APPLICATION NOTE

M-S-001-2019/A1

Fat / Oil Determination in Textile fiber

according to the Randall method

Reference: **ASTM D2257 Standard Test Method for Extractable Matter in Textiles**

Tested with **VELP Scientifica SER 158/6 Solvent AutoExtractor** (Code S303A0380)

VELP Scientifica, Italy Tel: +39 039 628 811 Fax: +39 039 628 8120 www.velp.com

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Introduction

Nowadays Quality inspection of textile products is an important activity for fabric manufactures because the clothing industry requiring higher product quality and improved productivity to meet both customer demands and to reduce the costs associated with quality issues. The Randall extraction method in textile industry is often used to analyze for example oils added to assist the textile processing or special finishing agents. The determination of fat/oil contents in the textile fibers has been carried out with the fully automatic solvent extractor SER 158 that minimizes operator time during the analysis, solvent consumptions while guaranteeing accurate results and superior ease of use.

Fat Determination in Textile fiber

Hot solvent extraction process with SER 158 Series can be summed up in 5 steps, for a fully unattended operation:

STEP 1 IMMERSION → STEP 2 REMOVING → STEP 3 WASHING → STEP 4 RECOVERY → STEP 5 COOLING

During IMMERSION the sample is immersed in boiling solvent. Then the REMOVING step automatically lowers the level of the solvent to below the extraction thimble. During WASHING the condensed solvent flows over the sample and through the thimble to complete the extraction process. The fourth step involves solvent RECOVERY. Approximately 90% of the solvent used is collected in the internal recovery tank. The final step is the COOLING of the extraction cups containing the extracted matter. The cups are raised to prevent burning. The extraction cups containing the extract are placed in a drying oven, cooled in a desiccator and weighed for the extract percentage calculation.

Sample

Cotton tissue Expected oil content: < 0.5 %

Chemicals and Equipment Required

- Analytical balance, 4 decimals
- Extraction thimbles (40x80 mm) (Code A00000296)
- Large Glass extraction cups (Code A00000302)
- Viton seals
- Petroleum Ether 40 – 60 °C as solvent

Sample Preparation

Fix the Extraction thimbles with the Extraction thimbles holders (Code A00000312). Cut the tissue in small pieces (5-10 mm) and put 10 g of sample (*Sample*) directly in the VELP extraction thimbles.
Position the extraction thimbles in the extraction cups.

Glass Extraction Cups Preparation

Position the empty extraction cups in an drying oven (105 °C) for 1 hour and cool them in a desiccator. Connect the optional Velp barcode reader (Barcode scanner with USB socket code: A00000364 or Wireless barcode scanner Code: A00000365) to SER 158. Select Analysis/Details, scan the crucible and weigh the tare (*Tare).*
The extraction cups containing the extraction thimble can now be placed on the ultra-fast heating plate of SER 158.

Extraction Procedure with SER 158

On the ControlPad select “Analysis”, and then method “Textiles and synthetic fibers” including the following parameters:

- Immersion Time: 20 minutes
- Removing Time: 40 minutes
- Washing Time: 30 minutes
- Recovery Time 30 minutes
- Cooling Time: 5 minutes
- Petroleum Ether 40-60 °C, 180 ml

Close the safety guard and add the solvent using the automatic solvent dispensing system SolventXpress™ to minimize exposure to the solvent ensuring operator safety.

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Press START to begin the extraction process. At the end of analysis position the extraction cups containing the extract in a drying oven (1 hour at 105 °C), cooled them in a desiccator to room temperature. In Results menu select the extraction cups batch ID analyzed, press calculate, scan the extraction cups with barcode reader and weigh (*Total*).

Results on Textile fiber

Analysis results are calculated automatically and stored in the ControlPad when entering the weights into the software (manually or automatically through a balance). The extract percentage calculation is performed by using the following formulas:

Extract (g) = (Total - Tare)
Extract (%) = Extract x 100 / (Sample)

Where:

Sample = sample weight (g)
Tare= weight of the empty extraction cup (g)
Total = weight of the extraction cup + extract (g)

Tare (g)	Sample (g)	Total (g)	Extract (g)	Extract (%)
142.2534	10.0015	142.2711	0.0177	0.177
142.6725	9.9231	142.6899	0.0174	0.175
143.7172	9.9254	143.7348	0.0176	0.177
143.7381	10.0567	143.7558	0.0177	0.176
144.7079	9.9665	144.7255	0.0176	0.177
140.9712	10.1493	140.9890	0.0178	0.175
			Average ± SD%	**0.176 ± 0.001**
			RSD% **	**0.47**
Expected oil content: < 0.5 %				

****** RSD% = (Standard Deviation x 100) / Average

Conclusion

The results obtained are reliable and reproducible in accordance with the expected values, with a low relative standard deviation (RSD < 1%), that means high repeatability of the results.
Therefore, SER 158 Solvent AutoExtractor is ideal for the fat content determination in textile fiber.

Benefits of hot solvent extraction (Randall) by using SER158 Automatic Solvent Extractor:
- up to 5 times faster than Soxhlet (hot solvent vs. cold solvent)
- low solvent consumption (high solvent recovery, approximately 90%) - limited cost per analysis
- no exposure to solvent
- worldwide official method
- full traceability with automatic result calculation and on-board archive
- Cloud connectivity to VELP Ermes ensuring software updates, real time monitoring and control, notifications and enhanced service support.