Axel Semrau®

CHRONECT Your Lab

DGF Fast & Clean – Automated MCPD Analyses

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Introduction

- **3-Monochloropropane-1,2-diol (3-MCPD), 2-monochloropropane-1,3-diol (2-MCPD) and glycidol known as contaminants in foodstuffs.**
- **MCPD fatty acids may occur during the refinement process of oils and fats at high temperature in the presence of chloride containing salts.**
- **Refinement is an essential chemical and physical process. Only through this kind of treatment undesired odorants, flavoring substances and possible traces of toxic compounds like pesticides, heavy metals or mycotoxins are eliminated.**
- **Increasing importance of the analysis of these contaminants due to their carcinogenicity. In March 2016, the European Food Safety Authority (EFSA) declared a reduced value for the tolerable daily uptake of 0.8 µg/kg body weight for 3-MCPD.**

Method

- **Many methods for the determination of MCPD-esters, divided into 2 groups**
  - **Direct determination using LC-MS/MS**

  → time-consuming: every single ester must be determined by LC/MS
  - **Indirect analytics by GC-MS**

  → Indirect method is more frequently used for routine applications
- **manual determination is linked to a high expenditure of time**
- **Well-established DGF method "DGF C-VI 18(10)" as a basis for an automation approach and optimization for routine analytics:**

→ Axel Semrau® DGF Fast & Clean.

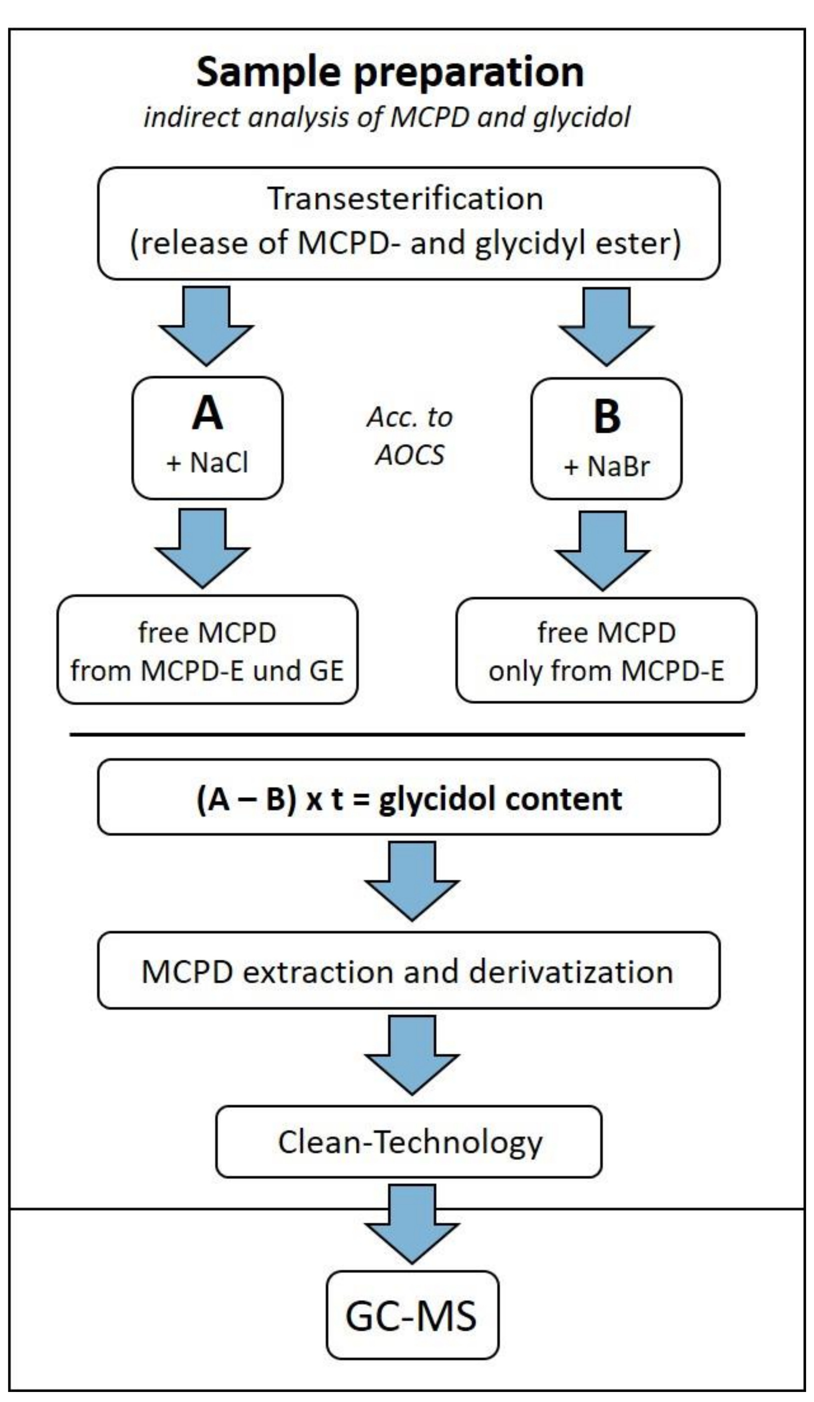


Fig. 1: Schematic workflow of the sample preparation for the indirect MCPD analytics according to the DGF Fast & Clean method.

- **Suitable for determination of 3-MCPD, 2-MCPD and glycidol contents.**
- **Analytes which are bound to fatty acid esters are first converted into their free forms, then released by transesterification**

→ MCPD becomes available as a free alcohol.

