

Pressurized water extraction of thyme

SpeedExtractor E-914:

Pressurized Water Extraction of Thyme using the SpeedExtractor E-914

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The extraction of valuable ingredients in thyme is the focus of different extraction techniques. The most commonly used technologies are liquid-solid-, pressurized liquid-, supercritical fluid- and pressurized water extraction. A fast and reliable method for the extraction of thyme is introduced below. The sample is extracted using the SpeedExtractor E-914 and analyzed to determine the amount of polyphenols.

1. Introduction

Thyme (*Thymus vulgaris*) is used as a spice or medicinal plant due to its ingredients. The most important ingredients are the polyphenolic acids, caffeic and rosmarinic acid as well as essential oils [1]. Due to the degradation of thermo-labile ingredients in the presence of extraction temperatures above 150 °C, the optimum temperature is evaluated using pressurized water extraction (PWE) [2].

2. Experimental

Equipment: SpeedExtractor E-914

Sample: Thyme dried and rubbed, *Thymus vulgaris*, from Germany (Thuringia), supplied by Beat Heuberger Weine & Gewürze, Zurich.

Determination: The sample (1.0 g) was directly weighed into a cellulose thimble. 0.25 g glass wool was added on top of the thimble. The extraction parameters are listed in Table 1.

Table 1: Extraction parameters with SpeedExtractor E-914

Method parameters for the SpeedExtractor E-914

Pressure	150 bar
Temperature	125 °C
Cell	40 mL
Solvent	Deionized water
Collecting vessel	250 mL round bottom flask
No. of cycles	2
Heat-up	4 min
Hold	5 min
Discharge	4 min
Flush with solvent	3 min
Flush with gas	2 min

For the quantification of polyphenols in thyme the following analysis are done: Folin-Ciocalteu method, HPTLC, HPLC and sensory analysis

3. Results

The obtained amount of rosmarinic acid (4.90 mg/g thyme) was highest at the extraction temperature of 125 °C, above this temperature it decreased. The opposite was the case for caffeic acid. For caffeic acid the amount increased for temperatures above 150 °C. This is due to the fact that rosmarinic acid degrades to

caffeic acid. Extracted amounts of rosmarinic and caffeic acid as well as the flavonone luteolin-7-o-glucuronide are shown in Figure 1.

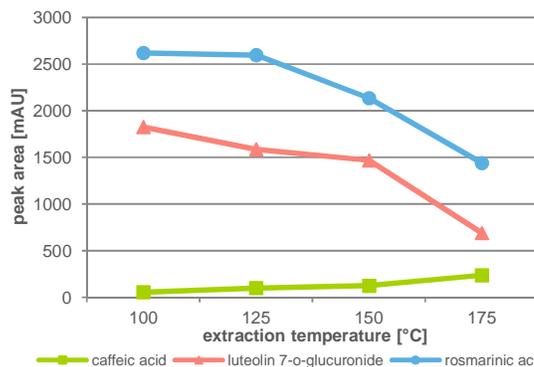


Figure 1: HPLC analysis of polyphenols - peak areas of both polyphenolic acids and the flavonone

Also the sensorial evaluation has shown that PWE at 125 °C resulted in a well-balanced, intense thyme flavoring and mentholic profile of the extract. Above this temperature the flavor was like cooked apple, musty and bitter.

4. Conclusion

The pressurized water extraction of the valuable ingredients (polyphenols and essential oils) from thyme is suitable and reliable using the SpeedExtractor E-914. The extraction temperature should not be set above 125 °C otherwise thermo-labile substances could be degraded. For details of the extraction of essential oils refer to Application Note 140/2014.

5. References

- [1] Stahl-Biskup, E. & Sáez, F. (2002): Thyme – The genus Thyme. London, Taylor & Francis
- [2] Vergara-Salinas, J. et al. (2012): Effects of Temperature and Time on Polyphenolic Content and Antioxidant Activity in the Pressurized Hot Water Extraction of Deodorized Thyme (*Thymus vulgaris*). Journal of Agricultural and Food Chemistry, 60(44), p. 10920-10929

Operation Manual of SpeedExtractor E-916/ E-914

For more detailed information and safety considerations please refer to the Application Note no. 140/2014.