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Dithiocarbamates
compiled by Veenu Bala

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Introduction

The dithiocarbamate functional group is an analogue of carbamate in which both oxygen atoms are replaced by sulfur atoms.

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\begin{align*}
\text{R}^1 & \quad \text{X} & \quad \text{R}^3 \\
\text{R}^2
\end{align*}
\]

\(X = \text{O} \quad \text{(carbamate)}\)
\(X = \text{S} \quad \text{(dithiocarbamate)}\)

Figure 1

Organic dithiocarbamates have attracted attention because of their interesting chemistry and wide utility. They are valuable synthetic intermediates and their functionalization leads to the generation of derivatives which may possess diverse biological properties. Dithiocarbamates are chain-transfer agents for RAFT polymerization, and organic dithiocarbamates are used as substrates in radical chemistry and as synthetic intermediates toward thioureas, amidines and guanidines. They are highly versatile mono-anionic chelating ligands which form stable complexes with transition elements possessing applications in medicine. Various dithiocarbamate salts can be easily prepared in high yields from amines, and they are soluble in water or organic solvents. Primary and secondary amines easily react with carbon disulfide and sodium hydroxide to form dithiocarbamate salts.

Abstracts

(A) Halimehjani et al. utilized dithiocarbamates as efficient intermediates for the synthesis of symmetrical substituted 2,5-diamino-1,3,4-thiadiazoles in water. Reaction of the easily prepared dithiocarbamates with hydrazinium salt gave the corresponding thiadiazoles in moderate to good yields.

(B) Das et al. described an efficient and practical procedure for the synthesis of a wide variety of 2-([N-substituted]amino)benzimidazoles using dithiocarbamates and a catalytic amount of CuO. This procedure can be used to synthesize potential drug candidates with antiallergic and antihistamine properties.

(C) An efficient method for the synthesis of unsymmetrical thioureas from readily synthesized S-alkyl dithiocarbamates and amines without using any catalyst under solvent-free conditions was developed. The short reaction time, high yield, simple work-up, and solvent-free conditions are advantages of this method.
References