

## Abstract

Halogen-bond donors have been investigated in the activation of carbonyl compounds for Michael additions.

The Lewis acidic character of elemental iodine in the catalyzed Michael addition of indole and *trans*-crotonophenone has been lined against hydroiodic acid, which could be possibly formed by iodine decomposition. Investigations of the substrate scope, a solvent study and the reaction order in iodine are in line with a Lewis acid based activation mode.

Furthermore, several organic, neutral and cationic halogen-bond donors were synthesized. A structure-reactivity relationship of the catalytic activity in the Michael addition of indole and *trans*-crotonophenone has been established for azolium-based halogen-bond donors, depending on substituents, type of azolium structure and counteranions. The results of the investigated Michael addition are in line with a halogen-bond based activation by the organic halogen-bond donor. A study of the reactivity of a 2-haloimidazolium salt with different carbon nucleophiles showed, that the stability of the 2-haloimidazolium salt correlates with the carbon-nucleophiles.