

## Accepted Manuscript

A sensitive HPLC-MS/MS method for the analysis of fiber dyes

Can Hu, Jun Zhu, Hongcheng Mei, Huixia Shi, Hongling Guo, Guannan Zhang,  
Ping Wang, Liang Lu

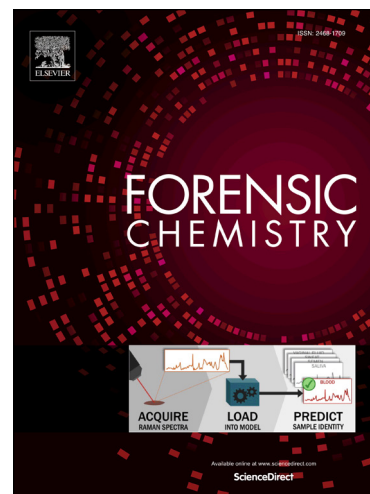
PII: S2468-1709(18)30012-2  
DOI: <https://doi.org/10.1016/j.forc.2018.08.001>  
Reference: FORC 115

To appear in: *Forensic Chemistry*

Received Date: 29 January 2018  
Revised Date: 1 June 2018  
Accepted Date: 9 August 2018

Please cite this article as: C. Hu, J. Zhu, H. Mei, H. Shi, H. Guo, G. Zhang, P. Wang, L. Lu, A sensitive HPLC-MS/MS method for the analysis of fiber dyes, *Forensic Chemistry* (2018), doi: <https://doi.org/10.1016/j.forc.2018.08.001>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



## A sensitive HPLC-MS/MS method for the analysis of fiber dyes

Can Hu\*, Jun Zhu, Hongcheng Mei, Huixia Shi, Hongling Guo, Guannan Zhang, Ping Wang,  
Liang Lu

Institute of Forensic Science, Ministry of Public Security, Beijing 100038, China

Correspondence: hucanjiayou@126.com

### Abstract

Textile fibers are frequently encountered as trace evidence. The identification and comparison of fibers is very important for case investigation, and an important aspect of forensic fiber examination is the characterization of fiber dyes. Fibers recovered at crime scenes are often very small and contain multiple dyes, which require a high demand for the sensitivity and separation efficiency of dye analysis methods. The combination of high performance liquid chromatography and tandem mass spectrometry (HPLC-MS/MS) is a highly selective and sensitive analytical method that can be useful for the characterization of dyes. A sensitive HPLC-MS/MS method is described here to analyze fiber dyes in different classes (acid, basic, direct, reactive, and disperse). Acetonitrile/water addicted with 0.1% acetic acid was utilized as the mobile phase. Under the optimized conditions, the limit of detection (LOD) for different dyes reached 0.01-16.7 ng/mL in Multi Reaction Monitor (MRM) mode. The described method is sensitive enough to analyze single fibers with a length of a few millimeters or less, which makes it suitable for forensic analysis.

**Key words:** Forensic science; Fiber dyes; HPLC-MS/MS; Sensitivity.

### 1. Introduction

Textile fibers are frequently encountered as trace evidence at crime scenes. The identification and comparison of textile fibers is crucial for case investigation. One of the most important characteristics for fiber comparisons is dye, which reflects the color of the fabric. Fiber dyes [1] are colored substances that have affinity to the fibers. Dyes must be able to absorb and reflect certain bands of visible light. With the development of the dye industry, the production and variety of dyes gradually increased. Thousands of dyes are produced worldwide, and the most common fiber dyes types are acid, basic, direct, disperse, reactive, sulfur, and vat dyes[2]. Different types of fibers have different chemical structures, and they are dyed with different classes of dyes. For example, polyester fibers are hydrophobic, so they are colored by hydrophobic disperse dyes. However, hydrophobic polyamide fibers also contain a large number of amide groups (-CONH-) and hydrophilic -NH<sub>2</sub> and -COOH groups in their molecular structure, so they can be also dyed by a variety of dyes, such as disperse dyes, weak acid dyes, reactive dyes, and direct dyes[3].

The challenge of analyzing dyes extracted from forensic fibers stems from the need for sensitive and widely applicable analysis techniques. Fibers recovered from crime scenes are often as small as 2 mm in length and contain as little as 2 ng of dye[4]. Furthermore, loss may occur during the dye extraction procedure, so a dye analysis method with high sensitivity is needed.

Download English Version:

<https://daneshyari.com/en/article/10126780>

Download Persian Version:

<https://daneshyari.com/article/10126780>

[Daneshyari.com](https://daneshyari.com)