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Zinc Chloride - HFE-7100

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Name of Procedure:

Zinc Chloride- HFE-7100

Suggested Uses:

Zinc Chloride is normally reserved for treatment of porous items such as paper, cardboard, etc. and applied after using ninhydrin or five (5) methoxyninhydrin. In effect, this process is a secondary or follow-up treatment for ninhydrin or one of the ninhydrin analogs to locate previously undetected latent impressions.

This formulation uses the environmentally safe solvent HFE-7100 (1-methoxynonafluorobutane).

The HFE-7100 solvent is fast drying and generally will not run most inks. Further, when used as described below, a highly fluorescent product will be produced.

Equipment Needed to Perform Procedures:

A - Protective clothing and rubber gloves

B - Face shield visor and/or safety goggles

C - Mist vapor mask

D - Graduated beakers

F - Application Equipment

1. Chromist applicator
2. Glass trays

G - Magnetic stirrer, magnetic follower and magnetic retriever

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

I - Fume hoods

J - Forceps

K - Laser and/or alternate light source with orange filter and goggles

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L - Large beaker

Chemicals Needed For Preparation of Chemical Solution(s):

A - Six (6) grams of zinc chloride

B - Fifty (50) ml of ethanol (ethyl alcohol)

C - Ten (10) ml of 2-Propanol

D - Ten (10) ml of glacial acetic acid

D - Two hundred (200) ml of HFE-7100 (1-Methoxynonafluorobutane)

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

1. Measure out 50 ml of ethanol and pour into a clean, dry, 400 ml glass beaker.
2. Measure out 10 ml of 2-Propanol. Add to the ethanol while stirring with a magnetic stirrer.
3. Measure out 10 ml of glacial acetic acid. Add to the solution while stirring.
4. Weigh out 6 grams of Zinc Chloride. Add to the solution and stir until all is dissolved.
5. Measure out 200 ml of HFE-7100. Pour into the solution and continue stirring for five minutes. A colorless Zinc toning solution will be produced.
6. Transfer the solution into a clean, dry, plastic container.

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

Note: The use of zinc chloride is based on what color the item fluoresces under the laser or alternate light source. If the item fluoresces weakly or has an orange hue, use zinc chloride as it will fluoresce bright yellow. If the item initially fluoresces yellow or other colors, another fluorescent dye should be utilized.

1. The zinc chloride solution may be applied to the item of evidence by using one of the following methods:
 - a. Spray method - spray the item with a sufficient amount of the solution (Do not

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saturate by over spraying).

- b. Dipping method - place a sufficient amount of the solution in a tray to completely submerge the item for five to ten seconds (Do not allow the item to sit in a tray of the solution for an extended period of time).
 - c. Brush method - dip the brush in the zinc chloride solution and brush the solution directly onto the item being processed.
2. Allow the item to completely air dry prior to proceeding. Purple marks from the use of ninhydrin or one of the ninhydrin analogs will change to an orange color when the zinc chloride reaction is complete.
3. Once the item is completely dry it may be photographed (See Photographic Equipment/Procedures). Often photography will yield impressions which were not readily visible to the naked eye.
4. View the item under the laser or alternate light source utilizing the orange goggles and filters. Preferred wavelengths range from 450 nm to 515 nm.

Steps to Preserve Developed Impressions:

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

Safety Concerns:

Glacial acetic acid and ethyl alcohol are extremely flammable and should be handled properly. The solution can be harmful if inhaled or ingested and should always be used in a fume hood when mixing and/or processing evidence. Protective gloves, eye goggles and protective clothing should be worn at all times.

Storage and Location of Chemicals and Solutions:

The zinc chloride, ethyl alcohol, 2-Propanol, acetic acid and HFE-7100 should be stored in the original shipping containers until needed.

The zinc chloride solution should be stored in dark containers until needed. The solutions may be stored in chromist sprayers for immediate use.

Shelf Life:

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Zinc Chloride solutions - Six (6) months.

Other Information:

Utilizing the photography technique after applying the solution to the item has been found to be a beneficial method of detecting latent impressions which may not have been visible to the naked eye. This blind method may also be utilized during the laser examination to detect latent impressions.

This procedure may be followed by Physical Developer and/or other techniques to develop latent impressions.

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