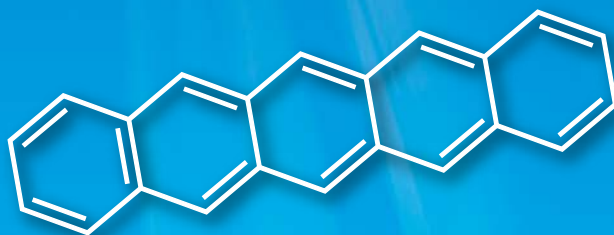


Chemical Compounds Purified by Sublimation



Chemical Compounds Purified by Sublimation

Reagent purity is paramount in countless applications, and is of particular importance when involving electronic materials including polyaromatic hydrocarbons. Pentacene [P0030], [P2524] and *N,N'*-diphenyl-*N,N'*-di(*m*-tolyl)-benzidine [D3236] in particular have garnered increased interest for their applications in organic semiconducting materials. The purification of organic compounds is almost entirely conducted via column chromatography or recrystallization. These mainstay procedures are highly effective, but are limited to compounds soluble in

organic solvents. Many electronic materials including PAHs due to their extensive π conjugation and aromaticity are poorly or completely insoluble in organic solvents. Fortunately, this very π conjugation lends to both high volatility with a relatively high sublimation temperature leading to sublimation purification being a highly effective purification avenue.

To address research and industry demands, TCI has introduced several electronic materials purified by sublimation which can be readily and reliably used in a variety of research applications.

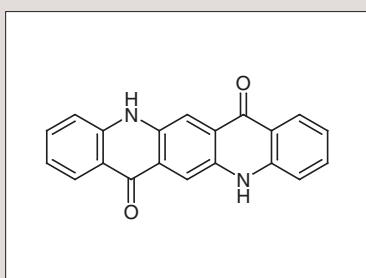
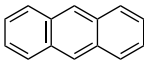
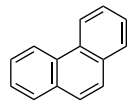
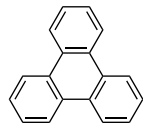
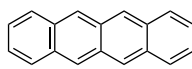
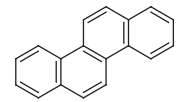
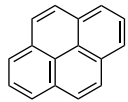
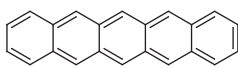
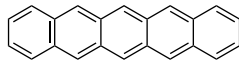
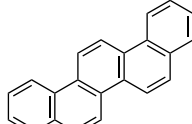
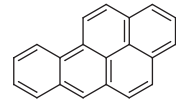
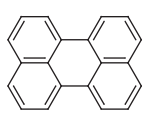
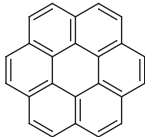
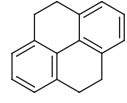
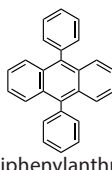
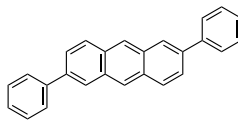


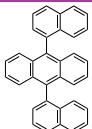
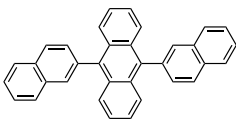
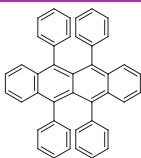
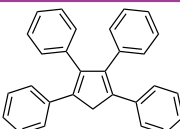
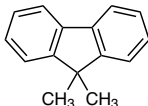
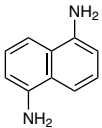
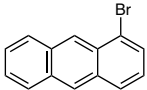
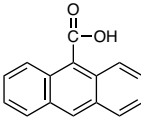
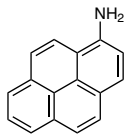
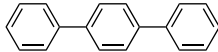
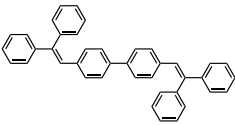
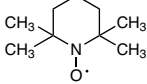
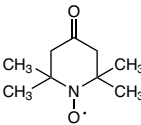
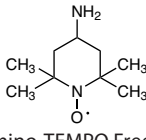
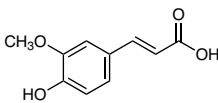



