LATEST NEW PRODUCTS FOR
Organic and Medicinal Chemists

- Organometallic Complexes and Ligands
- Ionic Liquids
- SmartBlocs™
- Halogenated Aryl Derivatives
- Aryl Sulfonyl Chlorides
- Bifunctionalized Building Blocks
- Alkoxy silanes
- Aromatic Terminal Alkynes
- Solid-Phase Polymer-Bound Reagents
- Functionalized Silica Gel Scavengers

sigma-aldrich.com
Organic synthesis has evolved over the centuries from a discipline based on intuition and guesswork to a more scientific approach where scientists can more accurately determine reaction mechanisms, intermediates and final products. Developments in such areas as medicinal chemistry, molecular biology, pharmaceutical chemistry, physiology, and genetics has led for the need of more varied and multifunctional building blocks as potential leads for fighting diseases, as new catalysts, and as new synthetic pathways for molecules.

This ChemFile contains a comprehensive listing of our latest new products for organic synthesis and medicinal chemistry. For a more comprehensive list of new products available from Sigma-Aldrich, please visit us on the Web at www.sigma-aldrich.com/new.

New Products in this ChemFile Include:

- Organometallic Complexes and Ligands
- Ionic Liquids
- SmartBlocs™
- Halogenated Aryl Derivatives
- Aryl Sulfonyl Chlorides
- Bifunctionalized Building Blocks
- Alkoxyilanes
- Aromatic Terminal Alkynes
- Solid-Phase Polymer-Bound Reagents
- Alkoxysilanes
- Aromatic Terminal Alkynes
- Solid-Phase Polymer-Bound Reagents

We are committed to being your preferred supplier of building blocks for organic synthesis. Our wide range of high-quality products, superior distribution facilities, user-friendly ordering systems, and vast chemical knowledge make us the ideal source for all of your research and development needs. We welcome the opportunity to show you our capabilities.

You Are Only a Click Away...

Visit our award-winning website, www.sigma-aldrich.com for the latest information on new and existing products. In addition, you will find a wealth of technical pages, structure searching, lot-specific information and technical updates; you will also be able to request literature all at the click of your mouse. If you are interested in learning more about how you can begin to purchase your Sigma-Aldrich products through the website, please call your local Sigma-Aldrich sales office for more information.

On the Cover

3-D structure of coupling catalyst SK-CC01-A (Fluka Product Number 36037), distributed in collaboration with Solvias.

To place an order contact your local Sigma-Aldrich office (see back cover of ChemFile).
Our Latest New Organometallic Complexes and Ligands

The unique and novel properties of organometallic complexes and ligands make them potential key intermediates in a variety of organic transformations such as pharmaceuticals, polymers, medicinal chemistry, as catalysts in homogeneous and heterogeneous organic synthesis, and as new catalysts for drug discovery. We, at Sigma-Aldrich, are working hard to offer you the latest novelties of these very useful compounds.

<table>
<thead>
<tr>
<th>Complexes</th>
<th>94732</th>
<th>500mg</th>
<th>C_{18}H_{28}Si_{2}Ti</th>
<th>MW 348.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bis(trimethylsilyl)acetylene-bis(cyclopentadienyl)titanium</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bis(trimethylsilyl)acetylene-bis(cyclopentadienyl)titanium</td>
<td>95257</td>
<td>500mg</td>
<td>C_{23}H_{33}Si_{2}Zr</td>
<td>MW 470.9</td>
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<tr>
<td>2’-(Dimethylamino)-2-biphenylpalladium(II) chloride</td>
<td>36037</td>
<td>250mg</td>
<td>C_{28}H_{37}Cl_{2}NPd</td>
<td>puriss, ≥99% 1g</td>
</tr>
<tr>
<td>3-Methyl-2-butenylene-bis(tricyclohexylphosphine)dichlororuthenium</td>
<td>44297</td>
<td>250mg</td>
<td>C_{41}H_{74}Cl_{2}P_{2}Ru</td>
<td>的技术，≥95% 500mg</td>
</tr>
<tr>
<td>Bis[tris(3-(heptadecafluorooctyl)phenyl)phosphine]palladium(II) dichloride</td>
<td>93521</td>
<td>100mg</td>
<td>C_{86}H_{24}Cl_{2}F_{102}P_{2}Pd</td>
<td>1g</td>
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<tr>
<td>Bis[tris(4-(1H,1H,2H,2H-perfluorodecyl)phenyl)phosphine]palladium(II) dichloride</td>
<td>95447</td>
<td>100mg</td>
<td>C_{96}H_{48}Cl_{2}F_{102}P_{2}Pd</td>
<td>500mg</td>
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<tr>
<td>Tri-2-furylphosphine</td>
<td>82163</td>
<td>250mg</td>
<td>C_{12}H_{9}O_{3}P</td>
<td>99% 1g</td>
</tr>
<tr>
<td>Tri-tert-butylphosphine</td>
<td>89984</td>
<td>1g</td>
<td>C_{12}H_{3}O_{3}P</td>
<td>99% 5g</td>
</tr>
<tr>
<td>Tricyclopentylphosphine</td>
<td>94096</td>
<td>100mg</td>
<td>C_{15}H_{27}P</td>
<td>96% 25g</td>
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<tr>
<td>Tris[3-(3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl)phenyl]phosphine</td>
<td>83934</td>
<td>1g</td>
<td>C_{48}H_{24}F_{18}P</td>
<td>95% 5g</td>
</tr>
<tr>
<td>Tris[3,3,5-bis(trifluoromethyl)phenyl]phosphine</td>
<td>74231</td>
<td>500mg</td>
<td>C_{24}H_{24}F_{18}P</td>
<td>MW 670.3</td>
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<tr>
<td>Bis[tris(3,3,5-bis(trifluoromethyl)phenyl]phosphine</td>
<td>94859</td>
<td>250mg</td>
<td>C_{24}H_{24}F_{18}P</td>
<td>MW 350.5</td>
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<tr>
<td>(R)-(+)-2-[2-(Diphenylphosphino)phenyl]-4-isopropyl-2-oxazoline</td>
<td>72575</td>
<td>500mg</td>
<td>C_{24}H_{24}F_{18}P</td>
<td>MW 373.4</td>
</tr>
<tr>
<td>(S)-(-)-2-[2-(Diphenylphosphino)phenyl]-4-isopropyl-2-oxazoline</td>
<td>91716</td>
<td>500mg</td>
<td>C_{24}H_{24}F_{18}P</td>
<td>MW 373.4</td>
</tr>
<tr>
<td>Tris[3-(3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl)phenyl]phosphine</td>
<td>84928</td>
<td>5g</td>
<td>C_{48}H_{24}F_{18}P</td>
<td>MW 1600</td>
</tr>
<tr>
<td>Tris[3,3,5-bis(trifluoromethyl)phenyl]phosphine</td>
<td>83934</td>
<td>5g</td>
<td>C_{24}H_{24}F_{18}P</td>
<td>MW 1600</td>
</tr>
</tbody>
</table>

