Technical Procedure for Zinc Chloride

1.0 Purpose - This procedure outlines how to make zinc chloride 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 is applied after processing an item with ninhydrin or a ninhydrin analog. Zinc chloride causes the latent prints to fluoresce under an alternate light source.

3.0 Definitions – (ALS)Alternate light source: Any Equipment used to produce light at various wavelengths to enhance or visualize potential items of evidence. ALS equipment readily available in the latent evidence section includes, but is not limited to, the CrimeScope, Mini Blue Maxx, Short and Long Wave lamps and Handscope Xenon (spex) ALS

4.0 Equipment, Materials and Reagents (Alternatively pre-mixed solutions may be purchased from a commercial Forensic Supplier)

4.1 Equipment and Materials

- Laboratory coat and gloves
- Face shield visor and/or safety goggles
- Magnetic stirrer, magnetic follower, 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 crystals (8 g)
- Ethanol (180 ml)
- Glacial acetic acid (20 ml)
- Petroleum ether, heptane or pentane (100 ml)

5.0 Procedure

5.1 Chemical Preparation

5.1.1 Place three (8) grams of zinc chloride, one hundred eighty (180) ml of Ethanol and twenty (20) ml of glacial acetic acid in a large beaker with a magnetic follower and stir until ingredients are dissolved. (stock solution)

5.1.2 Add Six (6) ml of (stock) solution to (100) ml of petroleum ether, or pentane or heptane. (Working solution)

5.1.3 Remove the magnetic follower 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 Examiner/technician shall produce a self-made test print to be processed concurrently with items of evidence. (See section technical procedure for Ensuring Quality Control.)

5.2.1.2 Dipping Method – Place the working solution into a tray that will allow the item to be submerged completely. Submerge the item for five (5) to ten (10) seconds.

5.2.1.3 Brush Method – Dip the brush into the working solution and brush directly onto the item.

5.2.1.4 Spray Method – Spray the item with the working solution to completely saturate the item.

5.2.1.5 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 – N/A

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 Working Solution – (6) Months

7.0 Safety

7.1 The process shall 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 in accordance with the safety manual.

8.0 References

Herod, D.W. and E.R. Menzel. "Laser Detection of Latent Fingerprints: Ninhydrin Followed by Zinc Chloride." *Journal of Forensic Science.* Vol. 27, 3: 513-518 (July 1982).

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9.0 Records - N/A

10.0 Attachments – N/A

REVISION HISTORY		
CURRENT VERSION	**EFFECTIVE DATE**	**SUMMARY OF CHANGES**
1	2016/07/01	Original Version
2	2018/04/01	Add definition of ALS-change revision history table, issue date to effective date, ref# to ver#.
3	2018/08/22	Edit formula and preparation to allow premix shelf life and characteristics to be more closely aligned with procedure.