

Application of X-ray Diffraction in the Forensic Science Laboratory of Stuttgart Germany

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The great importance of X-ray diffraction in the forensic science analysis is based on the fact that X-ray diffraction examinations are non-destructive, and therefore leave the original specimen intact and available for further analytical study, if necessary. These are often the only methods that allow a further differentiation of materials under laboratory conditions. The examples I will present include comparative and reconstructive investigations, as well as the identification of unknown samples. In our laboratory we analyze all kinds of polycrystalline substances or specimens with crystalline components, because in a criminal case any type of specimen may turn out to be of forensic interest. These materials are e.g. paints (from automobiles, buildings, tools), building materials, minerals, ceramics, metals, alloys, explosives, gemstones, soils, extender and impurities of drugs and abrasives. The applied preparation techniques, the selected diffraction method, and the used strategies of measurement depend on the forensic nature of the criminal case, as well as on the type, quantity and consistency of the suspected specimen, and the involved trace carrier. Accordingly, specimens are either examined undisturbed on the trace carrier, or removed, separated under microscopic control, and prepared using specially selected techniques. The sample holders are chosen based on their suitability in the use of micro X-ray fluorescence analysis in addition to X-ray diffraction. The samples are analyzed with a GADDS microdiffractometer based on Debye-Scherrer geometry with devices for fixed, scanning, oscillating or rotating samples.

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