Consumer Products

Sunscreens, moisturizers, deodorants and antiperspirants (AP)

Single reaction chamber (SRC) microwave digestion enables cosmetic chemists to digest up to 15 different sample types simultaneously at temperatures as high as 300°C, greatly simplifying product development workflow with an easy efficient digestion sequence.

Summary

The mix of consumer products (sunscreens, moisturizers and deodorants and antiperspirants (AP)) in the cosmetic industry often complicates the ability to find broad sample preparation-conditions for routine analysis of trace metals. While some are easy by digestion standards, others require extremely high temperature and complicated acid mixtures for complete digestion. In addition to these challenges there is a requirement of batching sample types for conventional microwave digestion, setting up cleaning and throughput limitations. Antiperspirant sticks are an example of challenging consumer product due to the mixture of organic silicone elastomers (siloxanes), organic modifiers and alumina-metal complexes.

This mix of reactive organic compounds and mixed salt formation leads to a variety of approaches to microwave digestion techniques.

Instrumentation

Milestone's UltraWAVE SRC benchtop microwave digestion system can digest up to 15 different samples simultaneously at temperatures and pressures as high as 300°C and 199 bar. The high temperature and pressure capability enables a complete digestion of almost any cosmetic sample that needs to be analyzed for trace metals. Samples can be directly weighed into disposable glass vials with the appropriate acid mixtures: no minimum acid requirement. Quartz or Teflon vials can also be used depending on the application. This minimizes acid handling and transfer steps, and therefore errors on contamination. Because any number of samples can be digested, difficult antiperspirants can be digested with simple samples. To illustrate handling of difficult sample types, we developed a method for commercial antiperspirant sticks.

Method Details

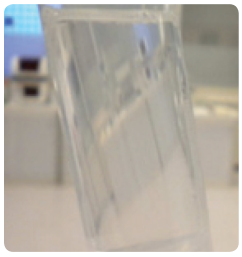
0.1 g commercial AP in a 15 mL Teflon vial was treated with 5 mL of concentrated HNO_3 and 1 mL HF and placed in a 15-position rack and lowered into the reaction chamber.

The chamber was pressurized to 40 bar to prevent acid boiling, and any cross-contamination and loss of volatiles.

Step	Time	T1	T2	P2	Power
1	20:00	250°C	60°C	110	1500W
2	10:00	250°C	60°C	110	1500W

Results

Following the digestion run, 0.1 g H_3BO_3 was added and the digestion method was repeated to neutralize any excess HF and salt precipitant from the first method, resulting in a clear and colorless liquid.



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