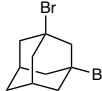

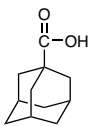
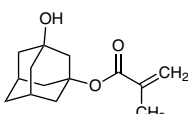
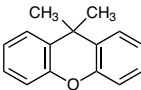
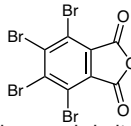
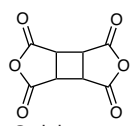
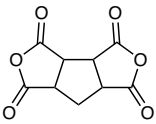
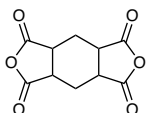
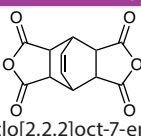
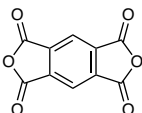
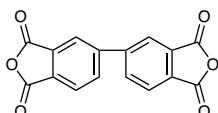
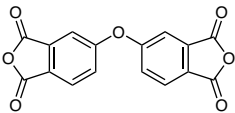
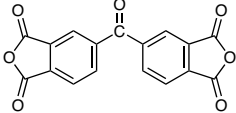
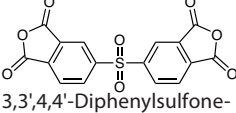
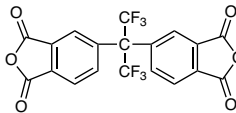
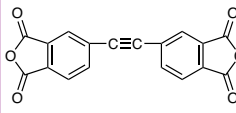
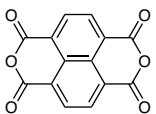
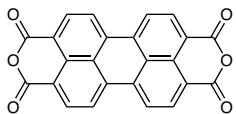
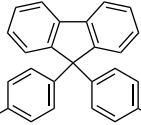
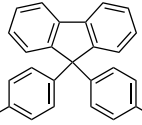
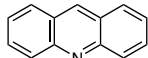
Figure 1. Comparison between the appearances of quinacridone [Q0083] before and after the sublimation

The visual comparison of pre (dark purple) and post (red) sublimated quinacridone [Q0083] highlights the purity and quality improvement from sublimation purification.

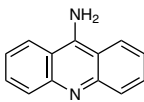
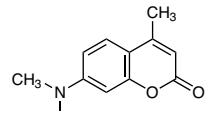
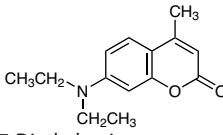
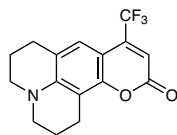
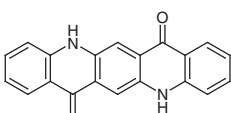
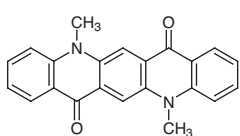
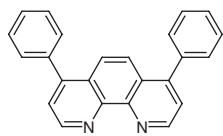
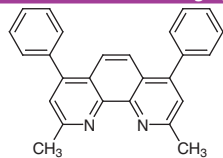
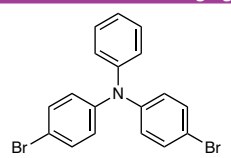
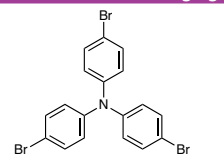
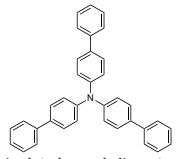
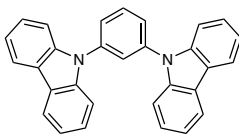
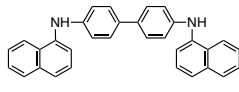
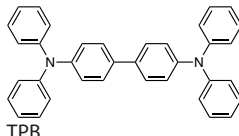
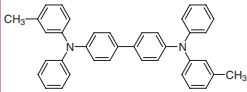
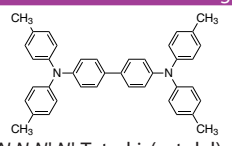
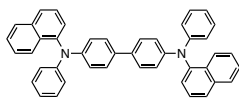
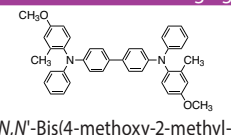
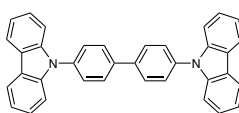
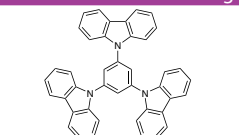
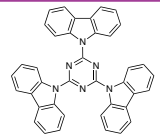
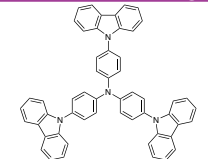
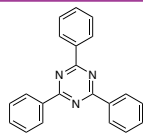
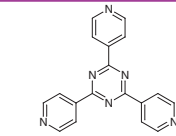
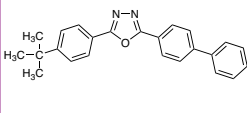
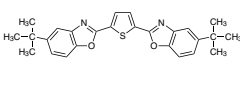
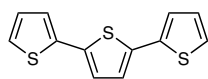
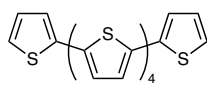
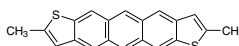
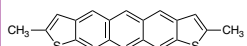
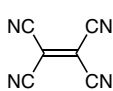
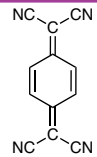
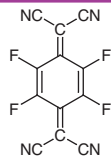
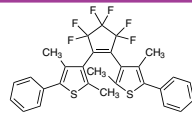
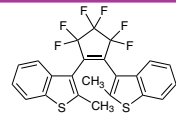
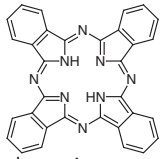
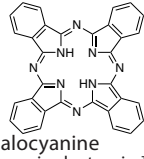
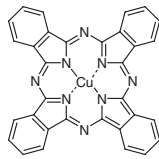
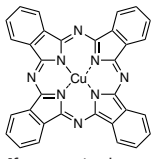
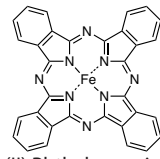
Additional sublimation purified electronic materials are shown below.

