



MILESTONE
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C H E M I S T S

MILESTONE ETHOS X

Microwave Total Fat Determination in
Milk and Milk Products



ETHOS X for Total Fat Determination in Milk and Milk Products

MILESTONE

HELPING CHEMISTS – Milestone has been active since 1988 in the field of microwave sample preparation. With over 20000 instruments installed worldwide, we are the acknowledged industry leader in microwave technology. Milestone vision is to help chemists by providing the most technologically advanced instrumentation for research and quality control. Our products offer a wide range of applications, such as microwave acid digestion, solvent extraction, synthesis and ashing. Furthermore we manufacture products for acid purification and direct mercury determination in solid, liquid and gas samples. We offer our customers the highest level of application support, building up over the years a relationship based on trust and responsibility.

ETHOS X

Microwave Total Fat Determination in Milk and Milk Products

The traditional fat extraction methods are very labour intensive and time-consuming. Large amounts of solvents are required to remove fat from the sample matrix, resulting in very high running costs. As an example, conventional fat extraction of pretreated cheese usually requires 3 hours and over 100 mL of solvent per sample. Therefore, the standard fat extraction methods are not time- and cost efficient. Furthermore they expose laboratory technicians to dangerous solvents.


To overcome these limitations, Milestone has developed a fast yet accurate microwave-based technology which allows the chemist to carry out the simultaneous total fat determination in 12 milk and milk products samples in just 90 minutes, with equivalent results of those obtained with reference methods. The main advantages of this technology include:

- One basis method for most milk and milk products
- Hydrolysis and extraction in one step
- High sample throughput, 12 total fat determinations in 90 minutes
- Large sample amount, up to 10 gram
- Green method, just 25 mL of solvent required
- The fat obtained can be used for fatty acid analysis
- Reproducible and fully documented
- Safe working conditions

ETHOS X

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MICROWAVE HARDWARE - The new Milestone ETHOS X microwave cavity has a volume in excess of 70 liters, by far the largest currently available. With an installed power of 1900 Watt, the ETHOS X is the most powerful microwave platform system available for extraction. A rotating diffuser evenly distributes the microwaves throughout the cavity. A high definition digital camera allows the chemist to monitor the progress of the extraction whilst fully protected by the all-stainless steel door of the instrument. Should there be a sudden over-pressurization of the cavity, the door slightly opens for rapid and safe pressure release and the microwave power is instantaneously cut off. A magnetic stirrer is built-in in the ETHOS X system. It is designed to ensure vigorous stirring of the solutions in all vessels. Finally, the ETHOS X actually acts as a fume hood, as it incorporates a powerful exhaust system.

USER INTERFACE - The new Milestone ETHOS X is equipped with the most advanced yet easy to use reaction temperature and pressure sensors for complete quality control of the extraction conditions. It is controlled via a compact terminal with an easy-to-read, bright, full-color, touchscreen display. The terminal runs a completely new user-friendly, icon-driven, multi-language software to provide easy control of the microwave run. All extraction parameters can be modified "on-the-fly", thus assuring the highest flexibility of operation.

A NEW METHOD

The ETHOS X determines total fat in milk and milk products as a result of two working steps.

In the first step sample hydrolysis and extraction take place simultaneously at relatively elevated temperature and pressure conditions.

In the second step a known aliquot of the solvent with the extracted fat is evaporated allowing the chemist to weigh and measure the fat content.

HYDROLYSIS AND EXTRACTION - Up to 12 samples can be analyzed simultaneously, with a typical sample amount up to 10 gram. 10 mL of diluted acid and 25 mL of solvent are used for most matrices.

The combined hydrolysis and extraction process takes place at 125°C and requires approximately 50 minutes or less.

Temperature is monitored and controlled in each and every vessel by using a unique combination of fiber optic and infrared temperature sensors.

