

Customer Support Note 031

Using VDA 278 preset methods in Maverick and MIC

Disclaimer: It is vital that this Customer Support Note is read carefully before proceeding and that any instructions contained within the document are followed closely. Markes International will not accept responsibility for any damage done to instrumentation or personnel if any instructions within this document are not followed exactly. Any ongoing warranty or contract may be voided if failure to follow these instructions results in damage to the instrumentation. If anything is unclear, you must clarify the details with a Markes representative before proceeding.

VDA 278 was developed by the German Association of the Automotive Industry (VDA), and is a screening method that describes direct thermal desorption of materials with analysis by GC-MS for semi-quantitative determination of the emissions of VOCs and SVOCs from these materials.

Many automotive manufacturers have taken VDA 278 and written an internal standard based on this methodology (for instance, GMW15634 and Toyota D423109). There are minor differences between these methods and VDA 278, but the general principles are the same.

VDA 278 uses a sampling introduction process called direct desorption in which a material is placed directly into an empty thermal desorption (TD) tube. The tube is placed into a thermal desorption instrument, heated and then the emissions from the material are focused on a cold trap, before injection onto a GC-MS system for detection.

VDA 278 describes two procedures, one for the determination of VOC compounds, and one for the determination of the FOG compounds (SVOCs). The analysis of each group of compounds requires dedicated methods for both the TD and GC-MS stages. Furthermore, an external calibration performed under a different set of TD conditions is also employed to allow semi-quantitation of the results obtained from the VOC and FOG analyses.

Which TD method should be employed and what the method parameters should be is often a source of confusion. As a result, dedicated methods have been incorporated into Markes' TD software to simplify this process and ensure consistency between testing laboratories. These methods have also been optimised for the use of glass tubes where appropriate.

This document outlines the procedure that must be followed in order to successfully use the dedicated VDA 278 software mode in Markes' thermal desorption software. The VDA 278 mode is available in Markes' TD Maverick software version 5.2.0 and in Markes Instrument Control (MIC) versions 1.1 and 2.0.

1. Software configuration

After the software has downloaded, the VDA 278 mode can be enabled as follows.

1.1 Maverick 5.2.0

1. In the toolbar select View → Options.
2. In the Configurations tab of the window that appears, select the 'Enable VDA 278 modes' box (Figure 1).

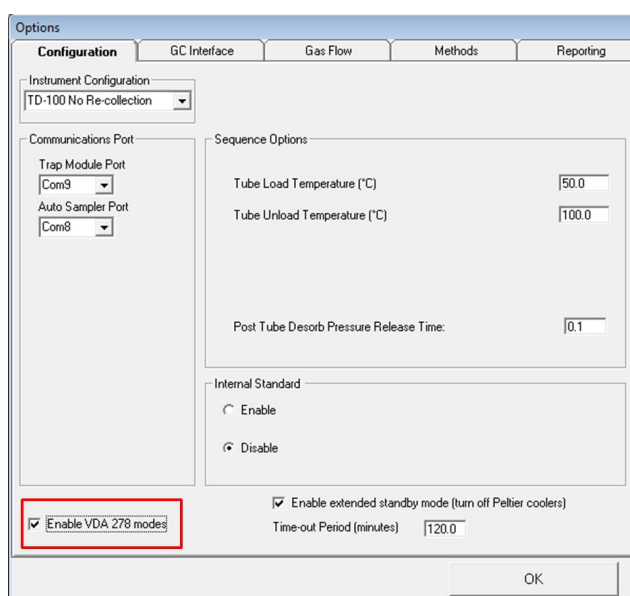


Figure 1: Software configuration – Maverick.

3. The software will need to be restarted to enable the changes, but after this the VDA 278 mode will be available at all times unless de-selected.

1.2 MIC 1.1

1. The VDA 278 methods can be found in the template methods folder with the other standard template methods (Figure 2).

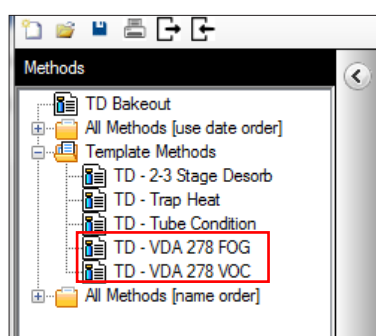


Figure 2: Software configuration – MIC 1.1.