| | | | | |
|--|---|---|---|---|
| A3437 5g 25g  Anthracene CAS RN: 120-12-7 | P2877 5g 25g  Phenanthrene CAS RN: 85-01-8 | T3267 200mg 1g  Triphenylene CAS RN: 217-59-4 | N0951 200mg 1g  Naphthacene CAS RN: 92-24-0 | C0339 100mg 1g  Benzo[a]phenanthrene CAS RN: 218-01-9 |
| P2072 1g  Pyrene CAS RN: 129-00-0 | P0030 100m 1g  Pentacene CAS RN: 135-48-8 | P2524 100mg 1g  Pentacene (99.999%, trace metals basis) CAS RN: 135-48-8 | P2207 100mg 500mg  Picene (>99.9%) CAS RN: 213-46-7 | B0085 100mg 1g  3,4-Benzopyrene CAS RN: 50-32-8 |
| P1629 1g  Perylene CAS RN: 198-55-0 | C1961 100mg  Coronene CAS RN: 191-07-1 | T2655 100mg  4,5,9,10-Tetrahydropyrene CAS RN: 781-17-9 | D4401 1g  9,10-Diphenylanthracene CAS RN: 1499-10-1 | D5152 100mg  2,6-Diphenylanthracene CAS RN: 95950-70-2 |

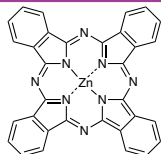
Chemical Compounds Purified by Sublimation

