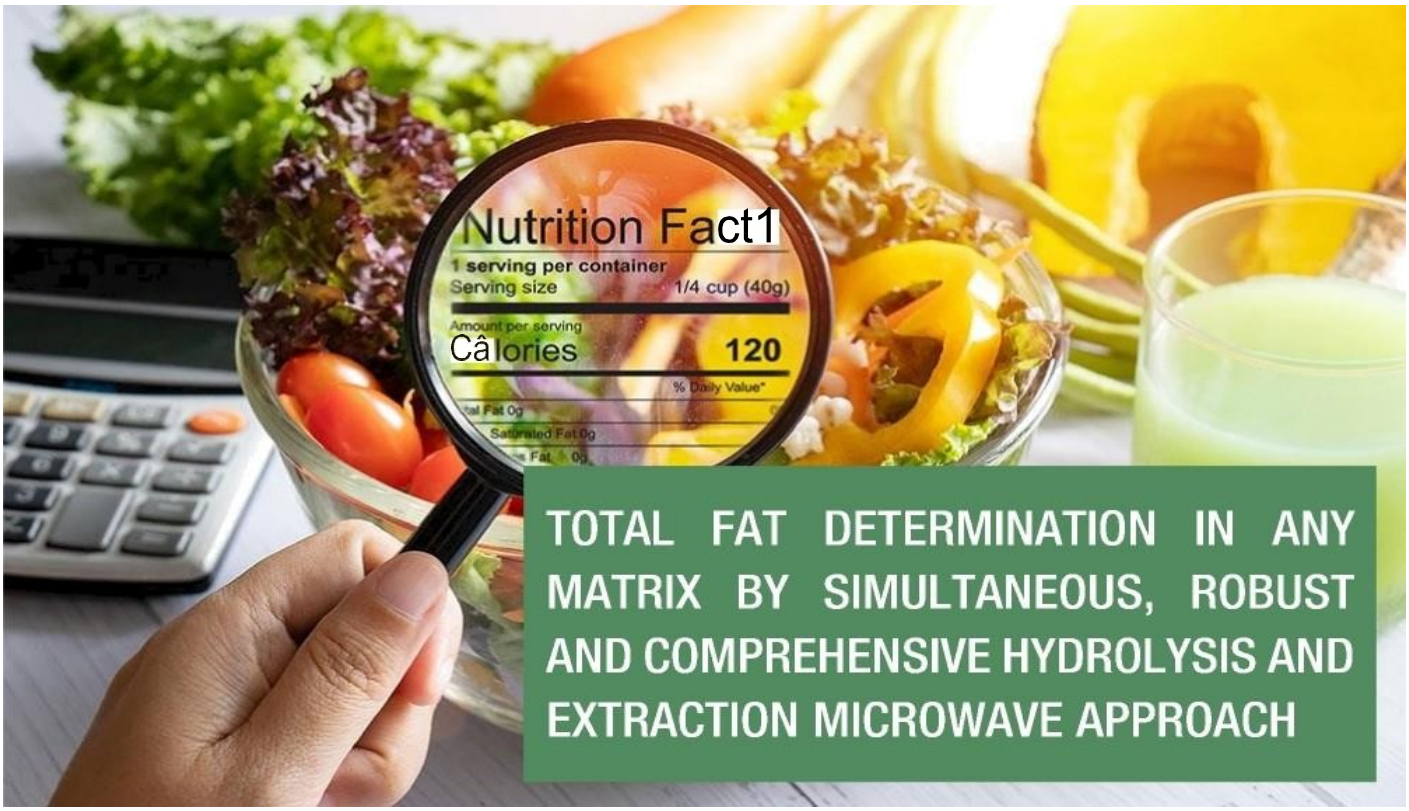
APPLICATION REPORT: BIS, Bangalore

Total Fat Determination in Food and Feed samples



Introduction to Microwave FAT Extraction Technology: Fat determination in food and feed matrices is a routine analysis that still relies on outdated and matrix-dependent methods which use obsolete and time-consuming technologies. The Microwave fat extraction system offers a new approach to gravimetric fat determination, moving toward a moremodern, greener and more efficient approach to total fat, Fatty Acid Methyl Ester (FAME) and free fat determinations in food and feed matrices.

Gain Productivity in Fat Determination on any Matrix:

- **Applicable to any matrix**
- **45 samples a day (15 Position Rotor will Takes 2.00 Hrs)**
- **Lower cost per sample**
- **Complete fat determination**
- **Safe and compact**

In The Microwave fat extraction system, hydrolysis and extraction are done in a single step and in less time, ensuring higherproductivity and better workflow.

