

Lipase-catalyzed alkoxy carbonylation in the deep eutectic solvent/water system

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As alternatives to organic solvents, deep eutectic solvents (DESs), which are prepared by mixing a hydrogen bond acceptor and a hydrogen bond donor with heating until a liquid is formed, have been acknowledged as green solvents. Among them, aqueous DESs (DESs/water systems) have recently been evaluated as solvents in lipase-catalyzed reactions. Lipases have been widely utilized in organic synthesis due to their high activity and selectivity, and their ease of handling under mild reaction conditions.

The alkoxy carbonyl group has been employed as a protecting group for alcohols and amines. Recently, enzymatic protecting techniques have gained increasing importance in the promotion of green and sustainable chemistry. In this research, we have investigated the lipase-catalyzed alkoxy carbonylation using alkyl phenyl carbonate in the DESs/water systems.

For example, the reaction of 4-methylbenzyl alcohol (**1**) with benzyl phenyl carbonate (**2**) (3 equiv.) was carried out in the presence of *Candida antarctica* lipase B (CALB) (lipase/**1** = 5 (w/w)) in a solution (4 mL) with different ratios of DES (choline chloride/urea/water or choline chloride/glycerol/water (1:2:1))/hexane (1:4) at 40 °C for 3 h (Scheme 1). The results showed that the aqueous DES (choline chloride/urea/water)–hexane mixed solvents were superior to hexane in the benzyloxycarbonylation of 4-methylbenzyl alcohol (Fig. 1).

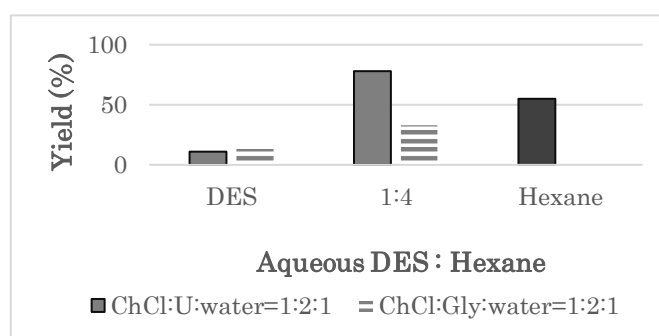
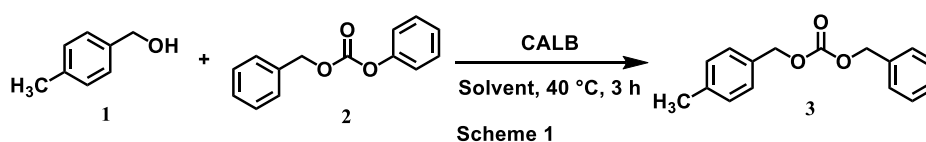


Fig. 1