1.3 MIC.2.0

1. The VDA 278 methods can be found in the preset menu in “2–3 Stage Tube Desorption method” template with the other method presets (Figure 3).

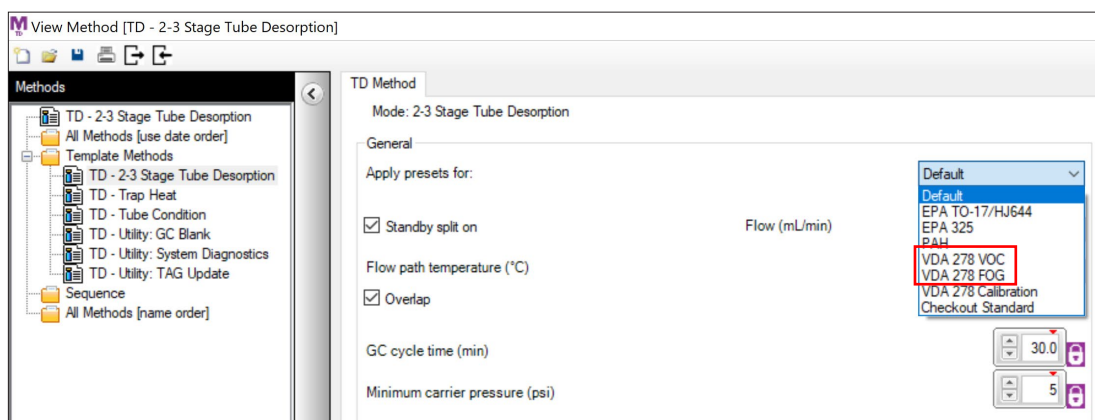


Figure 3: Software configuration – MIC 2.0.

2. The methods can be selected here and saved for later use.

2. Setting up the methods – Maverick 5.2.0

2.1 VDA 278 VOC method

1. Create a new method by selecting File → New → Method.
2. Select the dedicated ‘VDA Method 278 VOC for Glass Tubes’ from the drop-down menu.

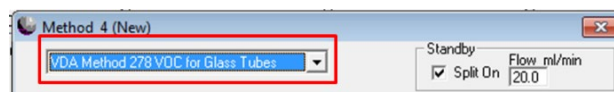


Figure 4: Selecting the method.

3. Set the desorb and split flows as required for the standard method in use (default values are for VDA 278, so no changes should be required for use with this method). All other parameters are locked, as they are consistent between all methods.
4. Save the method with a suitable file name, e.g. VDA 278 VOC.mth.

The individual stages for the VDA 278 VOC method should be as shown in Figures 5–7.

VDA278 VOC.mth

VDA Method 278 VOC for Glass Tubes

Standby Split On Flow ml/min 20.0

Pre-Desorption | Tube/Sample desorption | Trap Settings

Purge

Dry Purge

Time/min 0.1

Flow ml/min 20.0

Prepurge Time 1.0

Trap In Line

Flow ml/min 42.0

Split On

Flow ml/min 42.0

200 Flow Path Temp

5.0 Minimum Carrier Pressure

0.0 GC Cycle Time

Split Ratios

2.0 : 1 Inlet

33.3 : 1 Outlet

66.6 : 1 Total

Split Ratio Calculator

Figure 5: Pre-desorption settings for “VDA Method 278 VOC for Glass Tubes”.

VDA278 VOC.mth

VDA Method 278 VOC for Glass Tubes

Standby Split On Flow ml/min 20.0

Pre-Desorption | **Tube/Sample desorption** | Trap Settings

Tube Desorb

Time 1 30.0

Temp 1 90

Trap In Line

Trap Flow ml/min 42.0

Split On

Split Flow ml/min 42.0

Time 2 0.0

200 Flow Path Temp

5.0 Minimum Carrier Pressure

0.0 GC Cycle Time

Split Ratios

2.0 : 1 Inlet

33.3 : 1 Outlet

66.6 : 1 Total

Split Ratio Calculator

Figure 6: Tube/sample desorption settings for “VDA Method 278 VOC for Glass Tubes”.

