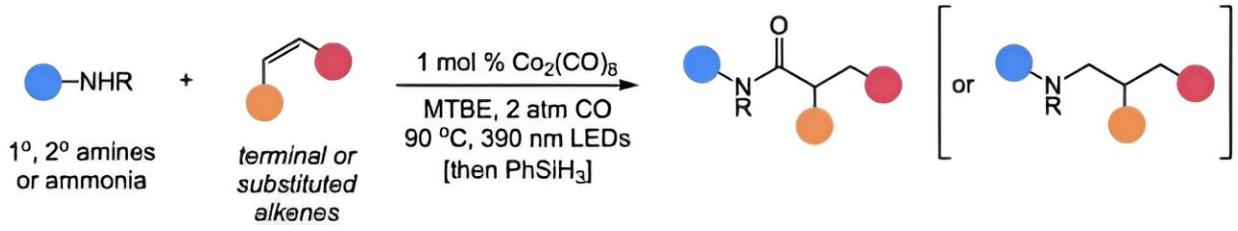
Researchers develop a new approach to amides from alkene and amine feedstocks

January 9 2024, by Erik Alexanian



Credit: University of North Carolina at Chapel Hill

A team at UNC-Chapel Hill has developed a new process for synthesizing amides in a 100% atom-economical, sustainable fashion using Earth-abundant, environmentally friendly cobalt.

UNC-Chapel Hill chemist Erik Alexanian is leading a research group focused on the development of new catalytic processes using sustainable, inexpensive Earth-abundant metals to synthesize valuable synthetic building blocks.

Amides are found in diverse chemical structures such as the backbone of proteins, materials including nylon and small molecule drugs. The amide bond is the most frequently constructed functionality in pharmaceutical synthesis. Typically, the amide bond is constructed via the addition of an amine to a carboxylic acid using a stoichiometric coupling reagent,

leading to waste and poor atom economy. A catalytic, waste-free process developed by the Alexanian group offers an attractive alternative.

The group's research paper, published in *Science*, details a catalytic approach to the construction of the amide bond using Earth-abundant cobalt and two fundamental chemical building blocks: alkenes and amines.

The catalyst is inexpensive cobalt carbonyl, which produces amides in a 100% atom-economical approach under mild conditions promoted by light. The transformation proceeds at low catalyst loadings, and even in the absence of reaction solvent, following the principles of green chemistry.

The reaction transforms alkenes ranging from propylene gas to complex natural products, and amines from ammonia gas to drug compounds, highlighting the versatility of the method.

More information: Mason S. Faculak et al, Cobalt-catalyzed synthesis of amides from alkenes and amines promoted by light, *Science* (2024). DOI: 10.1126/science.adk2312

Provided by University of North Carolina at Chapel Hill