

IDENTIFICATION OF ODOUR ACTIVE COMPOUNDS GENERATED IN A PROCESSED CHEESE-LIKE MODEL SYSTEM

E. BERTRAND^{1,2}, C. CHEVARIN¹, S. PORTANGUEN¹, P. TOURNAYRE¹, S. ABOUELKARAM¹, J.-L. BERDAGUE¹, A. KONDJJOYAN¹, A.S. GUILLARD²

1) INRA, UR 370 Qualité des Produits Animaux 63122 St-Genès-Champanelle France

2) Fromageries Bel D.R.A.G 7, Bd de l'industrie 41100 Vendôme France

e-mail: Emmanuel.Bertrand@clermont.inra.fr; Cyril.Chevarin@clermont.inra.fr;
Stéphane.Portanguen@clermont.inra.fr; Pascal.Tournayre@clermont.inra.fr;
Saïd.Abouelkaram@clermont.inra.fr; Berdague@clermont.inra.fr; Alain.Kondjoyan@clermont.inra.fr;
asguillard@groupe-bel.com

This work aimed at modelling, predicting and controlling the formation or consumption of key compounds in a processed cheese-like model system during its elaboration and storage. Oxidative degradations and Maillard reactions produce a huge number of neo-formed compounds and lead to major changes in food texture, colour, nutritional value and flavour. The first step presented here is the identification of these compounds. Odour activity was used in order to find out which ones may influence the product flavour.

In the model system native caseinate and anhydrous milk fat were used instead of cheese and butter respectively. This enabled both a simplification and a better reproductibility of the initial volatile fraction and permitted a better tracking of the compounds formed during heating. An hermetically closed cooking cell was designed to heat uniformly ten grams of sample from 5 to 150°C as quickly as possible without any flavour leak. This cell was built with stainless steel, copper and aluminium and heated using superheated steam jets (1). The shortest treatment enabled an increase in the sample temperature from 20 to 150°C in about 3,5 minutes. Numerical simulations were used to estimate the reproductibility and homogeneity of the treatment using a "worst case scenario". It showed that the thermal gradient inside the product was less than 15°C when the sample reached 150°C in a 3,5 minutes treatment. Odour-active compounds were searched using a gas-chromatograph-eight-way-olfactometer device (8 sniffers simultaneously) (2). Structural identification was performed with a gas-chromatograph-mass-spectrometer-olfactometer system (one sniffer) and a comprehensive-gas-chromatograph-time-of-flight-mass-spectrometer.

More of 500 compounds were identified. Among them 46 exhibited an odor activity and only 16 were found to be significantly influenced by the thermal treatment. 2,3-butanedione, acetic acid, butanoic acid, hexanal, 2-methylpropanal, 3-methylbutanal, methional, 2-acetyl-1-pyrazine and furaneol were found to be the most influenced compounds and are probably of major significance for the flavour of the cheese matrix. Odour-activity of 2-acetyl-1-pyrroline was found to be significantly lower in the heated sample than in its unheated counterpart.

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References:

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