| | | | | |
|--|--|--|---|---|
| D5065 1g  9,10-Di(1-naphthyl)-anthracene CAS RN: 26979-27-1 | D5066 200mg  9,10-Di(2-naphthyl)-anthracene CAS RN: 122648-99-1 | T2233 250mg 1g  Rubrene CAS RN: 517-51-1 | T3771 1g  1,2,3,4-Tetraphenyl-1,3-cyclopentadiene CAS RN: 15570-45-3 | D3810 1g  9,9-Dimethylfluorene CAS RN: 4569-45-3 |
| D5689 1g 5g  1,5-Diaminonaphthalene CAS RN: 2243-62-1 | B3475 1g  1-Bromoanthracene CAS RN: 7397-92-4 | A3299 1g  9-Anthracenecarboxylic Acid CAS RN: 723-62-6 | A3241 1g  1-Aminopyrene CAS RN: 1606-67-3 | T3263 5g 25g  p-Terphenyl CAS RN: 92-94-4 |
| B5139 200mg 1g  DPVBi CAS RN: 142289-08-5 | T3751 1g 5g  TEMPO Free Radical CAS RN: 2564-83-2 | O0521 1g  4-Oxo-TEMPO Free Radical CAS RN: 2896-70-0 | A3235 200mg 1g  4-Amino-TEMPO Free Radical CAS RN: 14691-88-4 | F1257 1g 5g  trans-Ferulic Acid CAS RN: 537-98-4 |
| A3233 5g 25g  Adamantane CAS RN: 281-23-2 | C3557 1g  1-Chloroadamantane CAS RN: 935-56-8 | B5879 1g 5g  1-Bromoadamantane CAS RN: 768-90-1 | D5654 1g 5g  1,3-Dibromoadamantane CAS RN: 876-53-9 | A3234 1g  1-Adamantanamine CAS RN: 768-94-5 |
| A3391 1g 5g  Adamantoic Acid CAS RN: 828-51-3 | H1689 1g 5g  3-Hydroxy-1-adamantyl Methacrylate CAS RN: 115372-36-6 | D5731 1g  9,9-Dimethyl-9H-xanthene CAS RN: 19814-75-6 | T3871 5g  Tetrabromophthalic Anhydride CAS RN: 632-79-1 | C2842 1g 5g  1,2,3,4-Cyclobutane-tetracarboxylic Dianhydride CAS RN: 4415-87-6 |
| C2920 1g 5g  1,2,3,4-Cyclopentane-tetracarboxylic Dianhydride CAS RN: 6053-68-5 | C2919 1g  1,2,4,5-Cyclohexane-tetracarboxylic Dianhydride CAS RN: 2754-41-8 | B4261 5g 25g  Bicyclo[2.2.2]oct-7-ene-2,3,5,6-tetracarboxylic Dianhydride CAS RN: 1719-83-1 | P2103 5g 25g  Pyromellitic Dianhydride CAS RN: 89-32-7 | B4262 5g  4,4'-Bipthalic Anhydride CAS RN: 2420-87-3 |
| O0423 5g  4,4'-Oxydiphthalic Anhydride CAS RN: 1823-59-2 | B4260 5g 25g  4,4'-Carbonyldiphthalic Anhydride CAS RN: 2421-28-5 | D4554 5g 25g  3,3',4,4'-Diphenylsulfone-tetracarboxylic Dianhydride CAS RN: 2540-99-0 | H1438 1g 5g  4,4'-(Hexafluoroisopropylidene)-diphthalic Anhydride CAS RN: 1107-00-2 | E1412 1g 5g  4,4'-(Ethyne-1,2-diyl)-diphthalic Anhydride CAS RN: 129808-00-0 |
| N0755 1g 5g  NTCD CAS RN: 81-30-1 | P2102 1g  3,4,9,10-Perylene-tetracarboxylic Dianhydride CAS RN: 128-69-8 | B4834 1g 5g  9,9-Bis(4-hydroxyphenyl)-fluorene CAS RN: 3236-71-3 | B2654 1g  9,9-Bis(4-aminophenyl)-fluorene CAS RN: 15499-84-0 | A3436 1g 5g  Acridine CAS RN: 260-94-6 |

