Category

Synthesis of Heterocycles

Key words

trifluoropyrimidinyl-borates

cross-coupling

chemoselectivity

thiobenzofurans

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Pyrimidin-6-yl Trifluoroborate Salts as Versatile Templates for Heterocycle Synthesis

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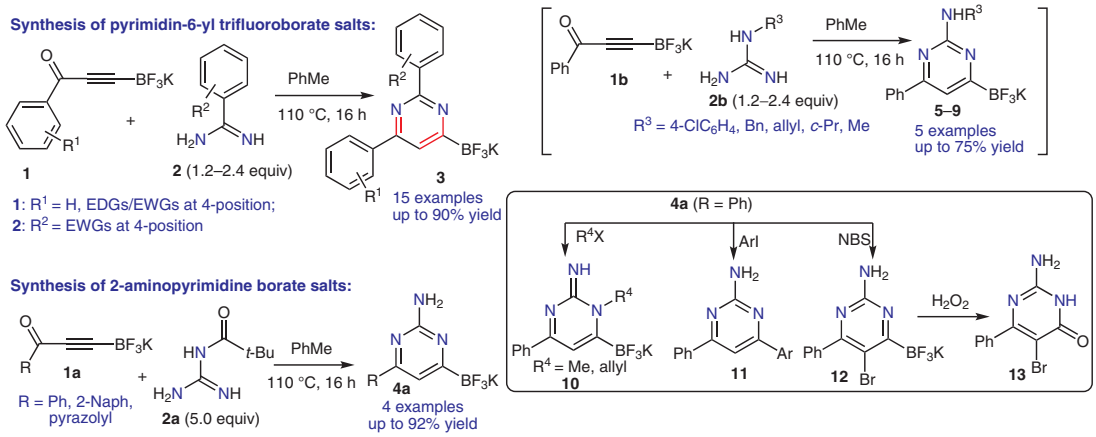
Synthesis of Heterocycles from Potassium Trifluoro(pyrimidin-4-yl)borate Salts



Significance: Reported is a new method for synthesizing trifluoro(pyrimidin-4-yl)borate salts **3** in high yields by the condensation of ynone trifluoroborates **1** with amidines **2**. Products **3** contain a trifluoroborate group at the C4 position, and this chemistry is highlighted by the unique ability of the trifluoroborate group to undergo chemo- and regioselective reactions at other positions on the pyrimidine scaffolds. Compounds **1** (R^1 = EDG, EWG) were well tolerated, affording the corresponding products **3**. Pyrazole- and alkyl-substituted ynone trifluoroborates also underwent smooth condensations with amidines **2** to afford products **3**. The reaction of the ynone salts **1a** with amidines **2a** gave the 2-aminopyrimidines **4a**, whereas the N-substituted guanidines **2b** gave a range of N-substituted analogues **5–9**. These compounds were isolated as single regioisomers, and the regioselectivity was assigned by X-ray crystallographic analysis in the case of **6** (R^3 = Bn).

Comment: Pyrimidines are present in nucleic acids and many biologically active compounds, including numerous pharmaceutical and agrochemical products whose syntheses are known (R. Abderrahim, E. Leclerc, J.-M. Campagne *Eur. J. Org. Chem*. **2017**, 2856). The synthesized C4 borylated pyrimidines are stable toward strongly nucleophilic amidines and guanidines, as well as alkylating agents, and even bromine. A reaction route for elaboration of a suitably activated C–B bond was also demonstrated. The potential of the products to undergo further reaction was demonstrated by transformations of **4a** into products **10–13** under various reaction conditions.

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