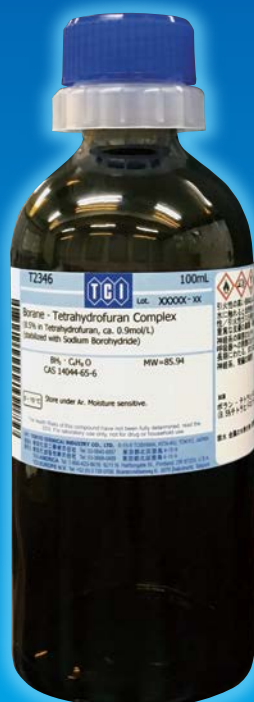


# DualSeal

## Airtight-Double-Cap Bottled Reagents



Volatile Solutions

Metallic Salt Solutions

Dehydrated Solvents

Organometallic Reagents

# DualSeal

## Airtight-Double-Cap Bottled Reagents

TCI introduced our newly developed double cap system "DualSeal" for moisture/oxygen-sensitive products, allowing you to keep them in good condition until the last drop. We will continuously increase our usage of DualSeal across our product portfolio.



### Features of DualSeal

- Highly airtight double cap structure.
- Air-sensitive reagents can be safely dispensed without exposure to air.
- Even after piercing the septum cap, the PTFE sheet on the blue outer cap provides sealing protection.
- Easy to dispose of caps and bottles separately.



Outer cap (Blue)

### DualSeal specification

DualSeal consists of two parts: the blue outer cap and the white septum cap, both of which can be screwed on and off.

No additional sealing is required after piercing the septum cap with a needle. Just screw the outer cap back in place.

The outer cap has a convex structure on the inside. By filling the space where air and moisture stay, the material is protected from moisture and oxygen even after piercing the septum cap with a needle.

#### Caution

Do not dispose of the inlaid PTFE sheet! Keep it as is during use! This PTFE sheet acts as a second layer air seal.



Septum cap (white)

The white septum cap has a wide septum surface for ease of use, and features two layers of rubber and a highly chemically resistant PTFE seal. The septum cap body is made of polypropylene and contains a screw thread allowing for easy removal from the bottle. The septum cap is closed with high torque to ensure an airtight seal. Open the septum cap only when all of the liquid has been used up and you want to prepare for the disposal of the bottle.

#### Caution

Do not place anything on the septum cap! This will significantly reduce seal quality. The cap and bottle can be separated for disposal. It is easy to dispose of caps and bottles separately. Highly reactive reagents may be residing inside the cap. Please take the necessary precautions to avoid accidents due to exposure to oxygen or moisture. Dispose of the bottle and the caps separately after ensuring that no chemical residue is left behind.

### How to use DualSeal

#### In case using a needle (1):

#### Solvents except for Halogenated hydrocarbon solvents

1. Clamp and secure the reagent bottle before opening.
2. Carefully unscrew the blue outer cap only. Place the cap near the bottle while in use.
3. To prevent air from entering the container, insert a needle with a balloon filled with an inert gas such as argon or nitrogen. Then insert a syringe needle through the septum surface of the septum cap.
4. Fill the syringe with the required amount of liquid.
5. Remove the syringe, inject the liquid into your reaction vessel and safely dispose of the needle.
6. Take the outer cap and screw it tightly back in place.

\*Repeated use can lead to increasing the number of holes or increasing the size of existing holes and will over time lead to an increase in air leakage. To prevent deterioration of the septum, reduce the number of injections as much as possible, or purchase a smaller sized bottle.



### In case using a needle (2):

#### Halogenated hydrocarbon solvents such as dichloromethane

1. Clamp and secure the reagent bottle before opening.
2. Carefully unscrew the blue outer cap only. Place the cap near the bottle while in use.
3. Attach a needle to the PTFE tube for liquid delivery connected to the reaction vessel filled with the inert gas. Puncture the septum with the needle so that the needle tip reaches the bottom of the reagent bottle.
4. A syringe filled with an inert gas or a needle connected to an inert gas pump punctures the septum, and the inert gas is sent into the void of the reagent bottle to send the liquid.
5. Remove the needle of the liquid feeding tube first, and then remove the needle that was feeding the inert gas.
6. Take the outer cap and screw it tightly back in place. However, it is recommended that the minimum number of removals be made, as the holes will be degraded by the vapor of the halogenated hydrocarbon solvent.

### How to remove the septum cap

Open the septum cap only when all of the liquid has been used up and you want to prepare for the disposal of the bottle.

1. Clamp and secure the bottle before opening.
2. Open the septum cap by unscrewing. (The septum cap is tightly closed with high torque to ensure airtightness. Using tools such as water pump pliers is recommended.)

