



# Metal-Free Regioselective Thiocyanation of (Hetero) Aromatic C-H Bonds using Ammonium Thiocyanate: An Overview

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## ABSTRACT

(Hetero)aryl thiocyanates have been extensively used as dyes, insecticides, vulcanization accelerators, and building blocks in the synthesis of diverse organosulfur compounds. Therefore, development of novel, efficient, and practical methods for their synthesis has always been the important topic in organic synthesis. Recently, direct thiocyanation of (hetero)aromatic C-H bonds using inexpensive and easily available ammonium thiocyanate has attracted considerable attention from the organic synthesis community, because no pre-functionalization of the starting materials is required and therefore the hazardous waste streams are significantly reduced. In this review, we summarize the recent discoveries and developments in this interesting field by hoping it will inspire and stimulate further research on the topic.

## 1. Introduction

Organosulfur compounds are among the most important class of molecules due to their presence in extensive number of natural products and biologically active compounds [1, 2]. Interestingly, more than 285 FDA-approved drugs contain at least one sulfur atom in their structure [3]. In this family of compounds, aryl thiocyanates are extremely valuable building blocks in organic chemistry and they allow to access efficiently various sulfur-containing compounds such as thiophenols, disulfides, aryl sulfides, trifluoromethylated sulfides, aryl sulfoxides, phosphonothioates, sulfenyl-tetrazoles and many more (Figure 1). Therefore, efficient strategies for the synthesis of this important class of organosulfur compounds have drawn extraordinary attention all the time.

Direct C-H bond activation with subsequent C-S bond formation has recently emerged as a powerful method for the synthesis of organosulfur compounds because of its high step- and atom-economical property [5].

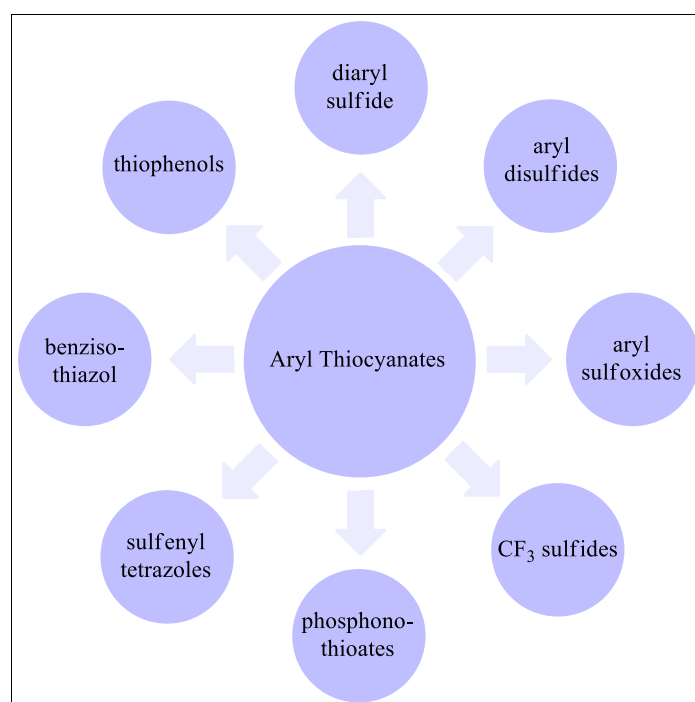


Figure 1. Some of synthetic products from aryl thiocyanates