Chemical Compounds Purified by Sublimation

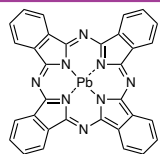
| | | | | |
|---|--|---|--|---|
| <p>A3298 1g</p>  <p>9-Aminoacridine CAS RN: 90-45-9</p> | <p>D5727 1g</p>  <p>7-(Dimethylamino)-4-methylcoumarin CAS RN: 87-01-4</p> | <p>D5730 5g</p>  <p>7-Diethylamino-4-methylcoumarin CAS RN: 91-44-1</p> | <p>C3640 200mg</p>  <p>Coumarin 153 CAS RN: 53518-18-6</p> | <p>Q0083 1g</p>  <p>Quinacridone CAS RN: 1047-16-1</p> |
| <p>D3227 1g</p>  <p>DMQA CAS RN: 19205-19-7</p> | <p>B2695 1g</p>  <p>Bathophenanthroline CAS RN: 1662-01-7</p> | <p>B2694 1g 5g</p>  <p>Bathocuproine CAS RN: 4733-39-5</p> | <p>D5603 200mg 1g</p>  <p>4,4'-Dibromotriphenylamine CAS RN: 81090-53-1</p> | <p>T3777 200mg 1g</p>  <p>Tris(4-bromophenyl)amine CAS RN: 4316-58-9</p> |
| <p>T3778 200mg 1g</p>  <p>Tris(4-biphenyl)amine CAS RN: 6543-20-0</p> | <p>D4087 1g</p>  <p>1,3-Di-9-carbazolylbenzene CAS RN: 550378-78-4</p> | <p>D4768 1g 5g</p>  <p>N,N'-Di(1-naphthyl)benzidine CAS RN: 152670-41-2</p> | <p>T3266 1g 5g</p>  <p>TPB CAS RN: 15546-43-7</p> | <p>D3236 1g 5g</p>  <p>TPD CAS RN: 65181-78-4</p> |
| <p>T3265 1g</p>  <p>N,N,N',N'-Tetrakis(<i>p</i>-tolyl)-benzidine CAS RN: 76185-65-4</p> | <p>D3970 1g 5g</p>  <p>N,N'-Di-1-naphthyl-N,N'-diphenylbenzidine CAS RN: 123847-85-8</p> | <p>B5140 1g 5g</p>  <p>N,N'-Bis(4-methoxy-2-methylphenyl)-N,N'-diphenylbenzidine CAS RN: 169685-34-1</p> | <p>B4219 1g</p>  <p>CBP CAS RN: 58328-31-7</p> | <p>T1934 1g</p>  <p>1,3,5-Tri(9<i>H</i>-carbazol-9-yl)-benzene CAS RN: 148044-07-9</p> |
| <p>T2700 1g 5g</p>  <p>2,4,6-Tri(9<i>H</i>-carbazol-9-yl)-1,3,5-triazine CAS RN: 134984-37-5</p> | <p>T2274 200mg 1g</p>  <p>TCTA CAS RN: 139092-78-7</p> | <p>T3268 1g</p>  <p>2,4,6-Triphenyl-1,3,5-triazine CAS RN: 493-77-6</p> | <p>T1937 1g 5g</p>  <p>2,4,6-Tri(4-pyridyl)-1,3,5-triazine CAS RN: 42333-78-8</p> | <p>B2696 1g 5g</p>  <p>PBD CAS RN: 15082-28-7</p> |
| <p>B4221 1g 5g</p>  <p>2,5-Bis(5-<i>tert</i>-butyl-2-benzoxazolyl)thiophene CAS RN: 7128-64-5</p> | <p>T1196 1g 5g</p>  <p>2,2':5',2''-Terthiophene CAS RN: 1081-34-1</p> | <p>S0504 100mg 1g</p>  <p>6T CAS RN: 88493-55-4</p> | <p>D4617 100mg</p>  <p><i>anti</i>-DMADT CAS RN: 1019983-99-3</p> | <p>D4618 100mg</p>  <p><i>syn</i>-DMADT CAS RN: 1392416-39-5</p> |
| <p>T3264 1g 5g</p>  <p>TCNE CAS RN: 670-54-2</p> | <p>T3034 1g 5g</p>  <p>TCNQ CAS RN: 1518-16-7</p> | <p>T1131 100mg 1g</p>  <p>TCNQF₄ CAS RN: 29261-33-4</p> | <p>B5604 100mg</p>  <p>1,2-Bis(2,4-dimethyl-5-phenyl-3-thienyl)-3,3,4,4,5,5-hexafluoro-1-cyclopentene CAS RN: 172612-67-8</p> | <p>B5623 100mg</p>  <p>1,2-Bis[2-methylbenzo(<i>b</i>)-thiophen-3-yl]-3,3,4,4,5,5-hexafluoro-1-cyclopentene CAS RN: 137814-07-4</p> |
| <p>P1795 1g</p>  <p>Phthalocyanine CAS RN: 574-93-6</p> | <p>P2734 100mg 500mg</p>  <p>Phthalocyanine [for organic electronics] CAS RN: 574-93-6</p> | <p>P1628 1g</p>  <p>CuPc CAS RN: 147-14-8</p> | <p>C3645 100mg 500mg</p>  <p>CuPc [for organic electronics] CAS RN: 147-14-8</p> | <p>I0783 200mg 1g</p>  <p>Iron(II) Phthalocyanine CAS RN: 132-16-1</p> |

