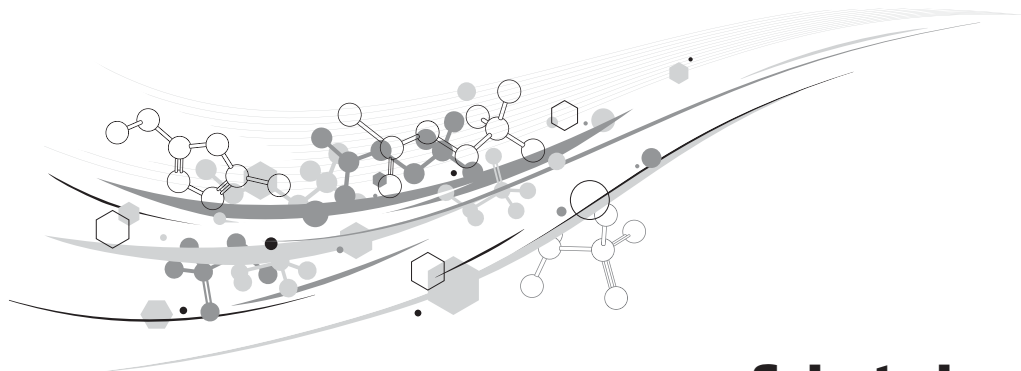




SULFONYL CHLORIDES
and other Sulfonylating
Reagents





Selected Building Block Series

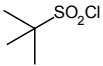
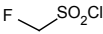
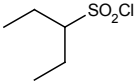
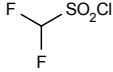
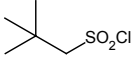
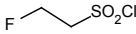
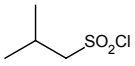
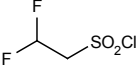
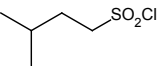
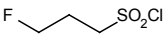
With development of on-line chemical directories acquiring necessary reagents and building blocks for day-to-day research activity has become a technical routine. Many thousands of building blocks are now available in the market and sub-structure search can efficiently provide a selection of reagents to buy. However, this approach might be limited.

With over 100,000 building blocks synthesized and now available from our stock we are a recognized leader in the market. Our catalogue features versatile building block classes and adds 1,000 products each month. Although they all are available for purchase through www.enaminestore.com and many public or corporate chemical databases we wanted to gather together the most interesting and recently prepared building blocks to provide a series of useful guides to a novel and innovative chemistry.

Sulfonyl chlorides and related sulfonylating reagents are an important class of synthetic building blocks in organic synthesis, medicinal chemistry, combinatorial chemistry, and pharmacology. These compounds are best known as reagents to prepare biologically active sulfonamides. Enamine Ltd has developed a succinct catalog of both known and new sulfonylating building blocks to offer you the best choice for your drug discovery programs as well as other synthetic needs. Present catalog contains ca. 600 most prominent structures out of more than 1300 sulfonylating reagents available from our stock. Full list of the title structures available from Enamine can be found in either our downloadable catalogue or on-line searchable Enamine store.

Monofunctional sulfonyl chlorides

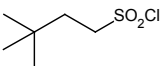
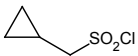
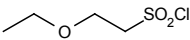
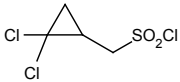
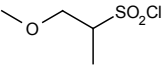
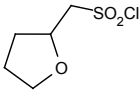
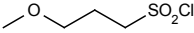
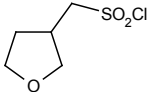
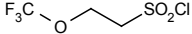
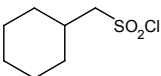
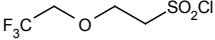
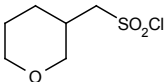
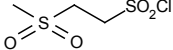
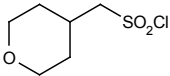
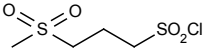
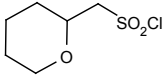
This part contains a selection of compounds in which the chlorosulfo-group is the only reactive functionality while the rest of the molecule is chemically inert. Besides introducing the sulfonamide unit these reagents are used to modulate a number of physicochemical parameters of the product, e.g., its lipophilicity (logP), aqueous solubility (logS), chemical/metabolic stability, conformation, etc. Consequently, the monofunctional sulfonyl chlorides have found a number of applications in drug discovery and organic chemistry. For example, they have been widely used in parallel syntheses of combinatorial libraries of analogs of biologically active compounds.¹ The compounds have also been used for peripheral functionalization of some amino-terminated dendrimers.²

EN300-59507		EN300-138820	
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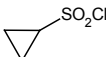
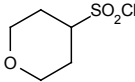
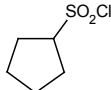
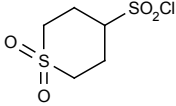
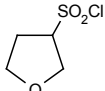
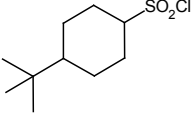
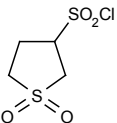
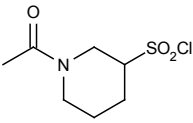
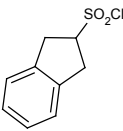
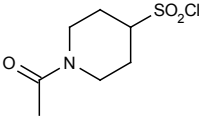
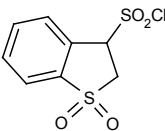
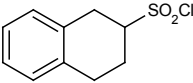
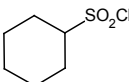
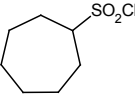
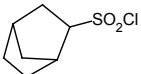
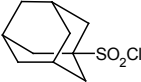
¹ (a) Nilsson, J. W. et al. *J. Comb. Chem.* **2001**, *3*, 546-553. (b) Li, L. et al. *J. Comb. Chem.* **2004**, *6*, 811-821. (c) Serrano, P. et al. *J. Comb. Chem.* **2007**, *9*, 43-52. (d) Cheung, Y.-Y. et al. *ACS Comb. Sci.* **2011**, *13*, 159-165.

² (a) Hahn, U. et al. *Chem. Int. Ed.* **2002**, *41*, 3595-3598. (b) Lukin, O. et al. *J. Org. Chem.* **2008**, *73*, 3562-3565.

Monofunctional sulfonyl chlorides

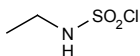
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<p>EN300-68942</p>		<p>EN300-69745</p>	
<p>EN300-88807</p>		<p>EN300-53764</p>	
<p>EN300-74210</p>		<p>EN300-90404</p>	
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Monofunctional sulfonyl chlorides

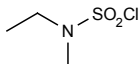
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EN300-78147		EN300-55113	
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Monofunctional sulfonyl chlorides

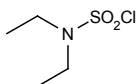
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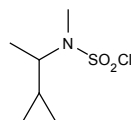
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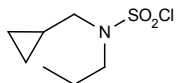
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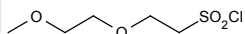
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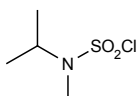
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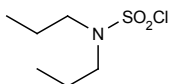
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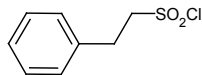
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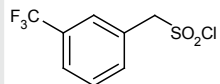
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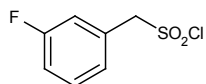
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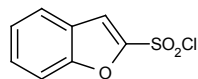
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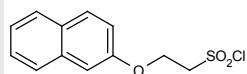
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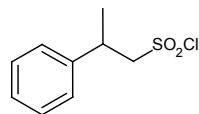
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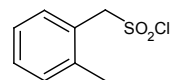
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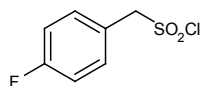
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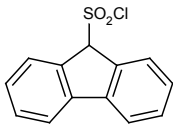
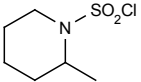
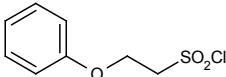
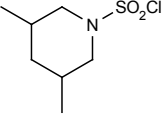
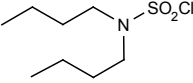
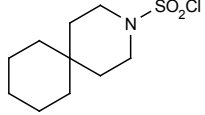
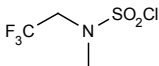
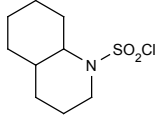
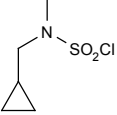
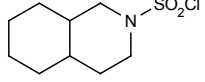
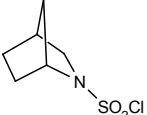
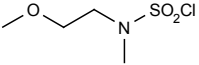
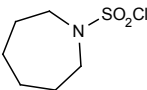
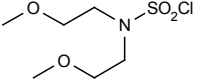
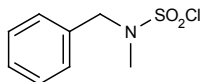
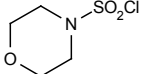
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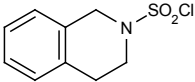

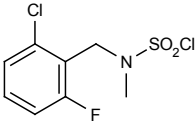
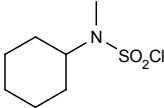
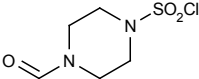
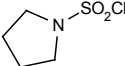
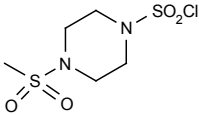
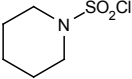
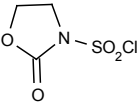
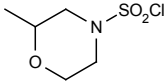
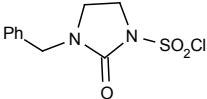
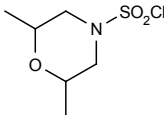
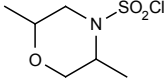
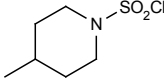
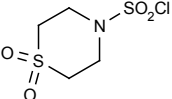
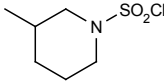
[EN300-27343](#)



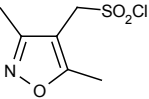
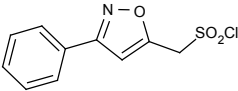
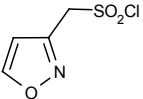
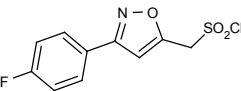
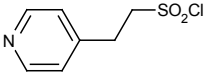
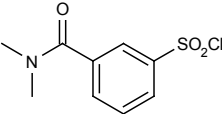
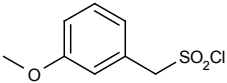
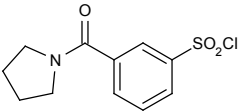
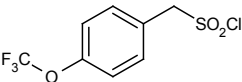
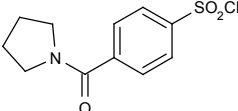
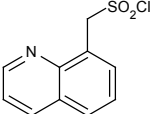
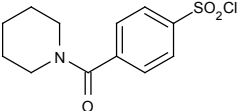
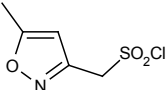
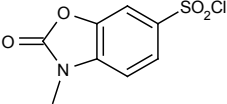
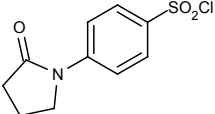
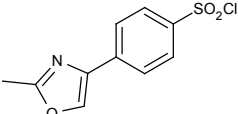
Monofunctional sulfonyl chlorides

