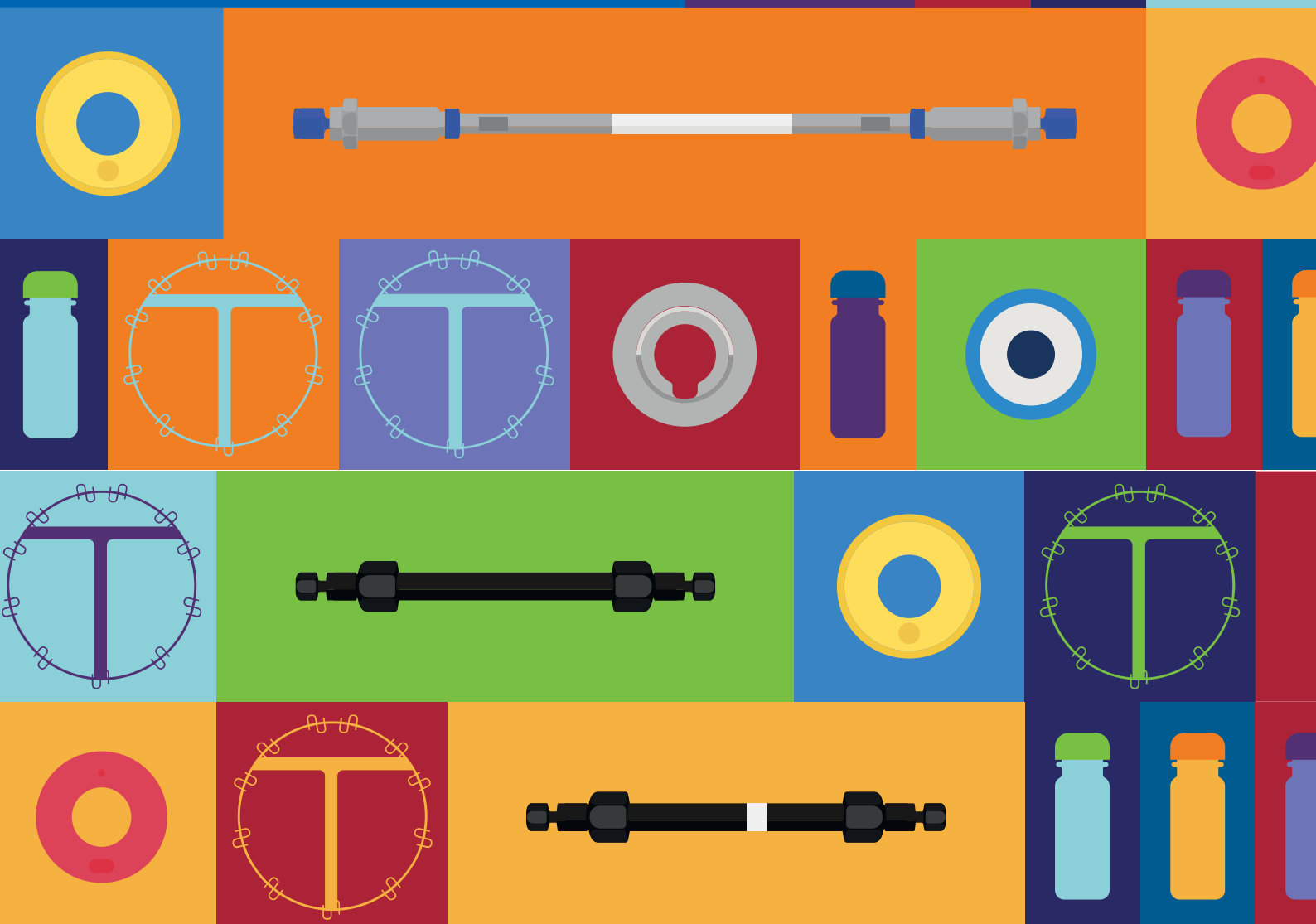


thermo scientific



# Connected chromatography solutions

2019/2021 Chromatography Consumables Catalog

**ThermoFisher**  
SCIENTIFIC

# GC reagents

Making the undetectable,  
detectable

Improve separation and detection for  
GC and GC-MS applications with our  
selection of derivatization reagents.



