

Development of a validated method for the determination of sucrose esters (E473) and sucroglycerides (E474)

Area of research interest: [Chemical hazards in food and feed](#)

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Conducted by: Central Science Laboratory (CSL)

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Background

Sucrose esters of fatty acids (E473) and sucroglycerides (E474) are permitted additives controlled by the Miscellaneous Additives Regulations 1995 (as amended). These additives are used as emulsifiers in a wide range of foods, including fine bakery wares, beverage whiteners, desserts, confectionery, sauces and dairy-based drinks. Therefore, robust validated methods are needed to quantitatively measure levels of E473-4 in permitted foods.

In order to build on the system already being used to monitor intakes and usage of food additives, the UK government are obliged under EU law to undertake surveillance and related research work on actual levels of additives in food, especially those for which no suitable methods of analysis exist.

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Research Approach

Reference materials will be obtained from commercial sources. Extraction protocols and separation conditions based on those described by previous researchers for the characterisation of sucrose ester emulsifiers will be applied to the analysis of corresponding reference materials and food additive formulations of E473-4. GC-FID/GC-MS measurement will be used in the chemical characterisation studies following trans-esterification to characterise the fatty acid moieties associated with emulsifiers. In order to provide a robust validated method for the determination of the range of permitted sucrose ester emulsifiers in foods, the methodology needs to be kept as simple and technologically transferable as possible.

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Results

The developed method was tested on eight foodstuffs: two items of bakery wares, a sugar confectionery product, a dairy product, margarine, two meat products and a sauce. Recoveries were in the range 73-106% and the relative standard deviation (RSD) varied from 5.7 to 18%. The limit of quantification for sucrose esters was calculated as 50 mg/kg.

The method involved solvent extraction (using tetrahydrofuran and ethyl acetate) and the removal of any free sugars co-extracted from the foodstuff by washing with saturated sodium sulphate.

The extract was then hydrolysed to produce free sucrose from the sucrose esters and/or sucroglycerides. The sucrose was hydrolysed to glucose and fructose and these were analysed by gas chromatography-mass spectrometry (GC-MS). Therefore an assumed conversion factor is needed to estimate the amount of sucrose ester or sucroglyceride in the foodstuff with the analysis based on the amount of sugars determined.

Further method development work may be required for the extraction procedures for high-fat and high-starch containing foodstuffs.

Research report

England, Northern Ireland and Wales

PDF

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