1.0 Purpose

This procedure provides instruction for the calibration, verification and operation of a microwave system for the digestion of samples and specific instruction for the operation of the Multiwave Go.

2.0 Scope

This procedure applies to the Multiwave Go microwave digestions system in use at Ion Labs, Inc.

3.0 Responsibility

3.1 It is the responsibility of QC Laboratory personnel to comply with this procedure.

3.2 It is the responsibility of QC Laboratory Management to implement this procedure and to ensure that the procedure is being followed.

3.3 It is the responsibility of QC Laboratory Management and/or Analytical Development to keep this procedure current with Ion Labs practices.

4.0 Definitions

4.1 **QC** – Quality Control

4.2 **SOP** – Standard Operating Procedure

4.3 **IR** – Infrared

4.4 **W** – Watts

4.5 **PPE** – Personal Protective Equipment

5.0 References

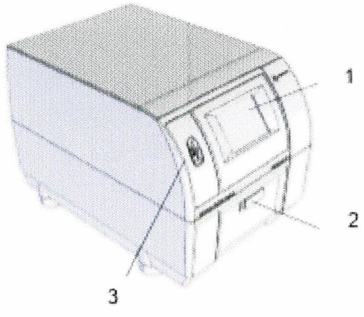
5.1 Anton Paar Multiwave Go Standard Operating Procedure booklet

5.2 Anton Paar Multiwave Go owner's manual

5.3 Anton Paar Multiwave Go Standard Operating Procedure video

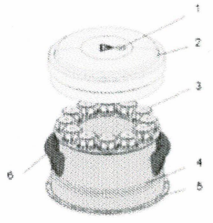
6.0 Overview

6.1 The Multiwave Go is a digestion system that uses a single magnetron to deliver up to 850W of microwave power over the full power range for the routine analysis of a variety of samples.



1 *Display*
2 *Lid opener*
3 *USB port*

Fig. 3-2: Front view of Multiwave GO



1 *Rotor lid magnet*
2 *Rotor lid*
3 *Pressure vessel HVT50*
4 *Rotor body*
5 *Centering plate*
6 *Handle*

Fig. 3-4: Rotor 12HVT50

High-throughput rotor with 12 high-performance pressure-activated-venting vessels made of PTFE-TFM (50 mL) for routine and quality control applications.

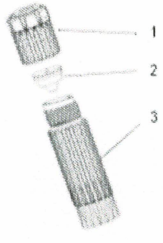


Fig. 3-5: Pressure vessel HVT50

High-performance reaction vessel with pressure-activated-venting for routine and quality control applications made of PTFE-TFM.

6.2 All personel involved in the operation and maintenace of the device must be properly trained.

6.3 Exhaust hose must be installed and vented into fume hood when in use.

6.4 Strong magnetic fields can be produced and persons with pacemakers should keep a distance of at least 1m during the operation of the device.

6.5 Cards (i.e. credit cards) can be damaged or deactivated by these fields.

7.0 Procedure

7.1 Location and Setup

7.1.1 The Multiwave Go requires a non-corrosive environment in an area without risk of explosion.

7.1.2 The Multiwave Go requires a fume hood within reach of the exhaust tubing for proper removal of fumes that may be generated.

7.1.3 The meter is powered up by first plugging in then flipping the rocker switch on the back of the instrument.

7.2 Performance Verification

7.2.1 IR Sensor verification should be performed at least once a month using the provided ceramic heating device as described below.

7.2.1.1 Open the lid of the Multiwave Go by pressing the black rectangular button on the front of the device.

7.2.1.2 Remove the circular drive ring and place the ceramic heating element containing calibration unit into the two bores of the cavity of the unit over the top of the IR heat sensor.

7.2.1.3 Connect the plug of the calibration unit to the rear of the unit and begin the verification of the IR sensor by first pressing <Menu> then <Service> then T-Calibration. Lastly hit <Start>.

7.2.1.4 Calibration can be saved or printed/exported or rejected. Range should be ±5°C.

7.2.1.5 If values deviate by more than ±5°C check the positioning of the calibration unit and the clear foil covering the IR sensor. Replace this if necessary and repeat IR sensor calibration. If deviation persists, contact Anton Paar for service.

