APPLICATION NOTE

F&F-S-007-2016/A1

Crude Fat Determination in Sesame Seeds according to the Randall method

Reference: **AOAC Official Method 2003.06**

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

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CRUDE FAT DETERMINATION IN SESAME SEEDS
RANDALL METHOD

Introduction

Sesame seed is one of the oldest oilseed crops known, domesticated well over 3000 years ago. Numerous wild relatives occur in Africa and a smaller number in India. It is widely naturalized in tropical regions around the world and is cultivated for its edible seeds. The world harvested 4.2 million metric tonnes of sesame seeds in 2013, with India and China as the largest producers. Sesame seed is a common ingredient in various cuisines. It is used whole in cooking for its rich, nutty flavour. The sesame seed is very energetic food and contain a very high quantity of fat (around 50%).

Fat Determination in Sesame Seeds

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

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

Sesame seed Fat range value: 55 g / 100 g

Chemicals and Equipment Required

- Analytical balance, 3 decimals
- Extraction thimbles (33x80 mm) (Code A00000295)
- Glass extraction cups Ø 56x120mm (Code A00000290)
- Viton seals (Code A00000297)
- N-hexane solvent
- Blade grinder

Sample Preparation

Fix the Extraction thimbles with the Extraction thimbles holders (Code A00000312). Homogenize through blade grinder around 40 g of sesame seeds in an empty and clean beaker. Then, put 3 g of sample in the VELP extraction thimbles with a spatula. 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.
Cool them in a desiccator until constant weight of 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 create a new customer method “Determination of crude fat in sesame seed” setting the following parameters:

- Immersion Time: 60 minutes
- Removing Time: 10 minutes
- Washing Time: 50 minutes
- Recovery Time 30 minutes
- Cooling Time: 20 minutes
- Extraction cups: standard Ø 56x120mm
- Thimble: 33x80 mm
- Solvent: n-hexane, 100 ml

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Close the safety guard and add the solvent using the automatic solvent dispensing system SolventXpress™ to minimize exposure to the solvent ensuring operator safety.
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 and record the accurate weight (*Total*).

Typical Results on Sesame seeds

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:

$$Extract\ (g) = (Total - Tare)$$
$$Extract\ (\%) = Extract \times 100 / (Sample)$$

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 (%)
133,7082	3,0318	135,3969	1,6887	55,70%
137,898	3,0573	139,5957	1,6977	55,53%
138,1604	3,0827	139,8498	1,6894	54,80%
131,5559	3,0492	133,2427	1,6868	55,32%
131,7544	3,0505	133,4416	1,6872	55,31%
133,8145	3,0664	135,5026	1,6881	55,05%
			Average ± SD%	**55,28 ± 0,32%**
			RSD% **	**0,584%**

Fat Labeled Value: 55 g / 100 g

****** 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 Extractor is ideal for the fat content determination in sesame seeds.

Benefits of hot solvent extraction (Randall) by using 158 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

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