

## Polymer Plasticizer Content in Polyamide Samples

*SpeedExtractor E-916, Multivapor P-6:  
 Determination of Polymer Plasticizer Content in Polyamide Samples*

Due to the excellent chemical and mechanical properties of polyamides there is a huge range of possible applications. Depending on the composition, polyamides can be used, for example, in the automobile industry, the electro technology industry, as well as in the production of textiles or domestic appliances. The addition of plasticizers is a typical procedure to change the properties of polyamides from dimensionally stable to flexible. The polymer plasticizer content was determined gravimetrically in a polyamide PA 6 and a polyamide PA 12 sample by pressurized solvent extraction using the SpeedExtractor E-916 after the extract was dried to a constant weight.

### 1. Introduction

The optimal properties of polyamides depend on the content of polymer plasticizers. This application note describes the extraction and the subsequent gravimetric determination of polymer plasticizers in a polyamide PA 6 and a polyamide PA 12 sample using the SpeedExtractor E-916.



Figure 1: Polyamide PA 6 (black), Polyamide PA 12 (white).

### 2. Experimental

Instrumentation: SpeedExtractor E-916, Multivapor™ P-6 with vacuum pump V-300 and interface I-300 Pro, recirculating chiller F-308, drying oven, analytical balance

5.5 g of the sample was extracted with the SpeedExtractor using the parameters shown in Table 1. The samples were extracted in triplicate.

Table 1: Extraction method (SpeedExtractor E-916).

Parameter	Value
Temperature	90 °C
Pressure	100 bar
Solvent	Methanol 100 %
Cells	10 mL
Vials	240 mL
Cycles	9
Heat-up	1 min
Hold	5 min
Discharge	2 min
Flush with solvent	2 min
Flush with gas	5 min

The solvent was evaporated in parallel using the Multivapor™ P-6 with a programmed pressure gradient (see Figure 2).

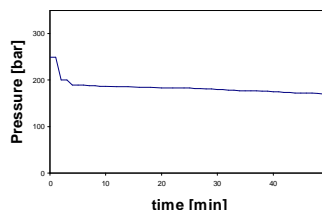


Figure 2: Pressure gradient for evaporating the solvent with the Multivapor P-6.

The extracts were dried to a constant weight in a drying oven (40 °C), and the polymer plasticizer contents were calculated.

### 3. Results

The determined polymer plasticizer content (Table 3) is in accordance with the declared content of the samples.

Table 2: Determined polymer plasticizer content in polyamide PA 6 and polyamide PA 12 samples

	Polyamide PA 6, plasticizer content [%]	Polyamide PA 12, plasticizer content [%]
<b>Declared value</b>	<b>10</b>	<b>12</b>
Sample 1	9.52	12.45
Sample 2	9.72	12.41
Sample 3	9.63	12.42
<b>Mean value</b>	<b>9.62</b>	<b>12.43</b>
rsd [%]	1.03	0.16

### 4. Conclusion

The determination of the polymer plasticizer content in polyamide samples by solvent extraction using the SpeedExtractor E-916 provides reliable and reproducible results that correspond to the stated value of the sample. The total extraction time of 6 samples is about 125 min, and 110 mL solvent are used per position.

### 5. References

For more detailed information please refer to the Application Note no. 016/2009.