Forensic trace and comparative analysis related to clandestine amphetamine laboratories

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Abstract

Aims: The forensic assessment of clandestine production facilities for amphetamine and other synthetic drugs is a demanding task. Not only the inventory of illicit drugs, precursor chemicals and solvents seized in the laboratory is of interest, but also the waste of previous production cycles, the functionality of the laboratory equipment as well as traces and indications pointing to the time frame the laboratory has been in operation. Typical questions of investigation and state prosecution include the precise state of production at the time of seizure, achieved chemical yields, the suitability and professionalism of the laboratory set-up, the number of verifiable previous production cycles and the total amount of drug substance that has at least been produced.

Methods: Methods used to elucidate details of clandestine amphetamine production included controlled model syntheses of amphetamine, trace analysis of surface contaminations of lab equipment by GC/MS and comparative analysis of amphetamine samples, precursor samples and production wastes by GC/MS after liquid-liquid-extraction ("CHAIN procedure") and by stable isotope ratio analysis (C, N, H).

Results and Discussion: The core of the study presented included a series of controlled syntheses of benzyl methyl ketone via the Dakin-West route starting from phenylacetic acid and of amphetamine sulphate from benzyl methyl ketone via the Leuckart-Wallach route. The key chemicals for the syntheses originated from a seizure of a clandestine laboratory, and the main aim of the study consisted in the assessment of the traceability of stable isotope and chromatographic impurity patterns from phenylacetic acid via benzyl methyl ketone into the end product, amphetamine. In the context of a further seized clandestine amphetamine laboratory, a harmonised GC/MS impurity profiling method as well as stable isotope profiles and trace analysis of contaminated vessels were successfully applied to elucidate the functionality, professionalism and past production history of the lab.

Conclusion: For the demanding task of full assessment of clandestine amphetamine laboratories highly sophisticated analytical techniques like quantitative GC/MS impurity profiling, trace analysis of contaminated surfaces and stable isotope ratio analysis are key success factors.

Eine ausführliche Darstellung folgt im nächsten Toxichem Krimtech Heft.