

THE INFLUENCE OF STORAGE TIME ON AROMATIC PROFILE OF VOLATILE COMPOUNDS OF BAKERY YEASTS AS REVEALED BY SPME/GCMS ANALYSIS - PRELIMINARY RESULTS

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The baker's yeasts industry produces active dry yeast or fresh yeasts cakes stored at 5-10 °C with a conservation time of 60-90 days. During storage, the different yeasts preparation undergo changes in their aromatic profile and sometimes off-odors are developed, rendering the entire batch unsuitable for bakery.

A quality control with electronic nose on several yeast batches evidenced a common evolution pattern with time and discrepancies and/or deviation from this "usual" behavior are diagnostic of off-odor development.

Is it possible to gather additional information on the volatile compound development during storage by SPME-GCMS?

Experimental

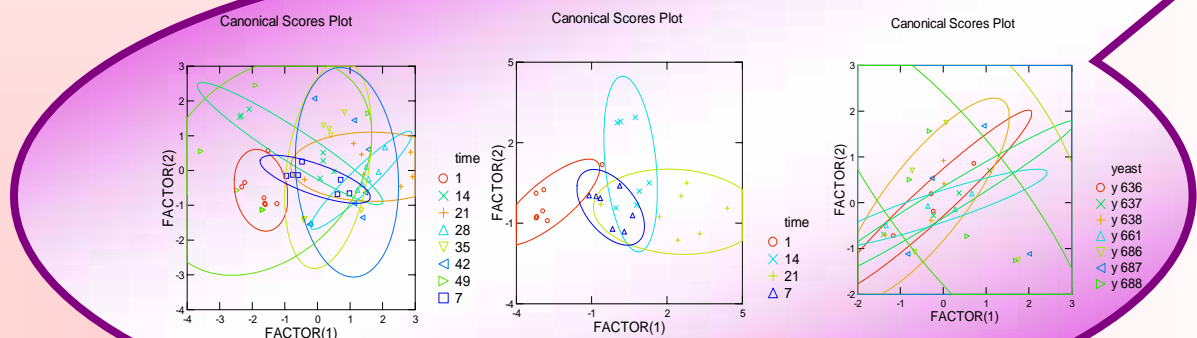
7 yeast 500g cakes from 7 batches stored at 10°C
 Weekly sampling for 49 days
 Parallel electronic nose + SPME-GCMS analyses

Method

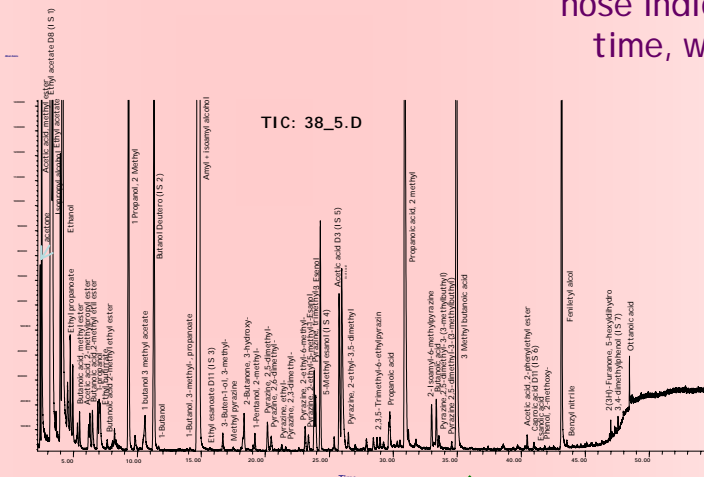
- 1g yeast stirred with 2ml of water and 1 g of NaCl in 10 ml vials
- DVB/CARBOXEN/ PDMS fiber, exposed for 10 min at 60°
- Addition of labeled internal standard mix to normalize responses.
- Column J&W Innowax 30 m, 0.25 mm, ID 0.5 µm DF; injection temperature 250°C, splitless mode, oven program: 40 degrees for 1 min then 2°C/min to 60 °C, then 3°C/min to 150°C, then 10°C/min to 200°C, then 25°C/min to 260°C for 6.6 min



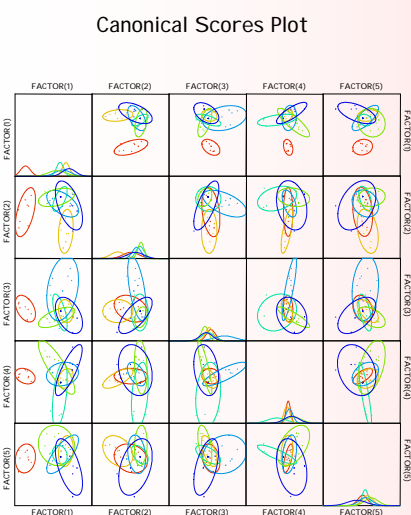
Agilent 5975C MSD spectrometer with Gerstel MPS2 XL equipped with SPME option