VDA278 VOC.mth

VDA Method 278 VOC for Glass Tubes

Standby Split On Flow ml/min 20.0

Pre-Desorption | Tube/Sample desorption | **Trap Settings**

Trap Desorb

Pre-Trap Fire Purge/min 1.0

Trap Flow ml/min 42.0

Flow ml/min 42.0

Trap Low /°C -30

Heating Rate /°C/s MAX

Trap High /°C 300

Trap Hold /min 3.0

Split On

Split Flow ml/min 42.0

200 Flow Path Temp

5.0 Minimum Carrier Pressure

0.0 GC Cycle Time

Split Ratios

2.0 : 1 Inlet

33.3 : 1 Outlet

66.6 : 1 Total

Split Ratio Calculator

Figure 7: Trap settings for “VDA Method 278 VOC for Glass Tubes”.

2.2 VDA 278 FOG method

1. Create a new method by selecting File → New → Method.
2. Select the dedicated 'VDA Method 278 FOG for Glass Tubes' from the drop-down menu.



Figure 8: Selecting the method.

3. Set the desorb and split flows as required for the standard method in use (default values are for VDA 278, so no changes should be required for use with this method). All other parameters are locked, as they are consistent between all methods.
4. Save the method with a suitable file name, e.g. VDA 278 FOG.mth.

The individual stages for the VDA 278 FOG method should be as shown in Figures 9–11.

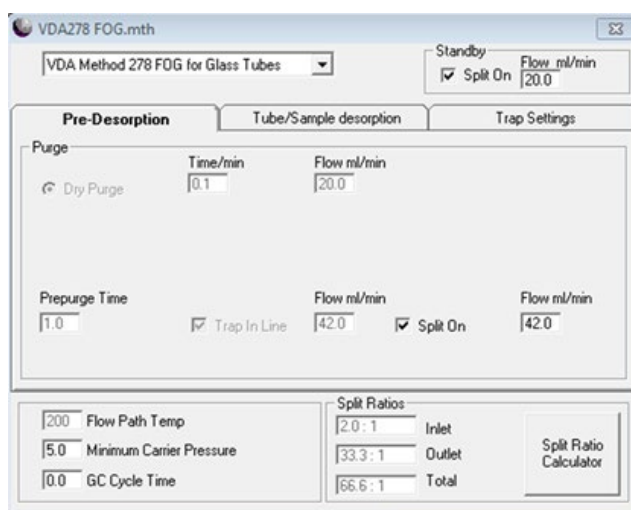


Figure 9: Pre-desorption settings for "VDA Method 278 FOG for Glass Tubes".

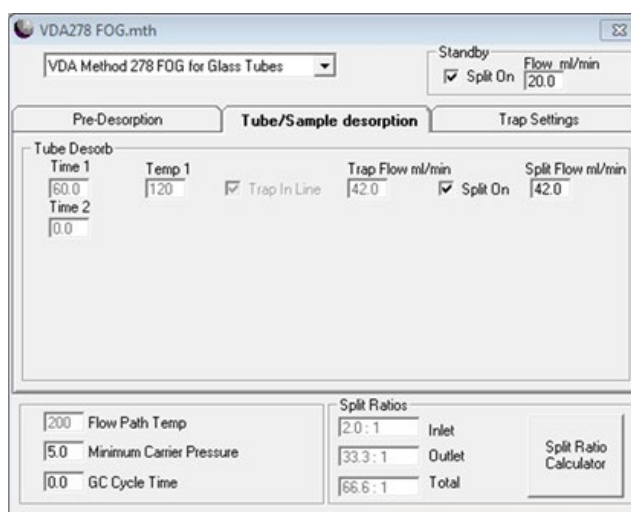


Figure 10: Tube/sample desorption settings for "VDA Method 278 FOG for Glass Tubes".

