

## Extraction of Spices using the SpeedExtractor E-916 for the determination of Pesticides

This application note describes a fast and reliable way to extract organochlorine and other pesticides in chilli and paprika spice samples with the SpeedExtractor E-916. After the extraction the extract was cleaned up via GPC and analyzed by GC-MS/MS.

### Introduction

A pesticide is any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any pest [1]. Pesticides can be classified by their chemical structure (organochlorines, organophosphates and carbamates) or by their target (herbicides, insecticides, fungicides, rodenticides, pediculocides and biocides).

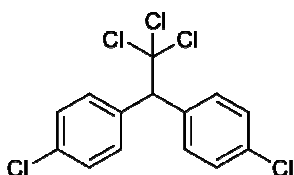


Figure 1: 4,4'-DDT

The adverse health effects depend on the type of pesticide. Organophosphates and carbamates for example affect the nervous system. Others may irritate the skin or eyes. Some pesticides may be carcinogens. Others may affect the hormone or endocrine system in the body [2].

### Experimental

Instrumentation: SpeedExtractor E-916 with 20 ml cells, GPC Gilson 233XL, Varian 3800 with MS-1200 QQQ

Samples: paprika and chilli powder with incurred pesticide content.

3 g sample was weighed in a beaker and 6 ml of water was added. The mixture was placed in the refrigerator over night. The next day 3 g of diatomaceous earth was added and mixed in well. The sample was transferred into a 20 ml extraction cell. A fourfold extraction was carried out using the parameters shown in Table 1. A blank and a spiked sample were extracted as well (QC test). After the extraction a GPC clean-up was performed and the pesticide content was analysed by GC-MS/MS. For comparison the samples were also extracted with a Dionex ASE<sup>®</sup> 200.

Table 1: Extraction method for pesticides using the SpeedExtractor E-916

Temperature	75 °C
Pressure	100 bar
Solvent	Cyclohexane 50%, Ethyl acetate 50%
Cells	20 ml
Vials	60 ml
Cycles	3
Heat-up	1 min
Hold	5 min
Discharge	3 min
Flush with solvent	1 min
Flush with gas	3 min

### Results

The extraction of pesticides from a chilli and a paprika sample carried out with the SpeedExtractor E-916 showed comparable results to those conducted with the ASE<sup>®</sup> 200. The results of the extractions using the SpeedExtractor showed low variations. The results of the chilli sample are displayed in Table 2. For the results of the paprika extraction please see Application note 64/2011.

Table 2: Results of the pesticides extraction from a chilli sample, n = 4

Sample: Chilli	SpeedExtractor E-916		ASE <sup>®</sup> 200	
	Mean [µg/kg]	RSD [%]	Mean [µg/kg]	RSD [%]
gamma-HCH	18	8	20	9
Chlorpyrifos	139	3	133	5
4,4'-Dichloro-benzophenone	16	7	17	11
Quinalphos	124	9	112	15
Profenofos	506	5	537	9
Ethion	2391	4	2818	5
Triazophos	1273	9	1244	10
Dicofol	427	7	333	15
Phosalone	2116	7	2108	8
Cypermethrin	1703	3	1619	11

### Conclusion

Pesticides were extracted from a paprika and a chilli sample with the SpeedExtractor E-916 and the ASE<sup>®</sup> 200. The results received are comparable (mean). The extractions conducted with the SpeedExtractor proved to be more exact (rsd).

### Acknowledgement

We sincerely thank the Kantonales Labor Zurich, Switzerland.

### References

[1] US Environmental (July 24, 2007), What is a pesticide? EPA Gov. retrieved on September 15, 2007.

[2] <http://www.epa.gov./pesticides/health/human.htm>

SpeedExtractor E-916 operation manual

For more details see Application note 064/2011