

# **Questioned Documents Unit (QDU)**

## **Procedure for Processing Evidence Using Potassium Thiocyanate**

### **Section 7**

#### **1 Scope**

This document applies to examiners and analysts in the QDU for the enhancement of some patterned impressions created with dust or dirt.

#### **2 Equipment/Materials/Reagents**

- Balance
- Weighing pans
- Spatulas
- Beakers (10 ml - 200 ml)
- Graduated cylinders (10 ml)
- Glass stirring rod
- Magnetic stirrer
- Magnetic stirring bars
- Pipette
- Non-metallic spray bottles
- Fume hood
- Disposable gloves
- Lab coat
- Protective eyewear
- Potassium thiocyanate
- Methanol
- Sulfuric acid
- Distilled water

#### **3 Standards and Controls**

##### **3.1 Sulfuric Acid Solution (Dilute)**

In a small beaker, add 1ml of concentrated sulfuric acid to 9 ml of water. Mix with a glass stirring rod. Note: Make certain that you add the sulfuric acid to the water. The dilute Sulfuric acid solution must be mixed fresh.

### **3.2 Acetone/Water Solution**

In a 200 ml beaker on a magnetic stirrer, mix 15 ml of water with 120 ml of acetone. Add 15 grams of Potassium Thiocyanate. The Acetone/Water Solution must be mixed fresh.

### **3.3 Potassium Thiocyanate Solution (Sulfuric Acid Solution (Dilute) + Acetone/Water Solution)**

Slowly add 8.5 ml of the Sulfuric Acid Solution (dilute) to the Acetone/Water Solution. Note: Make certain that you add the sulfuric acid to the Acetone/Water Solution. The Potassium Thiocyanate solution must be mixed fresh.

**3.4** Once the Sulfuric Acid Solution (dilute) is added to the Acetone/Water Solution, a milky mixture will result which will separate on standing. When the layers have separated, remove the top (clear) layer with a pipette and transfer it to a non-metal spray apparatus. This solution will be tested on a small portion of the dust or dirt impression prior to processing the entire item. A positive reaction will produce a reddish brown color. If the background develops a significant color, or the dust does not produce a reddish brown color, the Potassium Thiocyanate solution may not be appropriate for enhancement of this item. Record the results of the control test in the *Chemical Enhancement and Control Logbook* located in the Shoeprint examination room.

## **4 Sampling**

Not Applicable.

## **5 Procedure**

**5.1** The solution may be placed in a non-metal spray apparatus and applied by lightly spraying the specimen under a fume hood. The specimen should be allowed to air dry.

**5.2** At the completion of chemical enhancement, refer to the *QDU Procedures for Conducting Footwear and Tire Tread Examinations*.

## **6 Calculations**

Not Applicable.

## 7 Measurement Uncertainty

Not Applicable.

## 8 Limitations

The color and porosity of the background substrate must be tested prior to use of this reagent. The thiocyanate ion in an acid environment will react with iron ions in the soil to produce a reddish brown color. If there is no iron in the dust or dirt comprising the impression, there will be no color reaction.

## 9 Safety

**9.1** Adhere to the safety practices outlined in the *FBI Laboratory Safety Manual*.

**9.2** Handle any specimens containing known or possible biohazards in accordance with FBI Laboratory health and safety practices.

**9.3** Dispose of all chemicals according to the *Chemical Disposal Guidelines* on file in the Shoeprint examination room.

**9.4** Safety information concerning each of the chemicals used in these procedures are available from the *Material Safety Data Sheets (MSDS)* on file in the Shoeprint examination room.

## 10 References

*Bodziak, Footwear Impression Evidence, 2000.*

*FBI Laboratory Safety Manual*

*QDU Quality Assurance Manual*

*QDU Standard Operating Procedures Manual*

Rev. #	Issue Date	History
0	07/03/06	Rev. for ASCLD/LAB-International (ISO 17025).
1	03/01/18	1 Scope, added, "This document applies to examiners and analysts in the QDU" Deleted 4 Calibrations. Refer to the <i>QD Quality Assurance Manual, Maintenance, Calibration, and Performance for Verification Equipment</i> " and appropriately re-numbered

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**Approval**

Questioned Documents  
Unit Chief

Date: 02/28/2018

Footwear/Tire Tread  
Technical Leader

Date: 02/28/2018

**QA Approval**

Quality Manager

Date: 02/28/2018