\*Do not remove the outer cap when you remove the septum cap. Take extra care to avoid any spillage of inner liquid.

### Notes on bottle disposal

The cap and bottle can be separated for disposal.

- Remove DualSeal by referring to "How to remove the septum cap".
- Highly reactive reagents may be residing inside the cap. Please take the necessary precautions to avoid accidents due to exposure to oxygen or moisture.
- Dispose of the bottle and the caps separately after ensuring that no chemical residue is left behind.

## DualSeal (Double Cap) Sealability Test: Moisture Analysis

In order to evaluate the sealability of DualSeal, we periodically measure and monitor the moisture increment by Karl Fischer method after piercing the septum of a 500 mL bottle by a needle.

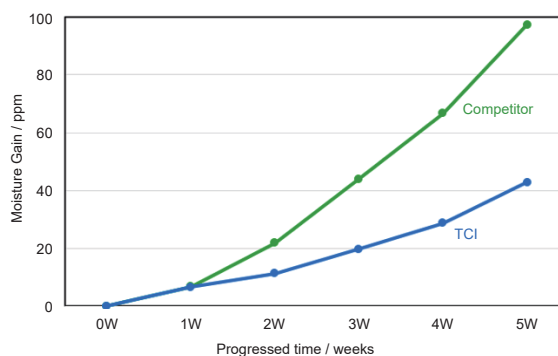
### Measurement condition

500 mL anhydrous tetrahydrofuran (TCI product number: T2394) was compared with a competitor's 500 mL anhydrous tetrahydrofuran.

The septum moiety was pierced using an 18 gauge needle at 4 different positions every week (in total, 20 different positions pierced in 5 weeks).

After piercing, the sample solvent was taken and the water content was measured by the Karl Fischer method.

After sampling, the septum was sealed by an outer cap with 1.5 Nm torque and the sealed bottle was stored in a closed environment at ca. 24 °C, ca. 75 % RH (relative humidity).



Periodical measurement to monitor moisture increment every week (5 weeks in total) showed a remarkable difference in the water content (in ppm) between TCI and the competitor's samples. This result indicates that the PTFE sheet inside the outer cap can tightly seal the septum and the outer cap.

As a result, use of the DualSeal can maintain the quality of product in a sealed bottle for a long time.

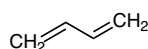
\* Not available for smaller than the 100 mL or 100 g size bottles.

\* We are not selling the DualSeal cap itself.

\* Since the septum cap part of DualSeal contains butyl rubbers, it is not durable enough for halogenated hydrocarbon solvents such as dichloromethane. Accordingly, the minimum number of needle punctures is recommended, as it is possibly degraded by the vapor of the solvent once a hole is made.

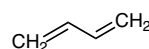
## Volatile Solutions

B4358 100mL 500mL



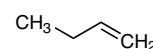
1,3-Butadiene  
(ca. 15% in Hexane)  
CAS RN: 106-99-0

B4359 100mL 500mL



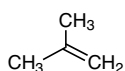
1,3-Butadiene  
(ca. 15% in Toluene)  
CAS RN: 106-99-0

B4411 100mL 500mL



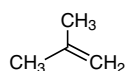
1-Butene (ca. 10% in Toluene)  
CAS RN: 106-98-9

I0909 100mL 500mL



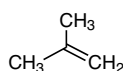
Isobutene  
(ca. 8% in Dichloromethane)  
CAS RN: 115-11-7

I0910 100mL 500mL



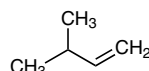
Isobutene  
(ca. 10% in Isopropyl Ether)  
CAS RN: 115-11-7

I0911 100mL 500mL



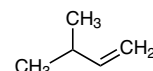
Isobutene  
(ca. 15% in Tetrahydrofuran)  
CAS RN: 115-11-7

M2563 100mL 500mL



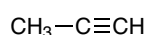
Isoamylene  
(ca. 15% in Dichloromethane,  
ca. 2.5mol/L)  
CAS RN: 563-45-1

M2565 100mL 500mL



Isoamylene  
(ca. 12.5% in Tetrahydrofuran,  
ca. 1.5mol/L)  
CAS RN: 563-45-1

P2295 100mL 500mL



Propyne (ca. 5% in  
Tetrahydrofuran, ca. 1mol/L)  
CAS RN: 74-99-7

M2813 100mL



Methyl Chloride (ca. 5.7% in  
Tetrahydrofuran, ca. 1mol/L)  
CAS RN: 74-87-3

T3957 100mL



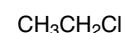
Trifluoroiodomethane (ca. 10%  
in Tetrahydrofuran, ca. 0.5mol/L)  
CAS RN: 2314-97-8

T3958 100mL



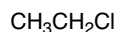
Trifluoroiodomethane  
(ca. 10% in Dimethyl Sulfoxide,  
ca. 0.6mol/L)  
CAS RN: 2314-97-8

