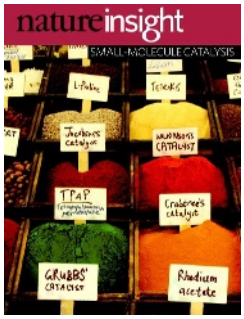

Cover illustration
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SMALL-MOLECULE CATALYSIS

In a world without catalysts, many chemical processes would not occur — at least, not at a rate that has any practical application. Catalysts have thus become indispensable in a wide range of industrial reactions. But the study of these systems can offer much more: it can change our understanding of fundamental chemical concepts and challenge us to rethink the 'rules' of the chemical world. Research in this area moves at breathtaking speed: many catalytic reactions now considered to be 'standard issue' by organic chemists were almost unthinkable just 10 years ago.

The catalytic systems being investigated today range from nanoparticles to transition metals to enzymes, and it would be difficult (if not impossible) to do justice to such diverse research in just a short series of articles. As a result, this Insight focuses on a key sector within the field: what we are calling 'small-molecule' catalysis. This includes transition-metal complexes — which are indeed small compared with proteins or nanoparticles — as well as organic molecules.

The theme is broader than that, though, as it also encompasses the small molecules that are produced in the catalysed reactions. The ability to synthesize and selectively modify small molecules is crucial for many applications, including drug discovery and the search for new materials. The development of new catalysts often makes it possible to generate previously unattainable compounds, which could have unique physical, chemical or biological properties.

But the basic science is as important as the applications: studies of catalytic mechanisms often uncover new modes of chemical reactivity, such as the way heteroatoms affect cross-coupling reactions, forcing us to think anew about the way molecules interact and react. We hope that this Insight will inspire both chemists and non-chemists, by providing fresh ideas about catalysis and the possibilities that it offers for the future.

Andrew Mitchinson, Senior Editor, News & Views
Joshua Finkelstein, Senior Editor

COMMENTARIES

REVIEWS

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