super Glue; and
(6) Super Glue type adhesive, most any brand will work as long as the label says "cyanoacrylate adhesive."

Procedure

This procedure should be performed in a fume hood if available. If not, use a well ventilated area and limit your exposure. Fuming chambers, as suggested by Kendall [*6*], were set up with a glass aquarium and foam rubber weather stripping applied around the top edge of the chamber, allowing a small space for the electrical cord (see Fig. 1).

The bottom, two sides, and back of the chamber are lined with aluminum foil to prevent excessive buildup on these surfaces. A small amount of rubber cement is used to make the foil adhere to the chamber sides. Aluminum foil is also placed on the underside of the plate glass lid. Next, the chamber is cleaned using cotton balls saturated with acetone or alcohol. This prevents premature residue buildup from any fingerprint residue deposited on the insides of the chamber when the aluminum foil was applied.

The items to be fumed are placed in the chamber. It is important that before an item is fumed, any blood or other trace evidence be removed first. Next, the ceramic light bulb socket is put in the chamber with the cord attached and light bulb screwed in. The flue pipe is placed over the socket and the aluminum foil dish is placed on top of the flue pipe with the bottom of the dish just touching the top of the light bulb.

The cyanoacrylate glue is placed, by drops, into the aluminum foil dish using only 2 drops per gallon of aquarium volume; for example 10-gal aquarium needs only 20 drops. The plate glass lid is placed on top of the chamber and the cord plugged into an electrical source (see Fig. 2). At the end of 10 min, the unit is unplugged and allowed to sit another 10 min.

The lid is then removed and the vapors in the chamber are allowed to dissipate. At this time the examination for latent prints is begun. Visible latents can now be photographed. Some latents may require the use of a photoflood lamp before they can be seen. This can then be followed by processing the item with conventional fingerprint powder or Magna

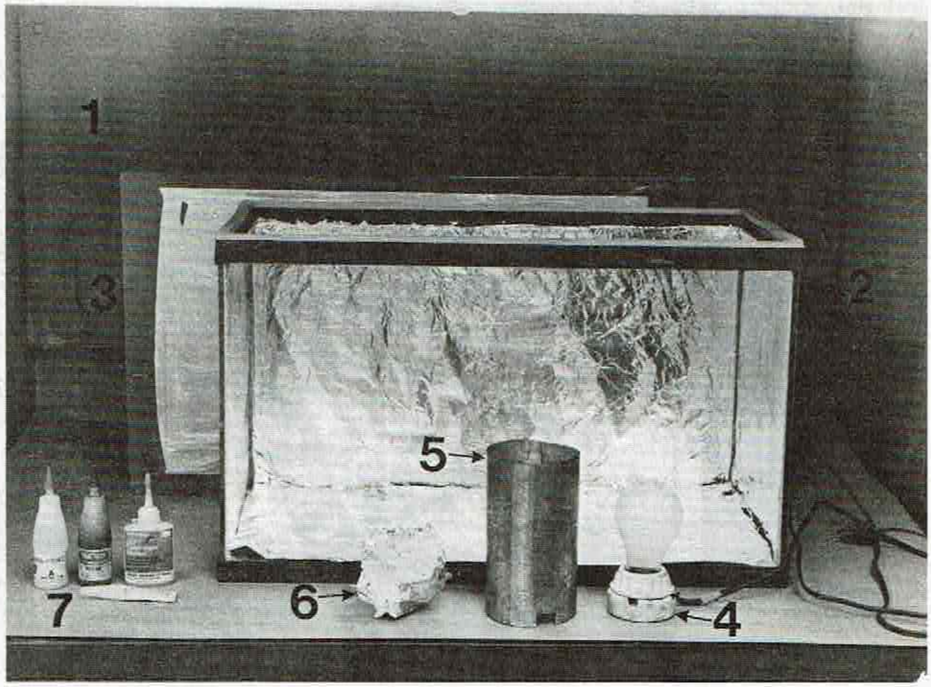

FIG. 1—(1) *fume hood;* (2) *fuming chamber with foam rubber weather stripping on top and lined with aluminum foil on bottom, two sides, and back;* (3) *plate glass lid with aluminum foil;* (4) *heat source consisting of ceramic socket with electrical cord attached and 40-W light bulb;* (5) *flue pipe with a slot for the electrical cord at the base;* (6) *aluminum foil dish to hold Super Glue; and* (7) *cyanoacrylate glues.*

