

Accepted Manuscript

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PII: S0040-4020(15)00072-1

DOI: [10.1016/j.tet.2015.01.029](https://doi.org/10.1016/j.tet.2015.01.029)

Reference: TET 26352

To appear in: *Tetrahedron*

Received Date: 14 October 2014

Accepted Date: 7 January 2015

Please cite this article as: Ordóñez M, Viveros-Ceballos JL, Cativiela C, Sayago FJ, An update on the stereoselective synthesis of α -aminophosphonic acids and derivatives, *Tetrahedron* (2015), doi: 10.1016/j.tet.2015.01.029.

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An update on the stereoselective synthesis of α -aminophosphonic acids and derivatives

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ARTICLE INFO

Article history:

Received

Received in revised form

Accepted

Available online

Keywords:

α -aminophosphonic acids

α -aminophosphonates

stereoselective synthesis

Three component reaction

ABSTRACT

This review describes the stereoselective synthesis of α -aminophosphonic acids and their ester derivatives. The procedures have been classified in accordance with acyclic, carbocyclic and azacyclic nature of the products obtained, establishing in the first case an order related to the strategy used whereas in the cyclic and azacyclic the ring size is considered.

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Abbreviations: ABSA, 4-acetamidobenzenesulfonyl azide; Abu, aminobutyric acid; Ac, acetyl; ACE, angiotensin-converting enzyme; Ala, alanine; Ar, aryl; BINAP, 2,2'-bis(diphenylphosphino)-1,1'-binaphthyl; BINOL, 1,1'-bi-2-naphthol; Bn, benzyl; Boc, *tert*-butoxycarbonyl; BPE, 1,2-bis(2,5-diphenylphospholano)ethane; BtH, benzotriazole; BuLi, butyllithium; Bz, benzoyl; CAN, cerium ammonium nitrate; catBH, catecholborane; Cbz, carboxybenzyl; CD, circular dichroism; COD, cyclooctadiene; CSA, camphorylsulfonic acid; DABCO, 1,4-diazabicyclooctane; DBU, 1,8-diaza-bicyclo[5.4.0]undec-7-ene; DDQ, 2,3-dichloro-5,6-dicyano-*para*-benzoquinone; DEAD, diethyl azodicarboxylate; DIAD, diisopropyl azodicarboxylate; DIBAL-H, diisobutylaluminum hydride; DMAP, 4-dimethylaminopyridine; DMF, *N,N*-dimethylformamide; DMSO, dimethyl sulfoxide; DPPA, diphenylphosphoryl azide; dr, diastereoisomeric ratio; ds, diastereoselectivity; ee, enantiomeric excess; EWG, electron withdrawing group; Gly, glycine; HIV, human immunodeficiency virus; HPLC, high-performance liquid chromatography; KHMDs, potassium bis(trimethylsilyl)amide; LDA, lithium diisopropylamide; L-DBTA, dibenzoyl-L-tartaric acid; Leu, leucine; LiHMDS, lithium bis(trimethylsilyl)amide; LTMP, lithium tetramethyl piperidide; *m*-CPBA, *m*-chloroperbenzoic acid; Me, methyl; Mes, 2,4,6-trimethylphenyl; Ms, mesyl; MS, molecular sieves; MTBE, methyl *tert*-butyl ether; MW, microwave irradiation; NBS, *N*-bromosuccinimide; OAB, methyl oxazaborolidine; Ph, phenyl; Phe, phenylalanine; Phg, phenylglycine; PMB, *p*-methoxybenzyl; PMP, *p*-methoxyphenyl; PPTS, pyridinium *p*-toluenesulfonate; Pro, proline; PTC, phase-transfer catalysis; *p*-Tol, *p*-tolyl; Py, pyridine; RAMP, (*R*)-1-amino-2-(methoxymethyl)pyrrolidine; SMS-Phos, 1,2-bis[(*o*-RO-phenyl)(phenyl)phosphino]ethane; TADDOL, 2,2-dimethyl- α,α,α' -tetraphenyl-4,5-dimethanol; TBox, tethered bis(8-quinolinato); TBS, *tert*-butyldimethylsilyl; *t*-Bu, *tert*-butyl; TCCA, trichloroisocyanuric acid; Tf, triflyl; TFA, trifluoroacetic acid; TFE, 2,2,2-trifluoroethanol; THF, tetrahydrofuran; THNAPhos, 1,2,3,4-tetrahydro-1-naphthylamine-derived phosphine-phosphoramidite; TMEDA, *N,N,N',N'*-tetramethylethylenediamine; TMS, trimethylsilyl; TMSBr, bromotrimethylsilane; Ts, Tosyl; Val, valine.

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