Z0037 500mg



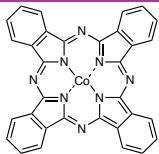
Zinc Phthalocyanine
CAS RN: 14320-04-8

L0230 200mg 1g



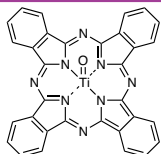
Lead(II) Phthalocyanine
CAS RN: 15187-16-3

C3252 200mg



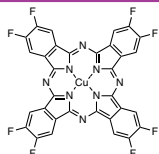
Cobalt(II) Phthalocyanine
CAS RN: 3317-67-7

T2272 200mg 1g



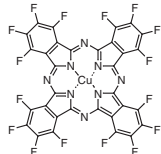
TiOPc
CAS RN: 26201-32-1

C2427 100mg 1g



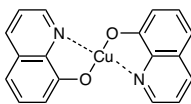
F₈CuPc
CAS RN: 148651-60-9

H1194 100mg 1g



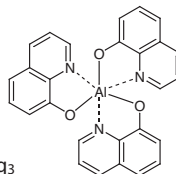
F₁₆CuPc
CAS RN: 14916-87-1

B3834 1g



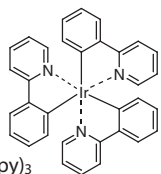
Bis(8-quinolinolato)-
copper(II)
CAS RN: 10380-28-6

T2238 5g



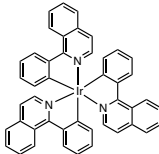
Alq₃
CAS RN: 2085-33-8

T1946 200mg



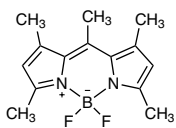
Ir(ppy)₃
CAS RN: 94928-86-6

T2685 100mg



Ir(piq)₃
CAS RN: 435293-93-9

D5724 200mg 1g



Pyrromethene 546
CAS RN: 121207-31-6

L0291 1g 5g

PbCl₂

Lead(II) Chloride
[for Perovskite precursor]
CAS RN: 7758-95-4

Service of Sublimation Purification

If you need a product purified by sublimation, which is not listed in this leaflet, please consult TCI about its synthesis and sublimation capabilities.

Please consult TCI if you wish your product to be purified by sublimation.

Benefits of TCI

- Consistent handling of the whole process, from custom synthesis production to sublimation purification
- In possession of an extensive range of unique sublimation apparatus
 - Possible to purify various compounds by sublimation
 - Purification capacity range from milligrams to kilograms
- Capable to analyze residual metals
- Possibility to handle and pack the compounds under low moisture or low oxygen atmosphere

Please contact TCI with your request!

When sending your request, please provide the following information:

- Product information
(Name of compound, Structure formula, Physical data, Literature information, etc.)
- Required quantity
- Requested delivery time
- Necessity of a confidentiality agreement
(TCI always makes assurance of confidentiality in all its business matters. But if an additional contract is needed, please don't hesitate to ask.)
- Possibility to supply the raw material
(TCI can also start from the production of the raw material)
- Test items after sublimation
- Requested package

Quotation

- * TCI will submit a quotation based on your request.
- * If you do not have any information about the compound, we will request you for a sample of the compound for verification.
(In some cases, sublimation might become difficult)

Order

Delivery of the product

Ordering and Customer Service

TCI AMERICA

Tel : 800-423-8616 / 503-283-1681
Fax : 888-520-1075 / 503-283-1987
E-mail : Sales-US@TCIchemicals.com

TCI EUROPE N.V.

Tel : +32 (0)3 735 07 00
Fax : +32 (0)3 735 07 01
E-mail : Sales-EU@TCIchemicals.com

TCI Deutschland GmbH

Tel : +49 (0)6196 64053-00
Fax : +49 (0)6196 64053-01
E-mail : Sales-DE@TCIchemicals.com

Tokyo Chemical Industry UK Ltd.

Tel : +44 (0)1865 78 45 60
E-mail : Sales-UK@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 (India) Pvt. Ltd.

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

TOKYO CHEMICAL INDUSTRY CO., LTD.

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

* Chemicals itemized in this brochure are for research and testing use only. Please avoid use other than by chemically knowledgeable professionals. * Information such as listed products and its specifications and so on are subject to change without prior notice. * The contents may not be reproduced or duplicated in whole or in part without permission of Tokyo Chemical Industry Co., Ltd.