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One-Pot Multi-Component Asymmetric Cascade Reactions Catalyzed by Soluble Star Polymers with Highly Branched Non-Interpenetrating Catalytic Cores
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Category
Polymer-Supported Synthesis

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star polymer catalysts
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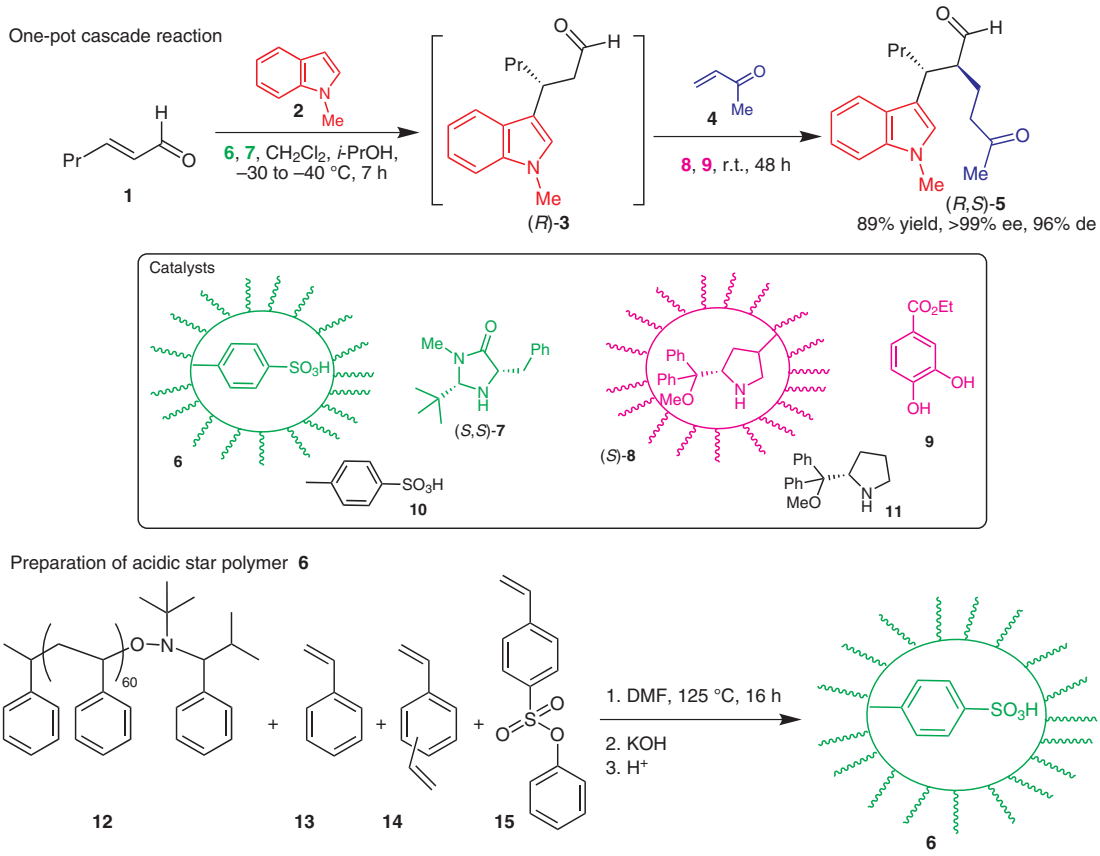
One-Pot Cascade Reactions Catalyzed by Star Polymer Catalysts



Significance: Non-interpenetrating two star polymer catalysts designed to mimic the site isolation characteristics of enzymes enabled a one-pot asymmetric cascade reaction. Thus, the one-pot nucleophilic addition of **2** to **1** and Michael addition of the resulting **3** to **4** were performed with a star polymer salt catalyst **6**·**7** (20 mol%) [prepared from an acidic star polymer **6** and imidazolidinone (*S*,*S*)-**7**], a pyrrolidine star polymer (*S*)-**8** (20 mol%), and a catechol mediator **9** (1 mol equiv) to give (*R*,*S*)-**5** in 89% yield with >99% ee and 96% de. The use of **10** or **11** in place of **6** or **8** under similar conditions did not give **5**.

Comment: The acidic star polymer **6** was prepared from polystyrene macroinitiator **12**, styrene **13**, divinylbenzene **14** and phenyl *p*-styrenesulfonate **15** according to their previous report (*Angew. Chem. Int. Ed*. **2005**, *44*, 6384). The amine star polymer **8** was prepared via a similar procedure. Polystyrene macroinitiator **12** was developed by Hawker and co-workers (*J. Am. Chem. Soc*. **1999**, *121*, 3904). When imidazolidinone (*S*,*S*)-**7** was replaced with its enantiomer (*R*,*R*)-**7**, a diastereomer (*S*,*S*)-**5** was obtained in 80% yield with >99% ee and 96% de.

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