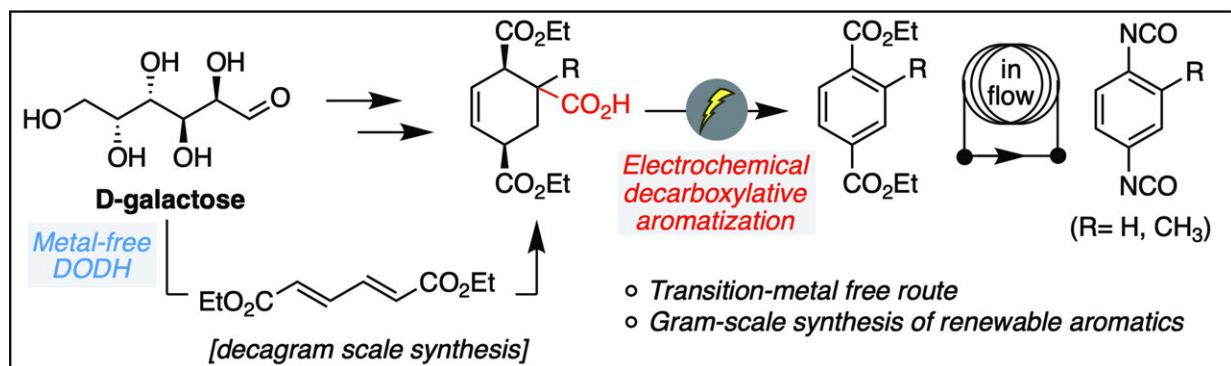


Bio-based method creates polyurethane without toxic chemicals

March 21 2025, by Michelle Franklin



Graphical abstract. Credit: *Angewandte Chemie International Edition* (2025).
DOI: 10.1002/anie.202421540

Diisocyanates are used in the preparation of all polyurethanes, ranging from the foams used in shoe soles to the thermoplastics used in cell phone cases.

Aromatic diisocyanates, which give [polyurethane foams](#) their structure, are commonly prepared on the megaton scale in highly secure facilities due to the use of phosgene, a highly reactive and toxic chemical reagent.

In [Angewandte Chemie International Edition](#), Michael Burkart's lab at UC San Diego reports the [preparation](#) of fully bio-based aromatic diisocyanates from a simple monosaccharide, D-galactose.

"This method provides a new route to 100% bio-based polyurethane foams, achieving a long-standing goal for the industry," says Burkart.

This new route avoids the use of transition metals, gaseous reagents or any high-pressure/temperature reactions. As an application, the team demonstrates the synthesis of a thermoplastic polyurethane (TPU) using these renewable diisocyanates, which show excellent material properties equivalent to petroleum-based TPUs.

These materials can serve as drop-in replacements for existing polyurethanes, which can now be sourced from 100% bio-based materials. Next, the team is developing scale-up procedures to prepare them in kilogram quantities for prototype applications.

More information: Matthew W. Halloran et al, Renewable Terephthalates and Aromatic Diisocyanates from Galactose, *Angewandte Chemie International Edition* (2025). DOI: [10.1002/anie.202421540](https://doi.org/10.1002/anie.202421540)

Provided by University of California - San Diego

Citation: Bio-based method creates polyurethane without toxic chemicals (2025, March 21)
retrieved 5 October 2025 from
<https://phys.org/news/2025-03-bio-based-method-polyurethane-toxic.html>

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