Ligands

| Complexes | 94732 | 500mg          | C_{18}H_{28}Si_{2}Ti  | MW 348.5       |
| Tri-2-furylphosphine                           | 82163 | 250mg          | C_{12}H_{9}O_{3}P    | 99% 1g |
| Tri-tert-butylphosphine                        | 89984 | 1g             | C_{12}H_{3}O_{3}P    | 99% 5g |
| Tricyclopentylphosphine                        | 94096 | 100mg          | C_{15}H_{27}P        | 96% 25g |
| Tris[3-(3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl)phenyl]phosphine | 83934 | 1g             | C_{48}H_{24}F_{18}P | 95% 5g |
| Tris[3,3,5-bis(trifluoromethyl)phenyl]phosphine | 74231 | 500mg          | C_{24}H_{24}F_{18}P | MW 670.3 |
| Bis[tris(3,3,5-bis(trifluoromethyl)phenyl]phosphine | 94859 | 250mg          | C_{24}H_{24}F_{18}P | MW 350.5 |
| (R)-(+)-2-[2-(Diphenylphosphino)phenyl]-4-isopropyl-2-oxazoline | 72575 | 500mg          | C_{24}H_{24}F_{18}P | MW 373.4 |
| (S)-(-)-2-[2-(Diphenylphosphino)phenyl]-4-isopropyl-2-oxazoline | 91716 | 500mg          | C_{24}H_{24}F_{18}P | MW 373.4 |
| Tris[3-(3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl)phenyl]phosphine | 84928 | 5g             | C_{48}H_{24}F_{18}P | MW 1600 |
| Tris[3,3,5-bis(trifluoromethyl)phenyl]phosphine | 83934 | 5g             | C_{24}H_{24}F_{18}P | MW 1600 |

Ready to scale up? For larger quantities, please contact your local Sigma-Aldrich office (see back cover of ChemFile) for availability.
Our Latest Developments in Ionic Liquids

Ionic liquids have received tremendous attention over the last few years, primarily because of the need for environmentally friendly reaction solvent alternatives. Ionic liquids also offer certain advantages over traditional solvents such as enhanced reaction rates, higher selectivities and higher reaction yields, as well as nonflammability, chemical and thermal stability, and no significant vapor pressure. These products also work well for a wide range of reactions including the Diels–Alder, Stille, Suzuki, and Heck reaction, as well as the Beckmann rearrangement. For an excellent review of ionic liquid applications in organic synthesis, please see Dr. Hua Zhao’s and Dr. Sanjay V. Malhotra’s recent article in the *Aldrichimica Acta*. Sigma-Aldrich is continually expanding its offerings of ionic liquids to keep pace with the accelerating developments in these types of applications. For a complete list of ionic liquids that Sigma-Aldrich offers, please visit our website at www.sigma-aldrich.com/ionicliquids.

References:

New Highly Fluorinated Ionic Liquids

Highly fluorinated hydrophobic anions are useful in performing water-immiscible separations, making them ideal for two-phase applications.

<table>
<thead>
<tr>
<th>1-Ethyl-3-methylimidazolium bis(tri-fluoromethylsulfonyl)imide [EMIM][BMeI]</th>
<th>3-Methyl-1-propylpyridinium bis(tri-fluoromethylsulfonyl)imide [PMPy][BMeI]</th>
<th>1,2-Dimethyl-3-propylimidazolium tris(trifluoromethylsulfonyl)methide [DMPIM][TMeM]</th>
</tr>
</thead>
<tbody>
<tr>
<td>11291</td>
<td>30565</td>
<td>74305</td>
</tr>
<tr>
<td>purum, ≥ 97%</td>
<td>purum, ≥ 97%</td>
<td>purum, ≥ 97%</td>
</tr>
<tr>
<td>C₉H₁₁F₆N₃O₄S₂</td>
<td>C₁₁H₁₂F₆N₂O₄S₂</td>
<td>C₁₂H₁₅F₉N₂O₆S₃</td>
</tr>
<tr>
<td>MW 391.3</td>
<td>MW 416.4</td>
<td>MW 550.4</td>
</tr>
</tbody>
</table>

1,2-Dimethyl-3-propylimidazolium bis(trifluoromethylsulfonyl)imide [DMPIM][BMeI]

| 50807 |
| 1g |
| purum, ≥ 97% |
| C₁₂H₁₅F₉N₂O₆S₃ |
| MW 491.3 |


New Halogen-Free Ionic Liquids

Halogen-free ionic liquids address the problem of disposing halogenated liquids and environmental compatibility.

<table>
<thead>
<tr>
<th>1-Ethyl-3-methylimidazolium tosylate [EMIM][Ts]</th>
<th>1-Butyl-3-methylimidazolium 2-(2-methoxyethoxy)ethyl sulfate [BMIM][MEESO₄]</th>
<th>1-Butyl-3-methylimidazolium octyl sulfate [BMIM][OctSO₄]</th>
</tr>
</thead>
<tbody>
<tr>
<td>89155</td>
<td>67421</td>
<td>75059</td>
</tr>
<tr>
<td>purum, ≥ 98%</td>
<td>purum, ≥ 98%</td>
<td>purum, ≥ 98%</td>
</tr>
<tr>
<td>C₁₃H₂₁N₂O₅S</td>
<td>C₁₃H₂₀N₂O₅S</td>
<td>C₁₆H₃₂N₂O₅S</td>
</tr>
<tr>
<td>MW 282.4</td>
<td>MW 338.4</td>
<td>MW 348.5</td>
</tr>
</tbody>
</table>

To place an order contact your local Sigma-Aldrich office (see back cover of ChemFile).
New Building Blocks for Organic Synthesis and Medicinal Chemistry

SmartBlocs™ are a unique collection of products having a wide range of applications in organic synthesis and medicinal chemistry. SmartBlocs™ contain two points of reactivity and could serve as the common core for library synthesis. Below are examples of some of the newest additions of heterocyclic monomers and polyfunctional template molecules.