- **Free MCPD is extracted, then derivatized, cleaned and measured via GC-MS/MS (Fig. 1).**
- **The application performs the entire sample preparation including analytics fully automated.**

Highlights

- **AOCS Cd 29c-13 (or DGF C-VI 18(10)) was optimized resulting in the in-house developed Axel Semrau® Clean-Technology.**
- **Results are available after 45 minutes only compared to 18 h traditionally**

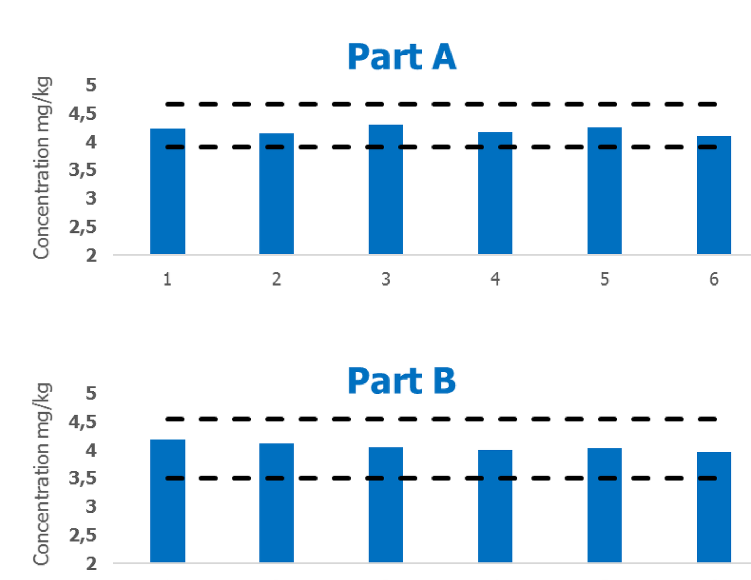
→ highest precision and significant time saving.

Results

- **Modular PAL3 system allows for automation of other methods**

  → perfectly suited for the everyday lab routine
- **The 3-in-1 method by SGS (AOCS Cd 29b-13), for example, may partially be automated, a short manual interaction still is required.**
- **For Unilever method (AOCS Cd 29a-13) a centrifuge can be added and integrated making this method as well automatable as the Zwagerman-Overman method. Equally, the earlier Weisshaar method has already been implemented.**
- **Method successfully validated for parts A and B (Fig. 3. A)**
- **Comparison to manual handling of the samples Fig. 4 proves that results are equally reliable (Fig. 4).**

Fig. 2: The MCPD Workstation by Axel Semrau® for automated analysis of MCPD and glycidol. The application device includes a multifunctional autosampler and a GC-TQ.



	Recovery [%]	Reproducibility [%]
3-MCPD part A	91.6	7.7
3-MCPD part B	101.9	8.8
2-MCPD part B	116.2	8.9

Fig. 3: Repeatability and Recovery of DGF F&C for 3-MCPD and 2-MCPD on consecutive days.

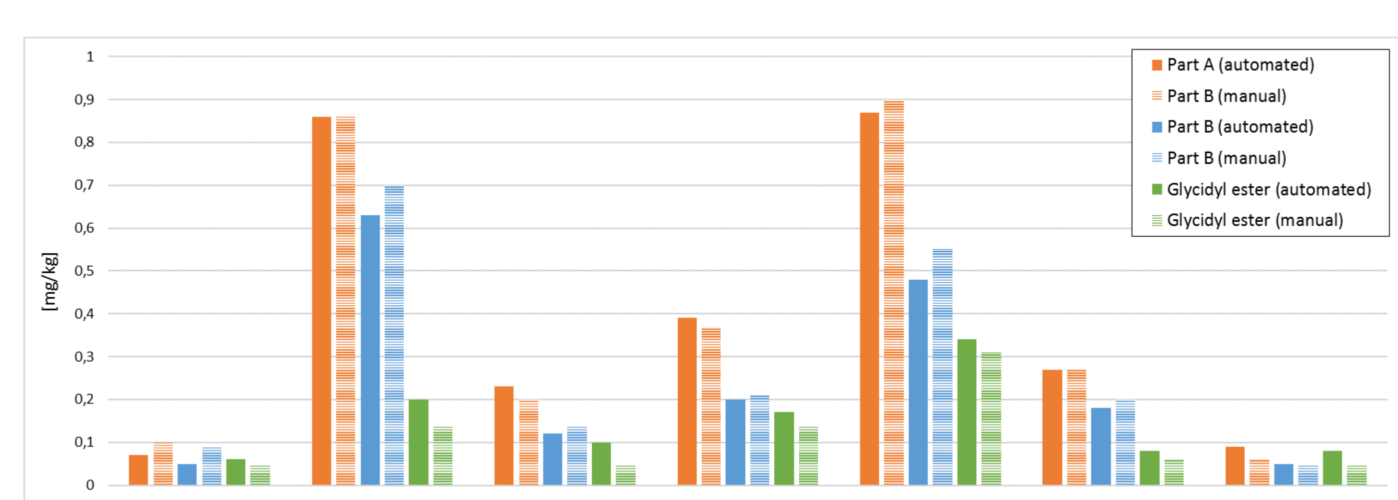


Fig. 4: Comparison of manual sample handling according to AOCS Cd 29c-13 with the automated sample preparation DGF Fast & Clean in different matrices.

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