Technical Procedure for Ninhydrin

1.0 Purpose - This procedure outlines how to make ninhydrin 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. Ninhydrin reacts to the amino acids present in fingerprint residue and turns the amino acids purple when the reaction is complete.

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 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
- Dust or mist respirator (for application outside of fume hood)

4.2 Reagents

- Ninhydrin crystals (5 g)
- (30 ml) Methanol
- (40 ml) 2- propanol
- (930) ml petroleum ether/heptane

5.0 Procedure

5.1 Chemical Preparation

5.1.1 Place five (5) grams of ninhydrin crystals and a magnetic follower into a five (1)L beaker.

5.1.2 Add thirty (30) ml of Methanol to the beaker and stir until the ninhydrin crystals have completely dissolved. Do not use heat.

5.1.3 Add forty (40) ml to the beaker after ninhydrin crystals have dissolved and continue stirring.

5.1.4 Add nine hundred and thirty (930) ml petroleum ether.

5.2 Processing Procedures

5.2.1 Chemical Application

5.2.1.1 Examiner/technicians shall produce a self-made test print to be produced 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 is deep enough to completely submerge the item. 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.

5.2.2 Latent impressions will develop over time at room temperature. Several methods listed below are available to enhance the development process.

5.2.2.1 Plastic Bag – Place the item in a sealed plastic bag until latent impressions develop.

5.2.2.2 Steam Iron – The iron is used to provide heat and moisture to the item. Hold the iron above the item and steam it, taking care to avoid contact between the item and the iron.

5.2.2.3 Microwave – Heat a tray or beaker of water in the microwave to produce steam. Place the item in the microwave for approximately five (5) minutes, or until impressions develop. Do not turn on the microwave with the evidence inside and avoid contact between the evidence and the hot water bath.

5.2.2.4 Humidity Chamber – Large items may be placed in a humidity chamber for approximately four (4) to five (5) hours. The chamber shall be checked hourly to ensure adequate moisture is present.

5.2.3 Preservation of Developed Impressions – Preserve the developed impressions through photography (see section photographic equipment procedures) and/or by electronic recording (see section Image Processing procedure and Recording of all Analytical Data).

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 Ninhydrin solutions shall be stored in dark, shatter-proof containers to avoid direct exposure to sunlight.

6.2 Shelf Life

6.2.1 Ninhydrin solution **-** one (1) year. (Note) Use may be continued when a positive and negative control test is performed with satisfactory results prior to processing each case. This may be continued until un-satisfactory results are observed during control test.

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 lab coats shall be worn during processing as the solution will stain skin and clothing.

8.0 References

Almog, J. "Reagents for Chemical Development of Latent Fingerprints: Vicinal Triketones – Their Reaction with Amino Acids and with Latent Fingerprints on Paper." *Journal of Forensic Sciences.* Vol. 32, 6: 1565–1573 (1987).

Almog, J., A. Hirshfeld and J.T. Klug. "Reagents for the Chemical Development of Latent Fingerprints: Synthesis and Properties of Some Ninhydrin Analogues." *Journal of Forensic Sciences.* Vol. 27, 4: 912–917 (1982).

Beaudoin, A. "Research on Transferring a Fingerprint to a Ninhydrin-Treated Document." *Journal of Forensic Identification*. Vol. 54, 2: 178–184 (2004).

Burns, Gerry F.F.S. "Ninhydrin Longevity." *Fingerprint Whorld.* (April 1982): 98-100.

Hamm, E. "Enhancement and Development of Blood Prints." *74th Annual Educational Conference International Association for Identification.* (June 22, 1989): 1-11.