EN300-98952		EN300-31565	
EN300-65997		EN300-29825	
EN300-40122		EN300-110261	
EN300-86307		EN300-102122	
EN300-82013		EN300-86804	
EN300-85150		EN300-74026	
EN300-25764		EN300-30708	
EN300-29904		EN300-27281	

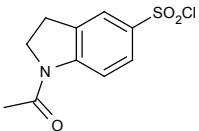
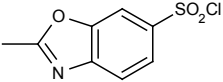
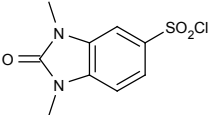
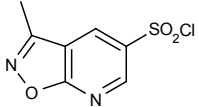
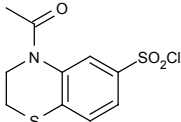
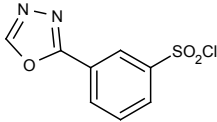
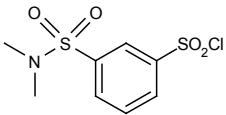
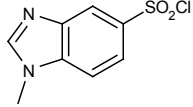
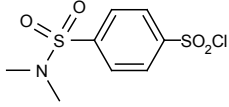
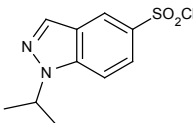
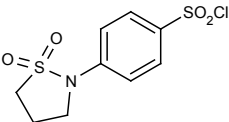
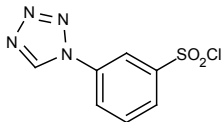
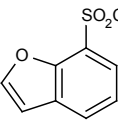
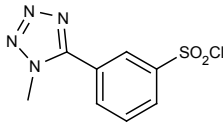
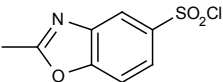
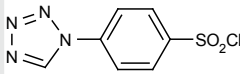
Monofunctional sulfonyl chlorides

EN300-28774		EN300-81521	
EN300-28270		EN300-30496	
EN300-50395		EN300-28610	
EN300-98372		EN300-28609	
EN300-35819		EN300-90511	
EN300-45455		EN300-34891	
EN300-90604		EN300-29511	
EN300-69622		EN300-29819	

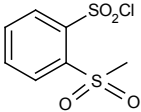
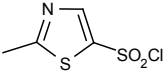
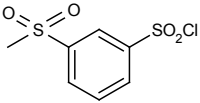
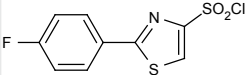
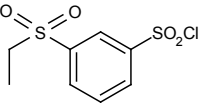
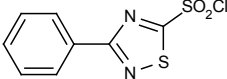
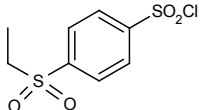
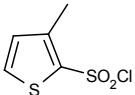
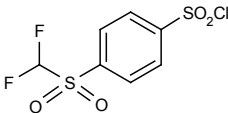
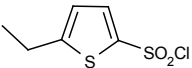
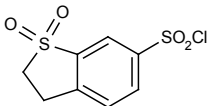
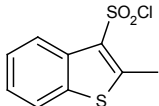
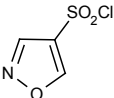
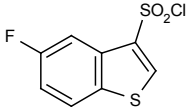
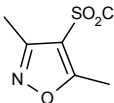
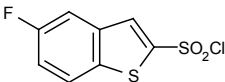
Monofunctional sulfonyl chlorides

<p>EN300-43852</p>		<p>EN300-38916</p>	
<p>EN300-81551</p>		<p>EN300-37519</p>	
<p>EN300-42784</p>		<p>EN300-39737</p>	
<p>EN300-42642</p>		<p>EN300-41641</p>	
<p>EN300-66299</p>		<p>EN300-29806</p>	
<p>EN300-56300</p>		<p>EN300-96736</p>	
<p>EN300-31062</p>		<p>EN300-28946</p>	
<p>EN300-23308</p>		<p>EN300-74193</p>	

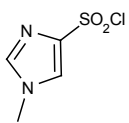
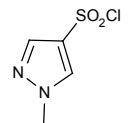
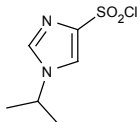
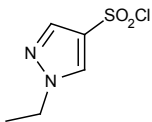
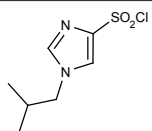
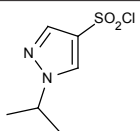
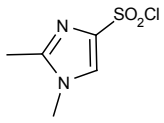
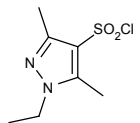
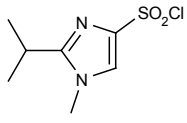
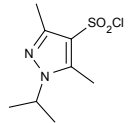
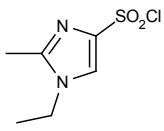
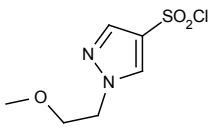
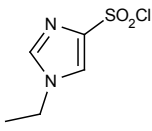
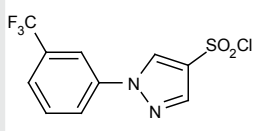
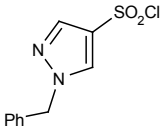
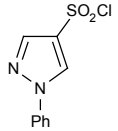
Monofunctional sulfonyl chlorides

EN300-15270		EN300-79482	
EN300-60294		EN300-63868	
EN300-79537		EN300-54718	
EN300-29558		EN300-79494	
EN300-09889		EN300-107491	
EN300-65400		EN300-52712	
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EN300-105170		EN300-60269	

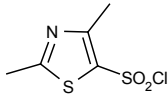
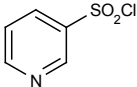
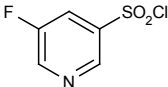
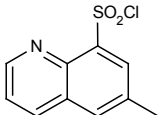
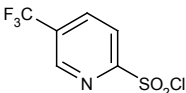
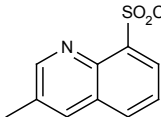
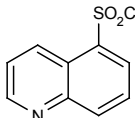
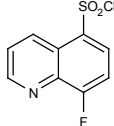
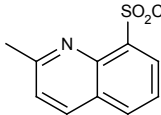
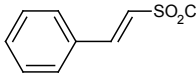
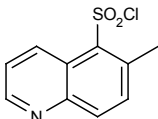
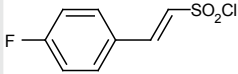
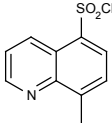
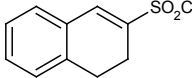
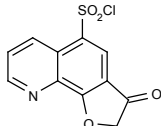
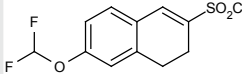
Monofunctional sulfonyl chlorides

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<p>EN300-29808</p>		<p>EN300-61454</p>	
<p>EN300-106531</p>		<p>EN300-35613</p>	
<p>EN300-51815</p>		<p>EN300-85700</p>	
<p>EN300-35629</p>		<p>EN300-51551</p>	
<p>EN300-109695</p>		<p>EN300-103795</p>	
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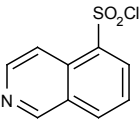
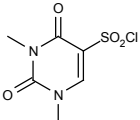
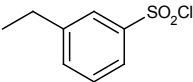
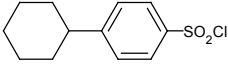
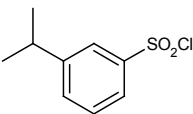
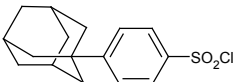
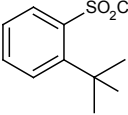
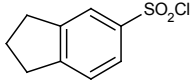
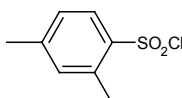
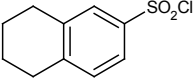
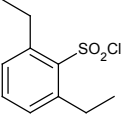
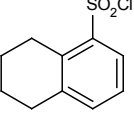
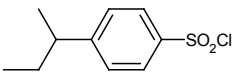
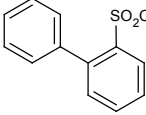
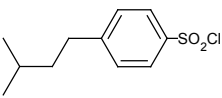
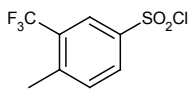
Monofunctional sulfonyl chlorides

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EN300-85972		EN300-66811	
EN300-91323		EN300-84990	
EN300-58948		EN300-85673	
EN300-94354		EN300-78313	
EN300-60217		EN300-114873	
EN300-98564		EN300-91257	
EN300-50985		EN300-56445	

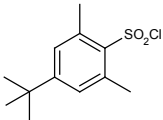
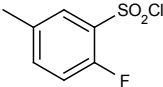
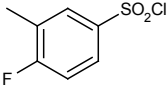
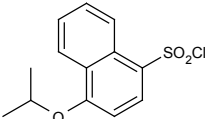
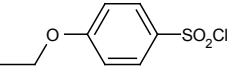
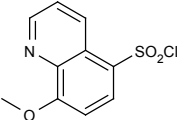
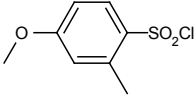
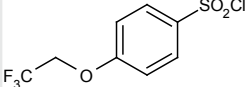
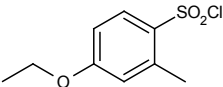
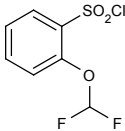
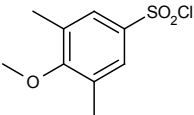
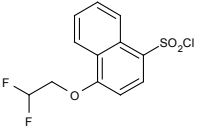
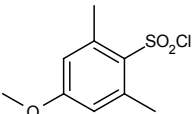
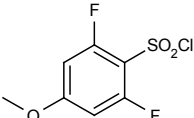
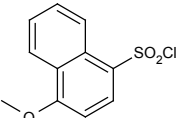
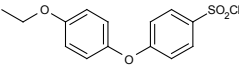
Monofunctional sulfonyl chlorides

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<p>EN300-55881</p>		<p>EN300-41574</p>	
<p>EN300-108076</p>		<p>EN300-26987</p>	
<p>EN300-61825</p>		<p>EN300-36180</p>	
<p>EN300-99012</p>		<p>EN300-17017</p>	
<p>EN300-41566</p>		<p>EN300-97908</p>	
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<p>EN300-41747</p>		<p>EN300-60679</p>	

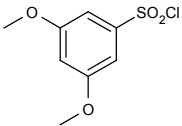
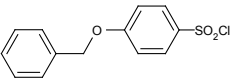
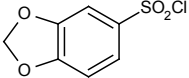
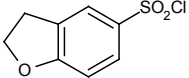
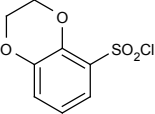
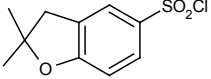
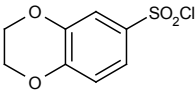
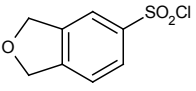
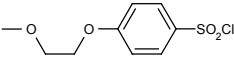
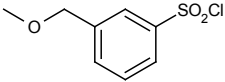
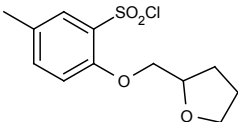
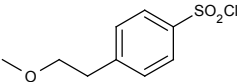
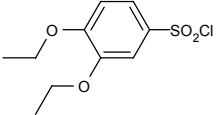
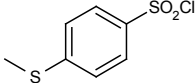
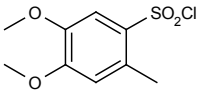
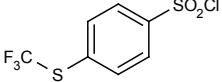
Monofunctional sulfonyl chlorides