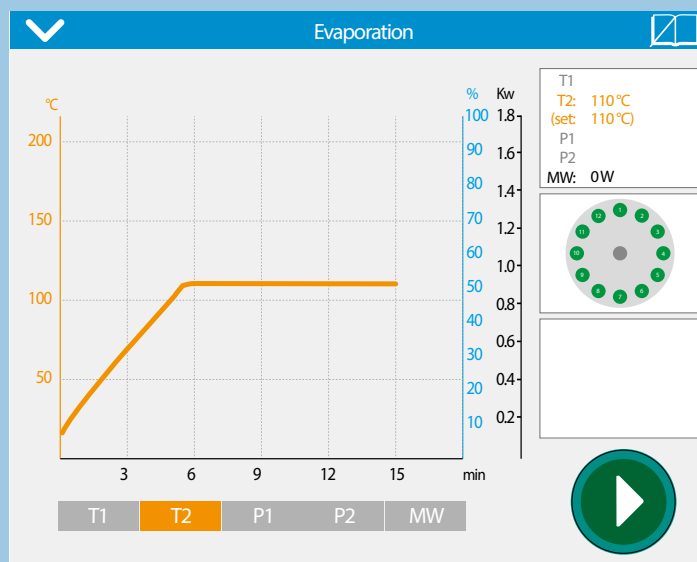
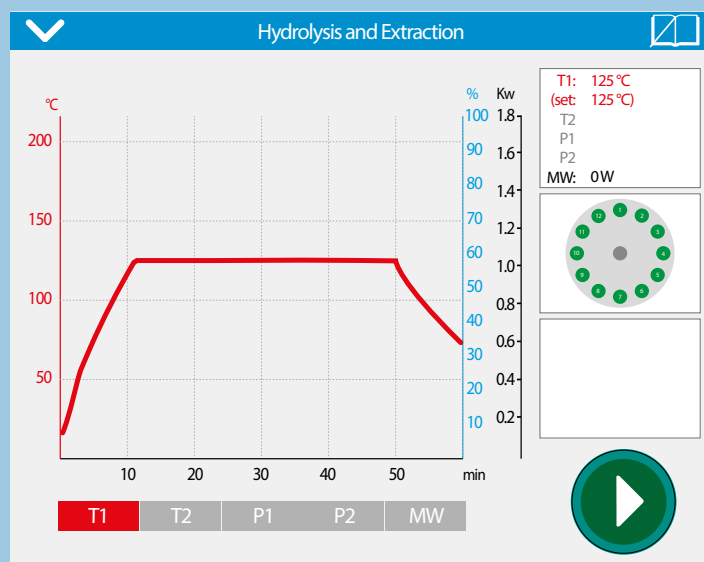
The ETHOS X built-in magnetic stirrer assures an even heating and temperature uniformity in all vessels, as well as intensive mixing between the aqueous and the solvent phases.

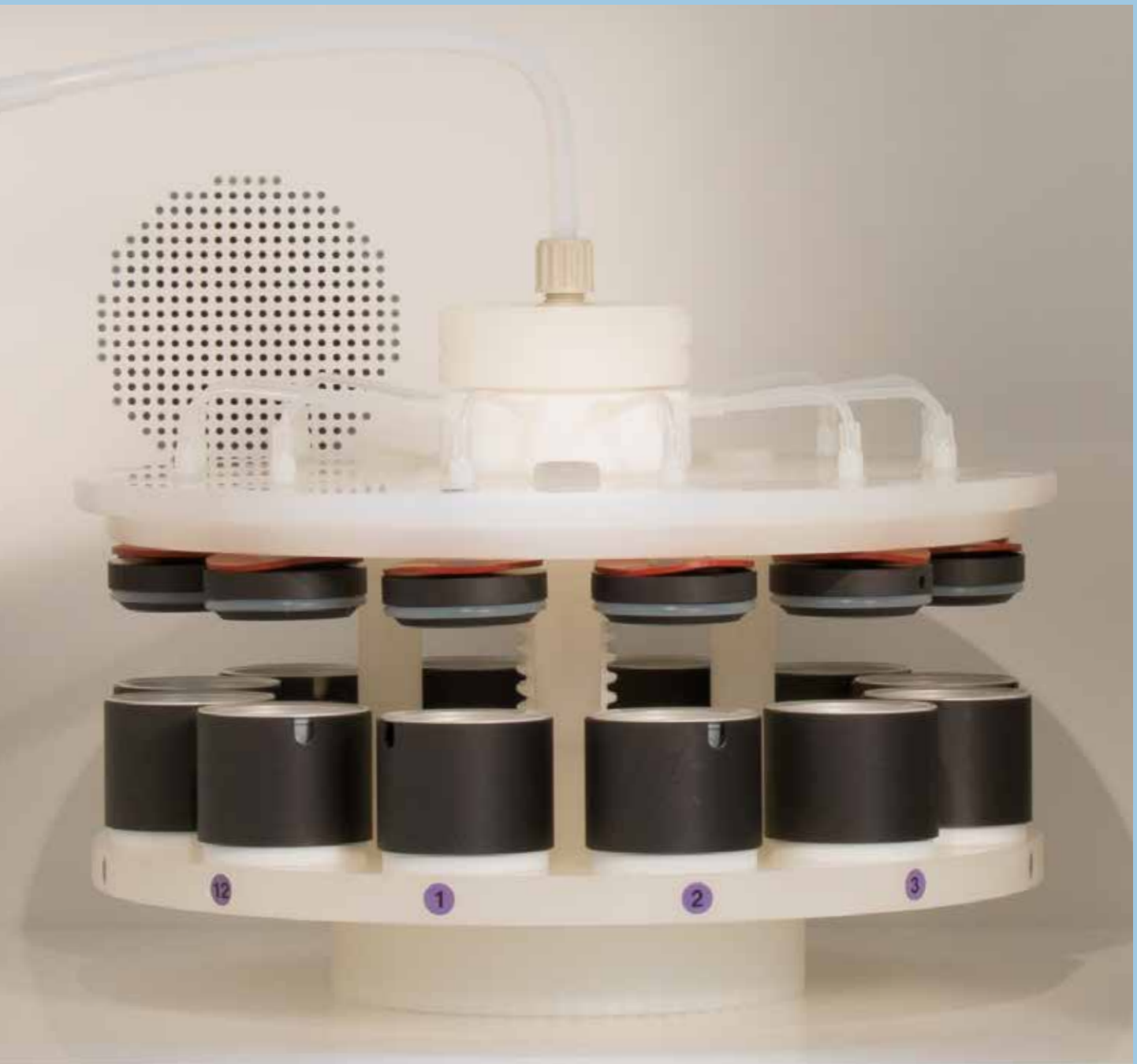
SOLVENT EVAPORATION - A measured aliquot of the solvent with the extracted fat is evaporated in disposable cups, located in a dedicated rotor, in just 15 minutes.

