

Novel, inexpensive catalysts enabling noble metal chemistry

November 23 2021



Credit: CC0 Public Domain

Alkynes have many uses in industry. Until now, it was assumed that gold- or platinum-based catalysts were absolutely necessary for certain chemical reactions with alkynes. Chemists at Martin Luther University

Halle-Wittenberg (MLU) have now succeeded in carrying out the same reactions with considerably less expensive materials. The team reports on its work in the *Journal of the American Chemical Society*.

Alkynes are hydrocarbons that contain carbon-carbon triple bonds. They are among the basic building blocks of organic chemistry. "For the desired industrial reactions, the triple bond must be activated in a special, so-called soft, manner. So far, this has been observed primarily in reactions with catalysts based on [precious metals](#), especially gold or platinum. There is a long-standing consensus in the [scientific community](#) on why these elements dominate in the intricate types of alkynes' activation," explains Professor Konstantin Amsharov from the Institute for Chemistry at MLU. However, gold and platinum are not only expensive but also relatively rare.

In the new study, the chemists show that under certain conditions, a [catalyst](#) based on aluminum oxide induces activation of alkynes similarly to gold- and platinum-based catalysts. "This material is inexpensive and accessible," says Amsharov. The team also provides an explanation for this. "With our new approach, we can mimic the interaction of gold and alkyne species at the electron level. In some cases, the reactions were even more efficient," says Amsharov.

So far, the researchers have proven the new method only on a laboratory scale. "With our study, we have provided fundamental proof that metal oxides can be used as comparable catalysts," says Dr. Vladimir Akhmetov from MLU, co-author of the paper. Further studies will now investigate which common reactions the discovery could be applied to.

More information: Vladimir Akhmetov et al, Alumina-Mediated π -Activation of Alkynes, *Journal of the American Chemical Society* (2021). [DOI: 10.1021/jacs.1c07845](https://doi.org/10.1021/jacs.1c07845)

Provided by Martin-Luther-Universität Halle-Wittenberg

Citation: Novel, inexpensive catalysts enabling noble metal chemistry (2021, November 23)
retrieved 24 June 2024 from <https://phys.org/news/2021-11-inexpensive-catalysts-enabling-noble-metal.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.