FOOD CONTACT COATNIGS: IDENTIFICATION BY FTIR AND ANALYSIS BY GC-MS

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INTRODUCTION

Metal cans are internally coated with a polymeric coating to protect the food. The coating may contain different components including resins, cross-linking agents, additives and solvents.
Fourier Transform Infrared (FTIR) analysis has shown to be a simple, fast and useful analytical tool for the identification of polymers.
In this work, a FTIR spectrometer equipped with an ATR (attenuated total reflectance) accessory was used to identify two polymeric can coatings. The identification was achieved based on the spectral comparison with KnowItAll® 17.4.135.B IR Spectral Libraries of Polymers & Related Compounds (Bio-Rad Laboratories, Inc.).
In the second part of the work, the semi-volatile compounds present in the samples, were investigated. For that purpose, methanolic extracts were obtained and analysed by GC-MS (EI).

INSTRUMENTATION

Column	*Rxi-5SilMS (30 m x 0.25 mm, 0.25 µm)*
Injection Volume	1 μL
Carrier gas flow (He)	1 mL/ min
Full scan range	35-500 m/z
Injector Temperature	300 °C
Transfer line Temperature	300 °C
Ramp Temperature	40-300 °C
Mode of injection	Splitless

Table 1. Chromatographic conditions.

Figure 1. GC-MS.

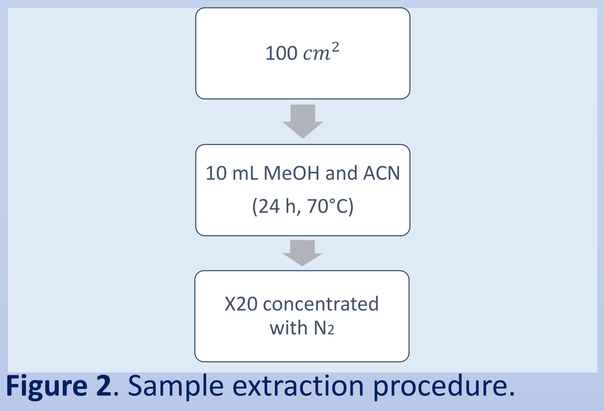

Figure 2. Sample extraction procedure.

RESULTS AND DISCUSSION

Characterization of the coating

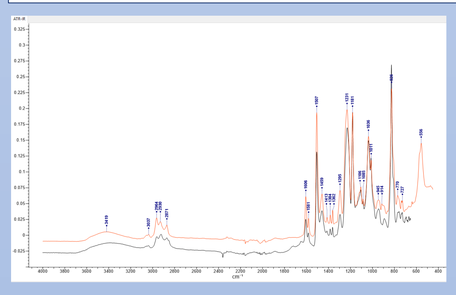

Figure 3. Spectra of one of the sample analysed by ATR-FTIR.

Figure 4. FTIR Spectrometer.

The polymeric coatings were identified as organosols and epoxy resin by ATR-FTIR.

Extraction of the coating

Esters and carboxylic acids were the most abundant compound identified by GC-MS. Some unknown compound were no possible its identification.

Tr (min)	Fragment ions (m/z)	Identification	CAS	SI	RSI	DI01 MeOH	DIO1 ACN	DI04 MeOH	DI04 ACN	DI06 MeOH	DI06 ACN
17.1	74, 87	Dodecanoic acid, methyl ester	111-82-0	939	949	X	-	-	-	X	-
19.7	74, 87	Tetradecanoic acid, methyl ester	124-10-7	920	943	X	-	-	-	X	-
20.2	73, 60, 129	Tetradecanoic acid	544-63-8	911	911	X	X	X	X	X	X
21.4	43, 73, 129	Pentadecanoic acid	1002-84-2	814	883	X	X	X	X	X	X
22.1	74, 87	Hexadecanoic acid, methyl ester	112-39-0	929	939	X	-	X	-	X	-
22.3	55, 69	Carboxylic acid				X	X	X	X	X	X
22.5	43, 60, 73	Hexadecanoic acid	57-10-3	907	952	X	X	X	X	X	X
22.9	148, 178	acid structure				-	-	X	X	-	-
23.9	55, 69	9-octadecanoic acid, methyl ester	112-62-9	902	914	X	-	X	-	-	-
24.2	74, 87	octadecanoic acid, methyl ester	112-61-8	833	834	X	-	-	-	X	X
24.4	55, 69	9-octadecanoic acid (Z)	112-80-1	858	931	X	X	X	X	X	X
24.6	43, 60, 73	octadecanoic acid	57-11-4	918	951	X	X	X	X	X	X
24.8	213, 119, 228, 91	2,4´-Bisphenol A	837-08-1	828	850	X	X	X	X	X	X
25.9	55, 74	octadecanoic acid, 9, 10-epoxy, methyl ester, cis-	2566-91-8	851	851	X	-	-	-	X	-
26.9	69	ester				X	-	-	-	-	-
28.1	277, 278	Triphenylphosphine oxide	791-28-6	856	902	X	X	-	-	X	X
28.8	136, 284	1,3-Bis(4-methoxyphenyl)-1,3-propanedione	18362-51-1	652	659	X	X	X	X	X	X
29.5	55, 264	Ester structure				-	-	X	X	-	-
30.4	69, 81	alkene				X	X	X	X	X	X

Table 2. Majority compounds identificated by GC-MS analysis.

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