The evaporation process takes place under controlled temperature and vacuum conditions, to avoid the thermal degradation of the fat content.

At the completion of the evaporation, the fat content is immediately weighed on a balance which is directly interfaced with the ETHOS X, taking advantage of the extremely short cooling time of the disposable cups.

The instrument operating software automatically calculates the fat content and all the statistics associated with the analysis of the 12 samples analyzed.

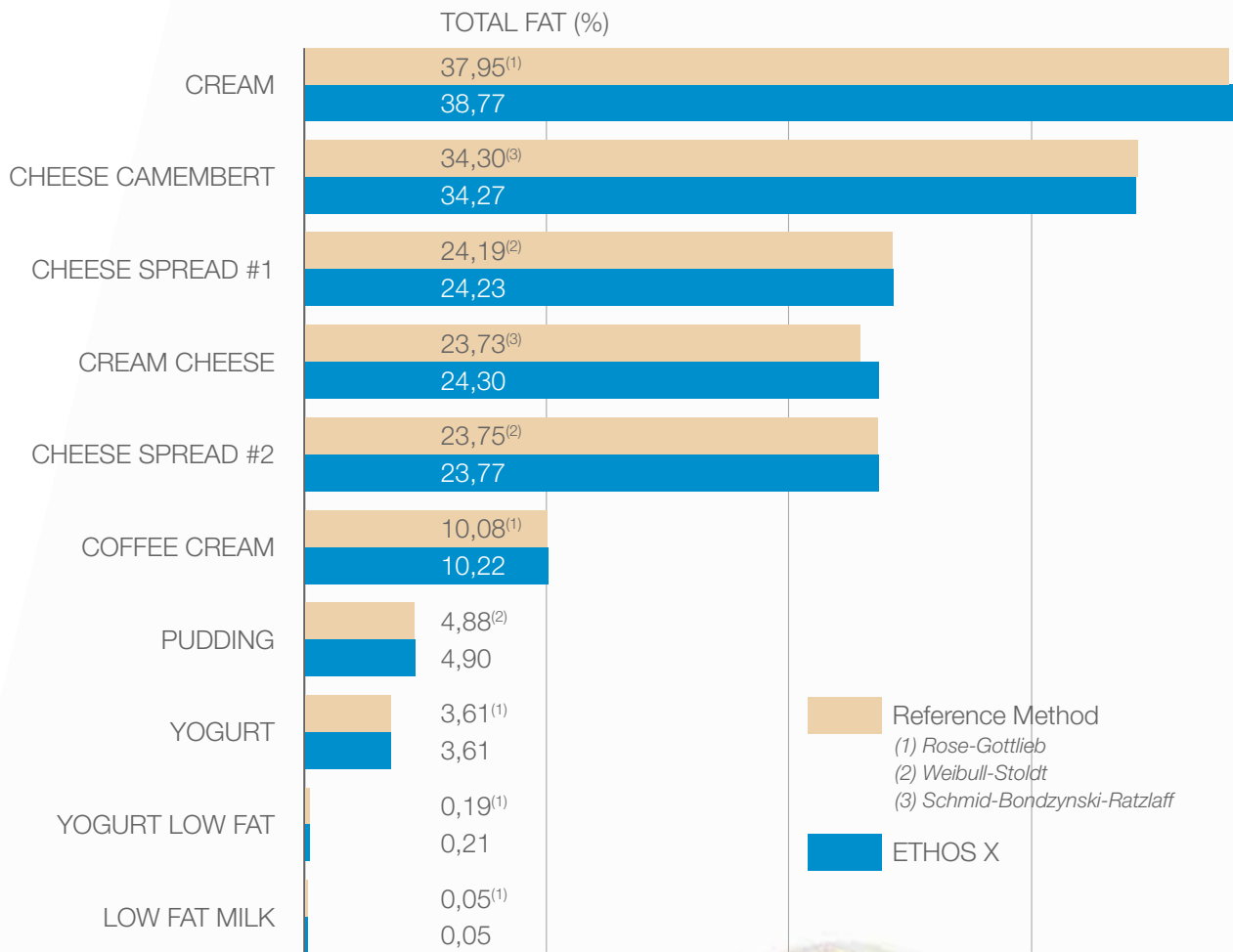




Left: typical combined hydrolysis and extraction temperature profile. Acid: diluted sulfuric acid or diluted hydrochloric acid. Solvent: cycle-hexane or petroleum ether.

Right: typical evaporation temperature profile.

PERFORMANCE



TECHNICAL SPECIFICATIONS

Milestone ETHOS X Microwave Total Fat Determination in Milk and Milk Products

The complete system includes:

- Microwave cavity: 18/8 stainless steel housing; largest microwave cavity: 43 x 40 x 41 (H) cm (70,5 liters); inlet/outlet ports: upper flange 36 mm ID, plus additional ports on the side walls; chassis protected against corrosive media with polymer coating; door completely made of 18/8 stainless steel with multiple independent safety interlocks to prevent microwave emission in case of improper closure or misalignment.
- Built-in exhaust system located above the cavity and separated from electronics to prevent corrosion.
- Microwave emission with dual magnetron system with rotating diffuser for homogeneous microwave distribution in the cavity; two 950 Watt rated magnetrons, for a total of 1900 Watt; exclusive magnetron protection from reflected microwave power; continuous and PID-controlled microwave emission at all power levels.
- Built-in fiber optic temperature control.
