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Joshua Debord, Ali Pourmand, Sarah Jantzi, Sini Panicker, Jose Almirall

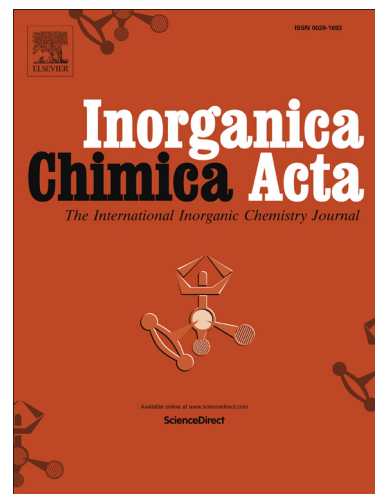
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Profiling of Heroin and Assignment of Provenance by $^{87}\text{Sr}/^{86}\text{Sr}$ Isotope Ratio Analysis

Joshua Debord¹, Ali Pourmand², Sarah Jantzi¹, Sini Panicker³ and Jose Almirall^{1*}

1. Department of Chemistry and Biochemistry and International Forensic Research Institute, Florida International University, Miami, FL

2. Department of Marine Geosciences, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, FL

3. Special Testing and Research Laboratory, U.S. Drug Enforcement Administration, Dulles, VA

* Corresponding Author. Email: almirall@fiu.edu. Mail: Jose Almirall, Department of Chemistry and Biochemistry and International Forensic Research Institute, Florida International University, OE116, 11200 SW 8th St., Miami, FL 33199.

Abstract

Heroin manufacturing and distribution by crime and terrorist organizations produce illicit economic benefits from the opium and heroin trade and result in devastating societal problems. Heroin chemical signatures provide important information to law enforcement and the intelligence community in order to combat the national and international heroin epidemic. Authentic (known origin) heroin samples from Southeast Asia (SEA), Southwest Asia (SWA), South America (SA) and SA-like heroin manufactured in Mexico (MEX-SA), were prepared for chemical analysis by microwave-assisted, acid digestion. Strontium concentration data were acquired using an inductively-coupled plasma mass spectrometry (ICP-MS). The samples having sufficient [^{88}Sr] (> 4 mg/kg in the sample) were prepared by ion exchange resin and the $^{87}\text{Sr}/^{86}\text{Sr}$ was measured using multi-collector inductively-coupled plasma mass spectrometry (MC-ICP-MS). South American (SA) and MEX-SA heroin samples are presently the most challenging regions to differentiate by analysis of their organic compositions. SA and MEX-SA heroin samples were correctly classified 82% and 77% of the time, respectively, when strontium isotope ratio ($^{87}\text{Sr}/^{86}\text{Sr}$) values of individual authentic samples were compared

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