

Catalytic CO₂ Hydrogenation Promoted by Pd, Pt, Ru, Rh, Ir and Os Bidentate and Pincer Complexes

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Many researchers are now focused on the capture and utilization of carbon dioxide (CO₂) as a means to mitigate global warming and climate changes linked to increased CO₂ emissions.^[1] A plethora of methods have been developed to utilize CO₂ as a C₁ carbon source for synthesis of useful chemicals such as carboxylic acids, esters, carbonates and lactones to name a few.^[2-4] The hydrogenation of into energy carrier products, formic acid and methanol, is an attractive way to valorise CO₂ and both homogeneous and heterogeneous catalysts (containing mainly Ru, Rh, Pd and Ir centres) have been extensively studied for this reaction (**Figure 1**). Amongst these, Ru and Ir have been reported to afford maximum turnover numbers of formate and methanol.^[4-7]

We have recently studied the direct and indirect CO₂ hydrogenation efficacy of new N^N and N^O bidentate complexes, as well as some N^NN and S^NS pincer complexes. The results of these studies together with selected complexes which were further heterogenized on metal organic frameworks and used in CO₂ hydrogenation will be discussed.

Combined NMR experiments and DFT calculations provided mechanistic insights into the hydrogenation processes.

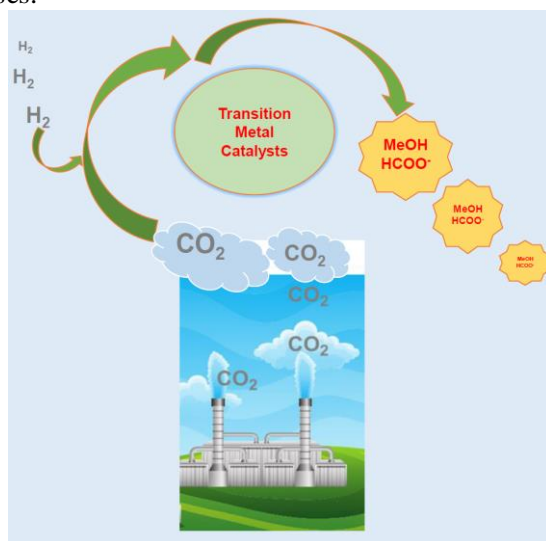


Figure 1: Utilization of CO₂ as a C₁ carbon source for synthesis of formate and methanol.

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