<table>
<thead>
<tr>
<th>Compound Description</th>
<th>Formula</th>
<th>MW</th>
<th>Purity</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-Amino-1-(4-chlorophenyl)-1H-pyrazole-4-carboxylic acid</td>
<td>C_{10}H_{8}ClN_{3}O_{2}</td>
<td>237.65</td>
<td>98.0%</td>
</tr>
<tr>
<td>5-Amino-1-(4-fluorophenyl)-1H-pyrazole-4-carboxylic acid</td>
<td>C_{10}H_{8}F_{3}N_{3}O_{2}</td>
<td>221.19</td>
<td>98.0%</td>
</tr>
<tr>
<td>5-Amino-1-phenyl-1H-pyrazole-4-carboxylic acid</td>
<td>C_{10}H_{9}N_{3}O_{2}</td>
<td>203.20</td>
<td>98.0%</td>
</tr>
<tr>
<td>1-(4-Bromophenyl)-5-(trifluoromethyl)-1H-pyrazole-4-carboxylic acid</td>
<td>C_{11}H_{6}BrF_{3}N_{2}O_{2}</td>
<td>335.08</td>
<td>98.0%</td>
</tr>
<tr>
<td>1-(4-Chlorophenyl)-5-(trifluoromethyl)-1H-pyrazole-4-carboxylic acid</td>
<td>C_{11}H_{6}ClF_{3}N_{2}O_{2}</td>
<td>290.63</td>
<td>98.0%</td>
</tr>
<tr>
<td>1-(3-Chlorophenyl)-5-(trifluoromethyl)-1H-pyrazole-4-carboxylic acid</td>
<td>C_{11}H_{6}ClF_{3}N_{2}O_{2}</td>
<td>290.63</td>
<td>98.0%</td>
</tr>
<tr>
<td>1-(4-Chlorophenyl)-2-oxo-3-pyrrolidinocarboxylic acid</td>
<td>C_{11}H_{10}ClNO_{3}</td>
<td>239.66</td>
<td>98.0%</td>
</tr>
<tr>
<td>1-(4-Fluorophenyl)-2-oxo-3-pyrrolidinocarboxylic acid</td>
<td>C_{11}H_{10}FNO_{3}</td>
<td>223.21</td>
<td>98.0%</td>
</tr>
<tr>
<td>5-Amino-1-(4-methylphenyl)-1H-pyrazole-4-carboxylic acid</td>
<td>C_{11}H_{11}N_{3}O_{2}</td>
<td>217.23</td>
<td>98.0%</td>
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<tr>
<td>5-Amino-1-(4-methoxyphenyl)-1H-pyrazole-4-carboxylic acid</td>
<td>C_{11}H_{11}N_{3}O_{3}</td>
<td>233.23</td>
<td>98.0%</td>
</tr>
<tr>
<td>5-Amino-1-(2-methoxyphenyl)-1H-pyrazole-4-carboxylic acid</td>
<td>C_{11}H_{11}N_{3}O_{3}</td>
<td>233.23</td>
<td>98.0%</td>
</tr>
<tr>
<td>1-(4-Methylphenyl)-5-(trifluoromethyl)-1H-pyrazole-4-carboxylic acid</td>
<td>C_{12}H_{9}F_{3}N_{2}O_{2}</td>
<td>270.21</td>
<td>98.0%</td>
</tr>
<tr>
<td>1-(4-Methoxyphenyl)-5-(trifluoromethyl)-1H-pyrazole-4-carboxylic acid</td>
<td>C_{12}H_{9}F_{3}N_{2}O_{3}</td>
<td>286.21</td>
<td>98.0%</td>
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<tr>
<td>1-(2-Methoxyphenyl)-5-(trifluoromethyl)-1H-pyrazole-4-carboxylic acid</td>
<td>C_{12}H_{9}F_{3}N_{2}O_{3}</td>
<td>286.21</td>
<td>98.0%</td>
</tr>
<tr>
<td>1-(4-Chlorobenzyl)-3-methyl-1H-pyrazole-5-carboxylic acid</td>
<td>C_{12}H_{11}ClN_{2}O_{2}</td>
<td>250.69</td>
<td>98.0%</td>
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<tr>
<td>1-(4-Fluorobenzyl)-3-methyl-1H-pyrazole-5-carboxylic acid</td>
<td>C_{12}H_{11}FN_{2}O_{2}</td>
<td>234.23</td>
<td>98.0%</td>
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<tr>
<td>Ethyl 5-amino-1-(4-bromophenyl)-1H-pyrazole-4-carboxylate</td>
<td>C_{12}H_{12}BrN_{2}O_{2}</td>
<td>310.15</td>
<td>98.0%</td>
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<tr>
<td>Ethyl 5-amino-1-(3-chlorophenyl)-1H-pyrazole-4-carboxylate</td>
<td>C_{12}H_{12}ClN_{2}O_{2}</td>
<td>265.70</td>
<td>98.0%</td>
</tr>
<tr>
<td>Chemical Name</td>
<td>Reference Code</td>
<td>Quantity</td>
<td>Molecular Formula</td>
</tr>
<tr>
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<td>-------------------</td>
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<tr>
<td>Ethyl 5-amino-1-(2-fluorophenyl)-1H-pyrazole-4-carboxylate</td>
<td>L25,152-6</td>
<td>250mg</td>
<td>C12H12FN3O2</td>
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<tr>
<td>1-(2-Methylphenyl)-2-oxo-3-pyrrolidinecarboxylic acid</td>
<td>L18,297-4</td>
<td>250mg</td>
<td>C12H13NO3</td>
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<tr>
<td>1-(3-Methylphenyl)-2-oxo-3-pyrrolidinecarboxylic acid</td>
<td>L18,298-2</td>
<td>250mg</td>
<td>C12H13NO3</td>
</tr>
<tr>
<td>1-(4-Methylphenyl)-2-oxo-3-pyrrolidinecarboxylic acid</td>
<td>L18,299-1</td>
<td>250mg</td>
<td>C12H13NO3</td>
</tr>
<tr>
<td>1-(2-Methoxyphenyl)-2-oxo-3-pyrrolidinecarboxylic acid</td>
<td>L18,300-3</td>
<td>250mg</td>
<td>C12H14NO4</td>
</tr>
<tr>
<td>1-(4-Methoxyphenyl)-2-oxo-3-pyrrolidinecarboxylic acid</td>
<td>L18,301-5</td>
<td>250mg</td>
<td>C12H14NO4</td>
</tr>
<tr>
<td>Ethyl 5-amino-1-(4-methoxyphenol)-1H-pyrazole-4-carboxylate</td>
<td>L25,146-1</td>
<td>250mg</td>
<td>C13H15N3O3</td>
</tr>
<tr>
<td>5-Amino-1-(4-bromophenyl)-1H-pyrazol-4-yl)(2-thienyl)methanone</td>
<td>L25,221-2</td>
<td>250mg</td>
<td>C14H10BrN3O2</td>
</tr>
<tr>
<td>2-(4-Bromophenyl)-1-(4-hydroxy-4,6-dimethoxyphenyl)ethanone</td>
<td>L25,129-1</td>
<td>250mg</td>
<td>C16H15BrO3</td>
</tr>
<tr>
<td>2-(4-Chlorophenyl)-1-(4-hydroxy-4,6-dimethoxyphenyl)ethanone</td>
<td>L25,126-7</td>
<td>250mg</td>
<td>C16H15ClO3</td>
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<tr>
<td>2-(4-Fluorophenyl)-1-(4-hydroxy-4,6-dimethoxyphenyl)ethanone</td>
<td>L25,128-3</td>
<td>250mg</td>
<td>C16H15FO4</td>
</tr>
<tr>
<td>2-(4-Chlorophenyl)-1-(2-hydroxy-4,6-dimethoxyphenyl)ethanone</td>
<td>L25,130-5</td>
<td>250mg</td>
<td>C16H15ClO3</td>
</tr>
<tr>
<td>Ethyl 4-(2-amino-4-chloroanilino)-1-piperidinecarboxylate</td>
<td>L15,785-6</td>
<td>250mg</td>
<td>C13H12ClN3O2</td>
</tr>
<tr>
<td>2-Phenyl-1-(2,4,6-trihydroxyphenyl)ethanone</td>
<td>L25,118-6</td>
<td>250mg</td>
<td>C15H13BrO3</td>
</tr>
<tr>
<td>2-(4-Chlorophenyl)-1-(2-hydroxy-4,6-dimethoxyphenyl)ethanone</td>
<td>L25,115-1</td>
<td>250mg</td>
<td>C15H13ClO3</td>
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<tr>
<td>(5-Amino-1-phenyl-1H-pyrazol-4-yl)(2-chlorophenyl)methanone</td>
<td>L25,168-2</td>
<td>250mg</td>
<td>C16H15ClN3O2</td>
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<tr>
<td>(5-Amino-1-phenyl-1H-pyrazol-4-yl)(4-chlorophenyl)methanone</td>
<td>L25,166-6</td>
<td>250mg</td>
<td>C17H15ClN3O2</td>
</tr>
<tr>
<td>(5-Amino-1-phenyl-1H-pyrazol-4-yl)(3-methylphenyl)methanone</td>
<td>L25,170-4</td>
<td>250mg</td>
<td>C17H14ClN3O2</td>
</tr>
<tr>
<td>(5-Amino-1-phenyl-1H-pyrazol-4-yl)(4-methylphenyl)methanone</td>
<td>L25,164-2</td>
<td>250mg</td>
<td>C17H14ClN3O2</td>
</tr>
<tr>
<td>(5-Amino-1-phenyl-1H-pyrazol-4-yl)(4-methylphenyl)methanone</td>
<td>L25,166-6</td>
<td>250mg</td>
<td>C17H14ClN3O2</td>
</tr>
</tbody>
</table>