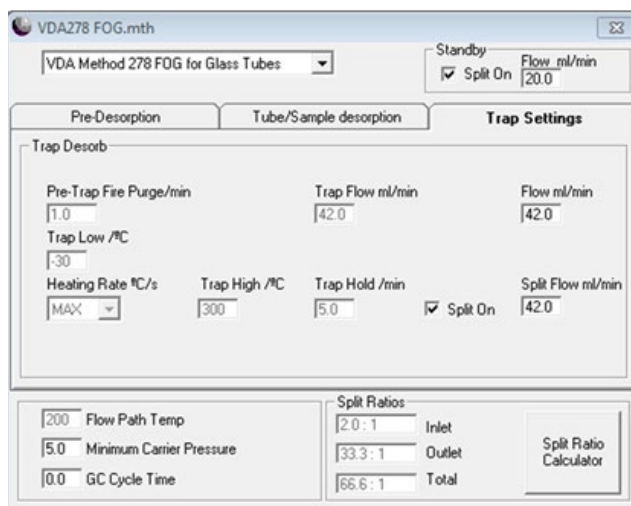


Figure 11: Trap settings for “VDA Method 278 FOG for Glass Tubes”.

2.3 VDA 278 calibration method

The VDA 278 calibration samples are injected onto stainless steel tubes, so a different way of accessing the method is required. An existing default method for this is included as a standard two-stage (or three-stage) desorption method.

1. Open the default method by selecting File → Open, and selecting the following method: C:\ProgramData\Marques TD\Methods\VDA 278 Calibration.mth.
2. Set the desorb and split flows as required for the standard method in use (default values are for VDA 278, so no changes should be required for use with this method). All other parameters are locked, as they are consistent between all methods. Ensure the flows are the same as for the VOC and FOG sample methods.
3. Save the method.

The individual stages for the VDA 278 calibration method should be as shown in Figures 12–14.

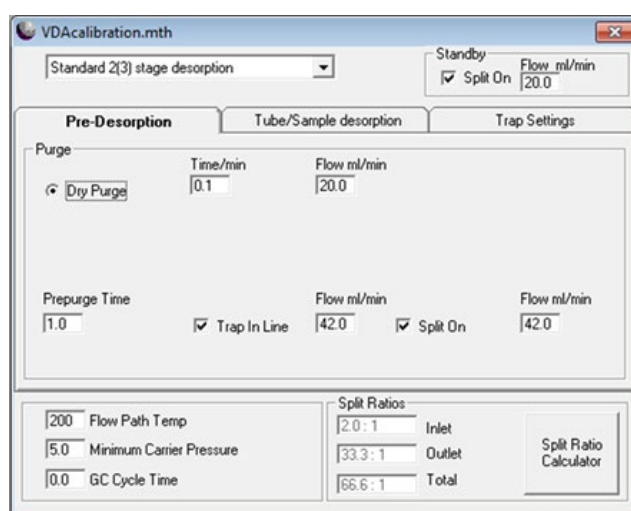


Figure 12: Pre-desorption settings for “VDA Method 278 Calibration method”.

VDAcalibration.mth

Standard 2(3) stage desorption

Standby Flow ml/min
 Split On 20.0

Pre-Desorption **Tube/Sample desorption** Trap Settings

Tube Desorb

Time 1	Temp 1	Trap In Line	Trap Flow ml/min	Split On	Split Flow ml/min
10.0	300	<input checked="" type="checkbox"/>	42.0	<input checked="" type="checkbox"/>	42.0
Time 2					
0.0					

200 Flow Path Temp
 5.0 Minimum Carrier Pressure
 0.0 GC Cycle Time

Split Ratios
 2.0 : 1 Inlet
 33.3 : 1 Outlet
 66.6 : 1 Total

Split Ratio Calculator

Figure 13: Tube/sample desorption settings for “VDA Method 278 Calibration method”.

VDAcalibration.mth

Standard 2(3) stage desorption

Standby Flow ml/min
 Split On 20.0

Pre-Desorption Tube/Sample desorption **Trap Settings**

Trap Desorb

Pre-Trap Fire Purge/min	Trap Flow ml/min	Flow ml/min		
1.0	42.0	42.0		
Trap Low /°C				
-30				
Heating Rate °C/s	Trap High /°C	Trap Hold /min	Split On	Split Flow ml/min
MAX	300	10.0	<input checked="" type="checkbox"/>	42.0

200 Flow Path Temp
 5.0 Minimum Carrier Pressure
 0.0 GC Cycle Time

Split Ratios
 2.0 : 1 Inlet
 33.3 : 1 Outlet
 66.6 : 1 Total

Split Ratio Calculator

Figure 14: Trap settings for “VDA Method 278 Calibration method”.

