

INVESTIGATION OF BIO-BASED AND BIODEGRADABLE FOOD CONTACT MATERIALS BY GAS CHROMATOGRAPHY COUPLED TO HIGH-RESOLUTION MASS SPECTROMETRY

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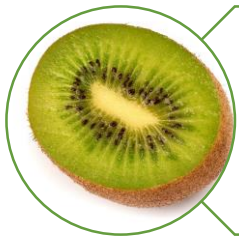
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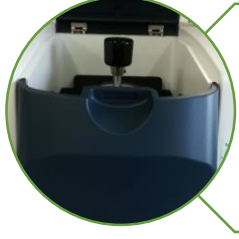
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Introduction

Bio-based and biodegradable food contact materials (FCMs) are expanding alternatives to petroleum-derived plastics. However, an in-depth study of the low molecular weight compounds that could migrate to the food is needed to fulfill risk assessment. In this work, intentionally and non-intentionally added substances (IAS & NIAS) present in 16 bio-based and biodegradable FCMs were investigated. For that purpose, non-targeted analysis by gas chromatography coupled to high-resolution mass spectrometry (GC-HRMS) were conducted. NIST libraries, MS² experiments, manual reviews and the bibliography (when available) were used for compound identification.

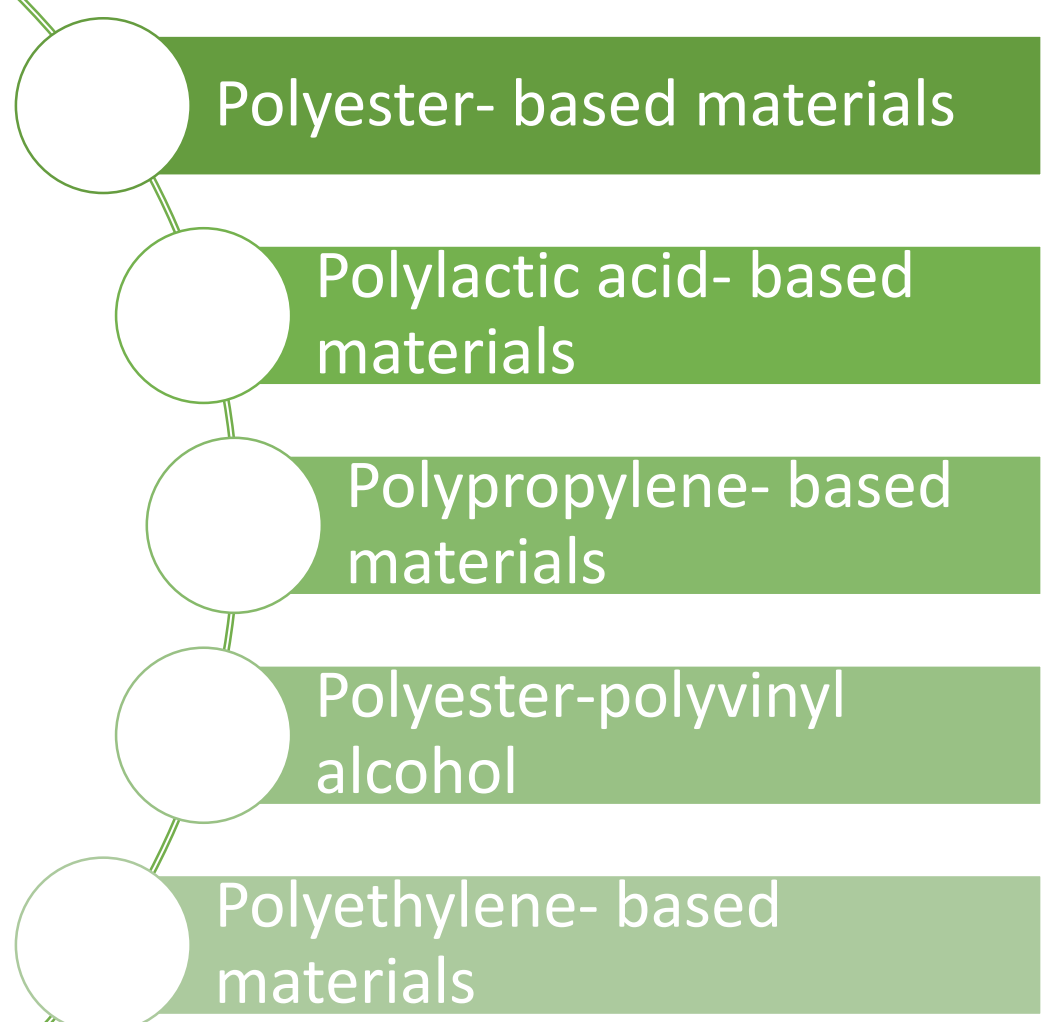
Samples

 **Fruit and vegetables bags and films & pellets (raw materials)**

 **FTIR Characterisation**

 **Extraction: 0.8 g / 5 mL acetonitrile (40 °C, 24 h)**

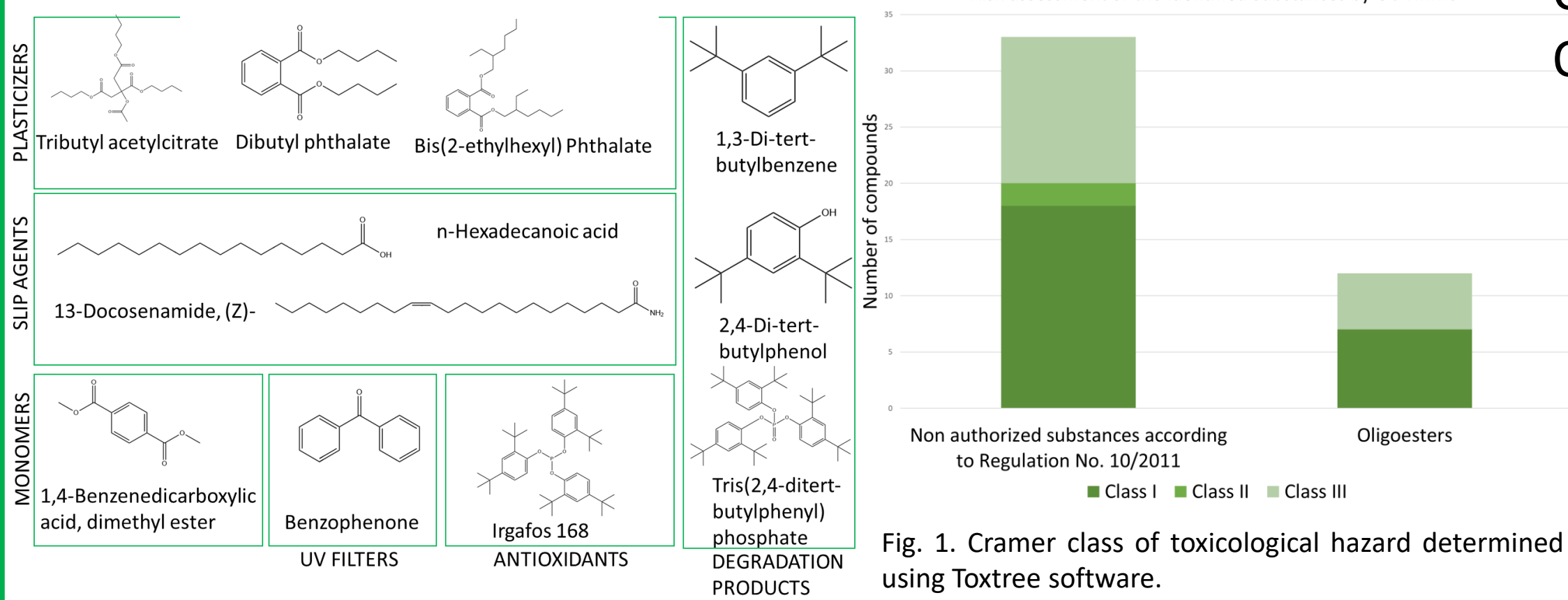
 **Data treatment**



Instrumentation and Analysis

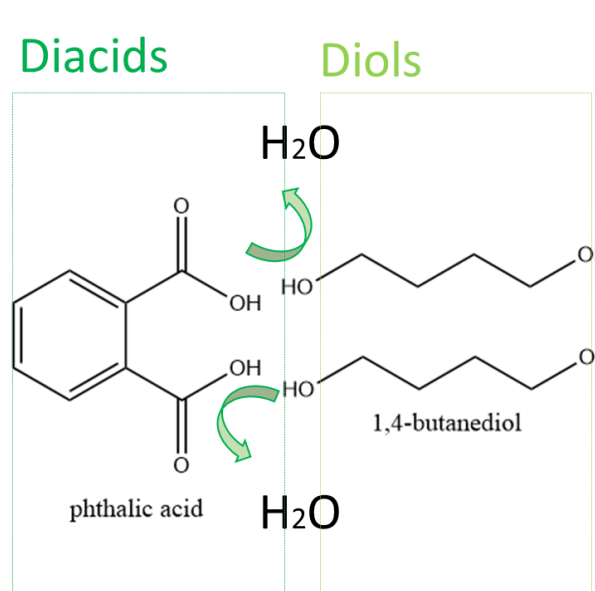
CHROMATOGRAPHIC CONDITIONS		SPECTROMETRIC CONDITIONS	
Equipment	Q-Exactive-GC	Full scan	120 to 800 <i>m/z</i>
Column	DB-5MS (30 m × 0.25 mm, 0.25 μm)	Time of analysis	6 to 32 min
Ramp temperature	100 °C, 2 min, rising 10 °C/min to 310 °C, 10 min	Mode	Electron ionisation
Carrier gas	He at a flow of 1 mL/min	MS transfer line	325 °C
Injection volume	2 μL	Resolution	120,000
Injection mode	Splitless	Voltage	70 eV
Inlet T°	300 °C	Ion source	300 °C