To place an order contact your local Sigma-Aldrich office (see back cover of ChemFile).
New Halogenated Building Blocks

Researchers are continually seeking new and interesting building blocks for synthesis applications. Sigma-Aldrich is adding new products monthly to meet this increasing demand. We have gathered some of our newest building blocks including halogenated aryl derivatives and aryl sulfonyl chlorides that have become increasing popular for organic synthesis.

Halogenated Aryl Derivatives— Aryl Fluorides and Iodides

Although fluorinated compounds are very rare in nature, the fact that the fluorine atom is small and strongly electronegative, and bonds very strongly to carbon, raises the possibility of interesting and useful properties displayed once inside living systems. Replacing one or two hydrogens with fluorine atoms has almost no effect on molecular volume, which is of critical importance to researchers concerned with the confined spaces of receptor molecules and enzyme active sites. The high electronegativity affects the chemistry of neighboring functional groups very strongly, and the high strength of the C–F bond effectively blocks metabolic oxidation at fluorinated sites. It is not surprising that medicinal chemists find selectively fluorinated molecules very attractive as potential anticancer, antiviral, and antibacterial agents.1

The need to create new carbon–carbon bonds is of prime importance in medicinal chemistry today. A number of metal-catalyzed coupling reactions, including the Heck, Suzuki, Stille,2 and Negishi3 couplings have successfully used aryl iodides in creating these types of bonds due to their higher reactivity over bromine and chlorine derivatives.4 Sigma-Aldrich offers a wide range of aryl fluorides and iodides to meet your research needs.


### 4-Chloro-2-fluoriodobenzene
- **54,118-4**
  - 97%
  - C₆H₅ClF
  - MW 256.44

### 3-Chloro-4-fluoriodobenzene
- **54,290-3**
  - 98%
  - C₆H₅ClF
  - MW 256.44

### 3-Chloro-2-fluoriodobenzene
- **55,865-6**
  - 97%
  - C₆H₅ClF
  - MW 256.44

### 1,2-Dichloro-4-iodobenzene
- **54,175-3**
  - 98%
  - C₆H₅Cl₂I
  - MW 272.9

### 2,5-Difluoriodobenzene
- **55,859-1**
  - 97%
  - C₆H₅F₂I
  - MW 239.99

### 3,5-Difluoriodobenzene
- **55,860-5**
  - 97%
  - C₆H₅F₂I
  - MW 239.99

### 2-Fluoro-5-iodobenzoic acid
- **55,245-3**
  - 97%
  - C₆H₅FIO
  - MW 284.45

### 2-Fluoro-5-iodobenzoic acid
- **55,243-7**
  - 97%
  - C₆H₅FIO₂
  - MW 266.01

### 2-(Trifluoromethoxy)iodobenzene
- **55,439-1**
  - 97%
  - C₆H₅F₃IO
  - MW 287.99

### 4-Chloro-2-iodobenzoic acid
- **55,243-7**
  - 97%
  - C₆H₅ClIO₂
  - MW 282.46

### 2-Iodobenzaldehyde
- **55,077-9**
  - 97%
  - C₇H₅IO
  - MW 232.02

### 2-Fluoro-6-iodobenzoyl chloride
- **55,244-5**
  - 97%
  - C₇H₅ClFIO
  - MW 284.45

### 2-Fluoro-5-iodobenzoyl chloride
- **55,246-1**
  - 97%
  - C₇H₅ClFIO
  - MW 284.45

### 3-(Trifluoromethoxy)iodobenzene
- **56,354-4**
  - 97%
  - C₆H₅F₃IO
  - MW 288.01

### 4-(Difluoromethoxy)iodobenzene
- **56,014-6**
  - 97%
  - C₆H₅Cl₂IO
  - MW 282.46

### 4-Cyano-2-iodoaniline
- **57,801-0**
  - 98%
  - C₇H₅IN₂
  - MW 244.03

### 2-Iodobenzaldehyde
- **55,246-1**
  - 97%
  - C₇H₅IO
  - MW 232.02

For technical assistance or to order, please call your local Sigma-Aldrich office.
To place an order contact your local Sigma-Aldrich office (see back cover of ChemFile).