3. Setting up the methods – Markes Instrument Control (MIC) 1.1

Open the Method Editor, and select 'Template Methods'. In this folder there are templates for the standard 2/3-stage desorption, tube conditioning and trap conditioning, as well as two VDA 278 methods (see Figure 2).

Figures 15–17 show the parameters set for the three VDA 278 methods in MIC. The split ratios are all that can be modified, and this should only be altered if specified in the standard method.

TD Method

Mode: VDA 278 VOC

General

- Standby split on
- Flow (mL/min): 20
- Flow path temperature (°C): 200
- Overlap
- GC cycle time (min): 60.0
- Minimum carrier pressure (psi): 5

Pre-desorption

- Prepurge time (min): 1.0
- Trap In Line
- Trap flow (mL/min): 42
- Split on
- Split flow (mL/min): 42
- Dry purge
- Dry purge time (min): 1.0
- Purge flow (mL/min): 50

Tube desorption

- Desorb time 1 (min): 30.0
- Desorb temperature 1 (°C): 90
- Trap in line
- Trap flow (mL/min): 42
- Split on
- Split flow (mL/min): 42
- Tube desorb 2
- Desorb time 2 (min): 10.0
- Desorb temperature 2 (°C): 250
- Trap in line
- Trap flow (mL/min): 50
- Split on
- Split flow (mL/min): 50

Trap settings

- Trap purge time (min): 1.0
- Trap purge flow (mL/min): 42
- Trap low temperature (°C): -30
- Trap heat rate (°C/s): MAX
- Trap high temperature (°C): 300
- Trap desorb time (min): 3.0
- Desorb split on
- Split flow (mL/min): 20

Figure 15: Settings for the VDA Method 278 VOC method.

TD Method

Mode: VDA 278 FOG

General

Standby split on Flow (mL/min)

Flow path temperature (°C)

Overlap

GC cycle time (min)

Minimum carrier pressure (psi)

Pre-desorption

Prepurge time (min)

Trap In Line Trap flow (mL/min)

Split on Split flow (mL/min)

Dry purge

Dry purge time (min)

Purge flow (mL/min)

Tube desorption

Desorb time 1 (min)

Desorb temperature 1 (°C)

Trap in line Trap flow (mL/min)

Split on Split flow (mL/min)

Tube desorb 2

Desorb time 2 (min)

Desorb temperature 2 (°C)

Trap in line Trap flow (mL/min)

Split on Split flow (mL/min)

Trap settings

Trap purge time (min)

Trap purge flow (mL/min)

Trap low temperature (°C)

Trap heat rate (°C/s)

Trap high temperature (°C)

Trap desorb time (min)

Desorb split on Split flow (mL/min)

Figure 16: Settings for the VDA Method 278 FOG method.

TD Method

Mode: 2-3 Stage Desorb

General

Standby split on Flow (mL/min)

Flow path temperature (°C)

Overlap

GC cycle time (min)

Minimum carrier pressure (psi)

Pre-desorption

Prepurge time (min)

Trap In Line Trap flow (mL/min)

Split on Split flow (mL/min)

Dry purge

Dry purge time (min)

Purge flow (mL/min)

Tube desorption

Desorb time 1 (min)

Desorb temperature 1 (°C)

Trap in line Trap flow (mL/min)

Split on Split flow (mL/min)

Tube desorb 2

Desorb time 2 (min)

Desorb temperature 2 (°C)

Trap in line Trap flow (mL/min)

Split on Split flow (mL/min)

Trap settings

Trap purge time (min)

Trap purge flow (mL/min)

Trap low temperature (°C)

Trap heat rate (°C/s)

Trap high temperature (°C)

Trap desorb time (min)

Desorb split on Split flow (mL/min)

Figure 17: Settings for the VDA Method 278 Calibration method.

