Vessel Cleaning Guidelines for MDS, MARS5, and MARSXpress Digestion Vessels

Cleaning Protocol Common to All Teflon Vessel Parts

1. Use hot soapy water to clean following digestion. Micro Cleaner® liquid detergent works well on Teflon. Avoid detergents that contain ingredients that could cause potential contamination such as Na and P. Avoid abrasive cleansers and stiff brushes which can scratch the Teflon surface. Sponges work best. For Xpress vessel liners, there is a foam cleaning brush available from CEM as **PN 302030**.
   Solvents can be used to remove oily residue. Follow with soapy water cleaning. Rinse thoroughly with DI water and allow to dry completely before next use.

2. For additional cleaning, rinse and/or soak Teflon parts in a dilute acid bath. Rinse thoroughly with DI water and dry before next use. *Note: EasyPrep covers should not be soaked in an acid bath.*

3. Most rigorous cleaning (low ppm to ppb analyte level):
   Put 10mL of acid in vessel and seal.
   Ramp to 180°C in 10 minutes and hold for 10 minutes.
   Note: For OMNI and Xpress vessels, ramp to 150°C and hold for 10 minutes.
   For EasyPrep vessels increase Ramp Time from 10 minutes to 20 minutes.

   Discard acid, rinse thoroughly with DI water, and allow to dry before next use.
   Acid "wash" from cleaning step can be analyzed to establish the cleaning protocol required to produce acceptable blank levels.

Cleaning Other Vessel Parts

Caps, Thread Rings, Frames, Vent Nuts

These parts can be washed in hot, soapy water following use. Rinse thoroughly and dry completely before next use. Turntables should also be washed if acid, sample residue, or dust gets on them. In general, if it's dirty, wash it!

Composite Sleeves

Do not soak composite sleeves in water. If acid gets on a sleeve, wipe it off with a damp paper towel and allow to dry. Do not set sleeves down in water or acid, as it will "wick up" into the composite material and damage it. If sleeves get wet, allow them to air dry (drain board or air oven at 105°C) before using again. *Note: Remove composite sleeves before adding acid to vessel liners or before pouring digested solutions out to prevent liquid from wicking into the composite material.* Use a vessel rack or beaker to support liners. Vessel racks are available for framed vessel liners (XP1500+, EasyPrep, HP500+, GreenChem+, etc.) as **PN 430655** and Xpress liners as **PN 166220**.

Drying

Teflon parts should be allowed to air dry. To facilitate drying they can be placed in an air oven @105°C. *Note: Do not place EasyPrep vessel caps in a drying oven. Doing so may cause the rings to drop off.*

If drying liners on the bench top, lay them on their side. This will allow acid vapors to dissipate while preventing dust particles from falling inside. Teflon parts can be stored in sealed plastic bags or plastic storage boxes between uses. Do not store open liners in metal lab drawers. Acid vapors from the liners will rust the inside of the drawers.

Other vessel parts (frames, sleeves, caps, thread rings, turntables) can be dried with a paper towel. (Remove any lint left from the towels.) Static should not be a problem here. These parts can be stored in lab drawers without a problem.

Static Problems

Teflon parts are prone to build-up of static charge. To minimize static, allow Teflon parts to air dry. Wiping parts with a dry paper towel will put a static charge on them. Handling Teflon parts while wearing latex gloves can also induce a static charge. This is especially true for the liners, which can be problematic when weighing samples directly into the liners.

To dissipate the static charge, try the following:

1. Place liners in front of an anti-static ionizer device prior to weighing or transferring samples. An anti-static device is available from CEM as **PN 912490** (120V) or **PN 912495** (240V).
2. Pat the outside of the liner with a damp paper towel. Allow the liner to dry completely before assembling the vessel.
3. Pat the outside of the liner with an anti-static dryer sheet. Make sure the sheet does not leave any residue on the liner.

Labeling

It is difficult to mark Teflon parts with a Sharpie® pen. Self-adhesive labels such as Avery® Color Coded Dots can be used. Put labels on liners to weigh samples. Transfer labels to vessel sleeves or frames when assembling vessels. *Note: Leaving labels on the liners during digestion may cause charring or burning of the paper surface.* White laboratory label tape can also be used to label vessels. Tape should be placed on the frame or sleeve during digestion to prevent charring of the paper surface of the tape. Be careful with tapes and labels. Some adhesive materials will absorb microwaves and can damage vessels. Test a small piece in the microwave before using on a vessel.

Engraver tools can be used to *lightly* etch identification numbers on Teflon parts. Pick a thick part of the liner or cover to etch. To make the etched marking more visible, use a fine-tip Sharpie® pen to trace inside the etched mark. Do not engrave on the bottom of a MARSXpress liner, as this could interfere with the temperature measurement through the bottom of the vessel.