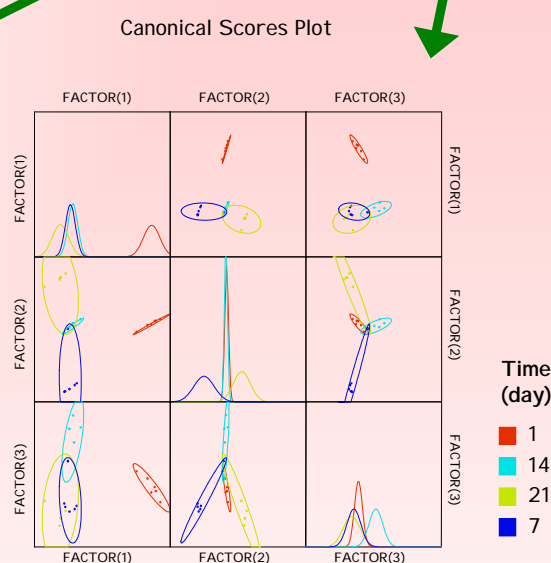
Discriminant analysis on PCA data from electronic nose indicates a trend of volatile compounds with time, with a limited statistical discrimination



Compound	53.611	2.849	20.115
ACETONE	53.611	2.849	20.115
METIL_ACETATO	249.181	12.916	9.823
ETIL_ACETATO	147.83	-27.553	31.867
METANOL	4.581	-1.905	0.851
ISOPROPANOL	0.677	0.167	0.063
ETANOL	-2.874	0.335	-0.498
METIL_PROPANOAT-O	-	109.136	-101.062
	1033.99	-	-
	5	-	-
ETHYL_BUTANOATO	34.389	70.809	82.385
ISOBUTHYL_ACETATE	-97.565	29.826	-24.857
ACETONI TRILE	-0.145	0.004	0.082
ETHYL_BUTIRATE	52.389	-30.594	-14.699
PROPANOL	0	0	0
PROPANOL_2_METHYL	-13.154	0.5	0.052
BUTANOL	0	0	0
PENTANOL_2_METHYL	165.662	-21.939	8.054
AMYL_1_SOAMYL_ALCOHOL	0	0	0
BUTANOL_3_METHYL_ACETATE	0	0	0
BUTANOIC_ACID_3_METHYL_ETHER	0	0	0
METHYL_PYRAZINE	0	0	0
NESANOL	-0.05	0.005	-0.008
PYRAZINE_2_5_DIMETHYL	0	0	0
PYRAZINE_2_6_DI_METHYL	2.707	-0.098	0.102
PYRAZINE_2_5_DI_METHYL	0	0	0
PYRAZINE_2_5_DIMETHYL	0	0	0
PYRAZINE_2_5_DIMETHYL	0	0	0
2_3_5_TRIMETHYL_6_ETHYLPYRAZINE	0	0	0
PROPANOIC_ACID	-1.47	0.028	-0.109
PROPANOIC_ACID_2_METHYL	-0.652	0	-0.055
ACETIC_ACID_2_PHENYLETHYL_ETHER	0	0	0
BUTANOL_1_OL_3_METHYL	0	0	0
BUTANOIC_ACID_2_METHYL_ETHER	0	0	0
BUTANOIC_ACID	0	0	0
PYRAZINE_2_5_DIMETHYL	0	0	0
PYRAZINE_2_5_DIMETHYL_3_3_METIL-LBUTYL	0	0	0
METIL_BUTANOIC_ACID	0	0	0
2_1_SOAMYL_6_METHYLPYRAZINE	0	0	0
PYRAZINE_2_5_DIMETHYL_3_3_METIL-LBUTYL	0	0	0
N_OCTANOL	0	0	0
ACETIC_ACID	1.181	-0.044	0.04
HEXANOIC_ACID	0	0	0
PHENYLETHYL_ALCOHOL	0	0	0
FURANONE_2_HEXYL-LI_HYDRO	0	0	0
GUAIACOL	0	0	0
BENZYL_NITRILE	0	0	0



YEAST
 Y 636
 Y 637
 Y 638
 Y 661
 Y 686
 Y 687



Time (day)
 1
 14
 21
 7

	1	7	14	21	28	%correct
1	6	0	0	0	0	100
7	0	5	1	0	0	83
14	0	0	6	0	0	100
21	0	0	1	5	0	83
28	0	0	1	0	5	83
Total	6	5	9	5	5	90

Most pyrazines were not useful for discrimination albeith they were present in the molasses from growing media

Discriminant analysis on normalized peak areas indicates large differences among freshly prepared or stored cakes, and discriminates among different batches.

CONCLUSIONS

- A large part of the volatile compounds in the bakery yeasts is derived from the growing media.
- The yeast cakes are discriminated on the basis of alcohols and esters concentration.
- Discriminant SPME-GCMS on normalizes peak areas affords better discrimination than electronic nose

