

# Thiophenes

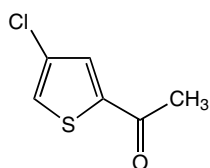
Thiophenes are an important class of heterocycles and have found great interest in a variety of fields from medicinal chemistry to material science. They are frequently found in various pharmaceuticals and drug candidates,<sup>1</sup> semiconductors,<sup>2</sup> liquid crystals<sup>3</sup> and other molecular functional materials.<sup>4</sup> Owing to their wide application in academia and industry, new methods and strategies for the generation of functionalized thiophenes derivatives are in demand. A number of new thiophene derivatives are now available through Alfa Aesar. Many have already been extensively cited in the scientific literature; here are just a few examples of their use.

Researchers at the Université Claude Bernard, Lyon France, have reported the synthesis of several thiophene inhibitors of alkaline phosphatase using H51060 as the starting material.<sup>5</sup> Furthermore, workers in China have also used H51060 and developed an efficient synthesis of  $\beta$ -diketones from aromatic  $\alpha$ -bromo ketones in the presence of Furukawa reagent under mild conditions.<sup>6</sup>

The Suzuki cross-coupling reactions of boronic acids have been extensively reported,<sup>7</sup> and under such conditions, H32543 was used to yield a versatile diarylethene containing a 1,10-phenanthroline ligand, which exhibits photochromic and luminescence switching properties.<sup>8</sup> Similarly, the thiophene moieties H53201 and B23637 were used to synthesize a series of 5-substituted, 6-substituted pyridine analogues of nicotine, as selective inhibitors of cytochrome P-450 2A6.<sup>9</sup>

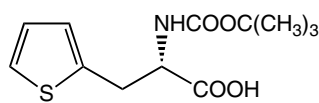
The thiophene H31867 was employed as in a convenient starting point for the synthesis of 2,3-diaminothieno[2,3-d]pyrimidin-4(3H)-one derivatives from substituted alkyl 2-(1H-tetrazol-1-yl)thiophene-3-carboxylates.<sup>10</sup> The use of H30384 has been described in many papers and patents as starting material for more complex materials such as herbicides,<sup>11</sup> inhibitors of protein kinase B activity,<sup>12</sup> or in the treatment of cancer and arthritis.<sup>13</sup>

Alfa Aesar has extended its comprehensive range of heterocyclic compounds with the following thiophenes.



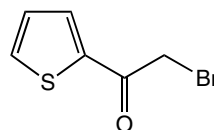
**H30384**

2-Acetyl-4-chlorothiophene,  
98+%  
[34730-20-6]



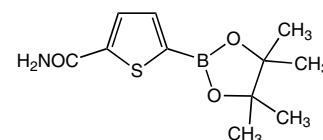
**H51971**

N-Boc-3-(2-thienyl)-L-alanine,  
95%  
[56675-37-7]



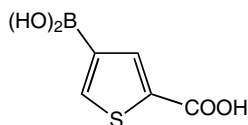
**H51060**

2-(Bromoacetyl)thiophene,  
97%  
[10531-41-6]



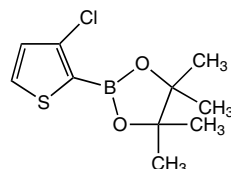
**H52353**

5-Carbamoylthiophene-2-boronic acid pinacol ester,  
96%



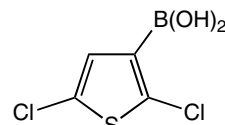
**H53210**

2-Carboxythiophene-4-boronic acid, 98%  
[913835-91-3]



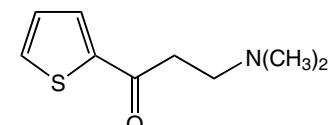
**H31951**

3-Chlorothiophene-2-boronic acid pinacol ester, 95%



**H32803**

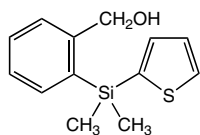
2,5-Dichlorothiophene-3-boronic acid, 95%  
[177735-28-3]



**H52377**

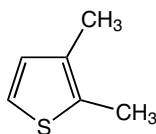
3-Dimethylamino-1-(2-thienyl)-1-propanone hydrochloride,  
97+%  
[5424-47-5]

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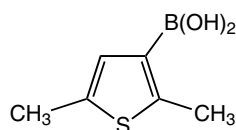
**H51663**

2-[(Dimethyl(2-thienyl)silyl)methyl]benzyl alcohol  
[853955-72-3]



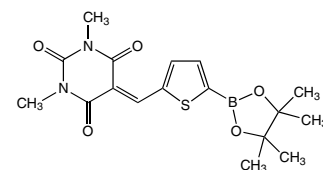
**H31641**

2,3-Dimethylthiophene, 97%  
[632-16-6]



