Fully integrated two-step flow process for continuous synthesis of Stilbenes

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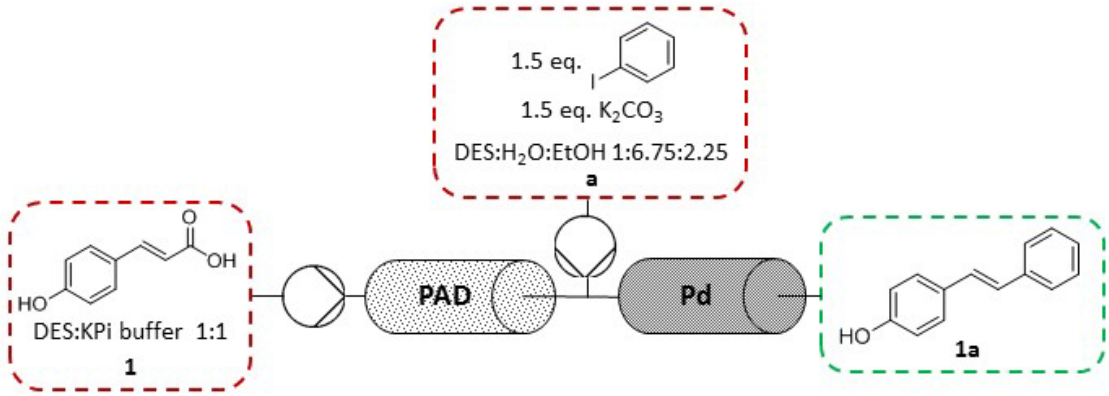
Stilbenes are aromatic molecules consisting of two benzene rings linked by a C=C bond and thus possess a conjugated double bond system. The most prominent derivatives of stilbenes are Resveratrol and its analogues. Due to their anti-oxidative and anti-inflammatory characteristic, they serve as anti-aging agent in cosmetics and are promising drugs in cancer prevention and treatment. [1] One potential synthetic route is the enzymatic decarboxylation of a carboxylic acid and subsequent Heck coupling with an aryl halide derivative. In this study, immobilization of PAD (phenolic acid decarboxylase) in alginate beads enabled the continuous application of the enzyme in a packed-bed reactor. The intermediate, 4-vinylphenol, serves as substrate for the subsequent Heck reaction. An in-house developed Pd-substituted Ce-Sn-Oxide catalyzes the coupling reaction. [2] With our setup a stable continuous process for more than six hours and full conversion and excellent yield was possible.



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[1] Varoni et el., Anticancer Molecular Mechanisms of Resveratrol, 2016, Frontier in Nature, 3, 1-15

[2] Lichtenegger et al., Suzuki-Miyaura coupling reactions using novel metal oxide supported ionic palladium catalysts, 2017, Journal of Molecular Catalysis, 426, 39-51