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Synthesis of quaternary α-aminophosphonic acids

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Abbreviations: Ac, acetyl; acac, acetylacetone; AcOH, acetic acid; Ar, aryl; BINAP, 2,2′-bis(diphenylphosphino)-1,1′-binaphthyl; Bn, benzyl; bnmim, 1-benzyl-3-methylimidazolium; Boc, *tert*-butoxycarbonyl; BtH, benzotriazole; Bu, butyl; Bz, benzoyl; CAN, ceric ammonium nitrate; cat., catalyst; Cbz, benzyloxycarbonyl; *c*-Hex, cyclohexyl; cod, cyclooctadiene; Cp, cyclopentadiene; *c*-Pr, cyclopropyl; Cy, cyclohexyl; DABCO, 1,4-diazabicyclooctane; DBU, 1,8-diazabicyclo[5.4.0]undec-7-ene; DCE, 1,2-dichloroethane; DDQ, 2,3-dichloro-5,6-dicyano-*p*-benzoquinone; de, diastereomeric excess; DEP, diethyl phosphite; DIB, [bis(trifluoroacetoxy)iodo]benzene; DIEA, diisopropylethylamine; DMF, *N*,*N*′-dimethylformamide; DMPU, *N*,*N*′-dimethylpropylene urea; DPPA, diphenylphosphoryl azide; dr, diastereoisomeric ratio; DTBM-SEGPHOS, (*R*)-(−)-5,5′-bis[di(3,5-di-*tert*-butyl-4-methoxyphenyl)phosphino]-4,4′-bi-1,3-benzodioxole; E, electrophile; ee, enantiomeric excess; Et, ethyl; HMDS, hexamethyldisilazane; *i*-Bu, isobutyl; *i*-Pr, isopropyl; LDA, lithium diisopropylamide; LiHMDS, lithium bis(trimethylsilyl)amide; LTMP, lithium tetramethylpiperidine; Me, methyl; Mes, 2,4,6-trimethylphenyl; MS, molecular sieves; MW, microwave; *n*-Bu, butyl; NMM, *N*-methylmaleimide; NMO, *N*-methylmorpholine *N*-oxide; NP, natural phosphite; NPht, phthalimidoyl; *n*-Pr, propyl; Ph, phenyl; PhTRAP, 2,2′-bis[1-(diphenylphosphino)ethyl]-1,1′-biferrocene; PMB, *p*-methoxybenzyl; Pr, propyl; PS, polystyrene-supported; *p*-Tol, *p*-tolyl; PTSA, *p*-toluenesulfonic acid; Py, pyridine; Quin-BAM, bisquinolin-2-ylcyclohexane-1,2-diamine; rt, room temperature; RAMP, (*R*)-1-amino-2-(methoxymethyl) pyrrolidine; RCM, ring-closing metathesis; *s*-Bu, *sec*-butyl; TBAI, tetrabutylammonium iodide; *t*-Bu, *tert*-butyl; TEP, triethyl phosphite; Tf, trifluorosulfonyl; TFA, trifluoroacetic acid; THF, tetrahydrofuran; THP, tetrahydropyran-2-yl; TMEDA, *N*,*N*,*N*′,*N*′-tetramethylethylenediamine; TMEDAPS, *N*,*N*,*N*′,*N*′-tetramethyl-*N*,*N*′-dipropanesulfonic acid ethylenediammonium; TMP, trimethyl phosphite; TMS, trimethylsilyl; t-Pc, tetra(*tert*-butyl)phthalocyanine; Ts, *p*-toluenesulfonyl; TSIL, task-specific ionic liquid.

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