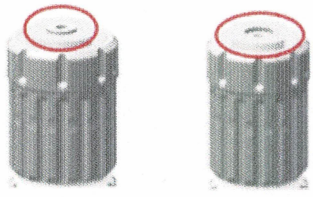
7.3 Safe Use

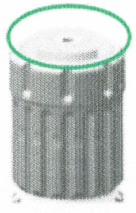
7.3.1 Appropriate sample amount should be weighed in supplied pressure vessels (see section 6.0 for picture)

7.3.2 Acid mixture should be added, ensuring that the sides are washed as best as possible.

7.3.3 Pressure release valve and cap should be added and screwed on.

Note: Cap spring holder and spring holder insert must be level. Indents are a sign of undertightening. Protrusion is a sign of overtightening.

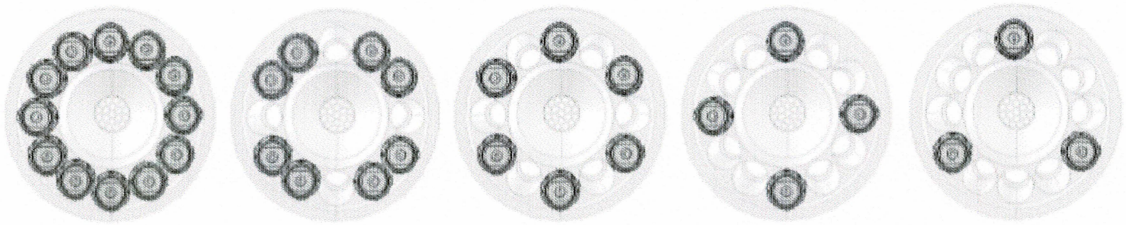




7.3.4 Be sure to immediately load tightened vessels into rotor as they **ARE NOT** pressure stable without added support from rotor

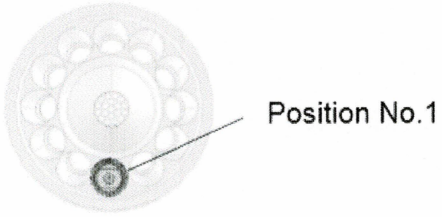
7.3.5 To ensure uniform heating, load the rotor in recommended load patterns (below)

Multi vessel mode



12 8 6 4 3

Single vessel mode

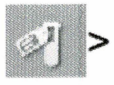


7.3.6 Before putting the lid on the rotor, inspect the foam lining in the lid. If it shows breakage, replace before using the lid.

7.3.7 Put the lid onto the rotor and place onto the drive ring.

7.3.8 Close lid and select method.

7.4 Choosing a method/Starting a run

7.4.1 Use the  to open the method selection menu.

7.4.2 From here, run name must be entered and method must be selected from drop down list.

7.4.3 Use  to accept changes then start to begin run.

7.4.4 Only after run is completed and samples are cooled, can the unit be opened.

7.4.5 With proper PPE and in a fume hood, slowly, while pointing away from people, unscrew the screw caps of the vessels.

7.4.6 After each run, all condensation within the microwave or any components should be cleaned promptly to prevent corrosion.

7.5 Digestion Vessel Cleaning

7.5.1 Soak vessels for at least one hour in a 1% citranox solution.

7.5.2 Rinse vessels with hot tap water. Be sure to pass water through the pressure release valve.

7.5.3 For difficult to remove contamination or visually dirty (after above cleaning) vessels: add 4 mL of water and 3 mL of nitric acid to the digestion vessel. Perform a digestion cycle ramping the temperature to 180°C over 10 minutes and hold at 180°C for 10 minutes.

7.5.4 In some cases, a rinse with organic solvent (methanol or isopropanol) may be required to remove partially digested samples.

7.5.5 Only for extremely resistant residual contamination, a test tube brush may be used. Take extreme care not to scratch the Teflon vessel with the test tube brush.

7.5.6 Rinse vessels with DI water. Be sure to pass water through the pressure release valve.

7.5.7 Allow vessel to air dry before use.

8.0 Revision History

Revision	Date	Description of Changes	CCR #	By
0	05/23/19	New procedure.	N/A	J. Maignan
1	09/07/22	Scheduled review: updated logo and format.	CC-22-0371	K. Burris
2	01/10/23	Updated to include cleaning details for vessels. Reference INV-22-0009.	CC-23-0015	J. Sassman