12.8 Thiocyanates

12.8.1 Introduction

Iron can be found in many residues, including soil and mud. Iron will react with thiocyanate ions in an acid solution. If iron is present in the residue of footwear or tire impressions, a positive reaction will result in a reddish-brown color which can enhance the visibility of the impression(s).

12.8.2 Safety Considerations

Warning: When mixing reagents, always add the acid to the acetone and/or water mixture, as adding the acetone/water to the acid could cause a strong exothermic reaction/explosion.

Use universal safety precautions for handling acids, such as chemical safety glasses and utilizing a fume hood.

12.8.3 Working Solutions

12.8.3.1 Potassium Thiocyanate

Ingredients:

120 ml acetone
15 ml distilled water
15 g potassium thiocyanate
8.5 ml of dilute sulfuric acid (10%)

Directions:

- Combine the acetone and water, then add the potassium thiocyanate.
- Stir until the potassium thiocyanate is dissolved.
- While stirring, slowly add the dilute sulfuric acid to the acetone/water/ potassium thiocyanate solution.
- A milky white precipitate will form. Allow this mixture to stand until the white precipitate settles to the bottom.
- After separation, pour the top layer, which is clear, into a dark glass bottle. This clear top layer is the solution to be sprayed onto the impression(s).

12.8.3.2 Working Solution – Ammonium Thiocyanate

Ingredients:

90 ml acetone
2 g ammonium thiocyanate
10 ml of dilute nitric acid (10%)

Directions:

- Combine the acetone and ammonium thiocyanate.
- Stir until the ammonium thiocyanate is dissolved.
- While stirring, slowly add the dilute nitric acid to the acetone/ammonium thiocyanate solution.
- No precipitation will result and no separation is required. The entire mixture is sprayed onto the impression.

12.8.4 Processing Method

The reagent is lightly sprayed over the impression. Try to control the amount of spraying to get the maximum reaction without causing the impression to run or bleed.

12.8.5 Photography

If visible, the impression(s) must be photographed before being chemically processed. After spraying the impression, re-photograph.

When photographing, it is recommended to try a #58 or #61 green filter, combined with black and white photography. This may further enhance the reddish-brown reaction.

Tips:

After spraying and re-photographing you can re-spray the impression and it may further enhance the impression.

Sometimes photographing the impression right after spraying provides better contrast than photographing after it dries.

12.8.6 Shelf Life

These solutions can be stored for several months.

12.8.7 Disposal and Cleanup

Utilize universal safety methods for disposal of weak acids.

12.8.8 Minimum Quality Standards and Controls

The reagent can be tested by adding drop of the reagent to a crystal of FeNO3 or FeCL3. A deep red to red orange color should form.

12.8.9 References

Footwear Impression Evidence: Detection, Recovery and Examination by William J. Bodziak ©2000, second edition, pages 145-147