RESULTS



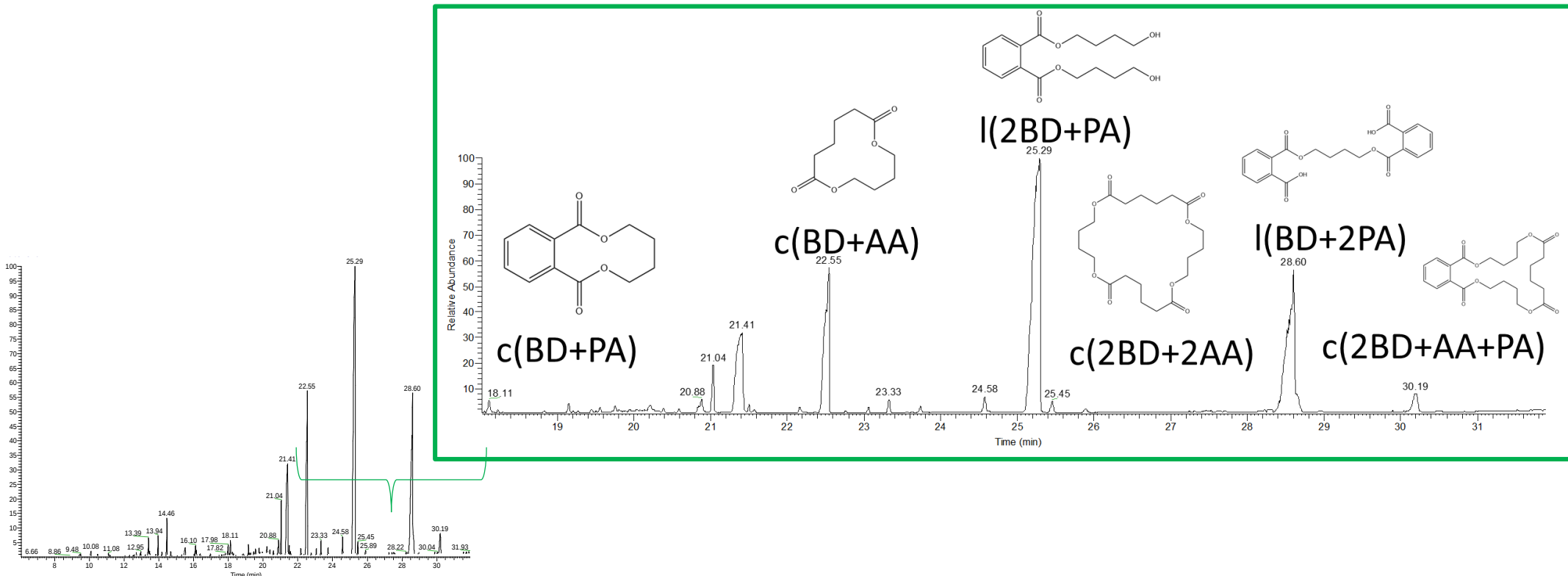
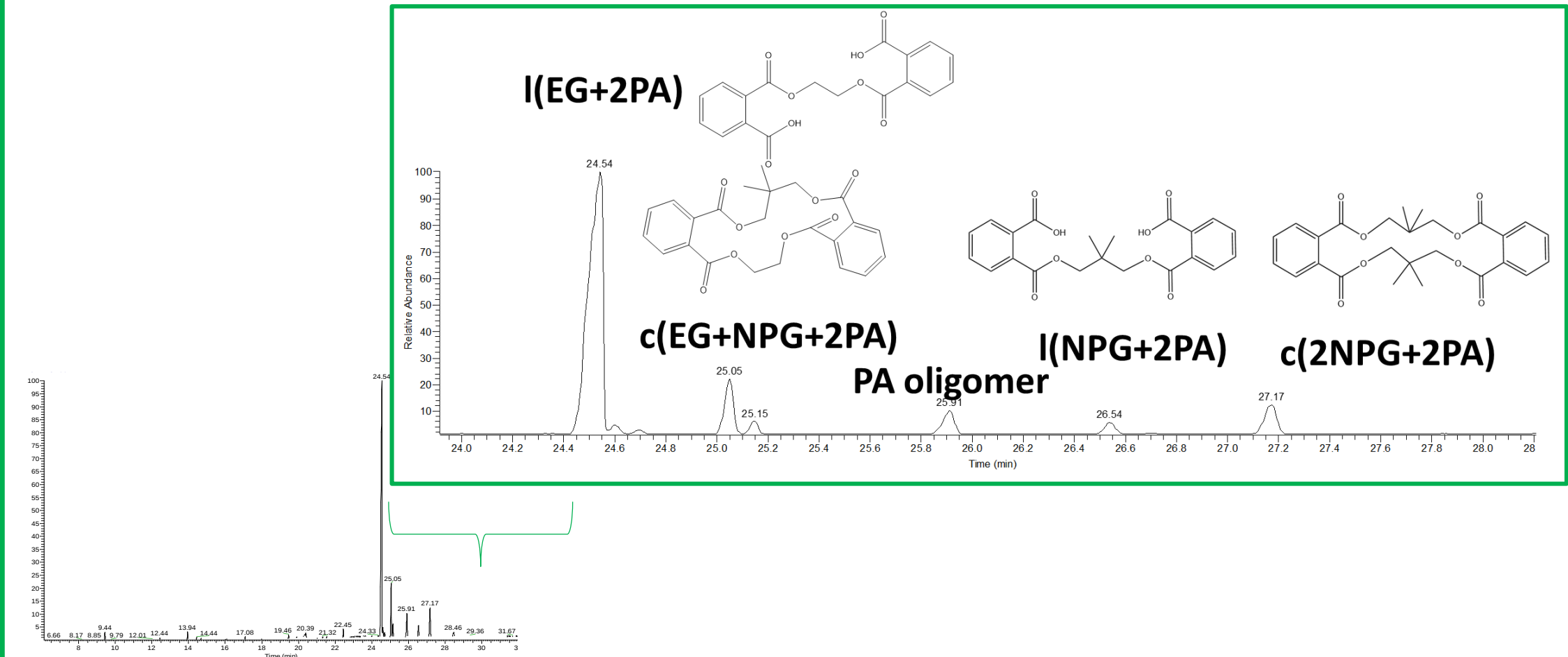
Other reaction products:

OLIGOESTERS



Data treatment

Software	Xcalibur 3.0.63
Identification	
Commercial libraries	NIST
Platforms	NIASdb 1.0
Others	Literature



Conclusions

Non-targeted analysis using GC-HRMS including solvent extraction was applied to investigate semivolatile compounds present in biobased and/or biodegradable materials mainly used for fruit and vegetables. Both IAS such as plasticizers, slip agents, monomers, antioxidant and UV-filter and NIAS such as degradation products, as well as cyclic or linear combinations of oligoesters were identified. Most of substances were NIAS not listed in the Regulation (EU) No 10/2011 [1] and more than a half belongs to Cramer III (high toxicity). Further studies should be considered to evaluate their potential migration into food and their toxicity.

References

[1] Commission Regulation (EU) No. 10/2011, on Plastic Materials and Articles Intended to Come into Contact with Food. Off. J. Eur. Union 2011, 12, 1–89

Acknowledgements

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