

## Determination of piperine in pepper

*UniversalExtractor E-800: Extraction of piperine from pepper*

### 1. Introduction

Pepper is one of the most widely used spice and seasoning. Piperine – the bioactive compound of white, black or long pepper – imparts the spice with its pungency and biting taste [1]. The determination of its content in pepper is of great importance, also for quality control reasons. In the presented application, the sample is extracted with the UniversalExtractor E-800 using the Hot extraction method. The total piperine content is determined using UV/Vis spectrophotometry.

### 2. Experimental

Equipment: UniversalExtractor E-800

Samples:

- Organic long pepper, expected piperine content: 4-5% [1]
- Black pepper, expected piperine content: up to 9% [1]
- Organic black pepper, expected piperine content: up to 9% [1]

Extraction: 0.5 g homogeneous sample was weighed into a cellulose thimble. The sample was extracted using the UniversalExtractor E-800, applying the parameters specified in Table 1. The sample was extracted in triplicates.

Table 1: Parameters for Hot Extraction using the UniversalExtractor E-800

Extraction method	Hot Extraction
Solvent	Ethanol
Extraction	1 hours
Heating level	18
Rinse step	10 min
Heating level	18
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Heating level	11
Solvent volume	100 mL



The absorbance of the sample solution is determined and compared to the pure ethanol at 425 nm. The piperine content was calculated based on the absorbance and based on the calibration curve.

### 3. Results

The determined piperine content is presented in Table 2. The results are in good correlation with the expected values. The low relative standard deviation indicates a complete extraction after 1 h extraction time.

Table 2: Determined piperine content of pepper (rsd: relative standard deviation), n=3

Sample	Piperine content	Mean value	rsd
Long pepper	4.21%	<b>4.22%</b>	<b>0.18%</b>
	4.21%		
	4.22%		
Black pepper	3.46%	<b>3.45%</b>	<b>2.80%</b>
	3.35%		
	3.54%		
Organic black pepper	4.28%	<b>4.28%</b>	<b>1.52%</b>
	4.22%		
	4.35%		



### 4. Conclusion

Determination of piperine content in pepper by use of the UniversalExtractor E-800 provides reliable and reproducible results. As compared to the method described in AOAC 987.07, the laborious filtration steps after the extraction are omitted using the BUCHI automated extraction system.

### 5. References

- [1] Gorgani, L. et al, Piperine – The Bioactive Compound of Black Pepper: From Isolation to Medicinal Formulations, *Comprehensive Reviews in Food Science and Food Safety*, 16, 124-140, 2017.
- [2] AOAC 987.07 Piperine in Pepper Preparations  
For more information, please refer to Application Note 747/2021.