C0_2 and formic acid, a winning couple in reduction chemistry

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INOR: Division of Inorganic Chemistry

102 - CO_2 and formic acid, a winning couple in reduction chemistry

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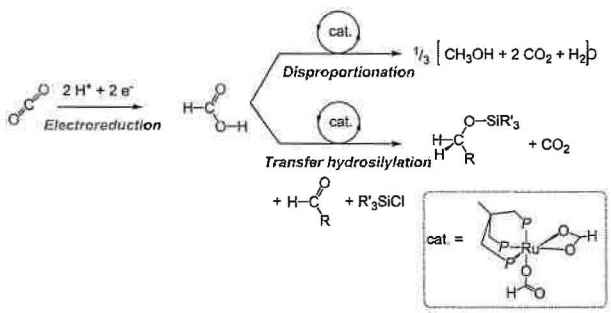
Abstract:
Because it is abundant, inexpensive, low-toxic and renewable, CO_2 is an attractive carbon feedstock and its conversion has motivated recent efforts both in the academia and in the industry. Nonetheless, major advances are still hampered by the kinetic inertness of CO_2 and efficient catalysts are still to be needed to promote the reduction of CO_2 to reduced products, such as methanol.
We have recently shown that formic acid (HCOOH), obtained from the 2-electron reduction of CO_2, can serve as an efficient C-H bond shuttle and reductant in the reduction of CO_2 to methanol. Using ruthenium(II) complexes, supported by a triphosphine ligand, formic acid can undergo a disproportionation reaction to methanol in high yields. In the presence of chlorosilanes, the same catalytic system is able to facilitate the reduction of aldehydes and CO_2, exemplifying the role of formoxysilane in transfer hydrosilylation chemistry for the first time.



Utilization of formic acid as a C-H bond shuttle in disproportionation and transfer hydrosilylation reactions