Brush® and then lifted. Note that other prints may appear that were not originally detected. When lifting the impressions, a second or third re-lift may be necessary to obtain a usable latent print.

Observations

Latent prints were observed in minutes, although 10 min was used to insure complete volatilization of the cyanoacrylate.

Note that other items can be used as a fuming chamber; for example, a large plastic garbage bag can be used to fume a rifle. However, more of the cyanoacrylate glue may be required (three or four drops per gallon of chamber volume may be needed.) A chamber with an accumulation of glue residue will also require more of the cyanoacrylate glue. Therefore, it is important after whitish residue is observed on the front of the chamber that it be removed using either commercially made Super Glue remover or a razor blade scraper. After 20 or more runs, the aluminum foil should be replaced.

This method is effective on difficult surfaces such as plastic bags, rubber gloves, electrical tape, galvanized metal, guns, and leather. Since the fuming technique can be used before or after processing with fingerprint powders or Magna Brush, conventional methods should be used first on freshly handled items and other surfaces that normally do not present any difficulty.

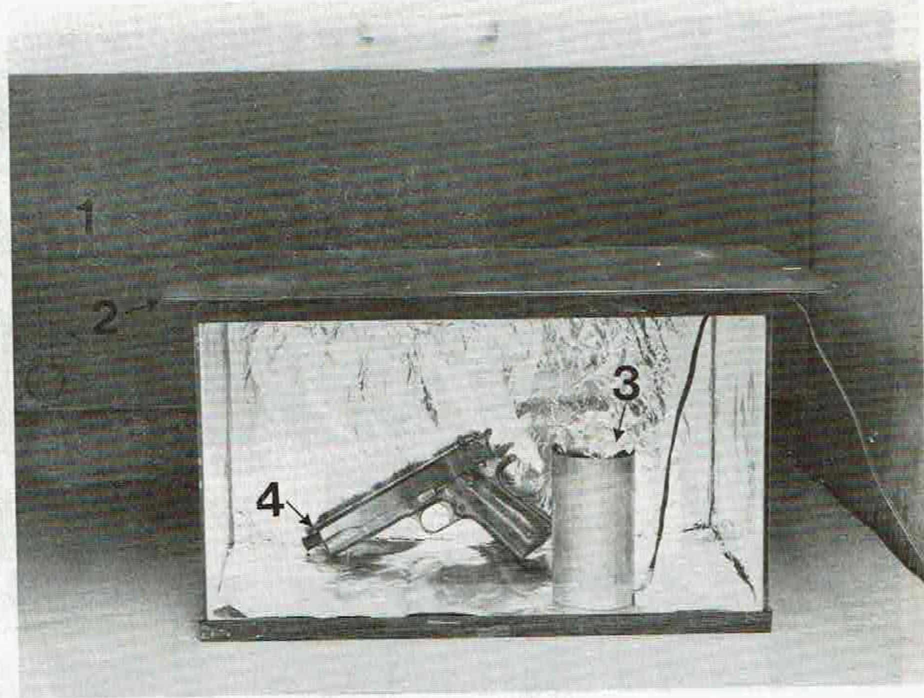

FIG. 2—(1) *fume hood;* (2) *fuming chamber sealed with plate glass lid;* (3) *aluminum foil pouch on heat source; and* (4) *item being fumed. Note: Place cork in barrel of pistol to prevent the fumes from entering barrel.*

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