Visit [www.sigma-aldrich.com/newproducts](http://www.sigma-aldrich.com/newproducts) for all of our newest products!

This site is regularly updated with our latest new products in the field of Analytical Science, Organic Synthesis and Life Science!
New Aryl Sulfonyl Chloride Derivatives

Aryl sulfonic chloride derivatives are frequently used in parallel synthesis to synthesize sulfonamides and sulfonate linkages.


<table>
<thead>
<tr>
<th>Compound Description</th>
<th>CAS number</th>
<th>Purity</th>
<th>Molecular Formula</th>
<th>Molecular Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Chloro-2-fluorobenzensulfonyl chloride</td>
<td>55,867-2</td>
<td>97%</td>
<td>C₆H₃Cl₂FO₂S</td>
<td>229.06</td>
</tr>
<tr>
<td>3-Chloro-4-fluorobenzensulfonyl chloride</td>
<td>56,182-7</td>
<td>97%</td>
<td>C₆H₃Cl₂FO₂S</td>
<td>229.06</td>
</tr>
<tr>
<td>2,3-Dichlorobenzensulfonyl chloride</td>
<td>54,491-7</td>
<td>97%</td>
<td>C₆H₃Cl₂O₂S</td>
<td>245.51</td>
</tr>
<tr>
<td>2,4-Dichlorobenzensulfonyl chloride</td>
<td>54,569-4</td>
<td>97%</td>
<td>C₆H₃Cl₂O₂S</td>
<td>245.51</td>
</tr>
<tr>
<td>2,6-Dichlorobenzensulfonyl chloride</td>
<td>54,570-8</td>
<td>97%</td>
<td>C₆H₃Cl₂O₂S</td>
<td>245.51</td>
</tr>
<tr>
<td>3-Chloro-2-fluorobenzensulfonyl chloride</td>
<td>55,860-0</td>
<td>97%</td>
<td>C₆H₃Cl₂FO₂S</td>
<td>229.06</td>
</tr>
<tr>
<td>3-Chloro-4-fluorobenzensulfonyl chloride</td>
<td>55,590-8</td>
<td>97%</td>
<td>C₆H₃Cl₂FO₂S</td>
<td>229.06</td>
</tr>
<tr>
<td>3,4,5-Trifluorobenzensulfonyl chloride</td>
<td>55,599-1</td>
<td>97%</td>
<td>C₆H₃ClF₃O₂S</td>
<td>230.59</td>
</tr>
<tr>
<td>3,5-Trifluorobenzensulfonyl chloride</td>
<td>54,693-3</td>
<td>97%</td>
<td>C₆H₃ClF₃O₂S</td>
<td>230.59</td>
</tr>
<tr>
<td>3-Bromobenzensulfonyl chloride</td>
<td>54,571-6</td>
<td>97%</td>
<td>C₆H₃BrClO₂S</td>
<td>255.52</td>
</tr>
<tr>
<td>4-(Trifluoromethoxy)benzenesulfonyl chloride</td>
<td>56,584-9</td>
<td>97%</td>
<td>C₆H₃ClF₂O₂S</td>
<td>244.62</td>
</tr>
<tr>
<td>2-Methoxy-4-nitrobenzenesulfonyl chloride</td>
<td>55,593-2</td>
<td>96%</td>
<td>C₆H₆ClNO₅S</td>
<td>251.64</td>
</tr>
<tr>
<td>2,4-Bis(trifluoromethoxy)benzenesulfonyl chloride</td>
<td>55,731-5</td>
<td>97%</td>
<td>C₆H₃Cl₂O₂S</td>
<td>254.71</td>
</tr>
<tr>
<td>2,5-Dimethoxybenzenesulfonyl chloride</td>
<td>55,223-2</td>
<td>98%</td>
<td>C₆H₆ClO₂S</td>
<td>236.67</td>
</tr>
<tr>
<td>4-Methylbenzenesulfonyl chloride</td>
<td>56,536-9</td>
<td>97%</td>
<td>C₁₁H₁₃ClO₂S</td>
<td>246.75</td>
</tr>
</tbody>
</table>

The Sigma-Aldrich Library of Rare Chemicals
Sigma-Aldrich...Your Chemistry Partner for Drug Discovery and Development

- Available Now!
- Entire library available as SDfiles (ISIS™/BASE ver 2.0 or later is required)
- Each SDFile contains a structure, molecular formula, molecular weight and unique catalog number
- Mac™ or PC formats

The Library of Rare Chemicals contains over 130,000 research compounds ideal for High Throughput Screening that have been acquired from thousands of academic scientists worldwide. In keeping with our motto, “Chemists Helping Chemists in Research and Industry,” we have supplied the scientific community for years with thousands of difficult-to-obtain compounds. We are continuing our commitment in providing a unique service to the researcher by adding a spectrum of small molecule compounds. By focusing on quality, reliability, and diversity of compounds in the Library, Sigma-Aldrich will continue to be the preferred supplier of compounds to the biotech, pharmaceutical, and agrochemical companies.
Our Latest Highlights in Bifunctionalized Building Blocks

Bifunctionalized building blocks offer the possibility of unique reactions and products because of their multiple reaction sites. Because of this, new reaction pathways and products for organic synthesis may be possible.

**tert-Butyl Protected Building Blocks**

<table>
<thead>
<tr>
<th>Compound</th>
<th>CAS Number</th>
<th>Quantity</th>
<th>Purity</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycine tert-butyl ester hydrochloride</td>
<td>42604</td>
<td>1g</td>
<td>≥99%</td>
<td>181.66</td>
</tr>
<tr>
<td>Mono-tert-butyl malonate</td>
<td>73974</td>
<td>5g</td>
<td>≥95%</td>
<td>220.23</td>
</tr>
<tr>
<td>tert-Butyl 3-hydroxypropionate</td>
<td>90218</td>
<td>1g</td>
<td></td>
<td>206.24</td>
</tr>
<tr>
<td>d-Alanine tert-butyl ester hydrochloride</td>
<td>30178</td>
<td>1g</td>
<td>≥99%</td>
<td>225.7</td>
</tr>
<tr>
<td>O-tert-butyl-L-threonine methyl ester hydrochloride</td>
<td>81655</td>
<td>5g</td>
<td></td>
<td>225.7</td>
</tr>
<tr>
<td>Isocyano &amp; Isothiocyano tert-Butyl Protected Building Blocks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tert-Butyl 2-isocyanopropionate</td>
<td>40803</td>
<td>250mg</td>
<td>≥97%</td>
<td>155.19</td>
</tr>
<tr>
<td>tert-Butyl 3-isocyanopropionate</td>
<td>08608</td>
<td>250mg</td>
<td>≥97%</td>
<td>155.19</td>
</tr>
<tr>
<td>tert-Butyl 2-isocyanato-3-methylbutyrate</td>
<td>18992</td>
<td>250mg</td>
<td>≥97%</td>
<td>183.25</td>
</tr>
<tr>
<td>tert-Butyl 2-isothiocyanatobenzoate</td>
<td>59813</td>
<td>1g</td>
<td>≥97%</td>
<td>235.31</td>
</tr>
<tr>
<td>Di-tert-butyl 2-isocyanosuccinate</td>
<td>51492</td>
<td>250mg</td>
<td>≥97%</td>
<td>255.31</td>
</tr>
<tr>
<td>tert-Butyl 2-isocyanato-3-phenylpropionate</td>
<td>16521</td>
<td>250mg</td>
<td>≥97%</td>
<td>231.29</td>
</tr>
</tbody>
</table>

