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A miniaturized microwave-assisted saponification and extraction method for MOH analysis

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Mineral oil hydrocarbons (MOH), a complex group of lipid contaminants, consist of thousands of compounds categorized into saturated hydrocarbons (MOSH) and aromatic hydrocarbons (MOAH). Their AMDE — absorption, metabolism, distribution, and elimination—varies depending on their molecular structure. Therefore, distinguishing between different subclasses of MOSH (e.g., linear, branched, or cyclic alkanes) and MOAH (e.g., compounds with 1–2 or ≥3 rings) is crucial, which is possible thanks to the use of GC×GC. Analysing MOH in biological samples requires an efficient sample preparation method capable of removing interfering substances and concentrating MOH to improve sensitivity. Traditional methods often rely on saponification using large sample quantities (1–5 g), which limits their use in specific contexts such as human biomonitoring. This study aims to optimize a miniaturized microwave-assisted saponification and extraction (MASE) method for evaluating MOH in limited adipose tissue samples.

The optimized method scales down the process described in prior research, testing tissue samples ranging from 100 to 400 mg. Saponification was conducted using only 2.5 mL each of hexane and KOH solution, enabled by an advanced microwave system that accommodates varying vessel sizes and operates under overpressure (~35 bars) at 120 °C for 20 minutes. The miniaturized MASE method demonstrated performance comparable to the original, with MOH recovery rates in line with JRC guidance requirements.

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Literature:

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