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<p>EN300-102363</p>		<p>EN300-10865</p>	
<p>EN300-85930</p>		<p>EN300-07709</p>	
<p>EN300-91422</p>		<p>EN300-11191</p>	
<p>EN300-04436</p>		<p>EN300-11024</p>	
<p>EN300-72583</p>		<p>EN300-55755</p>	
<p>EN300-07674</p>		<p>EN300-29809</p>	
<p>EN300-12415</p>		<p>EN300-61383</p>	

Monofunctional sulfonyl chlorides

EN300-10758		EN300-39479	
EN300-49212		EN300-36976	
EN300-01719		EN300-39712	
EN300-45518		EN300-59930	
EN300-61655		EN300-62319	
EN300-37580		EN300-88352	
EN300-36589		EN300-60114	
EN300-39897		EN300-13583	

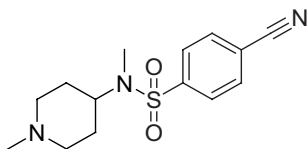
Monofunctional sulfonyl chlorides

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<p>EN300-62413</p>		<p>EN300-103038</p>	
<p>EN300-01513</p>		<p>EN300-56102</p>	
<p>EN300-31434</p>		<p>EN300-66009</p>	
<p>EN300-69986</p>		<p>EN300-36543</p>	
<p>EN300-13832</p>		<p>EN300-60361</p>	
<p>EN300-31054</p>		<p>EN300-56122</p>	

Sulfonyl chlorides with additional functional groups

It is of importance for both high-throughput parallel synthesis and fragment-based drug design to have building blocks capable of consecutive linking of two or more fragments in chemically and stereochemically predefined manners.³ Functionalized sulfonyl chlorides collected in this section are perfectly suitable for this purpose. The sulfonyl chlorides listed in this section are grouped by their second functionality.

Nitriles offer by far the best flexibility with regard to the functional group transformation. For example, the nitrile group can be selectively transformed to a primary amino-, carbonyl, or carboxylic group. In addition, the nitrile functionality can participate in non-covalent interactions, such as hydrogen bonding and π -stacking that play key roles in substrate binding. On account of this property sulfonyl chlorides bearing the nitrile group are often used only for the introduction of the group into the potentially bioactive species (Example 1).⁴



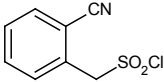
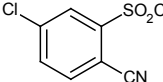
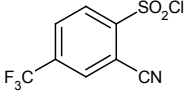
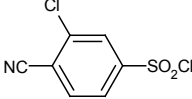
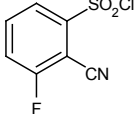
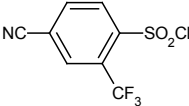
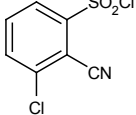
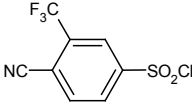
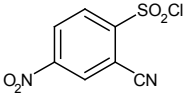
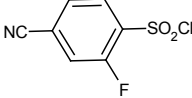
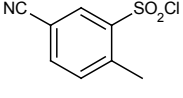
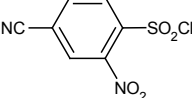
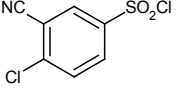
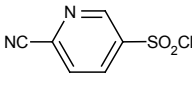
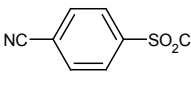
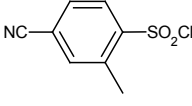
Example 1

³ (a) Erlanson, D. A. et al. *J. Med. Chem.* **2004**, *47*, 3463-3482. (b) Rees, D. C. et al. *Nat. Rev. Drug Discovery* **2004**, *3*, 660-672. (c) Chung, S. et al. *Nature Chem. Biol.* **2009**, *5*, 407-413.

⁴ Jang, J. W. et al. *Bioorg. Med. Chem. Lett.* **2012**, *22*, 347-352.

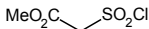
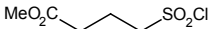
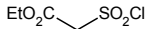

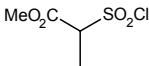
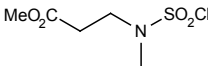
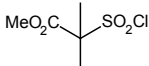
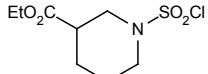
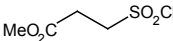

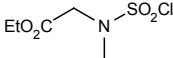
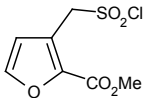
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Sulfonyl chlorides with additional functional groups

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EN300-77103		EN300-25504	
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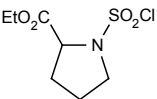
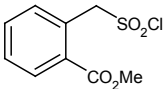
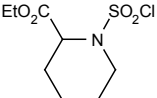
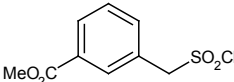
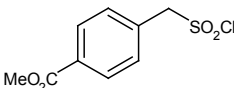
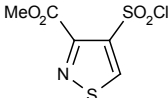
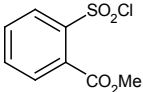
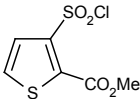
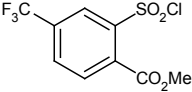
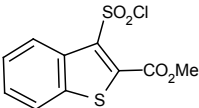
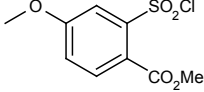
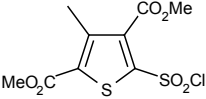
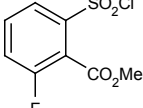
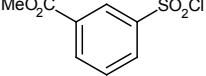
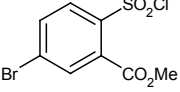
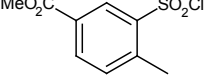
Sulfonyl chlorides with additional functional groups

Esters can be involved in transesterification, hydrolysis, and the amide bond formation. The sulfonyl chlorides containing ester group(s) are extensively used in functionalization of biologically active species and natural products.⁵

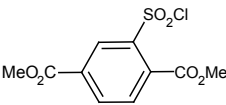
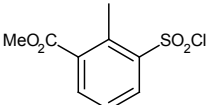
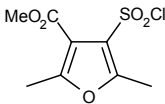
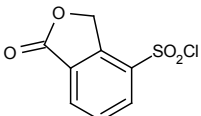
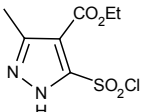
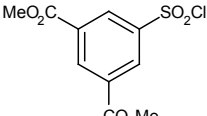
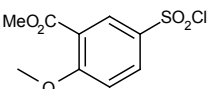
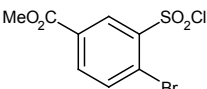
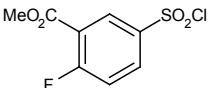
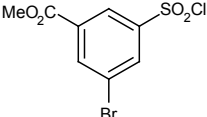
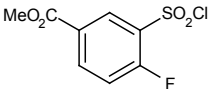
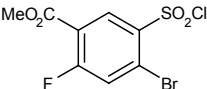
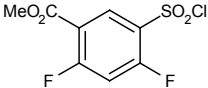
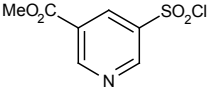
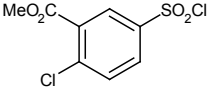
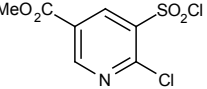
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EN300-14193		EN300-30736	
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⁵ Stanetty, C. et al. *Bioorg. Med. Chem.* **2010**, *18*, 7522-7541.

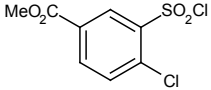
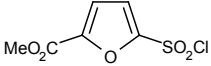
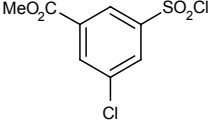
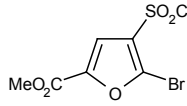
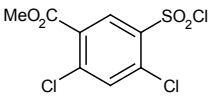
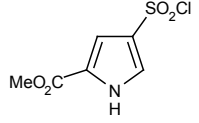
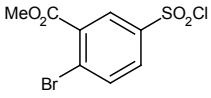
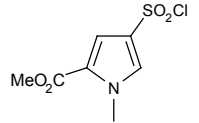
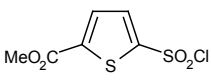
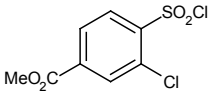
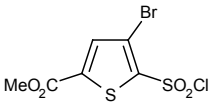
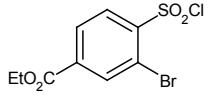
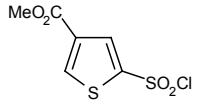
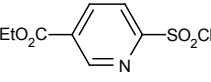
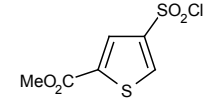
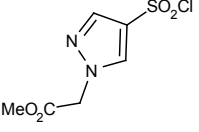
Sulfonyl chlorides with additional functional groups

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<p>EN300-17048</p>		<p>EN300-24083</p>	
<p>EN300-71536</p>		<p>EN300-73806</p>	
<p>EN300-115645</p>		<p>EN300-02082</p>	
<p>EN300-106176</p>		<p>EN300-27164</p>	
<p>EN300-07955</p>		<p>EN300-30560</p>	

