

	LPU-PM 3a.9 Ninhydrin	
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	<i>Document Manager: Tracee McIntosh</i>	<i>Approved By: Ryan Larrison</i>

3a.9 Ninhydrin

3a.9.1 Introduction

Ninhydrin, or triketo-hydrindene hydrate, is a sensitive indicator of amino acids. The reaction produces a violet to blue-violet coloring of these substances and is effective with older deposits

Ninhydrin may develop latent prints over time. A wait time of 48 hours is required prior to final evaluation of the evidence.

3a.9.2 Safety Considerations

3a.9.2.1

Application should be conducted in a fume hood using appropriate PPE.

3a.9.2.2

Safety precautions in the SDS available at each worksite for the components in this protocol shall be followed.

3a.9.3 Storage

The stock solutions and working solutions shall be stored in a dark glass bottle in a dark place.

3a.9.4 Preparation

Formula #1

Petroleum Ether based:

Completely dissolve 5.0 grams of ninhydrin in 20 milliliters of ethanol or methanol.

Slowly add 10 milliliters of glacial acetic acid.

Add 1 liter of petroleum ether.

Allow to stand for five to ten minutes. Two separate layers will form, a large pale yellow layer on top and a smaller darker yellow layer on the bottom. The darker layer is discarded and the lighter yellow solution is the working solution to be used on evidence. A large separatory funnel can be used to facilitate the separation of the two solutions.

Note: Glacial acetic acid may cause inks to run. It may be omitted from this formula if necessary.

Formula #2

Hexane based:

Mix 20 grams of Ninhydrin in 40ml methanol for 10 minutes.

Add and stir in the following for 10 minutes;

800ml ethyl acetate

3160 ml hexane are then added and stirred for 10 minutes.

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Formula #3

Acetone based:

25 grams Ninhydrin crystals
1000ml of acetone.

Note: alcohol solvents may be used to replace acetone in the this formula.

Formula #4

Heptane based:

Dissolve using a magnetic stirrer for 20 minutes, or until fully dissolved:
33 grams of Ninhydrin crystals
225ml of anhydrous ethyl alcohol (punctilious, 200 proof)

Remove 200ml of heptane from a 4L bottle and add the ninhydrin solution and shake vigorously.

3a.9.5 Instrumentation

3a.9.5.1

A humidity chamber should be utilized to achieve the desired post treatment temperature for optimal results (approximately 60-80% humidity).

3a.9.5.1.1

A steam iron may be used for specific items that may not be suitable for placement in the humidity chamber. A steam iron may prove more beneficial, in some instances, than the humidity chamber on raw cardboard.

3a.9.5.2

A forensic light source and camera equipment are required to visualize and capture suitable latent prints.

3a.9.6 Controls

3a.9.6.1

A test impression (from a finger, an amino acid pad, or amino acid solution) shall be placed on a porous item. The test sample is processed using Ninhydrin. Development of the test impression indicates a positive control test for the reagent.

3a.9.6.2

Documentation of the control test completed shall be maintained in the case worksheet.

3a.9.6.3

A periodic reagent test shall be documented in the reagent log.

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3a.9.7 Procedure for Application

1. Immerse or spray the item with the reagent. If using the immersion method, be sure the tray of reagent is a suitable size to accommodate the entire item.
NOTE: An alternate method of using a paint or soft bristle brush may be used if typical immersion or spray methods would not be effective.
2. Air-dry the item, allowing it to dry thoroughly.
3. Heat the item to the appropriate temperature;
 - a. Humidity Chamber: approximately 60-80 degrees and 60-80% relative humidity.
 - b. Use of a steam iron does not allow controlled humidity. A steam iron should be used with caution. Application of steam should continue until some development is noted. Extreme care must be used to ensure no water droplets come into contact with the item itself. A towel may be placed between the item and the iron to ensure this does not occur.

Thermal Paper:

Option #1

The wash solutions listed in LPU-PM 3a.7.5 may be used prior to application of ninhydrin.

Option #2

Thermal paper may be dipped and agitated for 20 seconds in the Acetone based Ninhydrin reagent to remove the carbon charging from thermal paper and process the item with Ninhydrin at the same time. If darkening begins to occur during drying the item may be dipped again in the reagent for additional 10-20 seconds to remove the remaining carbon.

3a.9.8 Interpretation of Results

3a.9.8.1

Ninhydrin application results in the development of a visible purple (Ruheman's purple) product.

3a.9.8.2

A green filter, Wratten #58, may provide added intensity and increased contrast of the digital photograph. However, with yellowish backgrounds a yellow filter, Wratten #12, may provide best contrast and decreased background.

3a.9.9 Limitations

3a.9.9.1

While ninhydrin can be used on semi-porous surfaces, it is best used on porous items

3a.9.9.2

If the touch occurred prior to the item becoming water soaked, Ninhydrin may not produce results.

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3a.9.9.3

Ninhydrin coloration is not permanent, and while some impressions may remain visible for years, others may fade in a matter of days.

3a.9.9.4

Optimal Ninhydrin development occurs in a dark, humid environment.

3a.9.9.5

Development of latent prints may be accelerated by the application of humidity, however it may be possible that a latent print may not develop for a few days.

3a.9.10 Other Related Procedures

Indanedione
Physical Developer
Silver Nitrate

3.14.11 References

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