To place an order contact your local Sigma-Aldrich office (see back cover of ChemFile).
New Alkoxysilanes for C–C Coupling Reactions

The use of silicon compounds as transmetalation reagents has attracted much attention as a viable alternative to the popular Stille and Suzuki coupling reactions mainly due to the formation of nontoxic byproducts and stability to many reaction conditions. Silicon-based coupling reactions can be carried out using aryl-, heteroaryl-, or alkenyl-halides and alkoxysilanes in the presence of palladium or rhodium catalysts. Among the various types of silicon compounds available, alkoxysilanes are more effective in coupling reactions.  

Recently, considerable attention has been paid to the rhodium-catalyzed addition of aryl(trialkoxy)silanes to carbonyl compounds, such as aldehydes, α,β-unsaturated ketones and esters.  

References:

<table>
<thead>
<tr>
<th>Chloromethyl(methyl)dimethoxysilane</th>
<th>Chloromethyltriisopropoxysilane</th>
<th>Triethoxy-p-tolylsilane</th>
</tr>
</thead>
<tbody>
<tr>
<td>[SiMe2(OCH3)2]Cl</td>
<td>[Si(CH3)3Cl]</td>
<td>[Si(C6H4(CH3)2)3]</td>
</tr>
<tr>
<td>59,742-2</td>
<td>59,697-3</td>
<td>59,157-2</td>
</tr>
<tr>
<td>97%</td>
<td>97%</td>
<td>97%</td>
</tr>
<tr>
<td>C6H11ClO2Si</td>
<td>C10H23ClOSi</td>
<td>C13H22O3Si</td>
</tr>
<tr>
<td>MW 154.67</td>
<td>MW 254.83</td>
<td>MW 254.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Triethoxysilylcyclopentane</th>
<th>Phenyliethoxysilane</th>
<th>1,4-Bis(triethoxysilyl)benzene</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Si(OCH3)2C5H8]</td>
<td>[Si(OCH3)C6H4Si(OCH3)2]</td>
<td>[Si(OCH3)C6H5Si(OCH3)2]</td>
</tr>
<tr>
<td>59,604-3</td>
<td>59,791-0</td>
<td>59,803-8</td>
</tr>
<tr>
<td>98%</td>
<td>97%</td>
<td>96%</td>
</tr>
<tr>
<td>C11H24O3Si</td>
<td>C12H13O3Si</td>
<td>C18H34O6Si2</td>
</tr>
<tr>
<td>MW 232.09</td>
<td>MW 274.82</td>
<td>MW 402.63</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phenyltriethoxysilane</th>
<th>Triethoxy-2-thienylsilane</th>
<th>3-(Triethoxysilyl)furan</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Si(OCH3)C6H4Si(OCH3)2]</td>
<td>[Si(OCH3)C6H5Si(OCH3)2]</td>
<td>[Si(OCH3)C5H4O]</td>
</tr>
<tr>
<td>17,560-9</td>
<td>17,556-0</td>
<td>59,231-5</td>
</tr>
<tr>
<td>98%</td>
<td>97%</td>
<td>96%</td>
</tr>
<tr>
<td>C10H18O3Si</td>
<td>C10H18O3Si</td>
<td>C12H18O3Si</td>
</tr>
<tr>
<td>MW 246.4</td>
<td>MW 246.4</td>
<td>MW 230.33</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Triethoxysilylpropoxysilane</th>
<th>Triethoxy-2-thienylsilane</th>
<th>3-(Triethoxysilyl)furan</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Si(OCH3)2C5H8]Cl</td>
<td>[Si(OCH3)C6H5Si(OCH3)2]</td>
<td>[Si(OCH3)C5H4O]</td>
</tr>
<tr>
<td>59,679-3</td>
<td>59,701-5</td>
<td>59,231-5</td>
</tr>
<tr>
<td>97%</td>
<td>97%</td>
<td>96%</td>
</tr>
<tr>
<td>C10H13ClO3Si</td>
<td>C13H22O3Si</td>
<td>C12H18O3Si</td>
</tr>
<tr>
<td>MW 254.83</td>
<td>MW 254.4</td>
<td>MW 230.33</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chloromethyltriisopropoxysilane</th>
<th>Triethoxy-2-thienylsilane</th>
<th>3-(Triethoxysilyl)furan</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Si(OCH3)2C5H8]Cl</td>
<td>[Si(OCH3)C6H5Si(OCH3)2]</td>
<td>[Si(OCH3)C5H4O]</td>
</tr>
<tr>
<td>59,697-3</td>
<td>59,701-5</td>
<td>59,231-5</td>
</tr>
<tr>
<td>97%</td>
<td>97%</td>
<td>96%</td>
</tr>
<tr>
<td>C10H23ClOSi</td>
<td>C13H22O3Si</td>
<td>C12H18O3Si</td>
</tr>
<tr>
<td>MW 254.83</td>
<td>MW 254.4</td>
<td>MW 230.33</td>
</tr>
</tbody>
</table>
New Aromatic Terminal Alkynes

The terminal alkyne functionality has a wide range of applications including most recently the synthesis of spiropyran substituted 2,3-dicyanopyrazines and (±)-asteriscanolide, as well as conversion to enamines using resin-bound 2° amines. Sigma-Aldrich offers a number of aromatic alkynes that can further enhance the reactivity of the alkyne group resulting in many new reactions and products for organic synthesis and medicinal chemistry.


