

## **Standard Operating Procedures for Processing with 1,2-Indanedione-Zinc**

### **1 Scope**

This procedure will be used by Friction Ridge Discipline personnel to develop latent prints on porous and semi-porous surfaces. 1,2-Indanedione-zinc reacts with the amino acids that are present in the matrix. Developed latent prints may fluoresce under a Forensic Light Source(s).

### **2 Limitations**

Fluorescent compounds will suffer from loss of fluorescent intensity over time, as such fluorescent prints will be captured as soon as practicable.

### **3 Equipment/Materials/Reagents**

Development equipment (e.g., humidity cabinet, oven, clothes iron, hair straightener)

1,2-Indanedione

Zinc Chloride

Glacial Acetic Acid

Absolute Ethanol

Ethyl Acetate

Petroleum Ether

Methanol

Forensic Light Source(s)

Humidity Monitor

### **4 Procedures**

#### **4.1 Solution Preparation**

The chemicals for each solution should be mixed thoroughly in the order listed. Bottles must be

clean and dry. Before using a new bottle, it should be washed with methanol so that moisture is removed and the bottles are clean.

Personnel will prepare the solutions as follows:

#### 4.1.1 Zinc Chloride Stock Solution

Combine:

- 6.4 g zinc chloride
- 160 mL absolute ethanol
- 16 mL ethyl acetate
- 3040 mL petroleum ether

#### 4.1.2 1,2-Indanedione Stock Solution

Combine:

- 32 g 1,2-indanedione
- 3600 mL ethyl acetate
- 400 mL glacial acetic acid

The 1,2-indanedione stock solution should be stirred for 20 minutes so that the 1,2-indanedione is completely dissolved.

#### 4.1.3 1,2-Indanedione Working Solution

Combine:

- 400 mL 1,2-indanedione stock solution
- 320 mL zinc chloride stock solution
- 3280 mL petroleum ether

## 4.2 Application

Personnel will complete the following steps in order:

1. Apply working solution to the item(s) by spraying, dipping, squirting, or painting.
2. Allow the item(s) to dry completely.
3. Review the humidity monitor in the area of application.
  - If the ambient humidity in the area of application is less than 23%, personnel will place the item(s) in a humidity cabinet at 50-80% humidity and 60°C - 80°C for 15 minutes.

- If the ambient humidity in the area of application is equal to or more than 23%, personnel will place the item(s) in a dry oven at approximately 100 °C for 20 minutes.

**4.2.1** Personnel will record the specific method used for development in the case record.

### **4.3 Alternate Methods for Development**

**4.3.1** Instead of using a humidity cabinet or oven, personnel may use one of the following development options:

1. Apply steam with iron or other steam heat source until development is sufficient or no further development seen..
2. Apply heat with dry iron, hair straightener or other dry heat source until development is sufficient or no further development is seen.

After using one of these methods, if latent print development is insufficient, personnel will continue to apply heat or steam until no additional development is seen or signs of potential overdevelopment appear.

**4.3.1.1** If equipment other than an oven or humidity cabinet are used as a development method, a control sample must be successfully tested using the chosen alternate method prior to using the technique in casework. After the initial successful test, the alternate method must be checked every 24 hours or if conditions warrant. The check(s) will be noted in the case record.

**4.3.2** In some circumstances, heat may be detrimental to the condition of the item(s). In these circumstances, the item(s) may be placed in a sealed bag or container and left at room temperature/humidity until development occurs. No control test is warranted.

**4.3.3** The use of alternate methods must be recorded in the case record.

### **4.4 Visualization and Preservation**

Personnel will view the item(s) using a Forensic Light Source(s) with optimal wavelengths ranging from 500nm to 555nm (Refer to FBI Friction Ridge Discipline Processing Manual, Standard Operating Procedures for Forensic Light Sources).

Manila envelopes, brown paper bags, cardboard, Kraft paper, and most yellow legal pad paper may be better viewed using a barrier filter ranging from 570 nm to 590 nm.

For digital capture and photography, see FBI Friction Ridge Discipline Processing Manual, Preamble.

#### **4.5 Processing Outside Laboratory Building**

A humidity monitor is not required when personnel process items outside of the controlled setting of the Quantico or Huntsville Laboratory buildings. If a humidity monitor is not used, a control sample must be successfully tested prior to using the reagent in casework. After the initial successful test, the reagent is checked every 24 hours or if conditions at the location warrant additional checks. All reagent checks are noted in the case record.

#### **4.6 Storage of Solutions**

Stock solutions must be stored in a dark glass bottle.

Working solution may be stored in any of the following receptacles:

- Metal can
- Stainless steel container
- Dark glass bottle

#### **4.7 Shelf Life**

1,2 Indanedione-Zinc solutions have an indefinite shelf life provided the reagent checks are satisfactory.

### **5 Standards and Controls**

See FBI Friction Ridge Discipline Processing Manual, Preamble.

The humidity monitor will be checked to ensure proper performance.

### **6 Safety**

This process must be prepared and used in a fume hood or well ventilated area.

See FBI Laboratory Safety Manual for appropriate information.

### **7 Sampling**

Not applicable.

## 8 Calculations

Not applicable.

## 9 Measurement Uncertainty

Not applicable.

## 10 References

FBI Laboratory Safety Manual, Federal Bureau of Investigation, Laboratory Division. Latest Revision.

FBI Friction Ridge Discipline Processing Manual, Preamble, Federal Bureau of Investigation, Laboratory Division. Latest Revision.

FBI Friction Ridge Discipline Processing Manual, Standard Operating Procedures for Forensic Light Sources, Federal Bureau of Investigation, Laboratory Division. Latest Revision.

Ramotowski, R.S. (2013). Lee and Gaensslen's Advances in Fingerprint Technology (3<sup>rd</sup> ed.). Boca Raton: CRC Press.

Wallace-Kunkel, C., Lennard, C., Stoilovic, M., and Roux, C. "Optimisation and evaluation of 1,2-indanedione for use as a fingermark reagent and its application to real samples." *Forensic Science International* (Online), 186(1), 14-26.  
doi;<http://dx.doi.org/10.1016/j.forsciint.2006.06.006>.

Rev. #	Issue Date	History
2	09/27/18	Section 1, minor wording correction. Section 2, added humidity monitor. Section 3, moved Section 5.4 content to this section and added humidity monitor check. Section 5.2, added “Personnel will” to beginning of most statements. Section 5.2c, added information on when to use humidity cabinet or dry oven. Updated Section 5.2.1 to add “Personnel may” to applicable statements and to update for checks. Section 5.2.2, minor wording modification. Section 5.2.3 added.
3	12/01/20	Replace Latent Print Units with Friction Ridge Discipline. Minor wording changes. Streamline equipment list. Section 1, modified perspiration to matrix. Re-organization and re-numbering of sections and information in sections. Added Section 4.2.1. Added Section 4.7. Section 10, consolidated.

**Approval**

Redacted - Signatures on File

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Date: 11/30/2020

Latent Print Operations  
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Date: 11/30/2020

Latent Print Support  
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Date: 11/30/2020

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