Fat in Polymer

SpeedExtractor E-916, Multivapor™ P-6:
Determination of the fat content in Polymer samples using the SpeedExtractor E-916

A quick and easy method for the determination of the fat content in polymer samples is introduced.

1. Introduction

The samples are extracted simultaneously under high pressure and elevated temperature with the SpeedExtractor E-916 using a pressurized solvent extraction (PSE) method. After parallel extraction the solvent is evaporated to dryness with the 6 position Multivapor™ P-6 evaporator. The fat content is determined gravimetrically.

2. Experimental

Equipment: SpeedExtractor E-916, Multivapor™ P-6

Samples: 2 Polymer samples (similar to natural rubber); expected fat content: 27 %

Determination: The samples were cut into small pieces (approx. 1 cm) and 2 g were weighed into an extraction thimble. The extraction thimble was loaded into an extraction cell and the following method (Table 1) was used with the SpeedExtractor E-916.

Table 1: Method for extraction with the SpeedExtractor E-916

Parameter	Value
Temperature	120 °C
Pressure	100 bar
Solvent	Acetone 50 % Isopropanol 50 %
Extraction cell	40 mL
Collection bottle	240 mL
Number of cycles	6

Heat-up
   Hold
   Discharge
	1 min
	10 min
	5 min

Vial change	After cycle 4
Flush with solvent	2 min
Flush with gas	10 min
Extraction time	2 h 20 min

After the extraction was complete the extract was evaporated to dryness using the parallel evaporator Multivapor™ P-6 (Table 2).

Table 2: Parameters for the Multivapor™ P-6

Parameter	
Bath temperature	60 °C
Rotation	7
Max. cooling temperature	20 °C
Step 1 : Acetone	Vacuum : 556 mbar for 10 min
Step 2 : Isopropanol	Vacuum : 136 mbar for 10 min

3. Results

Table 3: Results for sample 1, expected fat content: 27 %

	m_{Sample} [g]	$m_{Collection\ bottle}$ [g]	m_{Total} [g]	% Fat
Cycles 1-4	2.1481	148.5874	149.1014	23.93
Cycles 5+6	2.1481	148.2664	148.3064	1.86
Sum of all cycles				**25.79**

Table 4: Results for sample 2, expected fat content: 27 %

	m_{Sample} [g]	$m_{Collection\ bottle}$ [g]	m_{Total} [g]	% Fat
Cycles 1-4	2.1781	147.8850	148.3826	22.85
Cycles 5+6	2.1781	150.4935	150.5517	2.67
Sum of all cycles				**25.52**

4. Remarks

Sample preparation
Usually the samples for PSE will be mixed with a dispersing agent to dry the sample and to increase the surface of the sample. This sample was cut into small pieces. Experiments have shown that mixing with a dispersing agent negatively affects this application. To receive sufficient extraction efficiency the sample should also be rolled.

Temperature and extraction thimbles
The properties of the polymer samples depend on the temperature used. Therefore, prior to extraction, the temperature stability of the samples was tested. The samples were placed in a drying oven for 30 min at 120 °C. The samples became sticky, but not molten. The use of extraction thimbles is recommended to avoid the sample sticking to the extraction cell.

5. Conclusion

The fat content of polymer samples can be determined using the SpeedExtractor E-916. The results obtained are comparable to the expected values.

6. References

Operation Manual for the SpeedExtractor E-916
Operation Manual for the Multivapor™ P-6
Operation Manual for the Vacuum Pump V-700 and Vacuum Controller V-855

For more detailed information and safety considerations please refer to the Application Note no. 157/2014.