

Polymer coatings on yarns

Determination of polymer coatings on yarns using Extraction System B-811

1. Introduction

Yarns are coated with different polymers to optimize or change their individual properties.

This Short Note presents effective automated Soxhlet extraction methods for the determination of the amount of polymer coatings on yarns samples. Depending on the kind of polymer different methods are presented.

The automated Soxhlet extraction is carried out on the Extraction System B-811. Determination of the amount of polymer coating is performed gravimetrically after the extract has been dried to a constant weight.

2. Experimental

Equipment: Extraction System B-811.

Samples: Various yarns with polypropylene (sample A – D), polyester (sample E) or polyamide (sample F) coatings. Expected values: about 1 % w/w, determined by Soxhlet extraction for 4 h.

Determination: The samples were weighed into glass sample tubes. For the extractions about 5 g of samples were used. The parameters for the extractions on the Extraction System B-811 (Figure 1) are shown in Tables 1 - 3. The parameters depend on the nature of the polymer coating.



Figure 1: Extraction System B-811

Table 1: Parameters for the extraction using the Extraction System B-811. Sample A – D (polypropylene coating).

Method parameters	
Solvent	Methanol
Extraction method	Soxhlet standard
Step 1: Extraction	8 cycles, heating level 14
Step 2: Rinsing	-
Step 3: Drying	30 min, heating level 10
Solvent volume	150 mL

Table 2: Parameters for the extraction using the Extraction System B-811. Sample E (polyester coating).

Method parameters	
Solvent	Isopropanol : Petroleum ether 40/60 (1:1)
Extraction method	Soxhlet standard
Step 1: Extraction	20 cycles, heating level 17
Step 2: Rinsing	-
Step 3: Drying	30 min, heating level 10
Solvent volume	150 mL

Table 3: Parameters for the extraction using the Extraction System B-811. Sample F (polyamide coating).

Method parameters	
Solvent	Petroleum ether
Extraction method	Soxhlet standard
Step 1: Extraction	20 cycles, heating level 12
Step 2: Rinsing	-
Step 3: Drying	30 min, heating level 7
Solvent volume	150 ml

The extracts were dried to a constant weight in a drying oven at 102 °C.

3. Results and Discussion

The determined amounts of polymer coatings obtained with the Extraction System B-811 are shown in Table 4.

Table 4: Determined polymer coatings on yarns with the Extraction System B-811; (n = 2).

Sample	Mean value [%, w/w]
A Polypropylene	1.15
B Polypropylene	0.57
C Polypropylene	0.35
D Polypropylene	0.91
E Polyester	0.29
F Polyamide	0.49

4. Conclusion

The yarn samples can be extracted with the Extraction System B-811. The results are in the expected range. It was shown that the extraction times could be reduced significantly from 4 h to 1.5 h resp. 2.5 h.

For more detailed information and safety considerations please refer to the Application Note No. 228/2016.