IDENTIFICATION OF NON-VOLATILE COMPOUNDS IN EPOXY RESINS AND ORGANOSOLS INTENDED FOR FOOD CONTACT

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INTRODUCTION

Polymeric coatings are applied in the inner surface of food metal cans acting as a barrier between food and the metal surface. During the polymerization process, side reactions can occur, and reaction products can be formed, which have the potential to migrate into the food and may constitute a risk for the consumer health.

Epoxy or organosol resins are one of the most used for internal food and beverage can linings due to the excellent chemical resistance.

In the present study high performance liquid chromatography with fluorescence detection (HPLC-FLD) and liquid chromatography coupled to tandem mass spectrometry (LC-MS/MS) with atmospheric pressure chemical ionisation (APCI) were used for the identification and quantification of compounds in epoxy resins and organosols can samples.

INSTRUMENTATION AND SAMPLE TREATMENT

Column	Phenosphere 80A ODS (150 mm × 3.2 mm internal diameter, 3 µm particle size)
Flow	0,5 mL/ min
Injection Volume	10 µL
Mobile phase	MeOH: ACN (50:50, v/v) (A) and water (B)
Gradient elution	55% B and 45% A for 2 min., and then the percentage of MeOH: ACN (50:50 v/v) was gradually increased, reaching 75% at minute 16, followed by another gradient to 100% A at minute 23, held constant until minute 28
Excitation wavelenght	225 nm
Emition wavelenght	305 nm

Table 1. Cromatographic conditions by HPLC-FLD

EXTRACTION AND MIGRATION CONDITIONS

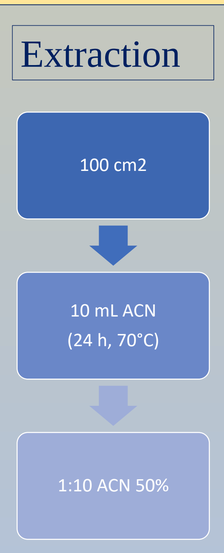

Figure 1. Sample extraction conditions

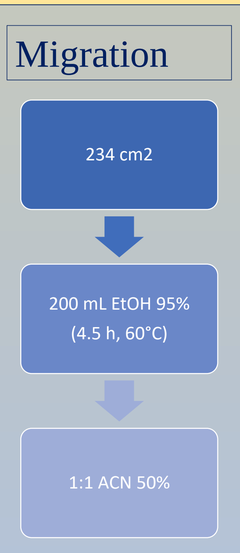

Figure 2. Migration assays conditions

RESULTS AND DISCUSSION

Compound	tr/min	m/z	DI01 [mg/dm²]	DI04 [mg/dm²]	DI06 [mg/dm²]	DI01 [mg/kg sim]	DI04 [mg/kg sim]	DI06 [mg/kg sim]
BPF	5.07	93, 105	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
BADGE.2H20	5.72	226.8, 300.6	0.03	0.004	0.02	0.1	< LOD	0.04
BPE	6.93	196.8, 197.8	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
BPA	8.74	133, 211.8	0.01	0.002	0.003	0.04	< LOD	< LOD
BPB	11.34	210.7, 211.8	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
BADGE.H20	11.83	211, 226	0.03	0.004	0.002	0.01	< LOD	< LOD
BADGE.H2O.HCl	12.41	106.9,134.8	0.01	0.001	0.001	0.02	< LOD	0.01
BPC	13.18	146.9, 239.8	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
BADGE	17.12	134.9,190.8	*	0.01	*	0.5	< LOD	0.3
BADGE.HCl	17.33	106.9, 134.9	*	< LOD	< LOD	< LOD	< LOD	< LOD
BADGE.2HCl	17.56	211, 226	0.02	< LOD	< LOD	0.02	< LOD	< LOD
BPG	19.82	174.9, 294.9	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
CyclodiBADGE	21.4-21.6	134.8, 106.9	0.5	0.10	0.49	1.5	< LOD	1.5

Table 2. Quantification by HPLC-FLD and m/z used for its confirmation by HPLC-MS (LOD: 0.001 mg/dm^2; 0.003 mg/kg sim). * It is not possible its quantification because of interferences of the matrix at the same retention time.

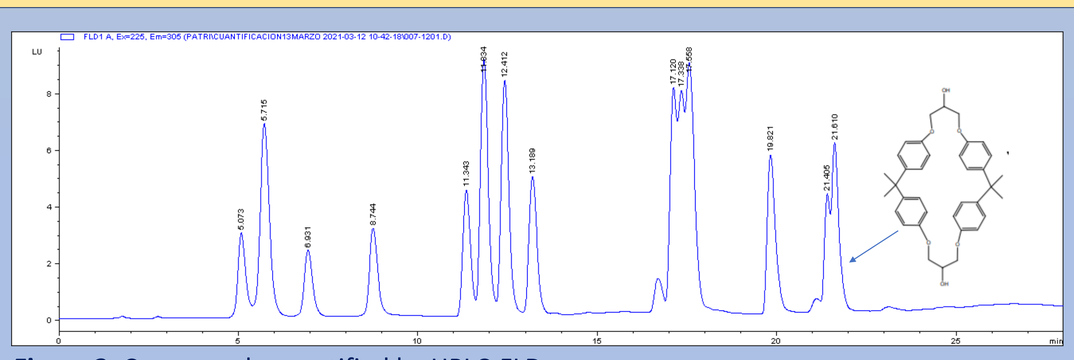

Figure 2. Compounds quantified by HPLC-FLD.

In addition to BPA, BADGE, BADGE.H2O, BADGE.2H2O, BADGE.H2O.HCl and CyclodiBADGE were quantified in the coating extracts, so special attention should be paid to the safety of these compounds.

ACKNOWLEDGEMENTS

This research was funded by the Ministerio de Ciencia, Innovación y Universidades, by Fondo Europeo de Desarrollo Regional (FEDER), and by Agencia Estatal de Investigación Ref. No. PGC2018-094518-B-I00 "MIGRACOATING" (MICIU/FEDER, UE).

Authors are grateful to "Ministerio de Ciencia, Innovación y Universidades" for the Predoctoral fellowship (ref. PRE2019-088195) awarded to Patricia Vázquez Loureiro.