Instrumentation: 3 step easy processing

Step 1: Weighing step on the hydrolysis/ extraction vessel

Step 2: Evaporation

Step 3: Data Processing

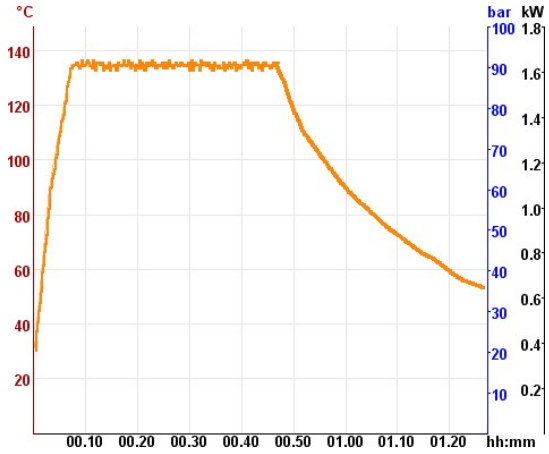
Experimental: Microwave Fat Extraction system-

Extraction rotor
Evaporation rotor Aluminum caps Vacuum system with condensation module
Analytical balance (with direct interface to Terminal)

Solvents and reagents were Sulfuric acid (25%) and Cyclohexane ACS reagent grade were used.

Approximately from 1 to3 g of sample was directly weighed in to the MW-Extraction vessels; 10 mL of sulfuric acid (25%) and 25 mL of cyclohexane were subsequently added, recording its final mass. Magnetic stirring bars were added to each vessel. Vessels was properly assembled. Following program is performed.

STEP	TIME	T	POWER	Stirrer
1	00:03:00	90°C	1400w	80%
2	00:04:00	135°C	1400W	80%
3	00:40:00	135°C	1400W	80%



At the end of the program, the Extraction vessels were opened, and the aliquots of the organic phase were transferred into aluminum cups and then weighed. After a fast solvent evaporation, using the 15 position evaporationrotor, the aluminum cups were newly weighed.

The Microwave fat extraction system software tracks and records all the steps and weights necessary for the calculation. Total fat values are delivered at the end of the run thanks to the capabilities of the control software and the direct interface with the analytical balance. The data can be saved with the possibility to generate customized reports.

Results & Discussion:

In this study, the total fat content of several food samples was analyzed by applying the Microwave fat extraction system software simultaneous hydrolysis and extraction method. The Microwave fat extraction system software method enhances total fat determination by simultaneously performing hydrolysis and extraction during the same heating run with up to 15 matrices.

Several food samples were tested, the samples were selected to explore a wide range of total fat content, from (1%) to (60%) samples. Samples like Wheat, Milk, coffee, were analyzed. For all the ranges tested, the measured total fat content was always in the acceptance range of the certified materials, with remarkably high reproducibility proven by incredibly low relative standard deviations even when working on 2-3 repetitions.

Nr	Name	Sample [g]	Solvent 1 [g]	Solvent 2 [g]	R [g]	Fat content [%]
1	Mlk1	1.4875	19.062	7.638	0.0086	1.44
2	Mlk2	1.5217	19.091	7.639	0.0089	1.46
3	Mlk3	1.0029	19.186	7.649	0.0056	1.40
4	Cattle feed p1	1.4900	19.201	7.661	0.0087	1.47
5	Cattle Feed p2	1.5054	19.181	7.665	0.0086	1.43
6	Cattle Feed p3	1.0062	19.184	7.656	0.0057	1.42
7	21c6123n	1.4961	19.183	7.652	0.0042	0.70
8	21cd92dp	1.5225	19.193	7.666	0.0037	0.61

- All matrices analyzed shows extremely good reproducibility.
- Performed 3 replicates for different samples
- All different matrices were performed from solid, liquid, semi solid.
- Universal method for all.
- Less amount of solvent used (25ml each)
- 15 samples within 2 hours (along with evaporation)
- Sample weight from 1-3gm can be taken.

Sample images of total fat:

CONCLUSION

Microwave fat extraction system Method for total Fat determination proved to be precise and accurate on a wide working range from 0.1% to 100% of total fat content.

Thanks to the performance of Microwave Fat extraction system and to the innovative Hydrolysis and extraction capability during the same run, this method allows on unmatchable turnaround time, a low solvent consumption and streamlined workflow. More ever the 15 positions of Both extraction and evaporation rotors ensures the highest throughput. The total fat residues may be further exploited after gravimetric evaluation for the (FAME) Fatty acid methyl ester analysis.

Microwave fat extraction system with its unique features full address the needs of food laboratories In terms of productivity ease of use , running costs and turnaround time.