Section D - Subsection 6 Ninhydrin - HFE-7100 Page 1

Name of Procedure:

Ninhydrin- HFE-7100

Suggested Uses:

To develop latent impressions on porous items such as paper, wood, cardboard, etc., making them visible to the naked eye. This process will allow the analyst to preserve the impression for future comparisons. Ninhydrin reacts to the amino acids in perspiration that have been deposited on an item and will appear reddish-purple in color when the process is complete.

This formulation uses the environmentally safe solvent HFE-7100(1-Methoxynonafluorobutane). The concentrate solution is prepared separately and is diluted with HFE-7100 to prepare the working solution.

The HFE-7100 solvent is fast drying and generally will not run most inks. Further, when followed up with Zinc Chloride also prepared with this solvent, a highly flourescent product will be produced.

Equipment Needed to Perform Procedures:

A - Magnetic stirrer, magnetic follower and magnetic retriever

B - Glass beaker

C - Dark shatter proof storage container

D - Application Equipment

1. Glass tray for submersion
2. Paint brush for large objects

E - Camera (35mm, 2 1/4, MP-4, CU5, TC III)

F - Rubber gloves and rubber aprons

G - Forceps (type which will not leave indented impressions)

H - Fume hood

I - Dust or mist respirator (For use outside of the laboratory or in conjunction with the fume hood)

Chemical(s) Needed for Preparation of Chemical Solution(s):

Concentrate Solution:

A - 25 grams of ninhydrin crystals.

B - 225 ml of ethanol (ehtyl-alcohol).

C- 10 ml of ethyl acetate.

D- 25 ml acetic acid.

Working Solution:

A- 52 ml of the concentrate solution.

B- 1000 ml of HFE-7100.

Formula/Directions for Preparation of Chemical Solution(s):

Concentrate Solution:

1. Place (25) grams of ninhydrin crystals in a 400 ml beaker.

2. Add 225 ml of ethanol to the beaker and, using a magnetic follower in the beaker, stir until the ninhydrin crystals are completely dissolved. (Do not use heat).

3. Add 10 ml of ethyl acetate to the mixture while stirring.

4. Add 25 ml of acetic acid to the mixture. Continue stirring until a clear yellow concentrate solution is produced and all ninhydrin crystals are dissolved.

5. Transfer the concentrate solution to a clean, dry, dark coated plastic bottle.

Working Solution:

1. Measure out 52 ml of the concentrate solution into a 2 liter glass beaker.

2. Measure out 1000 ml of HFE-7100 and add to the concentrate solution while stirring.

3. Transfer the resultant working solution to a clean, dry, dark coated plastic bottle.

Alternate Method

1. Place 5 grams of ninhydrin crystals in a 100 ml beaker.

2. Add 45 ml of ethanol to the beaker and, using a magnetic follower in the beaker, stir until the ninhydrin crystals are completely dissolved. (Do not use heat).

3. While continuing to stir, add 2 ml. of ethyl acetate and 5 ml. of acetic acid.

4. Add this stock solution to 1000 ml of HFE-7100.

5. Transfer the resultant working solution to a clean, dry, dark coated plastic bottle.

Processing Procedures for Application to Item(s) of Evidence:

1. The ninhydrin solution may be applied to the item of evidence by using one of the following methods:

   A. Dipping method - place a sufficient amount of the solution in a tray to completely submerge the item for approximately five to ten seconds.

   B. Brush method - dip the brush in the ninhydrin solution and brush the solution directly onto the item being processed.

It should be noted that the spray application of this formulation is not recommended.

2. Allow the item to completely air-dry prior to proceeding.

3. Latent impressions will develop over a period of time at room temperature. One recommended method for developing latent impressions is to place the items in a plastic bag for a period of time until the impressions develop.

4. To speed up the process a number of methods may be used:

a. Steam iron - the iron is heated with the steam to provide a moist heat. The iron is then held just above the item taking care not to touch the item. Great care must be taken as this method may scorch the item if the iron comes in contact with surface of the item.

b. Microwave - the microwave should be heated with a tray of water in the bottom to produce steam for approximately five minutes. The item is then placed in the microwave on a rack to avoid contact with the water and heated for approximately five minutes. It is recommended that the item be left in the microwave with no heat for an additional five minutes to absorb the remaining moisture.

c. Humidity Chamber - Large bulky items or a large number of papers may be placed in a humidity chamber for approximately four to five hours to develop latent impressions. The humidity chamber should be checked periodically to ensure adequate moisture is present.

Steps To Preserve Developed Impressions:

The most appropriate methods to preserve developed impressions is through photography, using the proper techniques (See Photographic Equipment/Procedures) and/or electronically recording the impressions (See Image Processing).

Safety Concerns:

The process should always be used 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. Protective goggles, gloves and aprons should be worn at all times during processing as the solution will also stain skin and clothing.

Storage and Location of Chemicals and Solutions:

The ninhydrin crystals should be stored in their original shipping container until needed.

Ninhydrin solutions should be stored in non-breakable dark containers at all times to avoid direct exposure to sunlight.

Shelf Life:

Ninhydrin Crystals - Indefinite

Concentrate and working solution- One year.

Other Information:

Ninhydrin reacts with the proteins and amino acids found in fingerprint residue.

Ninhydrin may be used in conjunction with a number of processes in the normal sequence of processing techniques.

Various improved formulations are presently pending research to improve the quality and application process of ninhydrin solutions.

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