

Chemistry Cracks the Case: Focus on Fiber

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Fibers, yarns, and even pieces of fabric found at a crime scene are examples of evidence used to solve crimes. Forensic scientists conduct tests on fibers collected from a crime scene. This article explains two types of tests.

The first way to identify the type of fabric is to burn it. This test clearly shows whether the fabric is made of natural or synthetic fibers. If the fabric burns easily and gives off a smell like burning paper, it is likely made of cotton. This makes sense because paper and cotton are both made of **cellulose**. The smoke from cotton is either gray or white, and the ash left after burning is soft, fine, and crumbly. If the fabric shrinks away from the flame, however, it is made of synthetic fibers. If it also has a sweet chemical smell, the fiber is likely polyester. The smoke and fumes from polyester are harmful to breathe in, so all burn tests are conducted in a well-ventilated area. Rather than leaving ash, burnt polyester leaves behind a dark, round bead.

Forensic scientists are careful to not use the burning test too often, for a few reasons. First, burning destroys the evidence! Second, the same material can burn with different results depending on the amount of each substance in the fabric. Finally, fabric coatings can cause errors because the coating burns first.

A second way to gather information about fibers from a crime scene is to use a **polarized light microscope**. A forensic scientist can use this piece of scientific equipment to conduct a few different tests to identify the type of fiber:

1. Separating the **polarized light** that reflects off the fabric to see its blend of different colors.
2. Finding the material's **refractive index**, which measures how it bends light.
3. Looking at the **shape and texture** of the fiber. For example, silk tends to be less rough than wool. Looking closely at the condition of the fiber, forensic scientists can also tell whether the clothing is new or has been worn and washed often.



In court cases, attorneys have fibers analyzed to show who might have been at the crime scene. Often, more than one scientist needs to analyze a piece of evidence. Using a polarized light microscope is a great way to analyze fibers because the evidence doesn't get destroyed during the test.

Fiber analysis alone cannot answer the question of "whodunnit?" Unlike fingerprints or DNA, fiber analysis does not point to one specific person. Instead, it can be used to identify a group of people as possible suspects, or to rule out other suspects. However, fiber analysis conducted by forensic scientists, along with other key evidence, helps investigators crack the case.

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