

B-36: Application of pyrolysis-mass spectrometry for the characterisation of caramel colours

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Pyrolysis-mass spectrometry (Py-MS), in conjunction with multivariate data handling procedures, was investigated as a potential method for the characterisation of caramel colours, classes I, III & IV.

Discrimination between the different classes of caramel colours was achieved and the mass spectral ions significant for their discrimination were identified. The differentiation of two apparent types of class IV caramel colours was repeatedly observed in the Py-MS studies.

Pyrolysis in conjunction with high resolution gas chromatography coupled with mass spectrometry (Py-GC-MS) was used to identify the more important pyrolysis products. Pyrolysis of class I caramel colours formed furans, pyrans, cyclopentenones and their derivatives. Nitrogen-containing heterocyclic compounds were prominent among the pyrolysis products of the class III caramels. The class IV caramel colours contained products that were common to class I and III caramel colours in addition to sulfur dioxide and

other sulfur containing compounds. Presence of the two types of class IV caramel colours was confirmed by Py-GC-MS. Sulfur dioxide was the main pyrolysis product of both types ('outlier' and 'normal') of class IV caramel colours. It was found that the relative intensity of m/z 64 (sulfur dioxide) in the pyrolysis mass spectrum of the 'outlier' class IV samples was much higher than in that of their 'normal' counterparts. This ratio of sulfur dioxide from the 'outlier' class IV samples to that of the 'normal' class IV samples was about 3:1.

Py-MS was also successful in recognising processor differences, particularly within the class IV caramels as well as identifying unknown caramel colours in complex food and beverage systems e.g. biscuits, Guinness and Cola-type soft drinks, without prior separation of the colours. Py-MS thus proved to be a rapid analytical technique that allows the authenticity and consistency of raw materials and finished food and beverage products to be assessed.