Sulfonyl chlorides with additional functional groups

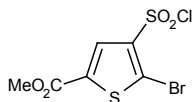
<p>EN300-06830</p>	 <p>Chemical structure: 1,3-bis(methoxycarbonyl)benzene-2-sulfonyl chloride. A benzene ring with a sulfonyl chloride group (SO_2Cl) at position 1, and methoxycarbonyl groups (CO_2Me) at positions 3 and 5.</p>	<p>EN300-72886</p>	 <p>Chemical structure: 1-methyl-3-(methoxycarbonyl)benzene-2-sulfonyl chloride. A benzene ring with a sulfonyl chloride group (SO_2Cl) at position 1, a methyl group at position 3, and a methoxycarbonyl group (CO_2Me) at position 5.</p>
<p>EN300-37100</p>	 <p>Chemical structure: 2-methyl-5-(methoxycarbonyl)-2H-benzofuran-3-sulfonyl chloride. A benzofuran ring system with a sulfonyl chloride group (SO_2Cl) at position 3, a methyl group at position 2, and a methoxycarbonyl group (CO_2Me) at position 5.</p>	<p>EN300-41021</p>	 <p>Chemical structure: 2-(benzo[d][1,3]oxazol-5-yl)sulfonyl chloride. A benzofuran ring system with a sulfonyl chloride group (SO_2Cl) at position 2.</p>
<p>EN300-45515</p>	 <p>Chemical structure: 1-methyl-4-ethoxycarbonyl-1H-imidazole-2-sulfonyl chloride. An imidazole ring with a sulfonyl chloride group (SO_2Cl) at position 2, a methyl group at position 1, and an ethoxycarbonyl group (CO_2Et) at position 4.</p>	<p>EN300-06759</p>	 <p>Chemical structure: 1,3-bis(methoxycarbonyl)benzene-4-sulfonyl chloride. A benzene ring with a sulfonyl chloride group (SO_2Cl) at position 1, and methoxycarbonyl groups (CO_2Me) at positions 3 and 5.</p>
<p>EN300-82832</p>	 <p>Chemical structure: 1-methoxy-3-(methoxycarbonyl)benzene-2-sulfonyl chloride. A benzene ring with a sulfonyl chloride group (SO_2Cl) at position 1, a methoxy group (OCH_3) at position 3, and a methoxycarbonyl group (CO_2Me) at position 5.</p>	<p>EN300-51711</p>	 <p>Chemical structure: 1-bromo-3-(methoxycarbonyl)benzene-2-sulfonyl chloride. A benzene ring with a sulfonyl chloride group (SO_2Cl) at position 1, a bromine atom (Br) at position 3, and a methoxycarbonyl group (CO_2Me) at position 5.</p>
<p>EN300-54846</p>	 <p>Chemical structure: 1-fluoro-3-(methoxycarbonyl)benzene-2-sulfonyl chloride. A benzene ring with a sulfonyl chloride group (SO_2Cl) at position 1, a fluorine atom (F) at position 3, and a methoxycarbonyl group (CO_2Me) at position 5.</p>	<p>EN300-80908</p>	 <p>Chemical structure: 1-bromo-3-(methoxycarbonyl)benzene-2-sulfonyl chloride. A benzene ring with a sulfonyl chloride group (SO_2Cl) at position 1, a bromine atom (Br) at position 3, and a methoxycarbonyl group (CO_2Me) at position 5.</p>
<p>EN300-54907</p>	 <p>Chemical structure: 1-fluoro-3-(methoxycarbonyl)benzene-2-sulfonyl chloride. A benzene ring with a sulfonyl chloride group (SO_2Cl) at position 1, a fluorine atom (F) at position 3, and a methoxycarbonyl group (CO_2Me) at position 5.</p>	<p>EN300-68708</p>	 <p>Chemical structure: 1-bromo-2-fluoro-3-(methoxycarbonyl)benzene-2-sulfonyl chloride. A benzene ring with a sulfonyl chloride group (SO_2Cl) at position 1, a bromine atom (Br) at position 2, a fluorine atom (F) at position 3, and a methoxycarbonyl group (CO_2Me) at position 5.</p>
<p>EN300-74820</p>	 <p>Chemical structure: 1,3-difluoro-5-(methoxycarbonyl)benzene-2-sulfonyl chloride. A benzene ring with a sulfonyl chloride group (SO_2Cl) at position 1, fluorine atoms (F) at positions 3 and 5, and a methoxycarbonyl group (CO_2Me) at position 4.</p>	<p>EN300-79589</p>	 <p>Chemical structure: 3-(methoxycarbonyl)pyridine-2-sulfonyl chloride. A pyridine ring with a sulfonyl chloride group (SO_2Cl) at position 2 and a methoxycarbonyl group (CO_2Me) at position 3.</p>
<p>EN300-54853</p>	 <p>Chemical structure: 1-chloro-3-(methoxycarbonyl)benzene-2-sulfonyl chloride. A benzene ring with a sulfonyl chloride group (SO_2Cl) at position 1, a chlorine atom (Cl) at position 3, and a methoxycarbonyl group (CO_2Me) at position 5.</p>	<p>EN300-41733</p>	 <p>Chemical structure: 1-chloro-3-(methoxycarbonyl)pyridine-2-sulfonyl chloride. A pyridine ring with a sulfonyl chloride group (SO_2Cl) at position 2, a chlorine atom (Cl) at position 3, and a methoxycarbonyl group (CO_2Me) at position 4.</p>

Sulfonyl chlorides with additional functional groups

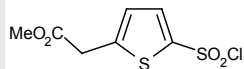
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<p>EN300-80827</p>	 <p><chem>COC(=O)c1ccc(Cl)cc1S(=O)(=O)Cl</chem></p>	<p>EN300-88933</p>	 <p><chem>COC(=O)c1cc(Br)oc1S(=O)(=O)Cl</chem></p>
<p>EN300-28659</p>	 <p><chem>COC(=O)c1cc(Cl)cc(Cl)c1S(=O)(=O)Cl</chem></p>	<p>EN300-92226</p>	 <p><chem>COC(=O)c1c[nH]c(c1)S(=O)(=O)Cl</chem></p>
<p>EN300-52088</p>	 <p><chem>COC(=O)c1ccc(Br)cc1S(=O)(=O)Cl</chem></p>	<p>EN300-96474</p>	 <p><chem>COC(=O)c1c[nH](C)c(c1)S(=O)(=O)Cl</chem></p>
<p>EN300-24719</p>	 <p><chem>COC(=O)c1ccsc1S(=O)(=O)Cl</chem></p>	<p>EN300-62464</p>	 <p><chem>COC(=O)c1ccc(Cl)cc1S(=O)(=O)Cl</chem></p>
<p>EN300-78000</p>	 <p><chem>COC(=O)c1cc(Br)sc1S(=O)(=O)Cl</chem></p>	<p>EN300-30809</p>	 <p><chem>CCOC(=O)c1ccc(Br)cc1S(=O)(=O)Cl</chem></p>
<p>EN300-54851</p>	 <p><chem>COC(=O)c1ccsc1S(=O)(=O)Cl</chem></p>	<p>EN300-73801</p>	 <p><chem>CCOC(=O)c1ccncc1S(=O)(=O)Cl</chem></p>
<p>EN300-70483</p>	 <p><chem>COC(=O)c1ccsc1S(=O)(=O)Cl</chem></p>	<p>EN300-93602</p>	 <p><chem>COC(=O)CN1C=CN=C1S(=O)(=O)Cl</chem></p>

Sulfonyl chlorides with additional functional groups

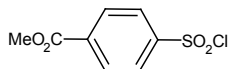
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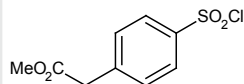
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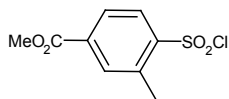
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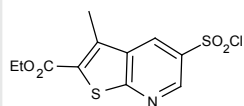
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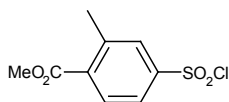
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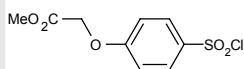
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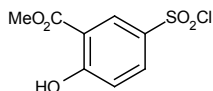
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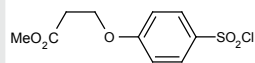
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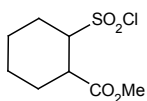
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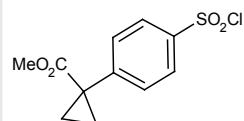
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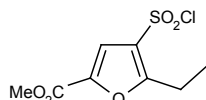
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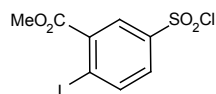
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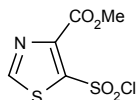
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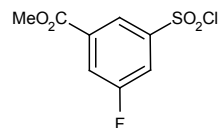
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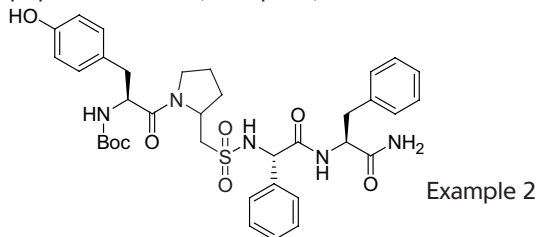


[EN300-131603](#)



Sulfonyl chlorides with additional functional groups

A group of aliphatic sulfonyl chlorides bearing a protected amine as the second functionality is represented by synthetic non-planar saturated ring compounds possessing limited number of rotatable bonds and asymmetric carbons.⁶ Compounds with such characteristics have potential in drug discovery on account of their structural similarity with many natural compounds. Some of the listed here sulfonyl chlorides with a protected amine moiety have already shown their utility in the synthesis of peptidomimetics (Example 2).⁷



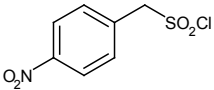
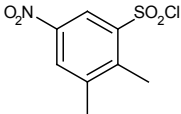
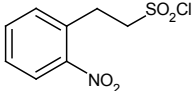
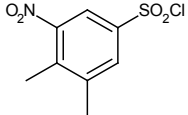
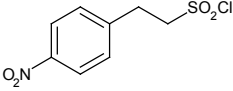
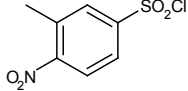
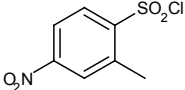
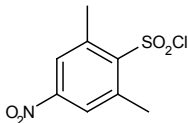
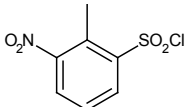
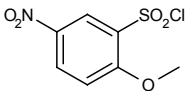
⁶ Zherish, S. et al. *Synthesis* **2011**, 3669-3674.

⁷ (a) Giordano, C. et al. *Eur. J. Med. Chem.* **2010**, *45*, 4594. (b) Giordano, C. et al. *Eur. J. Med. Chem.* **2009**, *44*, 179.

EN300-75794		EN300-74196	
EN300-62454		EN300-74411	
EN300-75789		EN300-33386	
EN300-74537		EN300-71725	
EN300-71924		EN300-41904	

Sulfonyl chlorides with additional functional groups

The nitro-group in *nitroarenesulfonyl chlorides* can easily be reduced into the amino-group that, in turn, can undergo a variety of further synthetic transformations. Besides their widespread use in medicinal chemistry and drug discovery⁸ the nitroarenesulfonyl chlorides have found a number of applications in organic and polymer chemistry, *e.g.*, as building blocks in the dendrimer synthesis.⁹

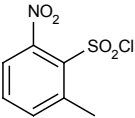
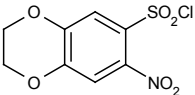
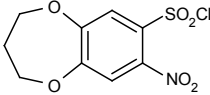
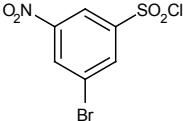
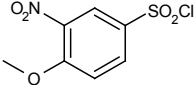
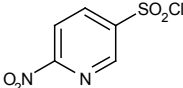
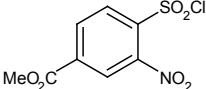
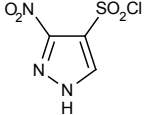
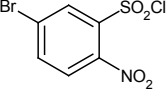
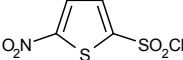
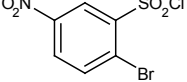
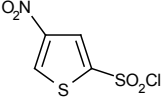
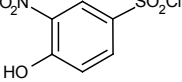
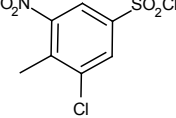
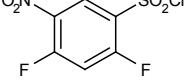
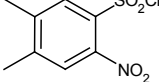
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⁸ For the most recent examples see: (a) Henn, C. et al. *J. Med. Chem.* **2012**, *55*, 3307-3318.