4. Setting up the methods – Markes Instrument Control (MIC) 2.0

Open the Method Editor, and select 'Template Methods'. In this folder there are templates for the standard 2/3-stage desorption, tube conditioning and trap conditioning. In the 2/3-stage desorption template method you can then select either of the two VDA 278 methods in the drop-down menu (see Figure 3).

TD Method

Mode: 2-3 Stage Tube Desorption

General

Apply presets for: **VDA 278 VOC**

Standby split on Flow (mL/min) 20

Flow path temperature (°C) 200

Overlap

GC cycle time (min) 60.0

Minimum carrier pressure (psi) 5

Pre-desorption

Prepurge Prepurge time (min) 1.0

Trap In line Trap flow (mL/min) 42

Split on Split flow (mL/min) 42

Tube desorption

Desorb time 1 (min) 30.0

Desorb temperature 1 (°C) 90

Trap in line Trap flow (mL/min) 42

Split on Split flow (mL/min) 42

Tube desorb 2

Desorb time 2 (min) 10.0

Desorb temperature 2 (°C) 250

Trap in line Trap flow (mL/min) 50

Split on Split flow (mL/min) 50

Trap settings

Desorb trap

Trap purge time (min) 1.0

Trap purge flow (mL/min) 42

Trap low temperature (°C) -30

Elevated trap purge

Elevated trap purge temperature (°C) 25

Trap heating rate (°C/s) MAX

Trap high temperature (°C) 300

Trap desorb time (min) 3.0

Desorb split on Split flow (mL/min) 42

Set Split calculator

Parameter set in method Parameter set on sequence line OK Cancel

Figure 18: Settings for the VDA Method 278 VOC method.

TD Method

Mode: 2-3 Stage Tube Desorption

General

Apply presets for: **VDA 278 FOG**

Standby split on Flow (mL/min) **20**

Flow path temperature (°C) **200**

Overlap

GC cycle time (min) **55.0**

Minimum carrier pressure (psi) **5**

Pre-desorption

Prepurge Prepurge time (min) **1.0**

Trap In line Trap flow (mL/min) **42**

Split on Split flow (mL/min) **42**

Tube desorption

Desorb time 1 (min) **60.0**

Desorb temperature 1 (°C) **120**

Trap in line Trap flow (mL/min) **42**

Split on Split flow (mL/min) **42**

Tube desorb 2

Desorb time 2 (min) **10.0**

Desorb temperature 2 (°C) **250**

Trap in line Trap flow (mL/min) **50**

Split on Split flow (mL/min) **50**

Trap settings

Desorb trap

Trap purge time (min) **1.0**

Trap purge flow (mL/min) **42**

Trap low temperature (°C) **-30**

Elevated trap purge

Elevated trap purge temperature (°C) **25**

Trap heating rate (°C/s) **MAX**

Trap high temperature (°C) **300**

Trap desorb time (min) **5.0**

Desorb split on Split flow (mL/min) **42**

Figure 19: Settings for the VDA Method 278 FOG method.

TD Method

Mode: 2-3 Stage Tube Desorption

Apply presets for: **VDA 278 Calibration**

Standby split on Flow (mL/min)

Flow path temperature (°C)

Overlap

GC cycle time (min)

Minimum carrier pressure (psi)

Pre-desorption

Prepurge Prepurge time (min)

Trap In line Trap flow (mL/min)

Split on Split flow (mL/min)

Tube desorption

Desorb time 1 (min)

Desorb temperature 1 (°C)

Trap in line Trap flow (mL/min)

Split on Split flow (mL/min)

Tube desorb 2

Desorb time 2 (min)

Desorb temperature 2 (°C)

Trap in line Trap flow (mL/min)

Split on Split flow (mL/min)

Trap settings

Desorb trap

Trap purge time (min)

Trap purge flow (mL/min)

Trap low temperature (°C)

Elevated trap purge

Elevated trap purge temperature (°C)

Trap heating rate (°C/s)

Trap high temperature (°C)

Trap desorb time (min)

Desorb split on Split flow (mL/min)

Figure 20: Settings for the VDA Method 278 Calibration method.

Please refer to Application note 142 for a full guide on how to analyse samples by VDA 278.

For all technical support queries, please contact Markes International.

Email: support@markes.com Tel.: +44 (0)1443 233922