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IDENTIFICATION OF PIGMENTS AND TATTOO INK INGREDIENTS BY PYROLYSIS-GAS CHROMATOGRAPHY-MASS SPECTROMETRY (Py-GC/MS)

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Identification of tattoo pigments is mainly carried out using liquid chromatography (LC) ultraviolet (UV) absorption spectroscopy, matrix-assisted laser desorption/ionization (MALDI) time-of-flight (TOF) mass spectrometry or Fourier transform infrared (FT-IR) spectroscopy.

Common disadvantages of these methods are either the need for pure pigments, insufficient solubility, the lack of reference substances for unambiguous identification of pigments or suitable spectra libraries.

Py-GC-MS provides a quick and reliable method for pigment decomposition product identification using either pure pigments or tattoo ink formulations. Here, we pyrolyzed pigments or tattoo inks at 800°C followed by gas chromatographic separation and electron impact ionization (EI) mass spectrometry. Identification of different pyrolysis products generated with this approach was carried out by using a common mass spectra library provided by the United Sates National Institute of Standards and Technology (NIST).

Since pigments decompose into defined patterns of products one can conclude the chemical structures of the respective mother compounds. For instance, the release of the potential carcinogenic aromatic amine 2-methoxyaniline from the azo pigment Yellow74 has been observed. Additionally, polymers used for pigment dispersion like polyvinylpyrolidones and polysiloxanes can simultaneously be identified.

Here, we provide pyrolysis data of tattoo inks of the main chemical classes of pigments that are widely applied in Germany and Europe. Using this approach, false declaration of tattoo pigments, suspicious additives and potentially carcinogenic aromatic amines as structural and releasable part of the respective pigment can be easily identified.