

**GERSTEL**  
certified **SUPPLIES**



**Twister®**



**Twicester®**



## Twister® / Stir Bar Sorptive Extraction SBSE

The GERSTEL Twister® enables efficient, solvent-free extraction of organic compounds from aqueous matrices based on Stir Bar Sorptive Extraction (SBSE). The Twister may look like a conventional magnetic stirring rod, but while it stirs samples, such as water, beverages, body fluids or QuEChERS food extracts, it absorbs and concentrates organic compounds into its sorbent coating. A large number of samples can be extracted simultaneously using multi-position stir plates resulting in high productivity and throughput and often eliminating labor-intensive sample preparation steps. Analytes are typically desorbed from the Twister using thermal desorption. Liquid desorption using a solvent can be performed whenever the analytes are very high-boiling, thermally labile, or when they must be determined by HPLC. SBSE is up to 1000 x more sensitive than SPME since the stir bar has significantly more sorbent volume and the capacity to extract much larger sample volumes very efficiently. Due to its mechanical stability, the Twister can be reused up to 200 times depending on the sample matrix and desorption conditions, and can also be used for field sampling. The Twister is easy and convenient to use and inexpensive to ship to the laboratory for analysis.

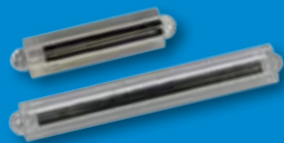



### GC Analysis:

When the SBSE-step has been completed, the Twister is transferred to either a Thermal Desorption Unit (TDU) or a Thermal Desorption System (TDS). Thermal desorption and GC/MS determination of the concentrated organic compounds are then performed in one integrated system under integrated software control. Using the multi-desorption mode, multiple Twister desorptions can be performed for each GC/MS run resulting in even higher sensitivity and lower limits of detection.

### LC Analysis:

Involatile, polar, or thermally labile compounds can be extracted from the Twister with a solvent using Twister Back Extraction (TBE) for subsequent determination by LC/MS. TBE and introduction to the LC/MS system is fully automated using the MultiPurpose Sampler.

	Standard PDMS Twister	EG/Silicone Twister
		
<b>Phase</b>	Polydimethylsiloxane (PDMS)	Polydimethylsiloxane (PDMS)/ Ethylene glycol (EG)-copolymer on an inert metal grid used for mechanical stabilization
<b>Enrichment</b>	Unspecific sorption of apolar compounds $\log(K_{ow}) > 4$ . The polarity range can be extended by adding salt to the sample (salting out).	Unspecific sorption of apolar compounds and specific binding of polar hydrogen bond donors, such as phenols
<b>Application examples</b>	Pesticides, PAHs and other contaminants in water PAHs in seafood (QuEChERS) 2,4,6-TCA and other off-odors in wine and water Flavors and off-flavors in food and beverages	Flavor compounds in beverages Phenolic compounds

Order no.

**GERSTEL Twister®**

for Stir Bar Sorptive Extraction (SBSE)  
with polydimethylsiloxane phase (PDMS)

<b>film thickness 0.5 mm, length 10mm</b>	
10 units	<b>011222-001-00</b>
100 units	<b>011222-002-00</b>
<b>film thickness 1.0 mm, length 10mm</b>	
10 units	<b>011333-001-00</b>
100 units	<b>011333-002-00</b>
<b>film thickness 0.5 mm, length 20mm</b>	
10 units	<b>011444-001-00</b>
100 units	<b>011444-002-00</b>
<b>film thickness 1.0 mm, length 20mm</b>	
10 units	<b>011555-001-00</b>
100 units	<b>011555-002-00</b>



**GERSTEL Twister® kit**

1 package (10 units)

**consists of:**  
film thickness 0.5 mm, 10 mm length (4 units)  
film thickness 1.0 mm, 10 mm length (2 units)  
film thickness 0.5 mm, 20 mm length (2 units)  
film thickness 1.0 mm, 20 mm length (2 units)

**012370-000-00**



**GERSTEL Twister® EG-Silicone**

for Stir Bar Sorptive Extraction (SBSE)  
with Polydimethylsiloxane (PDMS)/ Ethylene glycol (EG)-copolymer

**32µL phase volume, 10 mm length**  
10 units **016904-001-00**



**Book »New Concepts in Sorption-Based Sample Preparation for Chromatography«**

by H.A. Baltussen, 241 pages

**013745-000-00**



Order no.

