Organic Application Note

Oil in Soybeans–Exhaustive Extraction

- **Conforms to AOCS Official SFE Method Am 3-96**
- **Conforms to AOAC Official SFE Method 999.02**

Standard Method Used for Comparison

AOCS Method Am 2-93—FOSFA Method

Accessories

501-081 Glass Wool; 502-327 LECO-Dry;
502-369 Kimwipe®; 502-371 Ethanol

Collection Vial Preparation Procedure

1. Cut 1.3 to 1.5 g of glass wool from the end of the glass wool rope.
2. Pull the compact section of glass wool apart so that the material is loosened considerably.
3. Pack the loosened glass wool into the collection vial with a clean spatula, a little at a time. The goal is to have random, not vertical orientation of wool strands.
4. Tare the empty balance pan.
5. Weigh collection vial and enter initial vial weight into the instrument.
6. Install the collection vial on the instrument collection system.

Sample Preparation Procedure

1. Grind sample in a mechanical grinder and put ground sample through a #20 mesh sieve.
2. Install a lower end-cap assembly on a thimble and place in a thimble stand.
3. Pack 1/4 of a Kimwipe into the bottom of the thimble by folding it once and packing it into the bottom of the thimble with a clean spatula.
4. Place the thimble assembly on the balance and tare the weight.
5. Remove the thimble from the balance and add ~2.0 g of prepared soybean sample, using the funnel.
6. Place the thimble on the balance and enter the sample weight into the instrument.
7. Place thimble in stand, and fill upper portion of thimble with LECO-Dry.
8. Install the upper end-cap assembly on the thimble.

Extraction Parameters/Procedure

1. Set up (or recall and activate) the following instrument parameters:

Extraction Pressure:	7500 psi
Extraction Temperature:	100°C
HVR Temperature:	110°C
Hold Time:	0 minutes
Extraction Time:	60 minutes
Flow Rate:	1.3 lpm
Modifier*:	Denatured Ethanol

*M2000 Modifier Module is required for this analysis.

TFE2000

2. The pump head should be at 0°C or below from the last set of extractions. However, the refrigeration system times out and stops 20 minutes after extractions end. If the system has timed out, pre-cool the pump head by pressing any key on the key pad. The thimble and HVR temperatures should also be at set values. Temperatures can be displayed using the "Ambient Monitor" menu.
3. Insert the thimbles into the instrument and press the START key. The extraction will automatically take place, and the system will depressurize.

Post-Extraction Manipulations

1. Remove the collection vials from the instrument.
2. Using the thimble removal tool, remove the thimbles and place them in the thimble stand to cool.
3. Microwave three collection vials together on high for two minutes in a 1000 watt household microwave. (The wattage rating of the microwave is usually found on the serial number sticker or serial number plate.) The time may be extended to three minutes for 750 watt microwaves.
4. Set aside vials and let them cool for 15 minutes before weighing.
5. Tare the empty balance pan.
6. Weigh each collection vial and enter the weight into the instrument.
7. Results will be automatically calculated. Choose the print option to receive a printout of the results.

Typical Results

Sample ID	Weight (g)	TFE2000 Fat (%)	Standard Method FOSFA (%)
#1	1.9568	22.63	22.36 ±0.05 (n=3)
	2.0814	22.86	
	1.9524	22.71	
	1.9336	22.58	
	1.9667	22.66	
	1.9372	22.87	
	Average	***22.72***	
	Std. Dev.	***0.12***	

The LECO **TFE2000** was developed to safely extract fats/oils from your food, feed, and oilseed samples by using an advanced analytical technique. Extensive research proves that liquid CO_2 at elevated pressures and temperatures is the most effective extraction solvent for these target applications. Extraction by CO_2 offers superior performance over conventional organic solvents plus:

speed—simultaneous extractions take just minutes to complete; method development is simplified

low cost—a CO_2 tank will supply extraction solvent for approximately 100 extractions; no disposal or recycle cost

convenience—no need for solvent evaporation steps in the method

safety—non-toxic, non-explosive

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