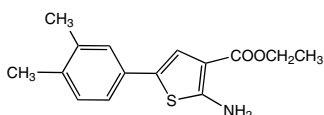
**H32543**

2,5-Dimethylthiophene-3-boronic acid, 95%  
[162607-23-0]



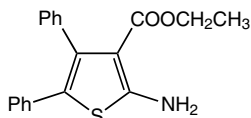
**H51898**

2-(1,3-Dimethyl-2,4,6-trioxohexahydro-5-ylidene-5-methylthiophene-5-boronic acid pinacol ester, 95%



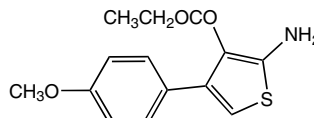
**H31569**

Ethyl 2-amino-4-(3,4-dimethylphenyl)thiophene-3-carboxylate, 96%  
[307511-65-5]



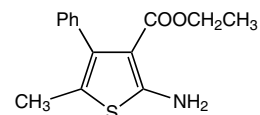
**H51846**

Ethyl 2-amino-4,5-diphenylthiophene-3-carboxylate, 97%



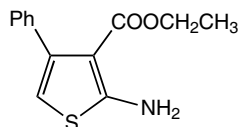
**H32736**

Ethyl 2-amino-4-(4-methoxyphenyl)thiophene-3-carboxylate, 96%  
[15854-11-2]



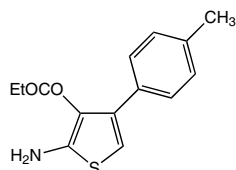
**H51799**

Ethyl 2-amino-5-methyl-4-phenylthiophene-3-carboxylate, 97%  
[4815-37-6]



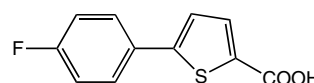
**H31867**

Ethyl 2-amino-4-phenylthiophene-3-carboxylate, 96%  
[4815-36-5]



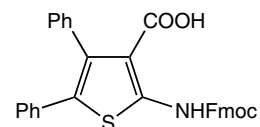
**H31633**

Ethyl 2-amino-4-(p-tolyl)thiophene-3-carboxylate, 97%  
[15854-08-7]



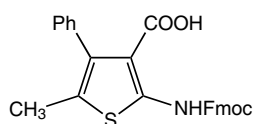
**H31579**

5-(4-Fluorophenyl)thiophene-2-carboxylic acid, 97%  
[115933-30-7]



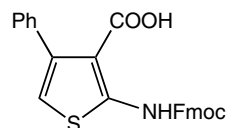
**H51855**

2-(Fmoc-amino)-4,5-diphenylthiophene-3-carboxylic acid, 97%



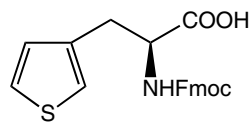
**H51843**

2-(Fmoc-amino)-5-methyl-4-phenylthiophene-3-carboxylic acid, 97%



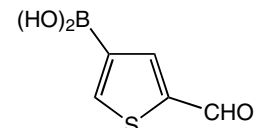
**H51802**

2-(Fmoc-amino)-4-phenylthiophene-3-carboxylic acid, 97%



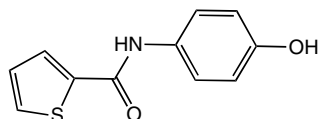
**H52167**

N-Fmoc-3-(3-thienyl)-L-alanine, 95%  
[186320-06-9]



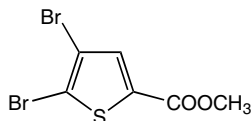
**H53298**

2-Formylthiophene-4-boronic acid, 98%  
[175592-59-3]



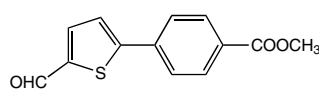
**H32772**

N-(4-Hydroxyphenyl)thiophene-2-carboxamide, 97%  
[98902-53-5]



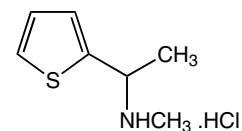
**H32113**

Methyl 4,5-dibromothiophene-2-carboxylate, 97%  
[62224-24-2]



**H52266**

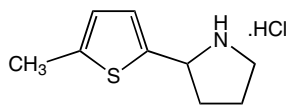
Methyl 4-(5-formyl-2-thienyl)benzoate, 95%



**H51109**

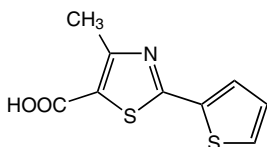
N-Methyl-1-(2-thienyl)ethylamine hydrochloride

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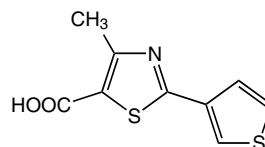
**H51958**

