

Taddol - a New Type of Chiral Catalyst for Asymmetric C-C Bond Formation Reactions. The Preparation of Enantiomerically Pure Amino Acids

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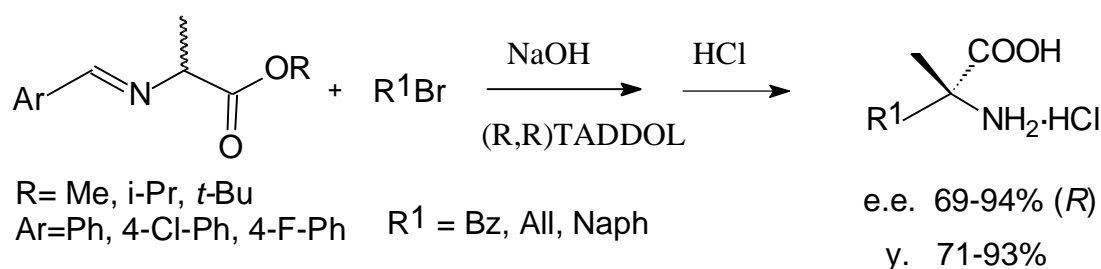
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The elaboration of simple, cheap and efficient asymmetric catalysts for the formation of C-C bonds is urgently needed. We report a new type of phase-transfer (PTC) C-alkylation of an alanine synthon with the formation of enantiomerically enriched α -methyl- α -amino acids which represent an important class of nonproteinogenic amino acids.

We showed that some alkali metal alkoxides of (*R,R*)-TADDOLates (chiral 1,3-diols) can be used as chiral catalysts in the enantioselective alkylation, as exemplified by the reaction of Schiff's bases derived from alanine esters and benzaldehydes with active alkyl halides.¹ Acid-catalysed hydrolysis of the products formed in the reactions afforded (*R*)-**a**-methylphenylalanine, (*R*)-**a**-allylalanine, (*R*)-**a**-methylnaphtylalanine with high chemical yields and enantiomeric purity. Similarly, (*S,S*)-TADDOL gave (*S*)-amino acid.



The e.e. of the reaction depended strongly on the structure of the substrate, alkyl halide, the action of the base and solvent. Our results compare favourably with other methods of asymmetric PTC alkylations, employing chiral derivatives of alkaloids in terms of both stability of the catalyst and e.e. of the final products. A possible mechanism was proposed.

Also TADDOL can be used as a chiral catalyst in the asymmetric Michael addition reaction of other substrates to methyl methacrylate. As a result physiologically active (2*S*,4*R*)-4-methylglutamic acid was obtained with e.e. >85%.²

1. Yu. N. Belokon', K. A. Kochetkov, et.al., *Tetrahedron:Asymmetry*, 1998, **9**, 851.
2. Yu. N. Belokon', K. A. Kochetkov, et.al., *Mendeleev Communications*, 1997, 137; *Russ. Chem. Bull.(Bull. Acad. Sci. Rus., Div.Chem.Sci, Engl.Transl.)*, 1998, **47**, 74.