
Technical Procedure for Leuco Crystal Violet (LCV)

1.0 Purpose - This procedure describes how to make the LCV solution and apply it to items of evidence.

2.0 Scope - This procedure applies to non-porous items of evidence and some porous items of evidence that may contain bloody impressions that require developing/enhancing.

3.0 Definitions

- **Alternate light source** - Any of the multiple forensic light sources readily available in the Latent Evidence Section including, but not limited to, the CrimeScope, Mini-CrimeScope, TracER Laser and Ultra-Lite ALS.
- **LCV** - Leucocrystal Violet.

4.0 Equipment, Materials and Reagents

4.1 Equipment and Materials

- Lab coats and gloves
- Face shield visor and/or safety goggles
- Fume hood
- Plastic applicators with spouts or glass tray for submerging items
- Processing tray
- Camera/scanner
- Magnetic stir bar

4.2 Reagents

- Leucocrystal Violet
- Sodium acetate
- 5-Sulfosalicylic acid
- Hydrogen peroxide (3 %)

5.0 Procedure

5.1 Mixing Procedure – Cyanoacrylate ester fumes may be detrimental to this process. The Leucocrystal Violet crystals shall be white prior to using. If the crystals are yellow, they shall be discarded.

5.1.1 Place 10 grams of 5-sulfosalicylic acid in a beaker with a magnetic stir bar..

5.1.2 Add 500 mL of 3 % hydrogen peroxide and stir until completely dissolved.

5.1.3 Add 3.7 grams of sodium acetate to the solution with continuous stirring.

5.1.4 Add 1 gram of Leucocrystal Violet to the solution with continuous stirring.

5.1.5 Place the solution in a clearly marked dark shatter-proof container until needed.

5.2 Application Procedure

- 5.2.1 Using a fume hood and rubber gloves, spray or completely submerge the item of evidence in the LCV solution and allow drying completely. Spraying with a fine mist is the most effective method to apply the solution.
- 5.2.2 Development of the impressions will occur in approximately 30 seconds and the area may be blotted with tissue or paper towels to remove excess solution.
- 5.2.3 Allow the area to dry completely and re-apply the solution to improve the contrast of the impression.

Note: This dye will adhere to the bloody impression; however, a certain amount will adhere to the item itself. If the impression over develops or becomes dark, wash the area with distilled water to remove the excess dye. The excess dye will wash away and in most cases the dye adhering to the latent impression will remain. LCV is a catalytic test for blood and will bind with the proteins found in blood which will limit the running or leaching of the developed impression.

- 5.2.4 Preserve the developed impressions through photography according to techniques in the photographic equipment procedures and/or by electronically recording the impressions (see Section Technical Procedure for Image Processing). The LCV developed impression may be enhanced with the use of a laser or an alternate light source.

Note: When LCV is applied in sunlight or a lighted environment, the impression shall be photographed as soon as possible to avoid unwanted background development.

- 5.3 **Standards and Controls** - Forensic Scientists shall produce a self-made test print to be processed concurrently with items of evidence.

5.4 **Calibration** - N/A

5.5 **Sampling** - N/A

5.6 **Calculations** - N/A

5.7 **Uncertainty of Measurement** - N/A

- 6.0 **Limitations** - Avoid the super glue process if LCV will be used on an item of evidence. Serological samples shall be taken prior to treating an item of evidence with LCV.

- 6.1 Until the health effects are thoroughly investigated, this procedure is not recommended for use on items which may be transferred to other laboratory sections.

- 6.2 The hydrogen peroxide solution will become a catalyst for oxidation of the hemoglobin and its derivatives found in blood thus producing a violet colored dye. The Crystal Violet in this process will bind with the proteins which have been affixed by the 5-sulfosalicylic acid to develop latent impressions and limit the running and leaching which may occur in other processes. Care shall be taken when development occurs with LCV as it is extremely light sensitive.

- 6.3 LCV and sodium acetate reagents have an indefinite shelf life.

- 6.4 LCV working solution has a shelf life of 90 days.

6.5 The LCV and sodium acetate reagents shall be stored in the original shipping container until needed.

6.6 The 5-sulfosalicylic acid shall be stored at room temperature until needed. Hydrogen peroxide shall be stored in the chemical refrigerator.

7.0 Safety - Presently, the safety concerns have not been thoroughly investigated in respect to the use of this chemical; however, it shall be applied and treated with extreme care until the full health effects are known. It may cause some irritation if it comes in contact with the eyes or skin and may be harmful if inhaled or ingested. Protective goggles, gloves and aprons shall be worn during processing.

8.0 References

Bodziak W. "Use of Leuco Crystal Violet to Enhance Shoe Prints in Blood." *Forensic Science International*. (1996): 45-52.

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Trozzi, T.A., R.L. Schwartz and M.L. Hollars. *Processing Guide for Developing Latent Prints*. (2000): 1-64.

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9.0 Records - N/A

10.0 Attachments - N/A

Revision History		
Effective Date	Version Number	Reason
09/17/2012	1	Original Document
10/31/2013	2	Added issuing authority to header
03/30/2017	3	Header Update – Removed Digital reference.
01/19/2018	4	Updated issuing authority in header 5.2.1 & 5.3 - Moved requirement for test print to “Standards and Controls.”
02/01/2019	5	Changed number references to be numerals only instead of spelled out throughout document 4.1: added “magnetic stir bar” 4.2: removed chemical amounts 5.1.1: “stir bar” instead of “stirrer”