C2882 100mL 500mL



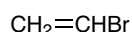
Chloroethane (ca. 17% in  
Ethyl Ether, ca. 2.0mol/L)  
CAS RN: 75-00-3

C2883 100mL 500mL



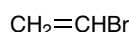
Chloroethane (ca. 15% in  
Tetrahydrofuran, ca. 2.0mol/L)  
CAS RN: 75-00-3

V0126 100mL



Vinyl Bromide (ca. 14% in  
Ethyl Ether, ca. 1.0mol/L)  
CAS RN: 593-60-2

V0127 100mL



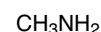
Vinyl Bromide (ca. 12% in  
Tetrahydrofuran, ca. 1.0mol/L)  
CAS RN: 593-60-2

M1016 100mL 500mL



Methylamine  
(40% in Methanol, ca. 9.8mol/L)  
CAS RN: 74-89-5

M2323 100mL



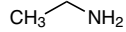
Methylamine  
(ca. 9% in Ethanol, ca. 2mol/L)  
CAS RN: 74-89-5

M2108 100mL 500mL



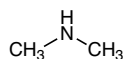
Methylamine (ca. 7% in  
Tetrahydrofuran, ca. 2mol/L)  
CAS RN: 74-89-5

E0531 100mL



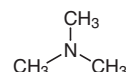
Ethylamine  
(30-40% in Methanol)  
CAS RN: 75-04-7

D3948 100mL 500mL



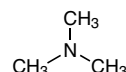
Dimethylamine (ca. 10% in  
Tetrahydrofuran, ca. 2mol/L)  
CAS RN: 124-40-3

T2704 100mL 500mL



Trimethylamine (ca. 13% in  
Tetrahydrofuran, ca. 2mol/L)  
CAS RN: 75-50-3

T3614 100mL



Trimethylamine (ca. 8% in  
Toluene, ca. 1mol/L)  
CAS RN: 75-50-3

H1060 500mL



Hydrogen Chloride  
(ca. 1mol/L in Ethyl Acetate)  
CAS RN: 7647-01-0

H1061 100mL 500mL



Hydrogen Chloride  
(ca. 1mol/L in Ethyl Ether)  
CAS RN: 7647-01-0

H1062 100mL 500mL



Hydrogen Chloride  
(ca. 4mol/L in 1,4-Dioxane)  
CAS RN: 7647-01-0

X0041 100mL 500mL

Hydrogen Chloride -  
Methanol Reagent (5-10%)  
[for Esterification]  
CAS RN: 7647-01-0

H0959 100mL 500mL

Hydrogen Bromide -  
Ethanol Reagent  
(10-20%) [for Esterification]  
CAS RN: 10035-10-6

U0147 100mL



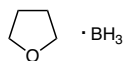
Sulfur Dioxide (ca. 8% in  
Tetrahydrofuran, ca. 1.2 mol/L)  
CAS RN: 7446-09-5

U0148 100mL



Sulfur Dioxide (ca. 2.5% in  
Dichloromethane, ca. 0.5 mol/L)  
CAS RN: 7446-09-5

T2346 100mL 500mL



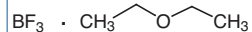
Tetrahydrofuran Borane (8.5%  
in Tetrahydrofuran, ca. 0.9mol/L)  
(stabilized with Sodium Borohydride)  
CAS RN: 14044-65-6

D1843 100mL



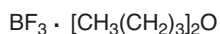
Dimethyl Sulfide Borane  
CAS RN: 13292-87-0

B0527 100mL 500mL



Boron Trifluoride -  
Ethyl Ether Complex  
CAS RN: 109-63-7

B2074 100mL 500mL



Boron Trifluoride - Butyl  
Ether Complex (BF<sub>3</sub> ca. 30%)  
CAS RN: 593-04-4

## Metallic Salt Solutions

L0186 100mL



Lithium Borohydride  
(ca. 4mol/L in Tetrahydrofuran)  
CAS RN: 16949-15-8

L0222 100mL



Lithium Chloride (2.3% in  
Tetrahydrofuran, ca. 0.5mol/L)  
CAS RN: 7447-41-8

T2052 100mL 500mL



Titanium(IV) Chloride (14% in  
Dichloromethane, ca. 1.0mol/L)  
CAS RN: 7550-45-0

T2053 100mL



Tin(IV) Chloride (ca. 1.0mol/L  
in Dichloromethane)  
CAS RN: 7646-78-8

Z0019 100mL



Zinc Chloride (ca. 7% in  
Tetrahydrofuran, ca. 0.5mol/L)  
CAS RN: 7646-85-7

Z0020 100mL



Zinc Chloride (ca. 25% in  
2-Methyltetrahydrofuran,  
ca. 2mol/L)  
CAS RN: 7646-85-7

