GERMAN FEDERAL INSTITUTE FOR RISK ASSESSMENT

20 YEARS

BfR

German Federal Institute for Risk Assessment

Micro-plastics

Stefan Merkel

Methods for micro-plastics

- Spectroscopic methods
  - µ-Raman-spectroscopy
  - Fourier Transform Infrared Spectroscopy
- Thermoanalytical methods
  - Pyrolysis-GC/MS, Thermoextraction/Desporption-(TED)-GC/MS
- Optical methods
  - Microscopy
  - Staining methods

- → No standardised method

Micro-plastic?

Publication: „*Microplastic release from the degradation of polypropylene feeding bottles during infant formula preparation*”

Procedure

- hot fill (70 °C) with water
- shaking for 60 seconds
- cooling of filled bottle
- filtration
- analysis: µ-Raman

→ Raman Spectrum of poly propylene is quite similar to that of sodium stearate (used as release agent for poly propylene bottles production)

Li et al., nature food, 2020 (1), 746-754; DOI: 10.1038/s43016-020-00171-y

Micro-plastic?

Discussion at BfR-Committee for Consumer Products in November 2020:

Is it really micro-plastic?

Migration of additives from poly propylene bottles under hot-fill conditions and later precipitation on cooling is more plausible than that abrasion-free migration of PP particles.

→ Further research/investigation is needed

Next meeting of BfR-Committee for Consumer Products in April 2021:

Presentation of first research results by Chemical and Veterinary Analytical Institute Münsterland-Emscher-Lippe

Micro-plastic?

Publication: „*Can the presence of additives result in false positive errors for microplastics in infant feeding bottles?*”

Same sample preparation procedure

- hot fill (70 °C) with water → shaking for 60 seconds → cooling of filled bottle → filtration → analysis: µ-Raman

hot filtration

cold filtration (as done by Li et al.)

Sample IFB1: 2 million particles

→ Significant lower number of particles

156 million particles

Significant higher number of particles

Gerhard et al., Food Additives and Contaminants: Part A, 2022, 39 (1), 185-197; DOI: 0.1080/19440049.2021.1989498

Micro-plastic?

Publication: „*Can the presence of additives result in false positive errors for microplastics in infant feeding bottles?*”

Identification of supposed micro-plastic particles: TDS-GC/MS of hot and cold filtered gold filters

cold filtration

→ Fatty acids and their esters migrate from some infant baby bottles and can precipitate when cooling down

hot filtration

→ Spectra of additives can imitate spectra of supposed micro-plastic particles → false positve results and overestimation of the number of micro-plastic particles

Gerhard et al., Food Additives and Contaminants: Part A, 2022, 39 (1), 185-197; DOI: 0.1080/19440049.2021.1989498

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Thank you for your attention

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