Continuous‐flow Diels‐Alder Reactions using Zeolite Catalysts

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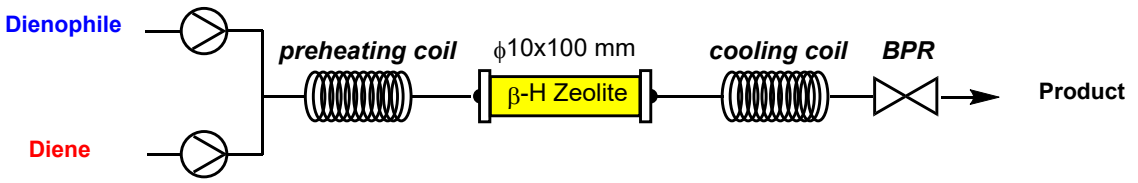
Keywords: (4+2) cycloaddition, Diels–Alder reaction, continuous flow, heterogeneous catalyst, Zeolite

Diels–Alder (D–A) reaction is arguably one of the most elegant strategies for creating carbon skeleton of complex organic molecules, as the reaction makes two new carbon–carbon bonds with multiple stereocenters.[1] However, industrial applications of D–A reaction are very limited mainly due to safety issues arising from uncontrolled polymerizations and instability of starting materials.[2] Thus, a large–scale D–A reaction is remaining a problem in synthetic organic chemistry.

Continuous–flow synthesis,[3] especially ones employing heterogeneous catalysts, have a potential to expand scope to less reactive substrates, and to enhance product selectivity to improve process efficiency of D–A reaction. Higher thermal and material transfer efficiency make it possible to realize energy saving in addition to higher productivity. A precise reaction space makes it possible to suppress risks lead by hazardous chemical operations. By using a catalyst column, the product can be separated automatically. These advantages imply that continuous-flow would be suitable for large scale D–A synthesis.

Herein, we report an efficient, durable, and recyclable continuous–flow system for Diels–Alder cycloaddition reactions. Various combination of dienes and dienophiles were applicable to provide the corresponding D–A adducts in high yields with good selectivity.



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