## The ideal derivatization procedure will:

- Accomplish the desired modification.
- Proceed quantitatively, or at least reproducibly.
- Produce products that are readily distinguishable and separable from the starting materials.
- Proceed rapidly with simple and straightforward laboratory techniques that will be both selective and applicable to a number of similar compounds.
- Involve reagents and reactions that present no unusual hazards.

## Why derivatize:

- To make a compound that otherwise could not be analyzed by a particular method suitable for analysis.
- To improve the analytical efficiency of the compound.
- To improve the detectability of the compound.

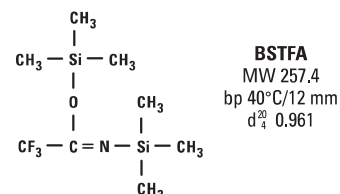
For more information visit [thermofisher.com/GCreagents](https://www.thermofisher.com/GCreagents)

## Silylation reagents

### BSTFA and BSTFA + TMCS

For excellent chromatographic separations and difficult-to-silylate compounds

- Increased volatility makes it possible to derivatize smaller molecules with which the TMS derivatives elute with the byproducts from BSA
- Excellent for derivatizing fatty acid amides, slightly hindered hydroxyls and other compounds
- Catalyzed formulation is stronger than BSTFA alone



#### BSTFA and BSTFA + TMCS

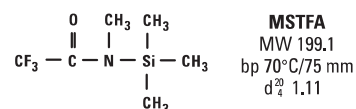
Description	Quantity	Cat. No.	Quantity
BSTFA	10 × 1mL ampules	TS-38830	1 Pack
	25g	TS-38828	1 Each
	100g	X TS-38829	1 Each
BSTFA + 1% TMCS	10 × 1mL ampules	TS-38831	1 Pack
	10g	TS-38832	1 Each
	25g	TS-38833	1 Each
	100g	X TS-38834	1 Each
BSTFA + 10% TMCS	10 × 1mL ampules	TS-38840	1 Pack

X in the ordering table indicates that hazardous shipping charges apply.

### MSTFA and MSTFA + 1% TMCS

Offers maximum volatility

- Trimethylsilyl donor strength comparable to BSA and BSTFA
- Reacts to replace labile hydrogens on a wide range of polar compounds with a Si(CH<sub>3</sub>)<sub>3</sub> group
- Used to prepare volatile and thermally stable derivatives for GC and GC-MS
- Addition of Thermo Scientific TMCS aids derivatization of amides, secondary amines and hindered hydroxyls not derivatized by MSTFA alone



#### MSTFA and MSTFA + 1% TMCS

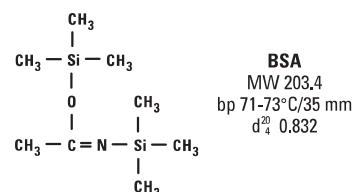
Description	Quantity	Cat. No.	Quantity
MSTFA	10 × 1mL ampules	TS-48910	1 Pack
	10g	TS-48911	1 Each
	25mL	TS-48913	1 Each
	100mL	X TS-48914	1 Each
MSTFA + 1% TMCS	10 × 1mL ampules	TS-48915	1 Pack

X in the ordering table indicates that hazardous shipping charges apply.