**Twister® Headspace Sorptive Extraction (HSSE), analyte extraction and concentration from the vapor phase using the GERSTEL® Twister.**

HSSE is a concentration technique that is much more sensitive than traditional static headspace analysis. A Twister is placed in an open adapter inside a closed headspace vial. The Twister is placed in the vapor phase above the sample such that analytes are extracted by, and concentrated into, the PDMS phase of the Twister. Sorptive extraction and concentration of organic compounds provides lower detection limits when combined with a GERSTEL TDS or TDU system for thermal desorption GC or GC/MS analysis.



**TWISTER headspace vials 20 mL**

1 package (100 units)

012491-000-00

**Inserts for 20 mL Twister headspace vials 20 mL**

1 package (100 units)

012492-000-00

**Crimp caps with septum for vial**

1 package (100 units)

Aluminium Headspace Crimp cap,  
Septum: Silicone white/PTFE beige,  
3.25mm, 35° shore A

011912-002-00



2



1

**Crimp cap vials**

	Type	mL	Seal size (mm)	unit	Part no.
1	clear	10	20	100	093640-005-00
	clear	10	20	1000	093640-069-00
2	clear	20	20	100	093640-006-00
	clear	20	20	1000	093640-068-00

**Screw cap vials and Screw caps with septa**

	Vials	mL	Thread Ø	unit	Part no.
1	Clear, Ø11.6 x 32 mm, for 20 mm Twisters	1.1	9	100	093640-045-00
2	Clear, Ø11.6 x 32 mm, for 10 mm Twisters	1.5	9	100	093640-046-00
3	Clear, blue screw caps, Septum: rubber red/PTFE PP blue,	1.5	9	100	089355-085-00
4	Septum: Silicone white/PTFE red, 1.0 mm, 55° shore A		9	100	093640-075-00



1



2



3



4

Order no.

## Desorption tubes for TDU

The following desorption tubes are designed for the GERSTEL Thermal Desorption Unit (TDU).  
Dimensions: OD 6 mm (ID 4 mm), length 60 mm

### straight with notch

For desorption of GERSTEL Twisters or for liquid injection and thermal desorption of samples with involatile residue in combination with GERSTEL Microvials

10 units	<b>013010-010-00</b>
100 units	<b>013010-100-00</b>



## Desorption tubes for use with TDS, TDS A2 or Tube Conditioner (TC)

### empty tubes

for Twisters with film thickness up to 1 mm,  
6 mm OD, 4.5 mm ID, 1 package (10 units)

**012518-010-00**



### Tweezers

**009999-025-00**



Order no.



**Twister® Back Extraction (TBE) kit for the MPS**

**Consists of:**

- PDMS Twisters, film thickness 0.5 mm, length 10mm (10 units)
- 2 ml vials (100 units)
- magnetic screw caps (100 units)
- 200 µl inserts (100 units)
- Opening lock for agitator

**Requires, but does not include:**

GERSTEL MPS with agitator incl. 2 mL inserts and GERSTEL MAESTRO software

012195-099-00



**TBE Supplies**

**GERSTEL Twister®**

for Stir Bar Sorptive Extraction (SBSE) with polydimethylsiloxane phase (PDMS)

**film thickness 0.5 mm, length 10mm**

10 units	<b>011222-001-00</b>
100 units	<b>011222-002-00</b>

**Screw cap vials**



Vials	mL	Thread Ø	unit	Part no.
Clear, Ø11.6 x 32 mm, for 10 mm Twisters	1.5	9	100	<b>093640-046-00</b>

**Microliter inserts for TBE**



For 10 mm Twisters: Insert Ø 6 x 31 mm, clear, flat bottom	0.2		100	<b>093640-047-00</b>
---	-----	--	-----	----------------------

**Screw caps with septa**



UltraClean™, magnetic, golden Septum: Silicone white/PTFE red 1.0 mm	9		100	<b>093640-079-00</b>
---	---	--	-----	----------------------

## GERSTEL Twicester®

Order no.

