

Applications of XRD in Forensic Casework

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Within the NFI powder XRD is mainly used for:

1. Characterization of powders of unknown composition

In The Netherlands the number of anonymous threatening letters sent to politicians and other VIP's has increased since 9/11 and the murder of Pim Fortuyn. To aggravate the threatening effect some senders enclose cartridges or powders in the letters. The risk of such enclosed powders is assessed by means of a standard procedure. If the risk is considered negligible or absent, the powder is characterized by means of FTIR, XRF and XRD. This generally leads to a quick and clear characterization of the powder. Mostly these powders are composed of household articles, such as flour, sugar or washing powder. In some cases more particular compounds, e.g. medicines, are present, which can be important information for the criminal investigation process.

2. Comparison of materials found at a scene of crime

In a particular case threatening letters were produced on pink sheets of paper. In the house of the suspect a bundle of similar pink paper was found. A comparative investigation of pink papers from different origin was carried focussing on the characterization of fillers and the cellulose crystallinity. The result was that the questioned paper and the paper found at the suspects house could not be distinguished from each other and that all other papers contained different fillers.

3. Characterization of pyrotechnical mixtures

In The Netherlands, strict regulations are effective with respect to the composition of consumer fireworks. The maximum allowable mass of the explosive charge depends on the chemical composition of the charge. By means of XRD the components of pyrotechnical mixtures can be identified easily and quickly.

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