## BSA

The perfect reagent for rapid silylation reactions

- Highly reactive trimethylsilyl donor that reacts quantitatively to form volatile, stable TMS derivatives
- Reacts quickly and quantitatively under mild conditions with a variety of compounds
- Derivatizes alcohols, amines, amides, carboxylic acids, phenols, steroids, biogenic amines and alkaloids



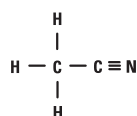
### BSA

Description	Quantity	Cat. No.	Quantity
BSA	10 x 1mL	TS-38836	1 Pack

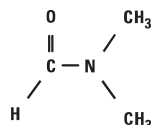
## Silylation grade solvents

Manufactured to meet your exact silylation needs

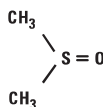
- Purified, dried and packaged under nitrogen in convenient 50mL Hypo-Vial Sample Storage Vials
- Supplied with elastomer septa, allowing immediate access to the sample without exposure to moisture and oxygen
- Use polar solvents (acetonitrile, dimethylformamide, dimethylsulfoxide, pyridine, tetrahydrofuran) to facilitate reactions; nonpolar organic solvents may be used, but they will not accelerate the rate of reaction



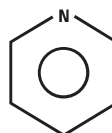
**Acetonitrile**  
MW 41.05  
bp 81.6°C



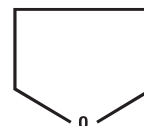
**Dimethylformamide**  
MW 73.09  
bp 153°C



**Dimethylsulfoxide**  
MW 78.13  
bp 189°C



**Pyridine**  
MW 79.10  
bp 115.2°C



**Tetrahydrofuran**  
MW 72.10  
bp 66°C

### Silylation grade solvents

Description	Quantity	Cat. No.	Quantity
Acetonitrile	50mL	X TS-20062	1 Each
Dimethylformamide (DMF)	50mL	X TS-20672	1 Each
Dimethylsulfoxide (DMSO)	50mL	X TS-20684	1 Each
Pyridine	50mL	X TS-27530	1 Each
Tetrahydrofuran (THF)	50mL	X TS-27860	1 Each

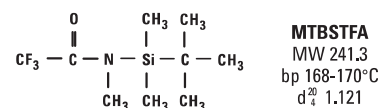
X in the ordering table indicates that hazardous shipping charges apply.

Learn more at [thermofisher.com/GCsreagents](https://www.thermofisher.com/GCsreagents)

## MTBSTFA and MTBSTFA + 1% TBDMCS

Offers stable TBDMS (tert-butyldimethylsilyl) derivatization

- Derivatizes hydroxyl, carboxyl, thiol and primary and secondary amines
- Typical yields are >96%
- Reaction byproducts are neutral and volatile
- Silylating potential increased by adding 1% TBDMCS



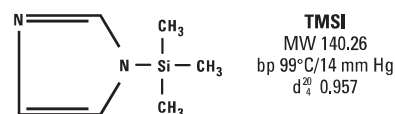
### MTBSTFA and MTBSTFA + 1% TBDMCS

Description	Quantity	Cat. No.	Quantity
MTBSTFA	5mL ampules	TS-48920	1 Each
MTBSTFA + 1% TBDMCS	10 × 1mL	TS-48927	1 Pack

## TMSI (N-Trimethylsilylimidazole)

The strongest silylator available for carbohydrates and steroids

- Reacts quickly and smoothly with hydroxyls and carboxylic acids, but not with amines
- Used in the derivatization of alcohols, phenols, organic acids, steroids, hormones, glycols, nucleotides and narcotics
- Excellent for C1 through C5 fatty acids in serum and urine



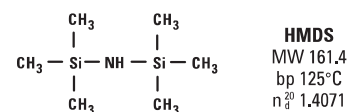
### TMSI

Description	Quantity	Cat. No.	Quantity
TMSI (N-Trimethylsilylimidazole)	10 × 1mL ampules	TS-88623	1 Pack
	25g	TS-88625	1 Each
	100g	TS-88626	1 Each

## HMDS (Hexamethyldisilazane)

The popular choice for silylation of sugars and related substances

- Greatly extends the practical range of GC, improving chromatographic results
- Suitable for deactivating and coating chromatographic supports
- Monofunctional, making polymerization not possible and eliminating surface moisture