- Built-in contact-less infrared temperature control.
- Built-in contact-less pressure control.
- Built-in magnetic stirrer.
- Built-in software-controlled digital camera.
- Safety standards: EN61010-1:2001; EN61010-2-010:2003; UL61010-1:2004; CAN/CSA-C22.2 No 61010-1:2004; CAN/CSA-C22.2 No 61010-2-010:2004; IEC 61010-2-010:2003; EN61326-1:2006.
- Control terminal 660, touch screen; 6,5" TFT display; 640x480 VGA resolution with 64k colors; 5 USB ports, 1 RS-232 port, 1 LAN port, 2 video ports.
- Icon-driven multi-language operating software (Chinese, English, French, German, Italian, Japanese, Polish, Portuguese, Russian, Spanish and Turkish) software allowing the user to edit, save and run a virtually unlimited number of methods.
- Weight: ca. 84 kg.
- Dimensions: 54 x 64 x 69 (H) cm.
- Power supply: 230-240V/50 or 60Hz, 3,5 kWatt.
- SR-12 high-pressure rotor for extraction and hydrolysis.
- Evaporation rotor with 12 positions for fast solvent drying and gravimetric determination of the total fat content.

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MILESTONE Srl - Via Fatebenefratelli, 1/5 - 24010 Sorisole (BG) - Italy
Tel: +39 035 573857 - Fax: +39 035 575498
www.milestone srl - email: analytical@milestonesrl.com

MILESTONE INC. - 25 Controls Drive - Shelton, CT 06484 - USA
Tel: (203) 925-4240 - Toll-free: (866) 995-5100 - Fax: (203) 925-4241
www.milestonesci.com - email: mwave@milestonesci.com

MILESTONE GENERAL K.K. - KSP, 3-2-1, Sakado - Takatsu-Ku,
Kawasaki 213-0012 - Japan - Tel: +81 (0)44 850 3811 - Fax: +81 (0)44 819 3036
www.milestone-general.com - email: info@milestone-general.com

MLS GmbH - Auenweg 37 D-88299 Leutkirch im Allgau - Germany
Tel: +49 (0)7561 9818-0 - Fax: +49 (0)7561 9818-12
www.mls-mikrowellen.de - email: mws@mls-mikrowellen.de