

Chemists find new way to break amide bonds

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(PhysOrg.com) -- Researchers in the University of Bristol's School of Chemistry have found a way to accelerate the breakdown of amide bonds.

The work, published in *Angewandte Chemie*, features as the lead [highlight](#) in the American Chemical Society's C&ENews this week.

An amide is an organic compound containing a carbonyl group (R-C=O) linked to a nitrogen atom (N). The bonds in an amide are notoriously difficult to break: reaction times under mild, neutral-pH conditions are over 100 years. The only way to make amide bonds break down faster without resorting to acids, bases, and catalysts is to twist them physically.

Now, Professor Guy Lloyd-Jones and Professor Kevin Booker-Milburn and colleagues have demonstrated that amide bonds (-CO-NH-) can be broken down much more easily by attaching an electron-withdrawing group (R) to an α carbon and bulky substituents (R') to the nitrogen. The groups induce the α carbon to lose a proton and the nitrogen to gain one. This results in R-HC-CO-NH⁺-R'² which expels the bulky [nitrogen](#) group HN-R'², thus breaking the amide bond.

The method may help explain how some cellular enzymes break amide bonds and will make it easier to carry out amide-based reactions.

Professor Tim Gallagher, Head of the School of Chemistry said: "This is an intriguing reaction, all the more so because we think of amides as such stable entities. Achieving this process under mild conditions has

defied some of the best brains for years and this paper presents and explains the solution against an elegant background of observation and understanding.”

More information: ‘Switching Pathways: Room-Temperature Neutral Solvolysis and Substitution of Amides’ by Marc Hutchby, Chris E. Houlden, Mairi F. Haddow, Simon N. G. Tyler, Guy C. Lloyd-Jones and Kevin I. Booker-Milburn in *Angew. Chem. Int. Ed* [DOI: 10.1002/anie.201107117](https://doi.org/10.1002/anie.201107117)

Provided by University of Bristol

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