(b) Mostafa, Y. A. et al. *Bioorg. Med. Chem.* **2012**, *20*, 58-68.

⁹ Lukin, O. et al. *J. Am. Chem. Soc.* **2006**, *128*, 8964-8974.

Sulfonyl chlorides with additional functional groups

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EN300-64356		EN300-43162	
EN300-07054		EN300-12971	
EN300-12973		EN300-29200	

Sulfonyl chlorides with additional functional groups

Sulfonyl chlorides with halogen atoms capable of aromatic nucleophilic displacement.

Chloro- and fluoronitrobenzenesulfonyl chlorides contain three functional groups which could be used in numerous transformations e.g. sulfonylation, aromatic nucleophilic displacement of halogen atom and reduction of the nitro group.¹⁰ Stepwise derivatizations of some fluoronitrobenzenesulfonyl chlorides were successfully used in the synthesis of drug-like compounds.¹¹

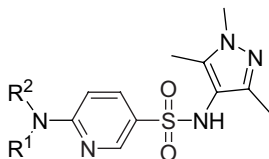
¹⁰ Zherish, S. et al. *Tetrahedron* **2010**, *66*, 5982-5986.

¹¹ (a) Hu, X. et al. *J. Am. Chem. Soc.* **2008**, *130*, 13820-13821. (b) Pescatore, G. et al. *Bioorg. Med. Chem. Lett.* **2008**, *5528-5532*. (c) Cherepakha, A. et al. *Tetrahedron* **2011**, *67*, 6233-6239.

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EN300-54672		EN300-43690	
EN300-12973		EN300-09832	
EN300-35187		EN300-43514	

Sulfonyl chlorides with additional functional groups

Chloropyridine- and other chlorohetarylsulfonyl chlorides bear active chlorine atoms, which can be substituted by nucleophiles. For example, sulfonyl chlorides of this type were already successfully used in many syntheses of biologically active compounds (Example 3).¹²



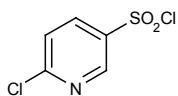
Example 3

¹² For the most recent examples see: (a) Brand, S. et al. *J. Med. Chem.* **2012**, *55*, 140-152. (b) Rawson, D. J. et al. *Bioorg. Med. Chem.* **2012**, *20*, 498-509.

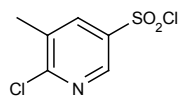
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Sulfonyl chlorides with additional functional groups

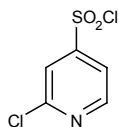
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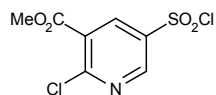
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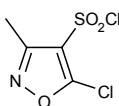
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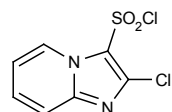
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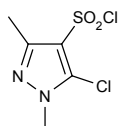
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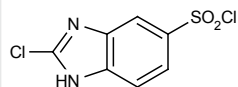
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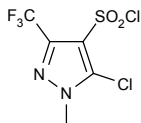
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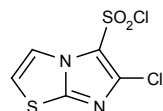
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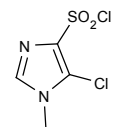
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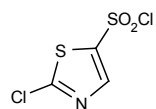
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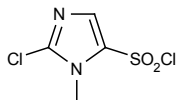
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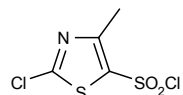
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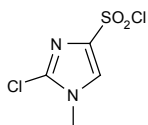
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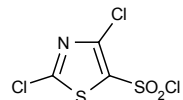
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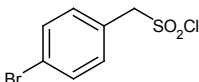
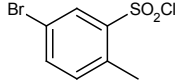
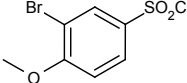
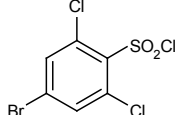
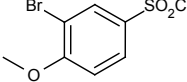
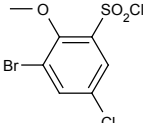
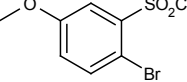
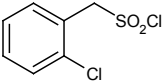
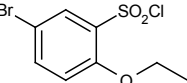
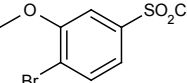
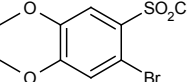
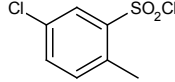


[EN300-31478](#)



Sulfonyl chlorides with additional functional groups

Aromatic *sulfonyl chlorides bearing bromine or chlorine atoms* can be involved in metal-mediated cross-coupling chemistry, *e.g.*, Suzuki-Miyaura reaction. The high reliability of the latter reaction allowed carrying out parallel syntheses of elaborated sulfonamides from bromoarylsulfonamides and boronic acids.¹³ Less reactive aryl chlorides react with boronic acids in the presence of high-performance Pd-catalysts.¹⁴

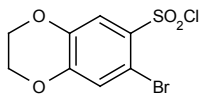
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¹³ Gutierrez, C. D. et al. *J. Comb. Chem.* **2008**, *10*, 280-284.

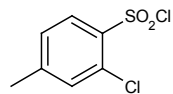
¹⁴ Kandre, R. et al. *Angew. Chem. Int. Ed.* **2007**, *46*, 4956-4959.

Sulfonyl chlorides with additional functional groups

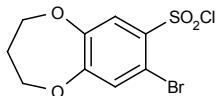
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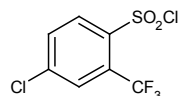
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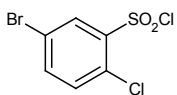
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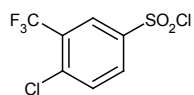
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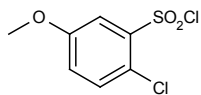
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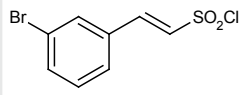
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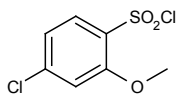
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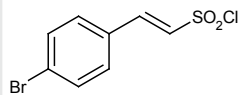
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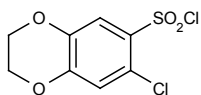
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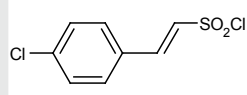
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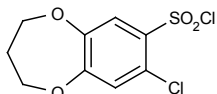
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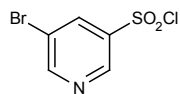
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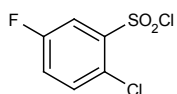
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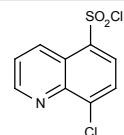
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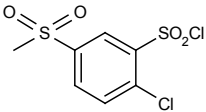
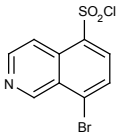
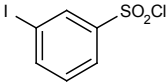
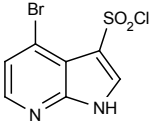
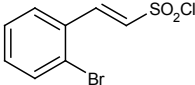
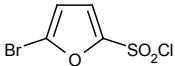
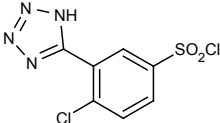
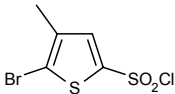
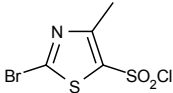
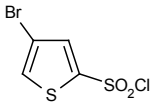
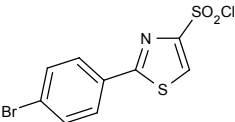
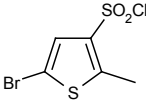
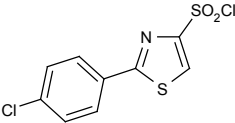
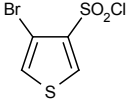
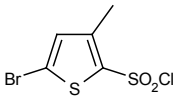
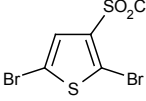
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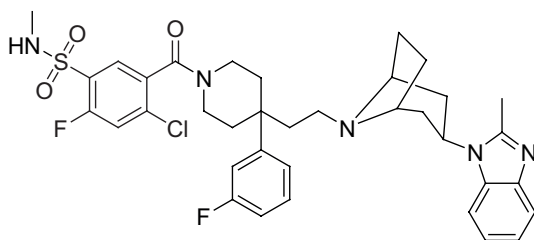


Sulfonyl chlorides with additional functional groups

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<p>EN300-71520</p>		<p>EN300-104391</p>	
<p>EN300-105109</p>		<p>EN300-12392</p>	

Sulfonyl chlorides with additional functional groups

Since the carboxylic group is one of the most important binding groups in drugs, aromatic *carboxylic acids* with chlorosulfo-group have been involved in a large number of drug discovery programs. The carboxylic group in the sulfonyl chlorides has also been used as the second functional unit for esterification or amide bond formation. Up to the present ca. 250 patents and more than 200 research papers described biologically potent compounds constructed with the use of the chlorosulfonylbenzene carboxylic acids. Acids in which the carboxylic group is in *meta*-position to the chlorosulfo-group are particularly important building blocks in this context. Additional functionalities, such as halogen atoms, are also of importance in medicinal chemistry and drug design (Example 4).¹⁵

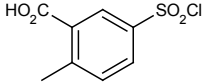
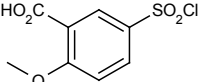
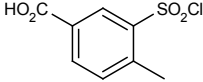
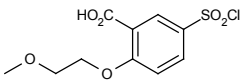
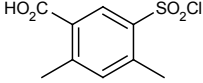
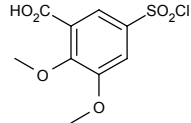
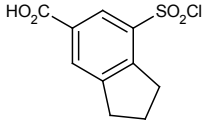
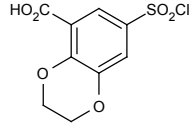
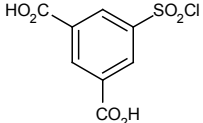
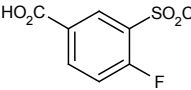
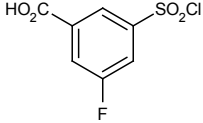
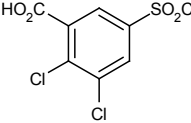
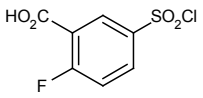
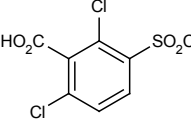
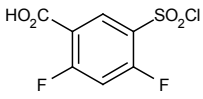
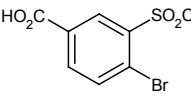


Example 4

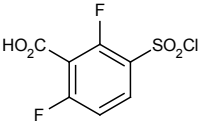
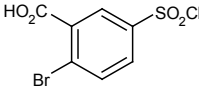
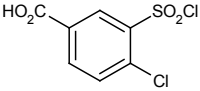
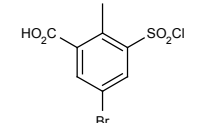
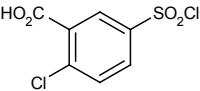
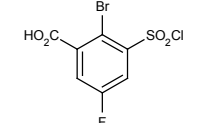
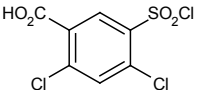
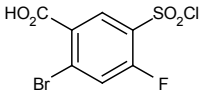
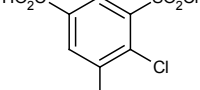
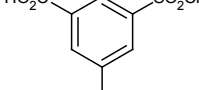
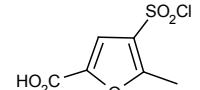
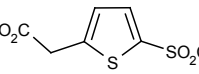
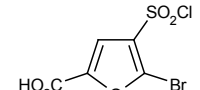
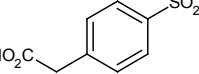
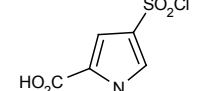
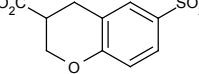
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¹⁵ Kazmierski, W. M. et al. *J. Med. Chem.* **2011**, *54*, 3756-3767.