The GERSTEL Twicester® offers a simple possibility to position one or more Twisters magnetically on the inner wall of a sample vial for more efficient sample extraction. The Twicester approach enables the extraction of a sample using more Twisters simultaneously, for example using Twisters with different types of phases for a more complete combined extraction and improved analyte recovery. The method, referred to as Multi-Stir Bar Sorptive Extraction (mSBSE), was developed in a cooperation between GERSTEL K.K., Tokyo, Japan, and the Research Institute for Chromatography (RIC) of Professor Pat Sandra in Kortrijk, Belgium. Twicester is well suited for the simple and efficient determination of a wide range of flavor compounds in aqueous matrices and it has been used successfully for the analysis of beverages.

A key element of the method is the use of both PDMS- and EG-Silicone Twisters in one vial and the simultaneous desorption of both Twisters combined into a single GC/MS run. While the PDMS Twister stirs the sample extracting non-polar to medium polarity compounds, the EG-Silicone Twister is held in position on the inside wall of the vial by the Twicester clip. The EG-Silicone Twister very efficiently extracts more polar compounds that form hydrogen bonds as hydrogen donors, for example phenols. Twicester can be used to place Twisters in the liquid phase or in the headspace as required.



### GERSTEL Twicester evaluation kit

**Consists of:**

- 3 PDMS Twister 10 x 0,5 mm
- 3 EG Silicone Twister
- 3 Twister holder for 10/20 mL Vials
- 1 Tweezers



016920-203-00

### GERSTEL Twicester kit

**Consists of:**

- 10 PDMS Twister 10 x 0,5 mm
- 10 EG Silicone Twister
- 10 Twister holder for 10/20 mL Vials
- 1 Tweezer



016920-210-00

### Twister holder

Magnetic clip for Twicester operation for 10mL/20mL vials with screw caps

10 units

019184-010-00





**GERSTEL**

**GERSTEL GmbH & Co. KG**

Eberhard-Gerstel-Platz 1  
45473 Mülheim an der Ruhr  
Germany

☎ +49 (0) 208 - 7 65 03-0  
☎ +49 (0) 208 - 7 65 03 33  
@ gerstel@gerstel.com  
🌐 www.gerstel.com

**GERSTEL Worldwide**

**GERSTEL, Inc.**

701 Digital Drive, Suite J  
Linthicum, MD 21090  
USA

☎ +1 (410) 247 5885  
☎ +1 (410) 247 5887  
@ sales@gerstelus.com  
🌐 www.gerstelus.com

**GERSTEL AG**

Wassergrabe 27  
CH-6210 Sursee  
Switzerland

☎ +41 (41) 9 21 97 23  
☎ +41 (41) 9 21 97 25  
@ swiss@ch.gerstel.com  
🌐 www.gerstel.ch

**GERSTEL K.K.**

1-3-1 Nakane, Meguro-ku  
Tokyo 152-0031  
SMBC Toritsu-dai Ekimae Bldg 4F  
Japan

☎ +81 3 5731 5321  
☎ +81 3 5731 5322  
@ info@gerstel.co.jp  
🌐 www.gerstel.co.jp

**GERSTEL LLP**

10 Science Park Road  
#02-18 The Alpha  
Singapore 117684

☎ +65 6779 0933  
☎ +65 6779 0938  
@ SEA@gerstel.com  
🌐 www.gerstel.com

**GERSTEL Brasil**

Av. Pascoal da Rocha Falcão, 367  
04785-000 São Paulo - SP Brasil

☎ +55 (11)5665-8931  
☎ +55 (11)5666-9084  
@ gerstel-brasil@gerstel.com  
🌐 www.gerstel.com.br

Information, descriptions and specifications in this Publication are subject to change without notice.

Ver. 2015/10/28

To download the latest version, please go to : [www.gerstel.com/en/supplies.htm](http://www.gerstel.com/en/supplies.htm)  
GERSTEL, GRAPHPACK, TWISTER and TWICESTER are registered trademark of GERSTEL GmbH & Co. KG

©Copyright by GERSTEL GmbH & Co.KG

Agilent is trademark of Agilent Technologies, Inc.; Carbotrap B and Carbotrap C are trademarks of Sigma-Aldrich Biotechnology L.P.; HP is trademark of Hewlett-Packard Development Company, L.P.; Kalrez® and Viton® are trademarks of Dupont Performance Elastomers; Teflon® is trademark of E. I. Du Pont de Nemours & Company; Tenax® TA is trademark of Buchem B.V.

