Pressurised liquid extraction of flavonoids in onions. Method development and validation

Pressurised liquid extraction of flavonoids in onions. Method development and validation

A rapid and reliable analytical method for quantification of flavonoids in onions was developed and validated. Five extraction methods were tested on freeze-dried onions and subsequently high performance liquid chromatography (HPLC) with UV detection was used for quantification of seven flavonoids. The extraction efficiencies were lowest for the conventional water bath extraction compared to pressurized liquid extraction (PLE), ultrasonication, ultrasonic liquid processor, and microwave extraction, which yielded similar efficiencies. The reproducibility was in the same range (RSD: 1-11%) for all tested extraction methods. However, PLE was the preferred extraction method because the method can be highly automated, use only small amounts of solvents, provide the cleanest extracts, and allow the extraction of light and oxygen-sensitive flavonoids to be carried out in an inert atmosphere protected from light. The method parameters: extraction temperature, sample weight, flush volume and solvent type were optimised, and a clean-up step was integrated in the PLE procedure by in-cell addition of C18-material to the extraction cells, which slightly improved the recovery and reproducibility of the method. The one-step PLE method showed good selectivity, precision (RSDs = 3.1-11%) and recovery of the extractable flavonoids (98-99%). The method also appeared to be a multi-method, i.e. generally applicable to, e.g. phenolic acids in potatoes and carrots.

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