<table>
<thead>
<tr>
<th>Alkyne</th>
<th>CAS</th>
<th>Formula</th>
<th>Purity</th>
<th>Quantity</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Ethynylthiophene</td>
<td>57,879-7</td>
<td>C₆H₄S</td>
<td>96%</td>
<td>1g</td>
<td>108.16</td>
</tr>
<tr>
<td>3-Ethynylpyridine</td>
<td>52,044-6</td>
<td>C₆H₄N</td>
<td>98%</td>
<td>1g</td>
<td>103.12</td>
</tr>
<tr>
<td>4-Bromo-1-ethynyl-2-fluorobenzene</td>
<td>51,925-1</td>
<td>C₈H₆BrF</td>
<td>96%</td>
<td>5g</td>
<td>218.01</td>
</tr>
<tr>
<td>1-Ethynyl-2,4-difluorobenzene</td>
<td>55,644-0</td>
<td>C₈H₆F₂</td>
<td>97%</td>
<td>5g</td>
<td>158.05</td>
</tr>
<tr>
<td>1-Ethynyl-3,5-difluorobenzene</td>
<td>59,017-7</td>
<td>C₈H₆F₂</td>
<td>97%</td>
<td>1g</td>
<td>158.05</td>
</tr>
<tr>
<td>3-Chloro-1-ethynylbenzene</td>
<td>63,026-8</td>
<td>C₈H₆Cl</td>
<td>97%</td>
<td>1g</td>
<td>154.59</td>
</tr>
<tr>
<td>1-Ethynyl-3-fluorobenzene</td>
<td>51,940-5</td>
<td>C₈H₆F</td>
<td>98%</td>
<td>5g</td>
<td>136.16</td>
</tr>
<tr>
<td>Phenylacetylene</td>
<td>11,770-6</td>
<td>C₈H₆</td>
<td>98%</td>
<td>25mL</td>
<td>102.14</td>
</tr>
<tr>
<td>2-Ethynyl-α,α,α-trifluorotoluene</td>
<td>52,118-3</td>
<td>C₅H₆F₃</td>
<td>97%</td>
<td>1g</td>
<td>170.14</td>
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<tr>
<td>1-Ethyl-4-ethynylbenzene</td>
<td>55,889-3</td>
<td>C₁₀H₁₀</td>
<td>98%</td>
<td>5g</td>
<td>134.20</td>
</tr>
<tr>
<td>1-Ethynyl-3,5-dimethoxybenzene</td>
<td>58,852-0</td>
<td>C₁₀H₁₀O₂</td>
<td>98%</td>
<td>5g</td>
<td>178.25</td>
</tr>
<tr>
<td>1-Butyl-4-ethynylbenzene</td>
<td>52,108-6</td>
<td>C₁₀H₁₄</td>
<td>97%</td>
<td>5g</td>
<td>156.25</td>
</tr>
<tr>
<td>4-Ethynylbiphenyl</td>
<td>52,117-5</td>
<td>C₁₄H₁₀</td>
<td>97%</td>
<td>5g</td>
<td>202.24</td>
</tr>
<tr>
<td>1-Ethynlnaphthalene</td>
<td>55,792-7</td>
<td>C₁₄H₁₀</td>
<td>97%</td>
<td>5g</td>
<td>202.24</td>
</tr>
<tr>
<td>9-Ethynylphenanthrene</td>
<td>52,116-7</td>
<td>C₁₆H₁₀</td>
<td>97%</td>
<td>1g</td>
<td>214.22</td>
</tr>
</tbody>
</table>
Solid-Phase Polymer-Bound Reagents

The current interest in parallel synthesis for the creation of small-molecule libraries has led to a greater interest in polymer-supported reagents for solution- and solid-phase synthesis.\(^1\) The ease of workup, purification, and isolation of final product from reaction impurities makes these reagents especially well suited for these applications.

Below are some of our latest polymer-bound products that we know you will find useful.


---

**Solid-Phase Polymer-Bound Reagents**

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Formula</th>
<th>DVB (%)</th>
<th>Mesh</th>
<th>MMol/g</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-tert-Butylimino-2-diethylamino-1,3-dimethylperhydro-1,3,2-diazaphosphorine, polymer bound (BEMP resin)</td>
<td>53,649-0</td>
<td>53% DVB, 100–200 mesh</td>
<td>2.0–2.5 mmol/g</td>
<td>1g</td>
<td>5g</td>
</tr>
<tr>
<td>Diisopropylamine, polymer bound (PS-DIEA)</td>
<td>53,846-9</td>
<td>53% DVB, 50–90 mesh</td>
<td>3.0–4.0 mmol N/g</td>
<td>5g</td>
<td>25g</td>
</tr>
<tr>
<td>Diisopropylamine, polymer bound (PS-DIEA)</td>
<td>53,873-6</td>
<td>53% DVB, 100–200 mesh</td>
<td>2.0–3.5 mmol N/g</td>
<td>5g</td>
<td>25g</td>
</tr>
<tr>
<td>Dimethylaminopyridine, polymer bound (PS-DMAP)</td>
<td>35,988-2</td>
<td>53% DVB, 2.5 mmol “DMAP”/g</td>
<td>2.0–3.5 mmol N/g</td>
<td>1g</td>
<td>5g</td>
</tr>
<tr>
<td>2,6-Di-tert-butylpyridine, polymer bound</td>
<td>37,782-1</td>
<td>53% DVB, 200–400 mesh, ca. 1.8 mmol/g</td>
<td>1g</td>
<td>5g</td>
<td>25g</td>
</tr>
<tr>
<td>1,3,4,6,7,8-Hexahydro-2H-pyrimido[1,2-a]pyrimidine, polymer bound (TBD, polymer bound)</td>
<td>35,875-4</td>
<td>53% DVB, ca. 2.6 mmol/g</td>
<td>ca. 7.8 mmol N/g</td>
<td>1g</td>
<td>5g</td>
</tr>
<tr>
<td>Tetraalkylammonium carbonate, polymer bound, macroporous (MP-Carbonate)</td>
<td>54,028-5</td>
<td>53% DVB, 2.5–3.5 mmol N/g</td>
<td>ca. 7.8 mmol N/g</td>
<td>5g</td>
<td>25g</td>
</tr>
<tr>
<td>Borohydride, polymer supported</td>
<td>35,994-7</td>
<td>53% DVB, 20–50 mesh, 2.0–5.0 mmol BH(_4^-/g)</td>
<td>10g</td>
<td>50g</td>
<td>100g</td>
</tr>
<tr>
<td>Cyanoborohydride, polymer supported</td>
<td>52,630-4</td>
<td>53% DVB, 18–50 mesh, 2.0–3.0 mmol/g</td>
<td>5g</td>
<td>25g</td>
<td></td>
</tr>
<tr>
<td>N-Benzyl-N’-cyclohexylcarbodiimide, polymer bound</td>
<td>56,184-3</td>
<td>53% DVB, 100–200 mesh, 1.3 mmol/g</td>
<td>5g</td>
<td>25g</td>
<td></td>
</tr>
<tr>
<td>1-(3-Dimethylaminopropyl)-3-ethylcarbodiimide, polymer bound (EDC, polymer bound)</td>
<td>42,433-1</td>
<td>53% DVB, 200–400 mesh, ca. 0.9 mmol N/g</td>
<td>5g</td>
<td>25g</td>
<td></td>
</tr>
</tbody>
</table>

