

Future options for storing carbon dioxide: Synthesis of inorganic heteroalkenes

January 14 2021



Structures of the gallaphosphene (1) and the complex of CO_2 (2) and acetophenone (3). (c) UDE/S.Schulz

Group 13/15 heteroalkenes RMER' with M-E double bonds (M = B-TI; E = N-Bi) offer promising potential for bond activation reactions, but they are difficult to prepare. A team led by CENIDE professor Stephan Schulz now describes new synthetic methods for group 13 metallapnictenes in no less than three articles in the journal *Angewandte Chemie*. They allow for the preparation of preparative amounts as a basis for systematic reactivity studies.

It was shown that the gallaphosphene L(CL)Ga=P-GaL (L = β -diketiminate) not only selectively activates the C(sp3)-H bonds of



acetone and acetophenone, but also CO_2 . The latter reaction is even completely reversible in this process, and thus the bound CO_2 can be rereleased with reversion of the gallaphosphene at 90 °C.

"I would never have thought that such a reversible reaction, that reveals new options in CO_2 storage, was possible. Together with CH activation, the supreme discipline in organometallic chemistry, this results in a wide range of options—including catalytic reactions," Schulz says.

More information: Bin Li et al. Synthesis and Reactivity of Heteroleptic Ga-P-C Allyl Cation Analogues, *Angewandte Chemie International Edition* (2020). DOI: 10.1002/anie.202012595

Julia Krüger et al. From π -Bonded Gallapnictenes to Nucleophilic, Redox-Active Metal-Coordinated Pnictanides, *Angewandte Chemie International Edition* (2020). DOI: 10.1002/anie.202013618

Stephan Schulz et al. Multi-talented gallaphosphene for Ga–P–Ga heteroallyl cation generation, CO₂ storage and C(sp3)–H bond activation, *Angewandte Chemie International Edition* (2020). DOI: 10.1002/anie.202014381

Provided by Universität Duisburg-Essen

Citation: Future options for storing carbon dioxide: Synthesis of inorganic heteroalkenes (2021, January 14) retrieved 3 May 2024 from <u>https://phys.org/news/2021-01-future-options-carbon-dioxide-synthesis.html</u>

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.