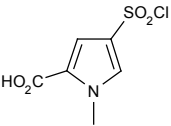
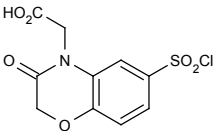
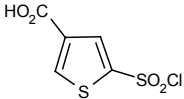
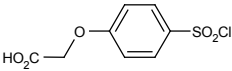
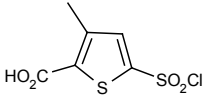
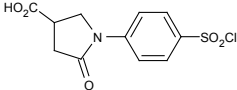
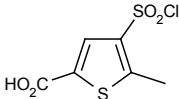
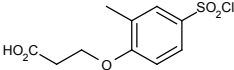
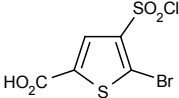
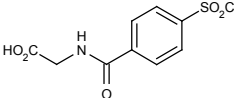
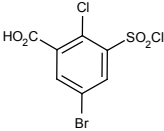
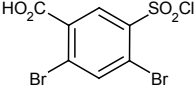
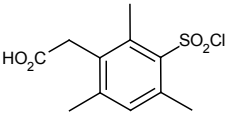
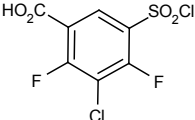
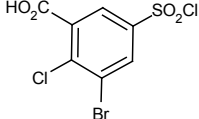
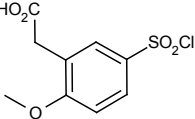
Sulfonyl chlorides with additional functional groups

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EN300-01836		EN300-73413	
EN300-39734		EN300-40475	
EN300-50582		EN300-52915	
EN300-50470		EN300-01833	
EN300-01841		EN300-59756	
EN300-09860		EN300-01839	
EN300-59276		EN300-01845	

Sulfonyl chlorides with additional functional groups

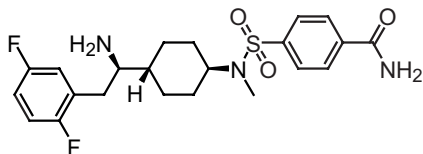
<p>EN300-01840</p>	 <p>Chemical structure of 2,4-difluoro-3-sulfonylbenzoic acid: A benzene ring with a carboxylic acid group (HO₂C) at position 1, sulfonyl chloride groups (SO₂Cl) at position 3, and fluorine atoms (F) at positions 2 and 4.</p>	<p>EN300-05638</p>	 <p>Chemical structure of 3-bromo-4-sulfonylbenzoic acid: A benzene ring with a carboxylic acid group (HO₂C) at position 1, a sulfonyl chloride group (SO₂Cl) at position 4, and a bromine atom (Br) at position 3.</p>
<p>EN300-01716</p>	 <p>Chemical structure of 3-chloro-4-sulfonylbenzoic acid: A benzene ring with a carboxylic acid group (HO₂C) at position 1, a sulfonyl chloride group (SO₂Cl) at position 4, and a chlorine atom (Cl) at position 3.</p>	<p>EN300-97705</p>	 <p>Chemical structure of 3-bromo-5-sulfonylbenzoic acid: A benzene ring with a carboxylic acid group (HO₂C) at position 1, a sulfonyl chloride group (SO₂Cl) at position 5, and a bromine atom (Br) at position 3.</p>
<p>EN300-01717</p>	 <p>Chemical structure of 3-chloro-5-sulfonylbenzoic acid: A benzene ring with a carboxylic acid group (HO₂C) at position 1, a sulfonyl chloride group (SO₂Cl) at position 5, and a chlorine atom (Cl) at position 3.</p>	<p>EN300-60929</p>	 <p>Chemical structure of 3-bromo-5-fluoro-4-sulfonylbenzoic acid: A benzene ring with a carboxylic acid group (HO₂C) at position 1, a sulfonyl chloride group (SO₂Cl) at position 4, a bromine atom (Br) at position 3, and a fluorine atom (F) at position 5.</p>
<p>EN300-01720</p>	 <p>Chemical structure of 3,5-dichloro-4-sulfonylbenzoic acid: A benzene ring with a carboxylic acid group (HO₂C) at position 1, a sulfonyl chloride group (SO₂Cl) at position 4, and chlorine atoms (Cl) at positions 3 and 5.</p>	<p>EN300-52736</p>	 <p>Chemical structure of 3-bromo-5-fluoro-4-sulfonylbenzoic acid: A benzene ring with a carboxylic acid group (HO₂C) at position 1, a sulfonyl chloride group (SO₂Cl) at position 4, a bromine atom (Br) at position 3, and a fluorine atom (F) at position 5.</p>
<p>EN300-01834</p>	 <p>Chemical structure of 3,5-dichloro-4-sulfonylbenzoic acid: A benzene ring with a carboxylic acid group (HO₂C) at position 1, a sulfonyl chloride group (SO₂Cl) at position 4, and chlorine atoms (Cl) at positions 3 and 5.</p>	<p>EN300-101896</p>	 <p>Chemical structure of 4-nitro-3-sulfonylbenzoic acid: A benzene ring with a carboxylic acid group (HO₂C) at position 1, a sulfonyl chloride group (SO₂Cl) at position 3, and a nitro group (NO₂) at position 4.</p>
<p>EN300-52993</p>	 <p>Chemical structure of 2-methyl-5-sulfonyl-3-furancarboxylic acid: A furan ring with a carboxylic acid group (HO₂C) at position 3, a sulfonyl chloride group (SO₂Cl) at position 5, and a methyl group (CH₃) at position 2.</p>	<p>EN300-14543</p>	 <p>Chemical structure of 2-(2-sulfonylphenyl)acetic acid: A benzene ring with a sulfonyl chloride group (SO₂Cl) at position 2 and a (2-carboxyethyl) group (HO₂C-CH₂-) at position 1.</p>
<p>EN300-52963</p>	 <p>Chemical structure of 2-bromo-5-sulfonyl-3-furancarboxylic acid: A furan ring with a carboxylic acid group (HO₂C) at position 3, a sulfonyl chloride group (SO₂Cl) at position 5, and a bromine atom (Br) at position 2.</p>	<p>EN300-41606</p>	 <p>Chemical structure of 2-(4-sulfonylphenyl)acetic acid: A benzene ring with a sulfonyl chloride group (SO₂Cl) at position 4 and a (2-carboxyethyl) group (HO₂C-CH₂-) at position 1.</p>
<p>EN300-27371</p>	 <p>Chemical structure of 2-sulfonyl-3-furancarboxylic acid: A furan ring with a carboxylic acid group (HO₂C) at position 3 and a sulfonyl chloride group (SO₂Cl) at position 2.</p>	<p>EN300-59305</p>	 <p>Chemical structure of 2-(2-sulfonylphenyl)ethyl 2-oxo-1,2,3,4-tetrahydro-2H-benzopyridine-5-carboxylate: A benzopyridine ring system with a carboxylic acid group (HO₂C) at position 5, a sulfonyl chloride group (SO₂Cl) at position 2, and a (2-(2-carboxyethyl)phenyl) group (HO₂C-CH₂-CH₂-C₆H₄-) at position 1.</p>

Sulfonyl chlorides with additional functional groups

<p>EN300-30825</p>		<p>EN300-29000</p>	
<p>EN300-23463</p>		<p>EN300-36605</p>	
<p>EN300-40056</p>		<p>EN300-35823</p>	
<p>EN300-69759</p>		<p>EN300-58884</p>	
<p>EN300-36917</p>		<p>EN300-09824</p>	
<p>EN300-01842</p>		<p>EN300-124932</p>	
<p>EN300-126444</p>		<p>EN300-126508</p>	
<p>EN300-129460</p>		<p>EN300-49333</p>	

Sulfonyl chlorides with additional functional groups

Amides are key subunits responsible for ligand-protein hydrogen bonding interactions. Sulfonyl chlorides equipped with an amide unit included in this catalogue are well suitable for introducing the amide group into molecules of interest in the drug discovery process (Example 5).¹⁶ Amides collected in this subsection can be *N*-alkylated or acylated.



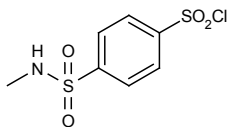
Example 5

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<p>EN300-27178</p>		<p>EN300-54149</p>	
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<p>EN300-14899</p>		<p>EN300-14508</p>	

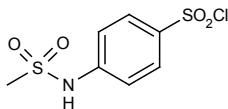
¹⁶ Chen, P.; Caldwell, C. G.; Ashton, W.; He, H.; Lyons, K. A.; Weber, A. E.; Wu, J. K.; Thornberry, N. A. *Bioorg. Med. Chem. Lett.* 2011, 21, 1880-1886.