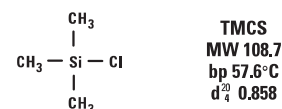
### HMDS

Description	Quantity	Cat. No.	Quantity
HMDS (Hexamethyldisilazane)	25g	TS-84770	1 Each

## TMCS (Trimethylchlorosilane)

An excellent catalyst for difficult-to-silylate compounds

- Excellent adjunct for forming trimethylsilyl ethers for GC determinations
- Used to prepare TMS derivatives of organic acids



### TMCS

Description	Quantity	Cat. No.	Quantity
TMCS	25g	TS-88530	1 Each

## MOX (Methoxyamine) reagent

Useful for preparing oximes of steroids and ketoacids prior to silylation

- 2% methoxyamine HCl (M.W. 83.51) in pyridine
- Prevents formation of multiple derivatives when enols are present during silylation

### MOX Reagent

Description	Quantity	Cat. No.	Quantity
MOX (Methoxyamine) Reagent (2% methoxyamine HCl in pyridine)	10mL	TS-45950	1 Each

Learn more at [thermofisher.com/GCsreagents](https://thermofisher.com/GCsreagents)

## Tri-Sil HTP (HMDS:TMCS:Pyridine) reagent

Reagent-catalyst mixture for one-step derivatization

- Derivatizes carbohydrates, phenols, steroids, sterols, organic acids, alcohols and some amines
- Useful for rapid production of TMS derivatives of polar compounds for gas chromatographic determination and biochemical synthesis
- The versatility, speed and ease of use of Tri-Sil HTP Reagent has made it the most widely used silylation formulation available

### Tri-Sil HTP reagent

Description	Quantity	Cat. No.	Quantity
Tri-Sil HTP Reagent HMDS:TMCS:Pyridine (2:1:10)	10 × 1mL ampules	TS-48999	1 Pack
Tri-Sil HTP Reagent HMDS:TMCS:Pyridine (2:1:10)	50mL	X TS-49001	1 Each

X in the ordering table indicates that hazardous shipping charges apply.

## Tri-Sil BP (BSA:Pyridine) reagent

Derivatizes alcohols, phenols, organic acids, aromatic amides and amines

Tri-Sil BP Reagent reacts with:

- Alcohols, phenols, some enols and other hydroxyl and polyhydroxyl compounds to form trimethylsilyl esters
- Organic acids to form trimethylsilyl esters
- Aromatic amides to form N-trimethylsilyl derivatives
- Amino acids to form both N- and O-trimethylsilyl derivatives
- Amines to form N-trimethylsilyl derivatives

### Tri-Sil BP reagent

Description	Quantity	Cat. No.	Quantity
Tri-Sil BP Reagent (2.5mEq/mL BSA in pyridine)	25mL	TS-49012	1 Each

## Tri-Sil TBT (TMSI:BSA:TMCS) reagent

A catalyzed silylation reagent formulation containing three parts TMSI, three parts BSA and two parts TMCS

- Converts all classes of hydroxyl groups to TMS ethers
- Under usual conditions, the reaction is complete in a short period of time at 60 to 80°C, although very hindered hydroxyls may require several hours

### Tri-Sil TBT reagent

Description	Quantity	Cat. No.	Quantity
Tri-Sil TBT Reagent TMSI:BSA:TMCS (3:3:2)	10 × 1mL ampules	TS-49016	1 Pack

## Tri-Sil TP (TMSI:Pyridine) reagent

Derivatizes hydroxyl compounds, particularly carbohydrates

- Silylates alcohols and phenols, organic acids, hydroxylamines, amino acids, carbohydrates, flavonoids, glycols and polyglycols, nucleotides, steroids, hydroxyl acids, barbiturates, narcotics, indoles and vitamins
- Does not react with amines
- May be used with water as long as there is enough reagent present to react with both the water and the sample

