



| CUSTOMER

Total is a major energy operator, that produces and markets fuel, natural gas and low-carbon electricity. They are the fourth largest international oil and gas producer in the world, the largest retailer in Africa, and the largest refiner and petrochemical producer in Western Europe. Total has an extensive portfolio of oil and gas production facilities, service stations, refineries and chemical sites supported by approximately 98,000 employees in 130 countries.

| CHALLENGE

Total's research and development laboratory in Belgium was experiencing a significant loss of volatile elements while digesting organic samples, which includes catalysts, oils and polymers.

| SOLUTION

After installing the ultraWAVE, Total's R&D lab was able to significantly improve its recovery rates for the volatile elements it tests for, which includes mercury, phosphorus, and osmium.

| BACKGROUND

Total Research and Technology Feluy (TRTF) is based in Feluy, Belgium and is the research and development center for Total's refining and petrochemicals branch. TRTF's R&D work is focused on optimizing polymers and catalysts to support the petrochemical branch's production of olefins, benzene, toluene, xylenes, and styrene, as well as numerous commodity polymers, including polyethylene, polypropylene, and polystyrene. Total's petrochemical branch serves numerous markets, including the automotive, construction, packaging, medicine, hygiene, and cosmetics. Their chemicals are also used in consumer products, such as fibers, and by film manufacturing companies.

| IMPLEMENTATION

TRTF equipped their laboratory with a Milestone ultraWAVE to facilitate laboratory analyses and analytical developments for their R&D projects. In partnership with Milestone's application team, the lab developed a new methodology that enabled them to optimize their sample preparation process across the wide variety of sample types they need to analyze. For more than 15 years, TRTF has utilized multiple Milestone systems for microwave digestion, including Milestone's original MEGA 1200 microwave system, and the Milestone ETHOS 1 closed vessel microwave digestion system.

LAB PROFILE ultraWAVE | PETROCHEMICAL



In 2016, the lab switched to Milestone's ultraWAVE Single Reaction Chamber (SRC) microwave system and currently achieves the high quality results and recovery rates it needs for the volatile elements it analyses.

THE ULTRAWAVE

The primary reason TRTF selected the ultraWAVE is because the system is able to digest the challenging organic and inorganic samples it needs without losing volatile elements in the process.

In fact, the lab is now able to digest higher sample amounts of organic matrices, including up to 1 gram of polymer sample, allowing them to achieve more precise measurements.

Obtaining analytical data of the highest quality begins with the crucial step of first producing a clear solution of the sample for analysis.



The ability to use larger sample weights with minimal acid volumes makes ultraWAVE SRC technology better suited to perform sample digestions for a wide and diverse range of matrices.

One of the main benefits of the ultraWAVE over rotor-based technology is system's ability to use vials with loose fitting caps instead

of traditional rotors that require a highly manual and time consuming process, both before and after each digestion run. With the ultraWAVE, once the samples are placed into the rack, the vials are then lowered into a larger vessel that contains a base load of acidified water. It is this baseload that absorbs the microwave energy and transfers it to the vial, which allows every vial to react independently within the base load, thus ensuring that all samples achieve maximum temperature (up to 250 °C) using pressures of 199 bar with no requirement for venting.

Because no venting is needed, recoveries even for the volatile elements, such as mercury, sulfur and even osmium are no longer an issue.

Before adopting the ultraWAVE, TRTF used the ETHOS One to digest polymers up to a maximum of 0.25 grams. Since switching to the ultraWAVE, the lab can now digest up to 1 g of polymers, which has resulted in a decrease by a factor of 4 on their limit of detection. This achievement is very important for the very low specification they must reach with specific polymers. Total was ultimately drawn not only to the ultraWAVE's ability to improve workflow capacity, but also to the system's ease of use.

"We decided to adopt ultraWAVE because it offers innovation and real improvement for our lab."
– Isabella Perotti, Technical Expert, Total Research and Technology Feluy



ABOUT MILESTONE

With over 50 patents and more than 20,000 instruments installed in laboratories around the world, Milestone has been widely recognized as the global leader in metals prep technology for the past 30 years. Committed to providing safe, reliable and flexible platforms to enhance your lab's productivity, customers worldwide look to Milestone for their metals digestion, organic extractions, mercury analysis and clean chemistry processing needs.



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