

Name: _____ Period: _____ Date: _____

Fiber Lab: Microscopic Analysis and Burn Test & Mystery Fiber Investigation

Background information: Fiber evidence can be found at crime scenes in a number of different ways. In personal contact between the clothing of a suspect and a victim, cross-transfers may occur. In a break-in, fibers can become fixed to window screens, or broken glass. In an auto accident, fibers, threads, or even pieces of clothing may adhere to parts of a vehicle. Fiber analysis does not follow any set procedure. Microscopic examination of both longitudinal and cross sectional samples is generally used. Additional tests such as burning can determine the identity of a fiber.

Natural fibers tend to look like hair and will often have rough external surfaces. Plant fibers, such as cotton, may be more ribbon shaped and may contain twists at irregular patterns. Synthetic fibers (man made) tend to be smooth and uniform, and some may have long extrusion lines on the outer layer.

In this investigation, you will identify the fiber on your shirt by doing a microscopic analysis and perform a burn analysis on known fibers.

Purpose: _____

Safety: _____

Materials: Clear tape, microscope, paper (white or black), known fibers, forceps, microscope slides, cover slips, water, dropper, candle or Bunsen burner

Procedure:

A. Microscopic Analysis

1. Pick fibers for your clothing with a piece of clear tape. Tape fibers to a microscope slide. Make sure there are at least two different types of fibers.
2. Place fiber on microscope slide. Add a drop of water and place cover slip on top of it. Make sure there isn't any air bubbles on slide.
3. Observe under microscope and draw a sketch of the fiber in the data section under "unknown" sample.
4. Compare with pre-made known sample fiber slides. Draw these in table 2. Identify unknown sample of fiber. Also check tags on your clothing to find out the type of fiber.
5. Repeat steps 2-4 for the next two unknown fibers.

Table 1. Identification of unknown fibers - microscopic identification

Unknown Fiber Sketch #1

Unknown Fiber Sketch #2

Table 2. Microscopic sketch for known fibers

Name of Fiber	Characteristics of Fiber	Sketch of Fiber (100x)

B. Burning Tests for Fibers

1. Light a Bunsen burner.
2. Hold a fiber; bring it close, but not in direct contact, to the flame. Does the fiber melt, ignite, or curl? Record observations.
3. Touch the fiber to the edge of the flame. Does the fiber ignite quickly or slowly? Does it sputter, melt, or drip? Record observations.
4. Remove the fiber from the flame. Does it continue to burn? Does it glow and smolder? Does it self-extinguish? Record your observations.

Table 3. Burning Tests for Fibers

Fiber	Results near flame	Type of burning in flame	Results when removed from flame	Odor	Residue
Wool					
Cotton					
Silk					
Rayon					
Polyester					
Nylon					

c. Mystery Fiber Analysis

Scenario: Three mysterious fibers were found at a crime scene. They were sent to the lab for analysis. As forensic scientist, your job is to identify the type of fiber.

Procedure:

Key to use to determine the type of fiber

When fiber is removed from flame,

1a. It ceases to burn.....Go to 2

1b. Fiber continues to burnGo to 3

2a. Fibers have the odor of burning hair/strong odorGo to 4

2b. Fibers do not smell like hair.....polyester

3a. Fibers produce a small amount of light ash residuerayon

3b. Fibers produce a gray, fluffy ashcotton

4a. A hard black bead results from burningwool

4b. A brittle, black residue result..... silk

- If the odor is of burning hair, the fiber is probably silk or wool
- If the odor is of burning paper, the fiber is probable cotton, cupra, rayon, viscose rayon or linen
- If the fiber melts and forms beads, the fiber is probable acetate, polyester, Dacron, Dynel, nylon or Orlon
- If the fiber does not burn, fiber is probably asbestos or a glass fiber\

Conclusion:

- Mystery fiber #1 is _____ because _____
- _____
- Mystery fiber #2 is _____ because _____
- Mystery fiber #3 is _____ because _____

Conclusion:

1. What is the difference between natural and synthetic fibers?
2. How are the differences between natural and synthetic fibers apparent in this lab?
3. What are your unknown samples of fibers?
4. Were you able to identify them with the microscope or burning tests or both? Explain.