

ETHOS UP/ETHOS EASY **ACCESSORIES LINE**

# Ultratrace Inserts

VESSEL-INSIDE-VESSEL TECHNOLOGY



**MILESTONE**  
H E L P I N G  
C H E M I S T S

*“To keep blank levels as low as possible the analyst must exercise care in keeping the volume of reagents to a minimum.”*

*T. Murphy, The role of analytical blank in accurate trace analysis.*

Vessel-inside-vessel technology was developed by Milestone in the late 90s. Vessel-inside-vessel technology uses a smaller secondary vessel inside the primary microwave vessel.

The secondary vessel contains the sample and digestion reagents, and the primary vessel contains the solution required to achieve accurate temperature monitoring.

This configuration reduces the amount of acid required for digestion to near stoichiometric quantities, which reduces the dilution factor and decreases the detection limit.

The use of vessel-inside-vessel technology is also used for the processing of larger organic sample sizes.

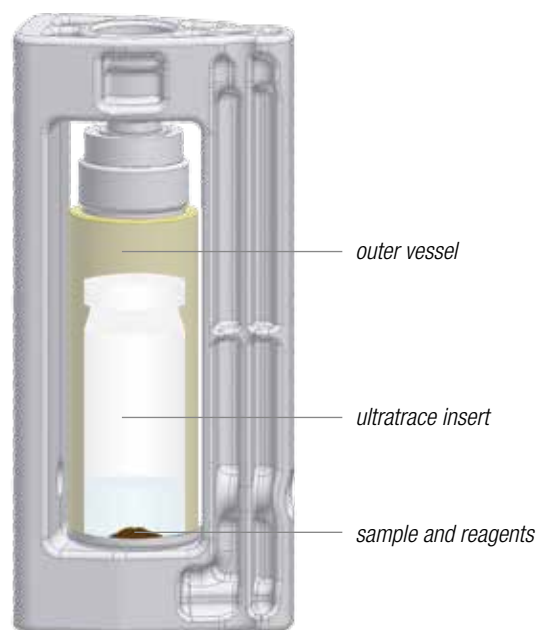
This is accomplished by controlling the reaction kinetics and lowering the pressure inside the microwave vessel. Controlling reaction kinetics is especially important when trying to digest large quantities of organic material.

The use of vessel-inside-vessel technology helps to control these exothermal reactions by providing a heat sink for the energy liberated during oxidization.

This is accomplished by placing water in the outer microwave vessel.

The water draws the heat away from the reaction mixture, slowing down the reaction kinetics and preventing a runaway reaction.

A variety of inserts are available from Milestone, in different materials (Quartz or TFM) and with different sizes and shapes, to accomplish all application requirements.

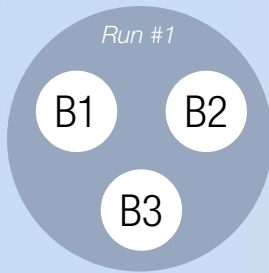


*Vessel-inside-vessel schematics*

- LESS ACID VOLUME
- HIGHER SAMPLE AMOUNT
- LOWER DILUTION FACTOR
- LOWER BLANK LEVEL
- LESS SURFACE CONTAMINATION
- LOWER ANALYTICAL BLANK

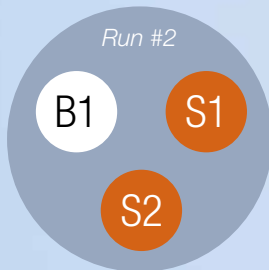
## NO CROSS CONTAMINATION

Three blanks were analyzed in run #1. The same blank was prepared along with two Animal Tissue samples, showing no cross contamination.



Vial	Cr (ug/L)	Cu (ug/L)	Mn (ug/L)	Ni (ug/L)	Pb (ug/L)	Zn (ug/L)
Blank 1	<2	<2	<2	<2	<2	<10
Blank 2	<2	<2	<2	<2	<2	<10
Blank 3	<2	<2	<2	<2	<2	<10

Blank 2 mL HNO<sub>3</sub>. Analysis by ICP-AES



Vial	Cr (ug/L)	Cu (ug/L)	Mn (ug/L)	Ni (ug/L)	Pb (ug/L)	Zn (ug/L)
Sample 1	54,8	40,0	14,4	31,6	11,0	148,5
Sample 2	56,1	40,0	14,3	32,6	10,8	148,2
Blank 1	<2	<2	<2	<2	<2	<10

Sample weight 100 mg. Blank 2 mL HNO<sub>3</sub>. Analysis by ICP-AES

## COMPLETE RECOVERY

Element	Ultratrace Inserts (mg/kg) (n=3)	Certified (mg/kg)
As	3,9	4,1 ± 0,5
Cd	19,5	19,6 ± 1,4
Pb	13,4	13,6 ± 0,5
Sb	9,6	10,1 ± 1,6
Zn	135	137 ± 20

### Polyethylene EC680K

Sample weight 200 mg. Blank 2 mL HNO<sub>3</sub>.  
Analysis by ICP-AES

Element	Ultratrace Inserts (mg/kg) (n=3)	Certified (mg/kg)
Cu	14,8	16,8 ± 1,0
Fe	70,0	79,3 ± 8,3
Mn	8,3	8,8 ± 0,4
Zn	156	163 ± 7

### Human Hair IAEA 085

Sample weight 100 mg. Blank 2 mL HNO<sub>3</sub>.  
Analysis by ICP-AES



Left to right: 50 ml single quartz insert, rack with three 10 ml glass quartz and TFM inserts

# HELPING CHEMIST

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 create 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 commitment.

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