Sulfonyl chlorides with additional functional groups

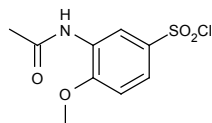
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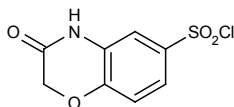
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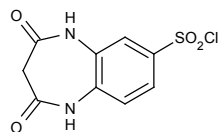
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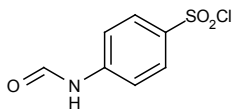
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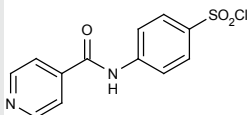
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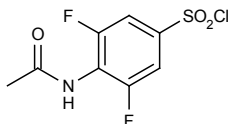
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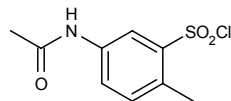
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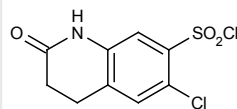
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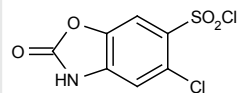
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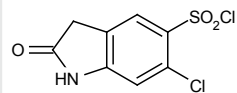
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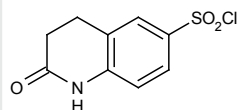
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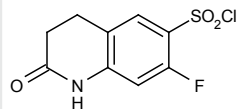
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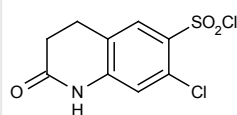
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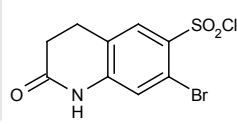
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[EN300-26754](#)

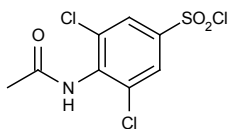


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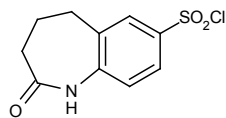


Sulfonyl chlorides with additional functional groups

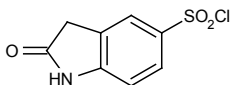
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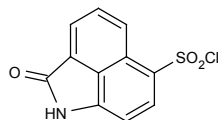
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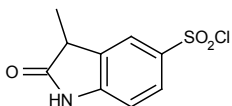
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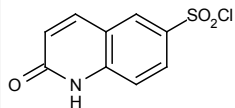
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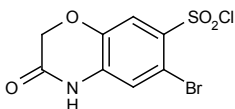
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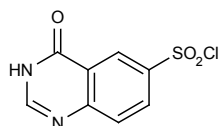
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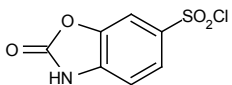
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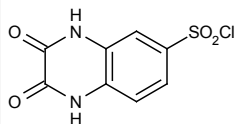
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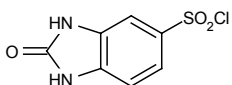
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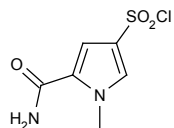
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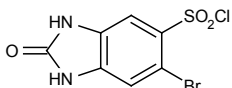
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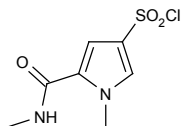
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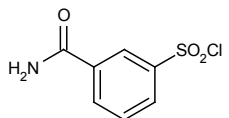
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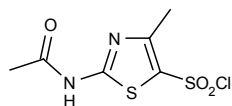
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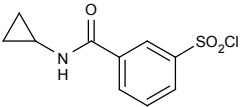
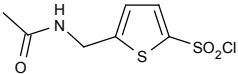
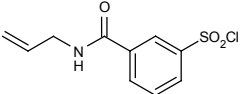
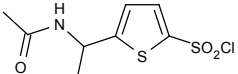
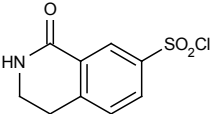
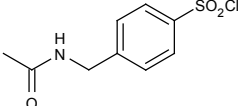
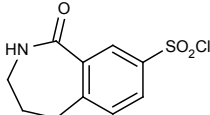
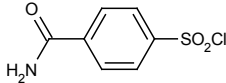
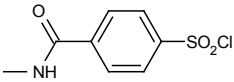
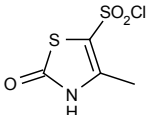
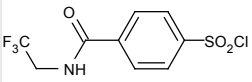
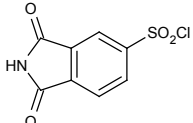
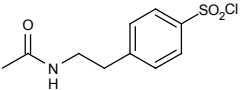
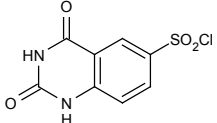
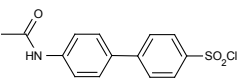
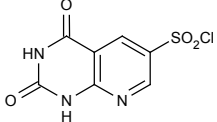
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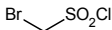
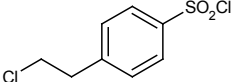
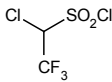
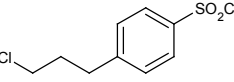
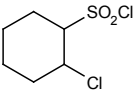
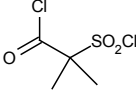
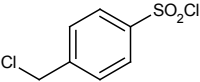
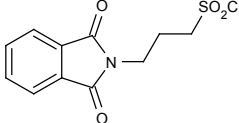
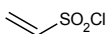
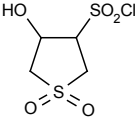
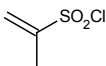
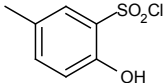
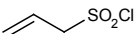
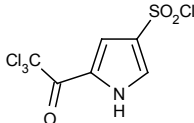


Sulfonyl chlorides with additional functional groups

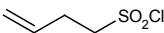
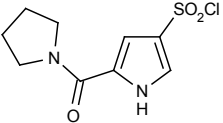
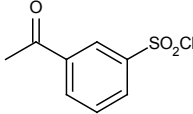
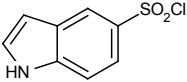
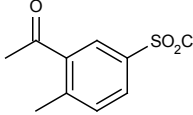
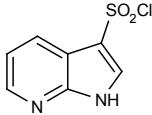
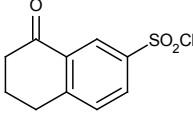
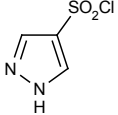
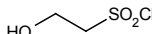
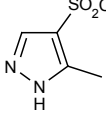
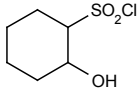
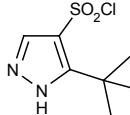
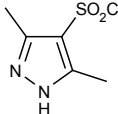
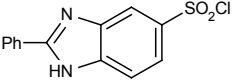
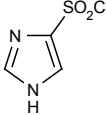
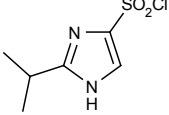
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EN300-45277		EN300-52267	
EN300-78531		EN300-05206	
EN300-103608		EN300-23544	
EN300-15349		EN300-27119	
EN300-11173		EN300-39487	
EN300-43732		EN300-27701	
EN300-23536		EN300-94424	

Sulfonyl chlorides with additional functional groups

Miscellaneous functionalized sulfonyl chlorides. These structures bear additional functional group, such as hydroxyl, halogen atom, C=C bond, etc, which can be appropriately functionalized afterwards.

EN300-43523		EN300-42116	
EN300-11961		EN300-63961	
EN300-70068		EN300-99174	
EN300-93181		EN300-39694	
EN300-98200		EN300-53691	
EN300-103670		EN300-49806	
EN300-67389		EN300-14443	

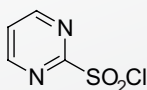
Sulfonyl chlorides with additional functional groups

<p>EN300-75072</p>	 <p><chem>C=CCS(=O)Cl</chem></p>	<p>EN300-29737</p>	 <p><chem>C1CCN1C(=O)c2c[nH]c3c2S(=O)(=O)Cl</chem></p>
<p>EN300-04283</p>	 <p><chem>CC(=O)c1ccc(S(=O)(=O)Cl)cc1</chem></p>	<p>EN300-105996</p>	 <p><chem>C1=CN=C2C=C(S(=O)(=O)Cl)C=C12</chem></p>
<p>EN300-77621</p>	 <p><chem>CC(=O)c1cc(C)ccc1S(=O)(=O)Cl</chem></p>	<p>EN300-51255</p>	 <p><chem>C1=NC2=C(N1)N=CN=C2S(=O)(=O)Cl</chem></p>
<p>EN300-101226</p>	 <p><chem>O=C1CCc2ccc(S(=O)(=O)Cl)cc2N1</chem></p>	<p>EN300-49990</p>	 <p><chem>C1=CN=C(N1)S(=O)(=O)Cl</chem></p>
<p>EN300-93233</p>	 <p><chem>CC(O)CS(=O)Cl</chem></p>	<p>EN300-50519</p>	 <p><chem>CC1=CN=C(N1)S(=O)(=O)Cl</chem></p>
<p>EN300-67349</p>	 <p><chem>O=C1CCCCC1c2ccc(S(=O)(=O)Cl)cc2</chem></p>	<p>EN300-82979</p>	 <p><chem>CC(C)(C)C1=CN=C(N1)S(=O)(=O)Cl</chem></p>
<p>EN300-10346</p>	 <p><chem>CC1=C(C)N=C(N1)S(=O)(=O)Cl</chem></p>	<p>EN300-66049</p>	 <p><chem>C1=NC2=C(N1)N=CN=C2c3ccc(S(=O)(=O)Cl)cc3</chem></p>
<p>EN300-75269</p>	 <p><chem>C1=CN=C(N1)S(=O)(=O)Cl</chem></p>	<p>EN300-84502</p>	 <p><chem>CC(C)C1=CN=C(N1)S(=O)(=O)Cl</chem></p>

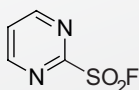
Substitutes for sulfonyl chlorides

Although the majority of aromatic sulfonyl chlorides are considerably stable compounds capable of reacting with nucleophiles under mild conditions there are many aliphatic and heteroaromatic sulfonyl chlorides that encounter problems associated with synthesis and storing. First, some aliphatic sulfonyl chlorides are considerably poor sulfonylating reagents because they undergo dehydrochlorination under mild basic conditions.¹⁷ Second, some sulfonyl chlorides (mainly heteroaromatic ones) are unstable under ambient conditions¹⁸ (Example 6) and, consequently, cannot be commercialized. They are usually prepared under specific conditions and used immediately in a next synthetic step. A good alternative to the highly reactive and often unstable sulfonyl chlorides are sulfonyl fluorides and pentafluorophenyl esters of sulfonic acids. In contrast to the chlorides, the fluorides and pentafluorophenyl esters are stable to a variety of conditions including column chromatography and even basic workup procedures. The pentafluorophenyl esters become irreplaceable sulfonylating reagents when the corresponding sulfonyl chlorides or fluorides cannot be prepared.¹⁹ (Example 6)

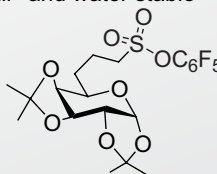
decomposes



air-stable, reactive



no chloride or fluoride analogs,
air- and water stable



Example 6


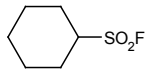
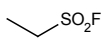
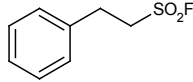
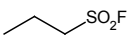
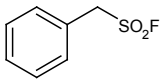

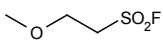
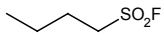
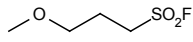
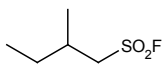
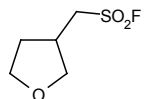
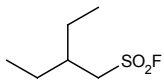
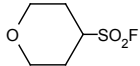
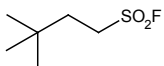
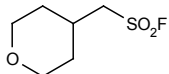
¹⁷ King, J. F. *Acc. Chem. Res.* **1975**, *8*, 10-17.

¹⁸ (a) Wright, S. W.; Hallstorm, K. N. *J. Org. Chem.* **2006**, *71*, 1080-1084.

