

Analytical procedures for the examination
Of fibrous and polymeric evidence

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INTRODUCTION

Fibrous evidence from criminal investigations are characterized and compared by visual examinations and microscopic examinations.

These examinations can be supplemented by solubility tests, thin layer chromatography, Fourier Transform infrared spectroscopy, and microspectrophotometry (color measurement).

Instrumentation utilized in microscopic examinations are the stereomicroscope, the polarizing light microscope, the comparison microscope which is equipped with polarizing and fluorescence attachments, and the scanning electron microscope which is used only on an occasional basis. Microscopes are also utilized in FTIR and color measurement analyses.

Data and conclusions are drawn from the examinations and tests performed and is formulated into results which are reported to officers and attorneys connected with the criminal investigation.

PROCEDURES AND PRECAUTIONS PERFORMED OR TAKEN PRIOR TO ANALYSIS

A. Precautions to Prevent Contamination/Destruction of Evidence

1. Inspect the seals on containers in which fibrous and polymeric evidence is submitted to insure no contamination can take place during the evidence handling process.
2. Do not allow a "question" specimen (e.g. piece of fabric, piece of cordage, yarn, button or tuft of fibers) to come in contact with a "known" specimen until a preliminary examination can be performed on each item in separate areas (rooms if possible).
3. Maintain the condition of a "question" specimen e.g. shape, position, layer or relation of one yarn to another) as received until a preliminary examination is done and in most cases until a "known" sample is submitted for comparison.
4. Do not cut a "sample" (to be used in composition testing) from ends of yarns or cordage or edges of fabric if there is the slightest possibility of performing a physical match with items that have been submitted or may be submitted in the future.
5. All items submitted for analysis should be processed over a clean piece of paper.
6. Items submitted for analysis should be processed one at a time.
7. Lab coats, materials and tools should be clean before the analysis takes place and cleaned after the analysis is completed.

B. Screening, Searching and Retrieval of Evidence

1. Before any screening, searching, or retrieval of evidence is performed, the analyst should get as many facts as possible about the case as he or she can including the environmental conditions which existed during the crime and until the evidence was collected.

2. Check for obvious differences between the "known" and "question". If differences can be seen initially, then an elimination can be made early on which may speed up the time of analysis by reducing the number of steps in the analysis.

3. Note the condition of the items submitted including the container in which they were packaged.

4. Mark each item and it's container with the examiner's initials, the item number, the date the case was received into the laboratory, and the assigned laboratory file number.

5. During visual examination of the evidence, remove obvious and potentially relevant hairs, yarns or other particulate matter such as paint chips that may be adhering to the surface of the item. This should be done with forceps. The hairs, yarns or particles should immediately be placed in envelopes, canisters or petri dishes so that they can be mounted at a later time.

6. After a good thorough visual examination has been performed, the item (if garment or fabric) should be processed with lifting tape (methanol soluble) to remove any hair, fiber or particulate material that may be relevant to the investigation (possible transfer).

7. The tape lifts in a screen or search should be processed as soon as possible. The tape lifts obtained in a screen or search and the tape lifts submitted from a crime scene are processed in the same fashion. As a general rule, the tape lift is placed in a 600ml. beaker with just enough methanol to cover the tape in an upright position. The adhesive is dissolved by the methanol which physically places the hair, fiber or particulate debris into solution. The hair, fiber and particulate debris is removed from the solution by one of two methods. It is either removed by centrifuging the solution to separate the solution from the debris or by filtering the solution through a piece of filter paper (5.5cm in diameter) which enables the analyst to capture the hair, fiber and particulate debris on the filter paper. The filter paper can then be placed into a metal canister which can be examined or analyzed under the stereoscope at a later time. At that time "question" hairs, fiber or

particles can be mounted on microscope slides for purposes of identification or comparison against "known" standards.

8. Known samples should be obtained during the screen or search process.

9. The stereomicroscope can be utilized in the analysis of the following items of evidence where micromanipulation may be required:

- Weapons such as guns, knives and clubs
- Vehicle body parts such as bumpers and fenders
- Articles or artifacts of clothing, cordage or tape
- Canisters of debris
- Prepared slides or preparing slides
- Tape lifts (i.e. when searching for a particular fiber)

10. After an item of evidence has been screened and placed back into it's container, the debris which remains on the "clean" paper should be collected and then examined under the stereomicroscope for any potential evidence that may have fallen off during examination.

11. All containers of hair, fiber and debris collected during a screen or search should be clearly labeled as soon as possible to prevent any confusion that could arise.

12. All items of clothing should be processed on the inside surface as well as the outside surface (this includes the pocket areas).