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3.20 Silver Nitrate

3.20.1 Introduction

Silver nitrate reacts with sodium and potassium chloride in palmar sweat to form silver chloride, a compound more photosensitive than silver nitrate. This procedure is particularly destructive in both general chemical reaction and the amount of water immersion required. Silver nitrate does not yield consistently high success on porous items, is expensive, and prohibits effective laser examinations and therefore should be avoided when processing routine paper or porous items. Yet with certain surfaces, such as raw or unfinished wood and wax-impregnated papers it is one of the most effective procedures currently available.

3.20.2 Safety Considerations

- Ethanol
- Glacial Acetic Acid
- Isopropanol
- Methanol

This procedure involves hazardous materials. This procedure does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this procedure to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. Proper caution should be exercised and the use of personal protective equipment should be considered to avoid exposure to dangerous chemicals. Consult the appropriate MSDS for each chemical prior to use.

3.20.3 Preparations

Concentrations of silver nitrate solutions vary from 1 to 10%, with 3% acceptable for most processing and higher concentrations for wood items. Three separate preparations of silver nitrate are available depending on the substrate to be processed. Aqueous silver nitrate solutions are adequate for wood items. Alcohol based solutions are preferred for wax impregnated papers. Silver nitrate solutions should be prepared in small amounts according to immediate need. Silver nitrate is a white crystalline substance that must be stored in dark containers. Working solutions are light sensitive as well and should not be stored for future use.

3.20.3.1 Preparation for raw wood

- Mix 5.0 grams of silver nitrate in 100 milliliters of distilled water and stir until the crystals are completely dissolved.
- Add 1 milliliter of glacial acetic acid and completely mix.

3.20.3.2 Preparation for wax impregnated papers

- Mix 3.0 grams of silver nitrate in 10 milliliters of distilled water and stir until the crystals are completely dissolved.
- Then add 90 milliliters of ethanol and 1 milliliters of glacial acetic acid and mix completely.

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3.21.3.3 Preparation for flare/dynamite wrapper type papers.

- Dissolve completely 6 grams of silver nitrate in 10 milliliters of distilled water and add 100 milliliters of ethanol.
- Dissolve completely 6 grams of silver nitrate in 10 milliliters of distilled water and add 100 milliliters of methanol.
- Dissolve completely 6 grams of silver nitrate in 10 milliliters of distilled water and add 100 milliliters of isopropanol.
- The ethanol solution is mixed with the methanol solution and then with the remaining isopropanol solution.

3.20.4 Instrumentation

See General Instrumentation

3.20.5 Minimum Standards and Controls

The Standards and Controls for silver nitrate consists of placing test impressions on a paper test strip and exposing the item to the silver nitrate working solution using the appropriate application device. If the test prints are visualized the silver nitrate solution is working properly and can be used on evidence. Documentation of this process must be done in the form of a reagent log for each working solution and in the case record worksheet. Due to the instability of the working solution, especially when exposed to light, storage of working solutions is not recommended.

3.20.6 Procedure or Analysis

All applications should be done in a fume hood

- The silver nitrate solution is applied to the item to be processed by immersing, brushing, swabbing or thoroughly spraying the item.
- The item is then blotted dry to remove all excessive liquid. Development requires that the item is completely dry before the next step.
- The item is then exposed to light from a photo flood or U.V. light source. Sunlight may be used but care must be exercised to control this exposure to avoid the silver halide from too rapidly developing.
- The developed impressions are then photographed taking care not to overexpose the item to light which will continue to darken the impressions and substrate.

3.20.7 Interpretation of Results

Silver chloride impressions will darken and when less than optimum intensity is reached, the item must be removed from the light source and photographed.

3.20.8 Minimum Quality Standards and Controls

See Standards

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3.20.9 Other Related Procedures

- Iodine
 - Ninhydrin
 - Physical Developer
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3.20.10 References

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