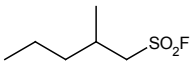
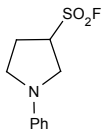
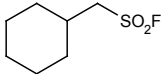
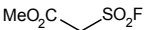
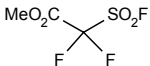
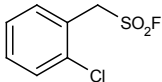
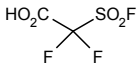
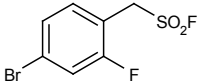

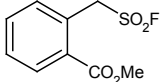
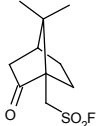
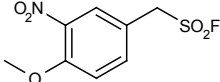
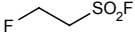
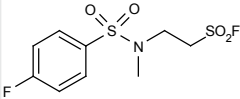
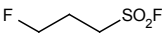
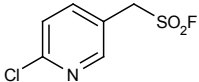
(b) Garcia-Rubia, A.; Urones, B.; Gomez A. R.; Carretero, J. C. *Angew. Chem. Int. Ed.* **2011**, *50*, 10927-10931.

¹⁹ Caddick, S.; Wilden, J. D.; Bush, H. D.; Wadman, S. N.; Judd, D. B. *Org. Lett.* **2002**, *4*, 2549-2551.

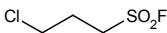
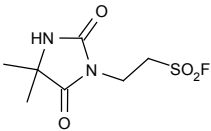

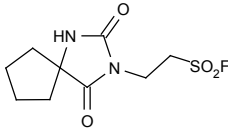
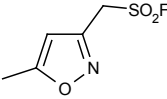
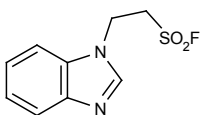
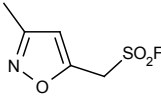
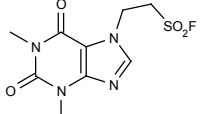
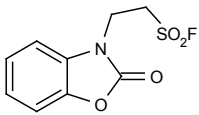
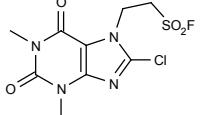
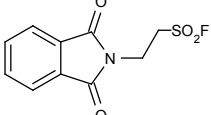
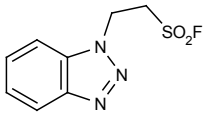
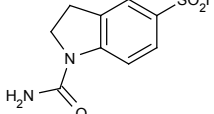
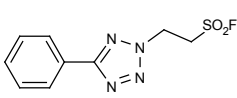
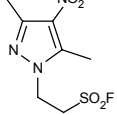
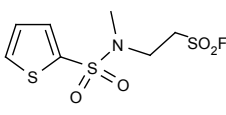
Sulfonyl fluorides

EN300-35716		EN300-64013	
EN300-53132		EN300-85771	
EN300-53968		EN300-24380	
EN300-53133		EN300-64011	
EN300-53662		EN300-98739	
EN300-76120		EN300-71446	
EN300-76121		EN300-83027	
EN300-76027		EN300-95163	

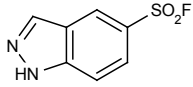
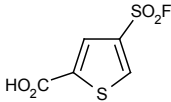
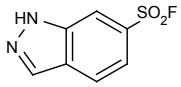
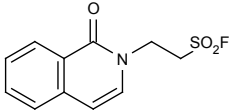
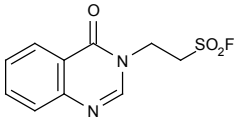
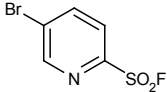
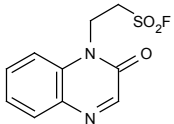
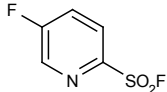
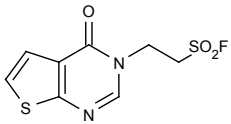
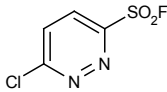
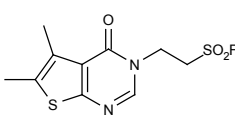
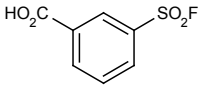
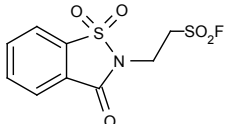
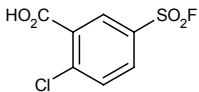
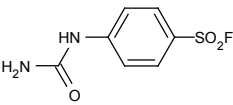
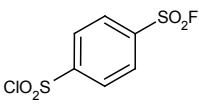
Sulfonyl fluorides

<p>EN300-76119</p>		<p>EN300-50305</p>	
<p>EN300-64014</p>		<p>EN300-55203</p>	
<p>EN300-101267</p>		<p>EN300-103153</p>	
<p>EN300-55379</p>		<p>EN300-64563</p>	
<p>EN300-97357</p>		<p>EN300-94625</p>	
<p>EN300-50258</p>		<p>EN300-66583</p>	
<p>EN300-84159</p>		<p>EN300-23952</p>	
<p>EN300-84685</p>		<p>EN300-64021</p>	

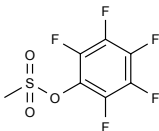
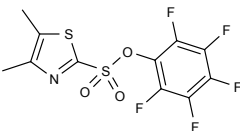
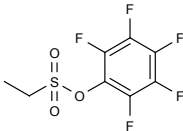
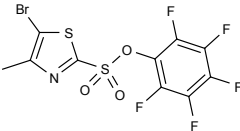
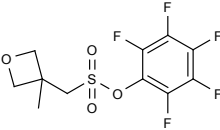
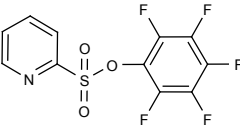
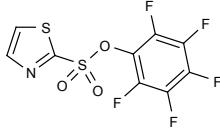
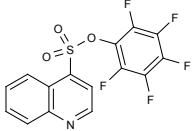
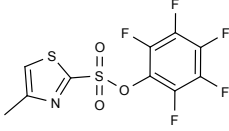
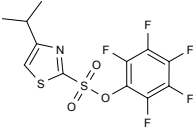
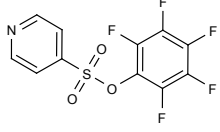
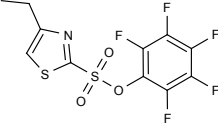
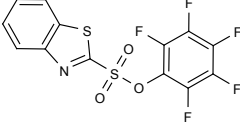
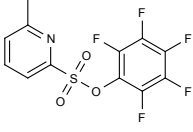
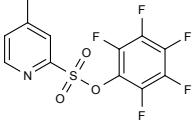
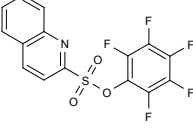
Sulfonyl fluorides

<p>EN300-64799</p>	 <chem>ClCCCC(=O)S(F)(F)F</chem>	<p>EN300-24166</p>	 <chem>CC(C)(C)C(=O)N(C(=O)N)CCS(F)(F)F</chem>
<p>EN300-07504</p>	 <chem>C=CC(=O)S(F)(F)F</chem>	<p>EN300-23623</p>	 <chem>C1CCN(C1)C(=O)N(C(=O)N)CCS(F)(F)F</chem>
<p>EN300-73995</p>	 <chem>CC1=CN=CO1CCS(F)(F)F</chem>	<p>EN300-23947</p>	 <chem>C1=NC2=CC=CC=C2N1NCCS(F)(F)F</chem>
<p>EN300-73997</p>	 <chem>CC1=CN=CO1CCS(F)(F)F</chem>	<p>EN300-23959</p>	 <chem>C1=NC(=O)N(C)C1NCCS(F)(F)F</chem>
<p>EN300-23946</p>	 <chem>C1=CC=C2C(=O)N(C1)O2CCS(F)(F)F</chem>	<p>EN300-23953</p>	 <chem>C1=NC(=O)N(C)C1N(C)C1=NC=C(C1)Cl</chem>
<p>EN300-23948</p>	 <chem>C1=CC=C2C(=O)N(C1)O2CCS(F)(F)F</chem>	<p>EN300-23956</p>	 <chem>C1=CC=C2C(=O)N(C1)O2CCS(F)(F)F</chem>
<p>EN300-50620</p>	 <chem>NC(=O)N1CC2=CC=C(C=C2)O1CCS(F)(F)F</chem>	<p>EN300-23958</p>	 <chem>C1=CC=C(C=C1)N2N=CN2CCS(F)(F)F</chem>
<p>EN300-23960</p>	 <chem>CC1=CC(=C(C=C1)N2N=CN2)CCS(F)(F)F</chem>	<p>EN300-24084</p>	 <chem>C1=CC=C(C=C1)S(=O)(=O)N(C)CCS(F)(F)F</chem>

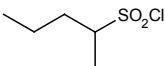
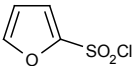

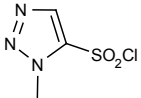
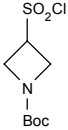
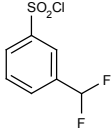
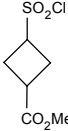
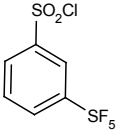
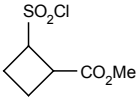
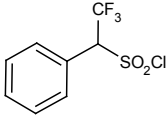
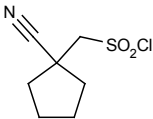
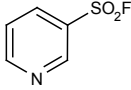
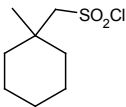
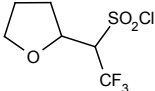
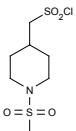
Sulfonyl fluorides

<p>EN300-93791</p>		<p>EN300-101868</p>	
<p>EN300-96915</p>		<p>EN300-24165</p>	
<p>EN300-23711</p>		<p>EN300-78717</p>	
<p>EN300-24082</p>		<p>EN300-82821</p>	
<p>EN300-23949</p>		<p>EN300-87431</p>	
<p>EN300-24167</p>		<p>EN300-24489</p>	
<p>EN300-23957</p>		<p>EN300-101873</p>	
<p>EN300-50265</p>		<p>EN300-134722</p>	

Pentafluorophenyl esters of sulfonic acids

<p>EN300-78474</p>		<p>EN300-91532</p>	
<p>EN300-78843</p>		<p>EN300-104043</p>	
<p>EN300-103783</p>		<p>EN300-108571</p>	
<p>EN300-104214</p>		<p>EN300-84274</p>	
<p>EN300-104212</p>		<p>EN300-104213</p>	
<p>EN300-108570</p>		<p>EN300-138704</p>	
<p>EN300-138705</p>		<p>EN300-138865</p>	
<p>EN300-138866</p>		<p>EN300-91674</p>	

New Arrivals

<p>EN300-175826</p>		<p>EN300-139041</p>	
<p>EN300-76495</p>		<p>EN300-154826</p>	
<p>EN300-142013</p>		<p>EN300-157022</p>	
<p>EN300-141189</p>		<p>EN300-154743</p>	
<p>EN300-137014</p>		<p>EN300-128059</p>	
<p>EN300-125018</p>		<p>EN300-138027</p>	
<p>EN300-135672</p>		<p>EN300-128057</p>	
<p>EN300-153072</p>		<p>EN300-129351</p>	