2-(5-Methyl-2-thienyl)  
pyrrolidine hydrochloride



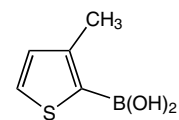
**H51798**

4-Methyl-2-(2-thienyl)thiazole-  
5-carboxylic acid, 97%



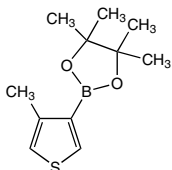
**H51803**

4-Methyl-2-(3-thienyl)thiazole-  
5-carboxylic acid, 97%



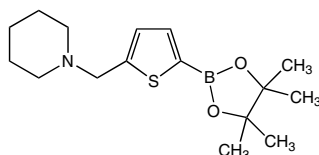
**H53201**

3-Methylthiophene-2-boronic  
acid, 98%  
[177735-09-0]



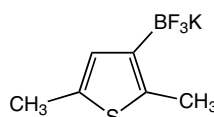
**H32023**

4-Methylthiophene-3-boronic  
acid pinacol ester, 95%  
[476620-20-9]



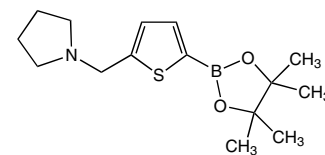
**H51117**

5-(1-Piperidinylmethyl)  
thiophene-2-boronic acid  
pinacol ester



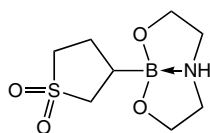
**H31781**

Potassium 2,5-dimethylthio-  
phene-3-trifluoroborate, 95%



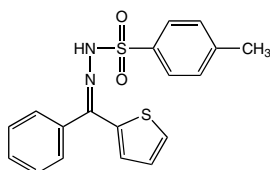
**H51118**

5-(1-Pyrrolidinylmethyl)  
thiophene-2-boronic acid  
pinacol ester



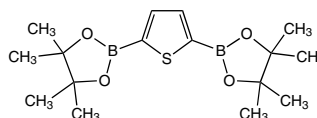
**H31355**

Tetrahydrothiophene-1,1-  
dioxide-3-boronic acid  
diethanolamine ester, 97%



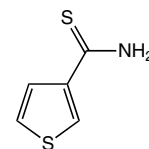
**H53384**

$\alpha$ -(2-Thienyl)benzaldehyde  
p-toluenesulfonylhydrazone,  
97%  
[105417-05-8]



**H51725**

Thiophene-2,5-diboronic acid  
bis(pinacol) ester, 97%  
[175361-81-6]



**H51830**

Thiophene-3-thiocarboxamide,  
97%  
[24044-76-6]

<sup>1</sup> P. Athri, T. Wenzler, P. Ruiz, R. Brun, D. W. Boykin, R. Tidwell & W. D. Wilson, *Bioorg. Med. Chem.*, 2006, **14**, 3144; J. J. Brendle, A. Outlaw, A. Kumar, D. W. Boykin, D. A. Patrick, R. R. Tidwell, & K. A. Werbovetz, *Antimicrob. Agents Chemother.*, 2002, **46**, 797.

<sup>2</sup> A. Facchetti, M.-H. Yoon, C. L. Stern, H. E. Katz, & T. J. Marks, *Angew. Chem., Int. Ed.*, 2003, **42**, 3900.

<sup>3</sup> K. Kobayashi, M. S. M. Ahmed, & A. Mori, *Tetrahedron*, 2006, **62**, 9548.

<sup>4</sup> T. Kojima, J. Nishida, S. Tokito, H. Tada, & Y. Yamashita, *Chem. Commun.*, 2007, 1430.

<sup>5</sup> L. Chang, F. Popowycz, S. Pellet-Rostaing, M. Lemaire, D. L. Duy, S. Mebarek, & R. Buchet, *Bioorganic & Med. Chem. Lett.*, 2011, **21**, 2297.

<sup>6</sup> L. Li, P. Cai, D. Xu, Q. Guo, & S. Xue, *J. Org. Chem.*, 2007, **72**, 8131.

<sup>7</sup> N. Miyaura & A. Suzuki, *Chem. Rev.*, 1995, **95**, 2457.

<sup>8</sup> V. Wing-Wah Yam, C.-C. Ko, & N. Zhu, *J. Am. Chem. Soc.*, 2004, **126**, 12734.

<sup>9</sup> T. T. Denton, X. Zhang, & J. R. Cashman, *J. Med. Chem.*, 2005, **48**, 224.

<sup>10</sup> N. T. Pokhodylo, V. S. Matyichuk, & M. D. Obushak, *Tetrahedron*, 2008, **64**, 1430.

<sup>11</sup> K. Beydoun, & H. Doucet, *J. Organomet. Chem.*, 2011, **696**, 1749.

<sup>12</sup> P. Stanetty, E. Puschautz, & G. Friedbacher, *Monatshfte fuer Chemie*, 1989, **120**, 53

<sup>13</sup> SMITHKLINE BEECHAM CORPORATION, Patent: WO2007/76423 A2, 2007.