Technical Procedure for Zinc Chloride HFE-7100

- **1.0 Purpose** This procedure describes how to make Zinc Chloride HFE-7100 solution and apply it to items of evidence.
- **2.0** Scope This procedure applies to porous items of evidence that are to be examined for the presence of latent prints. Zinc Chloride HFE-7100 is applied after processing an item with ninhydrin or a ninhydrin analog. Zinc Chloride HFE-7100 causes the latent prints to fluoresce under an alternate light source. HFE-7100 is an environmentally safe solvent that is fast drying and generally will not cause inks to run.

3.0 Definitions – N/A

4.0 Equipment, Materials and Reagents

4.1 Equipment and Materials

- Laboratory coat and gloves
- Face shield visor and/or safety goggles
- Magnetic stir bar and magnetic retriever
- Glass beakers
- Graduated cylinders
- Dark, shatter-proof container
- Forceps
- Fume hood
- Glass tray, paint brush, or aerosol sprayer (for application)
- Camera/scanner
- Laser and/or alternate light source with orange filter and goggles
- Dust or mist respirator (for application outside of fume hood)

4.2 Reagents

- Zinc chloride
- Ethyl alcohol (ethanol)
- Glacial acetic acid
- 2-propanol
- HFE-7100 (1-methoxynonafluorobutane)

5.0 Procedure

5.1 Chemical Preparation

- **5.1.1** Place 50 mL of ethanol into a 400 mL glass beaker with a magnetic stir bar.
- **5.1.2** Add 10 mL of 2-propanol to the solution and continue to stir.
- 5.1.3 Add 10 mL glacial acetic acid to the solution and continue to stir.
- **5.1.4** Add 6 g of zinc chloride to the solution and stir until it is completely dissolved.

- **5.1.5** Add 200 mL of HFE-7100 to the solution and continue to stir until a colorless solution is produced, approximately 5 minutes.
- **5.1.6** Remove the magnetic stir bar from the beaker and pour the solution into a dark, shatter-proof container.

5.2 Processing Procedures

5.2.1 Chemical Application

- **5.2.1.1 Dipping Method** Place the working solution into a tray that will allow the item to be submerged completely. Submerge the item for 5-10 seconds.
- **5.2.1.2** Brush Method Dip the brush into the working solution and brush directly onto the item.
- **5.2.1.3** Spray Method Spray the item with the working solution to saturate the item completely.
- **5.2.1.4** Allow the item to dry completely prior to proceeding. Purple marks from the use of ninhydrin or one of the ninhydrin analogs will change to an orange/red color when the zinc chloride reaction is complete.
- **5.2.2** View the item under the laser or alternate light source using the orange goggles and filters. Preferred wavelengths range from 450 nm to 515 nm.
- **5.2.3 Preservation of Developed Impressions** Preserve the developed impressions through photography (see photographic equipment procedures) and/or by electronic recording (see Section Technical Procedure for Image Processing).
- **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

- **6.1** Latent prints treated with zinc chloride will fluoresce yellow under an alternate light source. Background fluorescence shall be considered when using this chemical.
- 6.2 Zinc chloride solutions shall be stored in dark, shatter-proof containers until needed.
- 6.3 Shelf Life
 - **6.3.1** Zinc Chloride HFE-7100 Solution 6 months.

7.0 Safety

- 7.1 The process shall always be performed in a fume hood as the fumes may cause some irritation when in contact with the eyes or skin and may be harmful if inhaled or ingested.
- 7.2 Protective goggles, gloves and aprons shall be worn during processing.
- 7.3 Glacial acetic acid and ethyl alcohol are extremely flammable and shall be handled properly.

8.0 References

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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." Updated to stir bar throughout.
02/01/2019	5	Changed number and time references to be numerals only instead of spelled out throughout document 4.1: corrected spelling 4.2: Removed chemical amounts 5.1.6: Changed "follower" to "stir bar"