ODOUR PROFILE OF RECYCLED PET INTENTED TO FOOD PACKAGING

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Introduction

In recent years, concern for the environment has increased, and as a result, the use of recycled plastic polymers is higher. This type of material is used in food packaging, and must meet the requirement of being safe, ensuring that it will not modify the sensory properties of the food inside.

The most used plastic is polyethylene terephthalate (PETr). This work studied the most important aroma compunds of PETr transferred by food simulants.

Objectives

- Design an analysis method using gas chromatography coupled to mass spectrometry and olfactometry (GC-O-MS) for the study of recycled PET samples (PETr) and identify the compounds with the highest aromatic impact in PET samples with a different recycling ratio.
- Determine the presence of compounds identified in water and juice samples in contact with bottles made from recycled PET (PETr).

Materials and methods

Samples

Bottles of **25%** PETr and **100%** PETr

Sample treatment

- Direct extraction
- Migration test

10 days at 60ºC with Ethanol 20% and Acetic Acid 3%

Conditions

Instrumentation: SPME-GC-O-MS
Column: HP-5MS (30mx0,25mmx0,25µm)
Gradient: 50ºC 3min, 10ºC/min-300ºC 2 min
Extraction: 50 or 80 ºC and 900s
Fiber type: DVB/CAR/PDMS
MS detection: Mode SCAN: 40-400 amu

Results and discussion

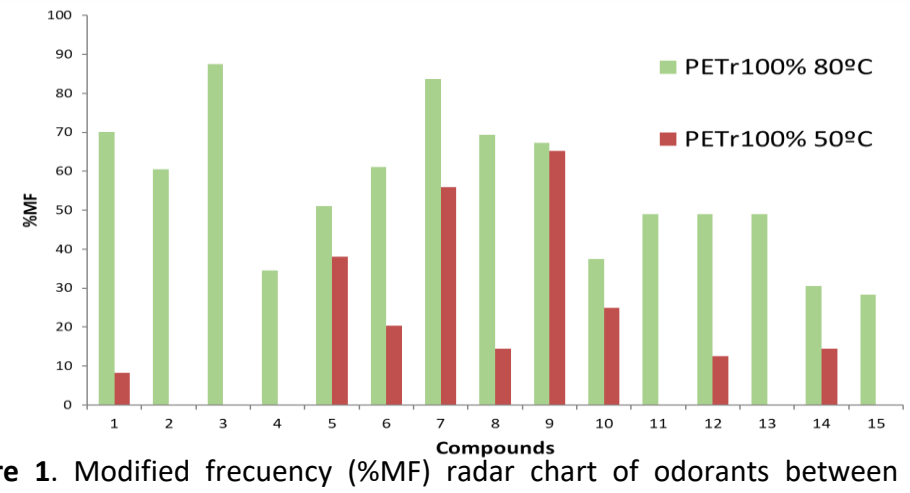

Figure 1. Modified frecuency (%MF) radar chart of odorants between 100% PETr samples and 25%PETr using 80ºC as extraction temperature.

Chromatographyc analysis shows a lot of differences between PET100% and PET25%. Some compounds were identified as odorants, but they were not found by GC-MS.

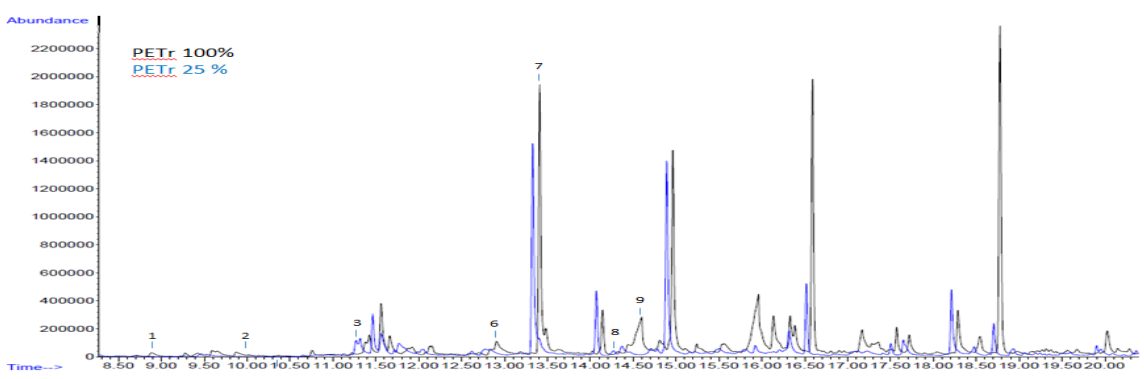

Figure 2. Chromatogram of PET100% and PET25%

Compounds migrate more in acetic acid 3% than in ethanol 20%. Some components were not found in simulants.

No	ik	rt	Odour	Candidates	ik flavornet
1	872	8.88-9.02	Fat, plastic, chemical	p-xylene	872
2	926	10.09-10.15	Herb, lemon	Heptanol*	925
3	982	11.15-11.26	Mushroom, moss, fat	2-Octanol	981
4	991	11.39-11,48	Lemon, citrus, mint	2,3-dehydro-1,8-cineole	992
5	1003	11.62-11.73	Lemon, green, fruit	Octanal*	1006
6	1084	12.94-13.07	Mushroom	3-5 octaqdienone	1095
7	1102	13.30-13.40	Aldehyde, citrus, green	nonanal*	1104
8	1164	14.25-14.35	Cucumber, fat, green	E-2-nonenal*	1162
9	1176	14.43-14.55	Sweet, flower	(E)-linalool oxide	1172
10	1262	15.72-15.76	Mint, sweet	p-anisaldehyde	1263
11	1268	15.80-15.84	Coconut, sweet	γ-octalactone	1275
12	1312	16.32-16.44	Aldehyde, oil	undecanal*	1291
13	1342	16.78-16.84	Herb, green, wet, wax	α-cubebene	1345
14	1409	17.66-17.71	Aldehyde, soup,	dodecanal*	1412
15	1489	18.68	Lactone, coconut	-	

Table 1. Identification of odorants volatile compounds in PETr simples.

Conclusions

- ✓ Identified compounds can influence the organoleptic properties of beverages contained in bottles.
- ✓ Higher migration was found in acetic acid simulant.