

**TENNESSEE BUREAU OF INVESTIGATION**  
*Forensic Services Division*



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Latent Print Standard Operating Procedures  
3.5 Dye Stains

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**3.5.1 Scope**

This procedure describes the use of fluorescent dye stains used to enhance latent prints developed with cyanoacrylate.

**3.5.2 Evidence**

Any non-porous evidence that has previously been fumed with cyanoacrylate may be processed with dye stains. The dye stain is applied to the object and visually examined utilizing an alternate light source (ALS). Each dye stain listed will have different preparation steps and optimum viewing parameters.

**3.5.3 Safety Precautions**

Mix all reagents inside fume hood. Take all laboratory precautions during reagent preparations, including wearing gloves (Nitrile preferred), laboratory coats, and safety glasses, to keep chemicals from coming into contact with skin or eyes. Avoid inhalation of fumes and keep all chemicals away from open flames, sparks, or heat sources.

All reagents shall be applied within a fume hood.

**3.5.4 Chemicals/Reagents**

MBD [7-(p-Methoxybenzylamino) – 4 – Nitrobenz – 2 – oxa – 1, 3 –  
Diazole]  
Acetone  
2-Propanol  
Petroleum Ether  
Ardrox P-133D  
Rhodamine 6G  
Acetonitrile  
Methanol

**3.5.5 Instruments/Equipment**

Beakers  
Graduated Cylinders  
Pipettes  
Pipette Bulbs  
Magnetic Stirrers  
Magnetic Stir Bar

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Balance  
Yellow, orange, and red goggles  
Fume Hood  
Spray Bottles  
Dark Storage Bottles  
Polilight or SPEX Crimescope (ALS)  
Yellow, orange, and red filters (for camera)  
Camera  
Safety Equipment

**3.5.6 Preparation**

**3.5.6.1 RAM**

**3.5.6.1.1 MBD Stock Solution**

Mix 0.1 g MBD in 100 ml Acetone in a glass beaker

**3.5.6.1.2 Rhodamine 6G Stock Solution**

Mix 0.1 g Rhodamine 6G in 100 ml Methanol in a glass beaker

**3.5.6.1.3 RAM Working Solution**

In a 1 L beaker, combine in the following order and stir:

3ml Rhodamine 6G stock solution  
2ml Ardrex P133D  
7ml MBD stock solution  
20ml Methanol  
10ml 2-Propanol  
8ml Acetonitrile  
950ml Petroleum Ether

**3.5.6.2 Rhodamine 6G**

**3.5.6.2.1 Rhodamine 6G Stock Solution**

Mix 0.1 g Rhodamine 6G in 100 ml Methanol

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**3.5.6.2.2 Rhodamine 6G Working Solution**

In a 1 L beaker, combine in the following order and stir:

3ml Rhodamine 6G stock solution  
15ml Acetone  
10ml Acetonitrile  
15ml Methanol  
32ml 2-Propanol  
925ml Petroleum Ether

**3.5.7 Storage**

**3.5.7.1 RAM**

Dark bottle.

**3.5.7.2 Rhodamine 6G**

Dark bottle.

**3.5.8 Shelf Life**

**3.5.8.1 RAM**

No expiration date is provided for MBD stock solution or Rhodamine 6G, however a control will be performed prior to use on evidence.

The RAM working solution is stable for approximately thirty (30) days. After thirty (30) days, it should be checked for separation. If there is separation, shake the container. If the solution returns to suspension it may be used; if the solution remains separated it shall be discarded. The thirty (30) day shelf life begins when petroleum ether is added to the working solution. All ingredients may be mixed and stored prior to adding petroleum ether.

**3.5.8.2 Rhodamine 6G**

No expiration date is provided for the stock solution, however a control will be performed prior to use on evidence.

The shelf life of the working solution is up to six (6) months.

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**3.5.9 Controls**

A fluorescent dye shall be applied to a glass slide or comparable non-evidence item containing latent prints that have been developed with cyanoacrylate.

After applying the fluorescent dye, observe under an alternate light source.

A positive result is the presence of fluorescing ridge detail under a wavelength appropriate to the dye stain.

A negative result is the lack of fluorescing ridge detail under a wavelength appropriate to the dye stain.

A control must be performed each time a dye stain is prepared and recorded in the Reagent Log Book.

A control must be successfully performed before a dye stain is applied to evidence and recorded in the examiner's notes.

If at any time a control test indicates that a reagent is not working properly, the examiner or technician performing the control will properly dispose of that reagent, make a new reagent, and test a new control. Once the control tests appropriately, the reagent may be used.

In some circumstances of a failed control test it may be necessary to review each component of the reagent/solution to ensure no deficiencies exist in that lot number. If a deficiency is discovered, the preparer will properly dispose of that lot number and document the deficiency and disposal in the Chemical Log. A different lot shall then be used to make the reagent.

**3.5.10 Procedure**

1. Evidence must be processed with cyanoacrylate prior to applying fluorescent dyes; however dust may be applied after cyanoacrylate and prior to fluorescent dyes.

2. Any dye stain shall be applied in the fume hood.



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3. Fluorescent dyes may be applied to evidence either by spray, dip, or wash.
4. Allow evidence to air dry.
5. Observe for fluorescence of ridges under the alternate light source (ALS) according to the following:

<u>Wavelength</u>	<u>Filter (Goggles)</u>
≤ 350 nm	ultraviolet
≤ 455 nm	yellow
≤ 515 nm	orange
≤ 555 nm	red

Refer to Chapter 1.1 in the Latent Print Unit Standard Operating Procedure Manual for further instruction.

#### **3.5.11 Deviation from Protocol**

Any major variation in the above procedure may be performed with supervisor approval.

#### **3.5.12 Interpretation of Results**

Latent prints of comparable value shall be marked and photographed with a ruler included using the appropriate filter. Refer to 2.5.2 and 2.5.5 of the Forensic Imaging Standard Operating Procedures Manual for further instruction.

#### **3.5.13 References**

CBDIAI. "R.A.M." Retrieved from <http://www.cbdi.ai.org/Reagents/ram.html>

CBDIAI. "Rhodamine 6G." Retrieved from <http://www.cbdi.ai.org/Reagents/rhod.html>

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Federal Bureau of Investigation. Revised 2001. "Cyanoacrylate Fluorescent Dye (RAM)." Processing Guide for Developing Latent Prints. Developing Latent Prints. Federal Bureau of Investigation, Washington, D.C., p. 30-33.

Federal Bureau of Investigation. Revised 2001. "Rhodamine 6G (Fluorescent Dye)." Processing Guide for Developing Latent Prints. Developing Latent Prints. Federal Bureau of Investigation, Washington, D.C., p. 85-87.