### Tri-Sil TP reagent

Description	Quantity	Cat. No.	Quantity
Tri-Sil TP Reagent TMSI: Pyridine (1:4)	10 × 1mL ampules	TS-49230	1 Pack
Tri-Sil TP Reagent TMSI: Pyridine (1:4)	25mL	TS-49231	1 Each

Learn more at [thermofisher.com/GCsreagents](https://www.thermofisher.com/GCsreagents)

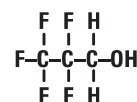


## Acylation reagents

### Pentafluoropropanol

Purified for GC-MS applications

- Addition of fluorine atoms into compounds greatly enhances the sensitivity of certain detectors for all those materials
- Carboxylic acids can be derivatized using a two-step reaction involving reaction with anhydride, followed by a fluorinated alcohol



#### Pentafluoropropanol

MW 150.05  
bp 80.6°C  
d<sub>4</sub><sup>20</sup> 1.2880

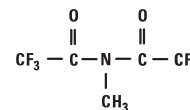
#### Pentafluoropropanol

Description	Quantity	Cat. No.	Quantity
Pentafluoropropanol	10 x 1mL ampules	TS-65195	1 Pack

### MBTFA

For trifluoroacylating primary and secondary amines, hydroxyl and thiol groups and carbohydrates

- Reacts under non-acidic conditions
- Principle byproduct from the derivatization reaction is N-methyltrifluoroacetamide, which is stable, volatile and does not present problems in subsequent GC
- Produces very volatile derivatives of carbohydrates
- Can be used to selectively acylate amines in the presence of hydroxyl and carboxyl groups that have been protected by silylation



**MBTFA**  
MW 223.08  
bp 123-124°C  
d<sub>4</sub><sup>20</sup> 1.55

#### MBTFA

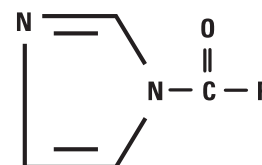
Description	Quantity	Cat. No.	Quantity
MBTFA [N-Methyl- bis(trifluoroacetamide)]	10 x 1mL ampules	TS-49700	1 Pack
	25mL	TS-49703	1 Each
	100mL	X TS-49704	1 Each
	5g	TS-49701	1 Each

X in the ordering table indicates that hazardous shipping charges apply.

## Perfluoroacylimidazoles (HFBI and TFAI)

Offer effective acylation of hydroxyl groups and primary and secondary amines

- Reactions are smooth, quantitative and produce no acid byproducts
- Excellent for FID and ECD techniques
- Derivatives are volatile, despite size of group
- Closely bound fluorines contribute to stability



R	Name	M.W.	Boiling Point
C <sub>3</sub> F <sub>7</sub>	HFBI	264.10	57 to 58°C/10mm
CF <sub>3</sub>	TFAI	164.08	38 to 40°C/14mm

### Perfluoroacylimidazoles (HFBI and TFAI)

Description	Quantity	Cat. No.	Quantity
HFBI	5g	* TS-44211	1 Each
TFAI	10 x 1mL ampules	TS-48882	1 Pack

\* indicates that additional dry ice and/or freight charges apply.

## Perfluoro acid anhydrides (TFAA, PFAA and HFAA)

Highly purified for optimal preparation of fluoracyl derivatives

- Used to prepare fluoracyl derivatives for GC-MS
- Produce stable volatile derivatives for FID and ECD techniques



### Perfluoro acid anhydrides

Description	Quantity	Cat. No.	Quantity
TFAA (Trifluoroacetic Acid Anhydride)	100g	X TS-67363	1 Each
PFAA (Pentafluoropropionic Acid Anhydride)	10 x 1mL ampules	TS-65193	1 Pack
PFAA	25g	X TS-65192	1 Each
PFAA	100g	X TS-65191	1 Each
HFAA (Heptafluorobutyric Acid Anhydride)	10 x 1mL ampules	TS-63164	1 Pack
HFAA	25g	X TS-63163	1 Each
HFAA	100g	X TS-63162	1 Each

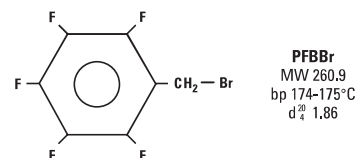
X in the ordering table indicates that hazardous shipping charges apply.