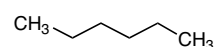
## Dehydrated Solvents

D3478 500mL



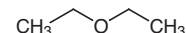
Dichloromethane  
Anhydrous (stabilized with  
2-Methyl-2-butene)  
CAS RN: 75-09-2

H1197 500mL



Hexane Anhydrous  
CAS RN: 110-54-3

D3479 500mL



Diethyl Ether Anhydrous  
(stabilized with BHT)  
CAS RN: 60-29-7

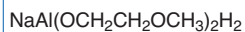
T2394 500mL



Tetrahydrofuran Anhydrous  
(stabilized with BHT)  
CAS RN: 109-99-9

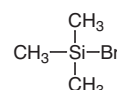
## Organometallic Reagents

S0467 100g 500g



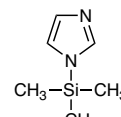
Sodium Bis(2-methoxyethoxy)-  
aluminum Dihydride  
(70% in Toluene, ca. 3.6mol/L)  
CAS RN: 22722-98-1

B1087 25mL 250mL



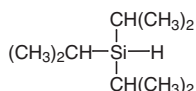
Bromotrimethylsilane  
CAS RN: 2857-97-8

T0585 100g



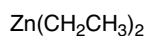
N-Trimethylsilylimidazole  
CAS RN: 18156-74-6

T1533 25mL 100mL



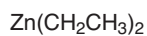
Triisopropylsilane  
CAS RN: 6485-79-6

D3214 100mL 500mL



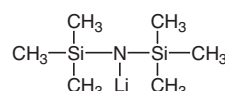
Diethylzinc (ca. 15% in  
Hexane, ca. 1mol/L)  
CAS RN: 557-20-0

D3902 100mL



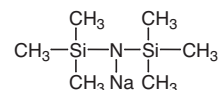
Diethylzinc (ca. 15% in  
Toluene, ca. 1mol/L)  
CAS RN: 557-20-0

H0915 100mL 500mL



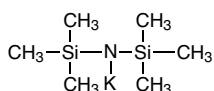
LiHMDS (ca. 26% in  
Tetrahydrofuran, ca. 1.3mol/L)  
CAS RN: 4039-32-1

H0894 100mL 500mL



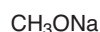
NaHMDS  
(contains 2-Methyl-2-butene) (38%  
in Tetrahydrofuran, ca. 1.9mol/L)  
CAS RN: 1070-89-9

P2730 100mL



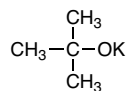
KHMDS  
(14% in Toluene, ca. 0.6mol/L)  
CAS RN: 40949-94-8

S0486 100mL 500mL



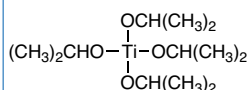
Sodium Methoxide  
(ca. 5mol/L in Methanol)  
CAS RN: 124-41-4

P1619 100mL 500mL



Potassium *tert*-Butoxide  
(12% in Tetrahydrofuran,  
ca. 1mol/L)  
CAS RN: 865-47-4

T0133 500g



Tetraisopropyl  
Orthotitanate  
CAS RN: 546-68-9

\* Not available for smaller than the 100 mL or 100 g size bottles.

\* We are not selling the DualSeal cap itself.

\* Since the septum cap part of DualSeal contains butyl rubbers, it is not durable enough for halogenated hydrocarbon solvents such as dichloromethane. Accordingly, the minimum number of needle punctures is recommended, as it is possibly degraded by the vapor of the solvent once a hole is made.

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## Ordering and Customer Service

### TCI AMERICA

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Fax : 888-520-1075 / 503-283-1987  
E-mail : Sales-US@TCIchemicals.com

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E-mail : Sales-EU@TCIchemicals.com

### TCI Deutschland GmbH

Tel : +49 (0)6196 64053-00  
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E-mail : Sales-DE@TCIchemicals.com

### Tokyo Chemical Industry UK Ltd.

Tel : +44 (0)1865 784560  
E-mail : Sales-UK@TCIchemicals.com

### TCI Chemicals (India) Pvt. Ltd.

Tel : 1800 425 7889 / 044-2262 0909  
Fax : 044-2262 8902  
E-mail : Sales-IN@TCIchemicals.com

### 梯希爱(上海)化成工业发展有限公司

Tel : 800-988-0390 / 021-67121386  
Fax : 021-6712-1385  
E-mail : Sales-CN@TCIchemicals.com

### TOKYO CHEMICAL INDUSTRY CO., LTD.

Tel : +81 (0)3-5640-8878  
E-mail : globalbusiness@TCIchemicals.com

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