---

Supporting References:


---

Ready to scale up? For larger quantities, please contact your local Sigma-Aldrich office (see back cover of ChemFile) for availability.
**Supported Oxidizing Reagents**

<table>
<thead>
<tr>
<th>Perrutenate, polymer-bound, polystyrene cross-linked with 1% DVB</th>
<th>2,2,6,6-Tetramethylpiperidine N-oxyl, polymer-bound, polystyrene cross-linked with 1% DVB</th>
</tr>
</thead>
<tbody>
<tr>
<td>83715</td>
<td>72601</td>
</tr>
<tr>
<td>capacity: ~0.3 mmol/g</td>
<td>(TEMPO-4-oxymethyl)polystyrene) capacity: ~2.5 mmol/g</td>
</tr>
<tr>
<td>particle size: 20–50 mesh</td>
<td>particle size: 200–400 mesh</td>
</tr>
<tr>
<td>2.5g</td>
<td>5g</td>
</tr>
<tr>
<td>10g</td>
<td>25g</td>
</tr>
</tbody>
</table>

**Other Supported Reagents**

<table>
<thead>
<tr>
<th>Methylthiourea, polymer-bound, polystyrene cross-linked with 2% DVB</th>
<th>Benzylidenebis(tricyclohexylphosphine)dichlororuthenium, polymer-bound, polystyrene cross-linked with 1% DVB</th>
</tr>
</thead>
<tbody>
<tr>
<td>84094</td>
<td>91501</td>
</tr>
<tr>
<td>capacity: ~2.0 mmol/g</td>
<td>(Grubbs catalyst on polystyrene) capacity: ~0.1 mmol/g</td>
</tr>
<tr>
<td>particle size: 200–400 mesh</td>
<td>particle size: 100–200 mesh</td>
</tr>
<tr>
<td>5g</td>
<td>1g</td>
</tr>
</tbody>
</table>

**Professor Suzuki’s Contributions**

Professor Suzuki’s contributions to organoborane chemistry involve the discovery and development of new synthetic methodologies using organoborane compounds. The formation of organic radicals from organoboranes in the presence of catalytic amounts of oxygen was first discovered in the course of cooperative work with Professor Brown’s research group. Professor Suzuki was also instrumental in the utilization of organoborane compounds as carbanions in synthesis. Organoboranes are also useful as a source of carbocations under electrochemical conditions, although a limited number of examples have been reported. More recent work by Suzuki and coworkers revolves around palladium-catalyzed cross-coupling reactions of various organoborane compounds with a number of organic electrophiles in the presence of bases. This reaction has become known as the Suzuki Coupling and is the focus of this book.

**Also Available:**

**Organic Syntheses via Boranes Vol. 1**
Herbert C. Brown
Z40,094-7

**Organic Syntheses via Boranes Vol. 2: Recent Developments**
Herbert C. Brown, Marek Zaidlewicz
Z40,095-5

**Organic Syntheses via Boranes Vol. 3: Suzuki Coupling**
Akira Suzuki & Herbert C. Brown
Z51,430-6

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To place an order contact your local Sigma-Aldrich office (see back cover of ChemFile).
**Functionalized Silica Gel Scavengers**

Sigma-Aldrich Corporation and SiliCycle Inc. have collaborated to offer scientists ultra pure functionalized silica gels for medicinal and parallel chemistry. These silica gels offer several advantages over traditional polystyrene based products:

- Broad solvent compatibility, including polar solvents
- Minimal swelling, which facilitates the use in automated flow-through systems
- Ease of handling, since they develop no static charge; this simplifies filling cartridges and columns
- Thermal stability, which allows their use in microwave-assisted reactions

Highlighted below are the functionalized silica gels that can be utilized as scavengers in organic synthesis. For a complete listing of all of SiliCycle's products offered by Sigma-Aldrich, please email bseitz@sial.com.

### 3-Aminopropyl-functionalized silica gel

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Amounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>36,425-8</td>
<td>10g</td>
</tr>
<tr>
<td></td>
<td>50g</td>
</tr>
<tr>
<td></td>
<td>250g</td>
</tr>
</tbody>
</table>

Reacts with:

- Acids, acid chlorides, anhydrides, aldehydes, isocyanates, and chloroformates

### 3-(Diethylenetriamino)propyl-functionalized silica gel

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Amounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>53,792-6</td>
<td>5g</td>
</tr>
<tr>
<td></td>
<td>25g</td>
</tr>
<tr>
<td></td>
<td>100g</td>
</tr>
</tbody>
</table>

Reacts with:

- Acids, acid chlorides, anhydrides, aldehydes, isocyanates, and chloroformates

### 3-(Dimethylamino)propyl-functionalized silica gel

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Amounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>53,804-3</td>
<td>5g</td>
</tr>
<tr>
<td></td>
<td>25g</td>
</tr>
<tr>
<td></td>
<td>100g</td>
</tr>
</tbody>
</table>

Reacts with:

- Acids

### 3-(Isocyanato)propyl-functionalized silica gel

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Amounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>53,778-0</td>
<td>5g</td>
</tr>
<tr>
<td></td>
<td>25g</td>
</tr>
<tr>
<td></td>
<td>100g</td>
</tr>
</tbody>
</table>

Reacts with:

- Amines (primary and secondary), anilines, and hydrazines

### 3-(Thiocyanato)propyl-functionalized silica gel

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Amounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>53,794-2</td>
<td>5g</td>
</tr>
<tr>
<td></td>
<td>25g</td>
</tr>
<tr>
<td></td>
<td>100g</td>
</tr>
</tbody>
</table>

Reacts with:

- Amines (primary and secondary), anilines, and hydrazines

### 4-Ethylbenzenesulfonylchloride-functionalized silica gel

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Amounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>53,797-7</td>
<td>5g</td>
</tr>
<tr>
<td></td>
<td>25g</td>
</tr>
<tr>
<td></td>
<td>100g</td>
</tr>
</tbody>
</table>

Reacts with:

- Alcohols, amines, and other nucleophiles

### 4-Ethylbenzenesulfonylchloride-functionalized silica gel

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Amounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>53,807-8</td>
<td>5g</td>
</tr>
<tr>
<td></td>
<td>25g</td>
</tr>
<tr>
<td></td>
<td>100g</td>
</tr>
</tbody>
</table>

Reacts with:

- Amines and other nucleophiles

### 4-Ethylbenzenesulfonylchloride-functionalized silica gel

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Amounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>53,807-8</td>
<td>5g</td>
</tr>
<tr>
<td></td>
<td>25g</td>
</tr>
<tr>
<td></td>
<td>100g</td>
</tr>
</tbody>
</table>

Reacts with:

- Fmoc and Bsmoc protecting groups

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