## Alkylation reagents

### Pentafluorobenzyl bromide (PFBBr)

For electron capture GC analysis of carboxyl acids, phenols and sulfonamides

- Fast reaction times for extraction alkylation technique: ~20 minutes
- Derivatives are highly EC-sensitive
- Analysis of trace organics in asphalt

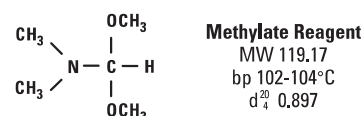


### Methylate reagent (DMFDMA)

For easy, effective preparation of methyl esters from fatty acids and amino acids

Advantages for preparation of methyl esters for gas chromatography:

- Speed: the reaction is complete upon dissolution (except long chain solid acids)
- No water washing, extraction or concentration of derivatives required
- No water formed
- Convenient: ready-to-use reagent contains 2mEq/mL pyridine



#### Methylate reagent

Description	Quantity	Cat. No.	Quantity
Methylate Reagent (N, N-Dimethylformamide dimethyl acetal)	25mL	TS-49350	1 Each



## MethElute reagent (TMPAH)

Provides accurate sensitive on-column methylation

- 0.2M trimethylanilinium hydroxide (TMPAH) in methanol solution
- For quantitative methylation and detection of barbiturates, sedatives, xanthine bases, phenolic alkaloids and phenytoin by gas chromatography
- Single quantitative peak for each substance
- Comparable to or better than UV/TLC method (when phenobarbital and phenytoin are present, GC is superior to UV/TLC)
- Coefficient of variation is 5% or less
- Detects barbiturates to 0.2mg/dL

### MethElute reagent

Description	Quantity	Cat. No.	Quantity
MethElute Reagent (TMPAH)	10mL	TS-49300	1 Each
MethElute Reagent (TMPAH)	12 × 1mL ampules	TS-49301	1 Pack

Learn more at [thermofisher.com/GCsreagents](https://thermofisher.com/GCsreagents)



## Siliconizing fluids

### Water-soluble siliconizing fluid

Attaches the silane polymer, octadecyltrialkylsilane, to make the surface inert or polymerizes to create an inert film

- Easy-to-use silane monomer solution that is supplied as a 20% solid solution in a mixture of diacetone alcohol and tertiary butyl alcohol
- Greater resistance to base hydrolysis than other surface treatments
- Can be used on plastic surfaces

#### Water-soluble siliconizing fluid

Description	Quantity	Cat. No.	Quantity
Siliconizing Fluid-Water Soluble	120mL	X TS-42799	1 Each

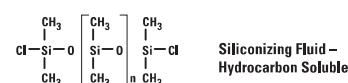
X in the ordering table indicates that hazardous shipping charges apply.

### Hydrocarbon-soluble siliconizing fluid

Attaches a short-chain silane polymer to make the surface inert or polymerizes to create an inert film

When applied to glass, quartz or similar materials, the unhydrolyzed chlorines present on the chain react with surface silanols to form a neutral, hydrophobic and tightly bonded film over the entire surface.

- Soluble in organic solvents
- Excellent for modifying metals, glass, ceramics and fiber optics
- Can be used for certain plastic surfaces
- Well-suited for treatment of GC injection port liners



#### Hydrocarbon-soluble siliconizing fluid

Description	Quantity	Cat. No.	Quantity
Siliconizing Fluid-Hydrocarbon Soluble	120mL	X TS-42800	1 Each
Siliconizing Fluid-Hydrocarbon Soluble	480mL	X TS-42801	1 Each

X in the ordering table indicates that hazardous shipping charges apply.