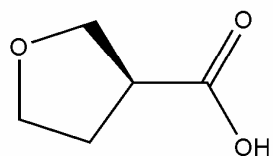
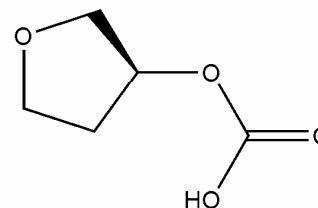
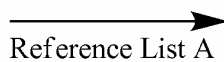


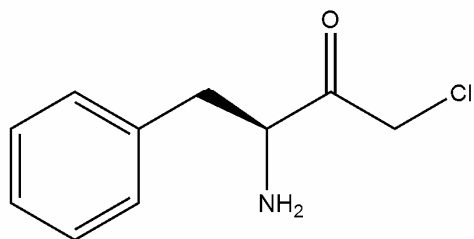
Total Synthesis of Agenerase #1



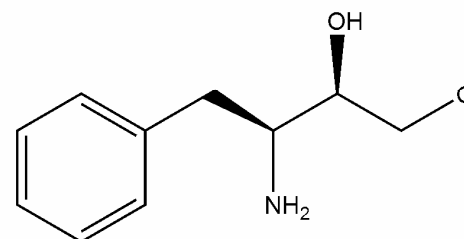
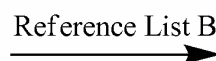
Tetrahydro-furan-3-carboxylic acid



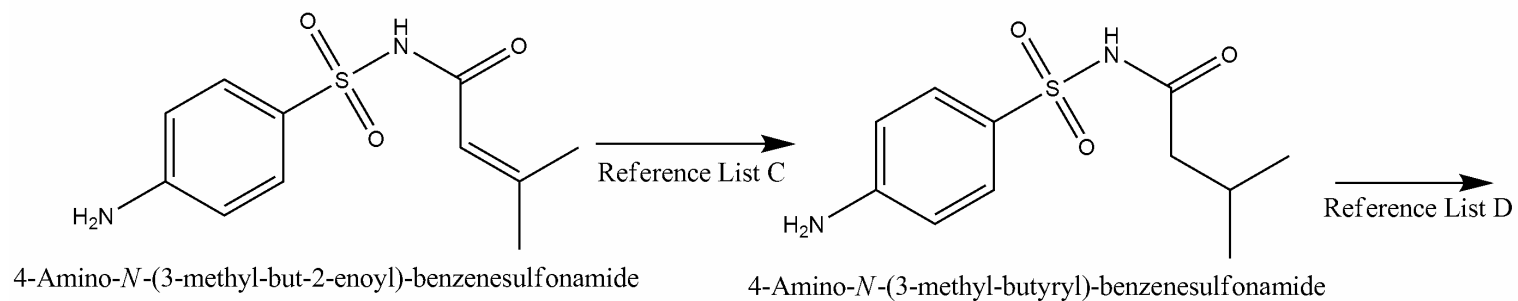
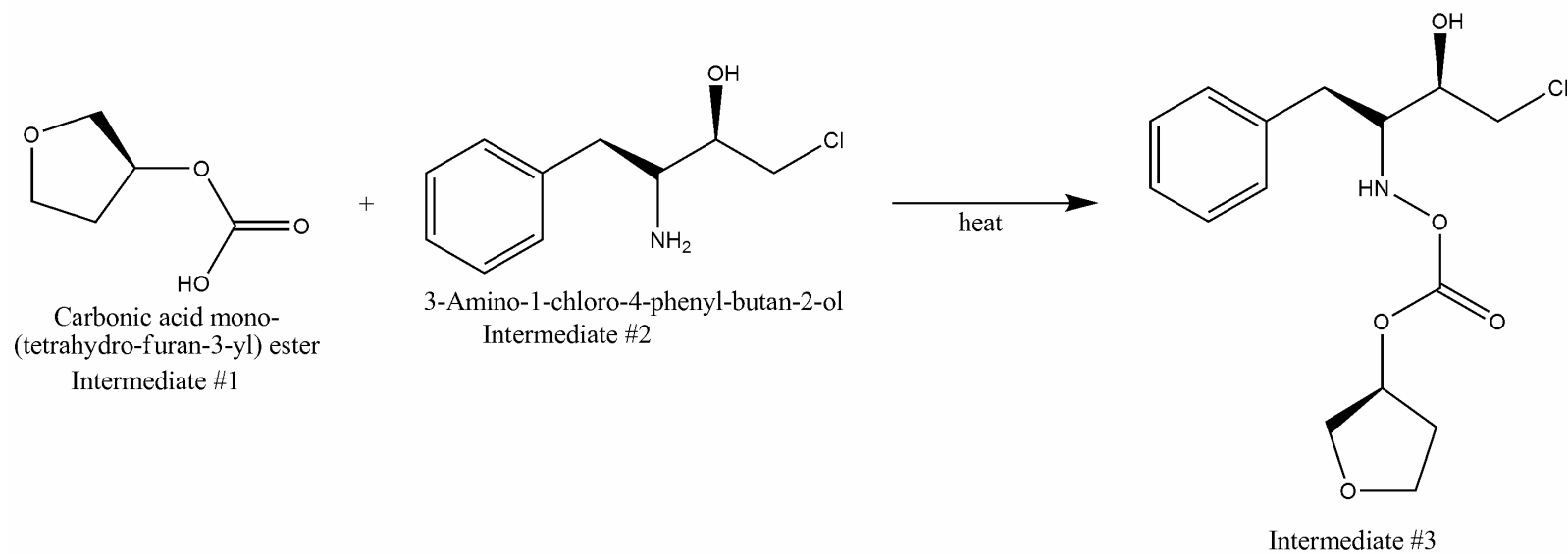
Carbonic acid mono-(tetrahydro-furan-3-yl) ester
Intermediate #1

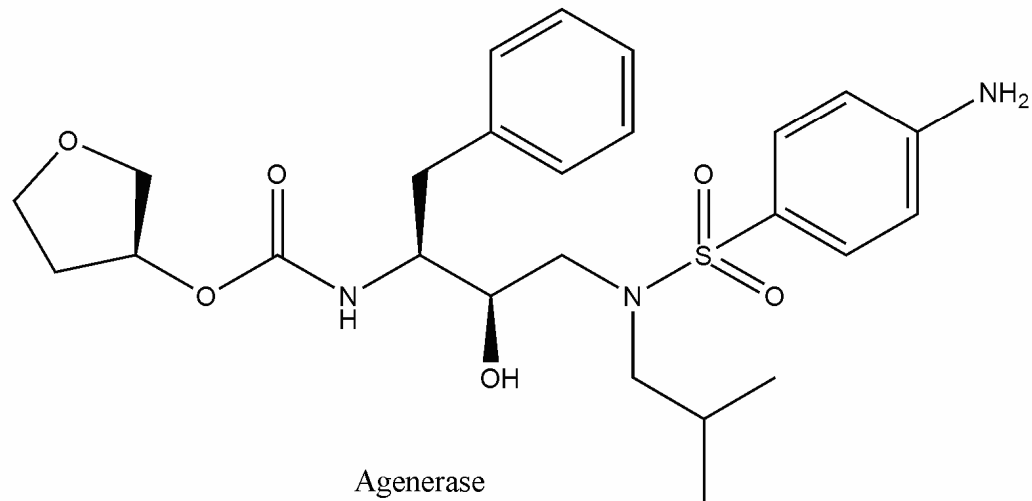
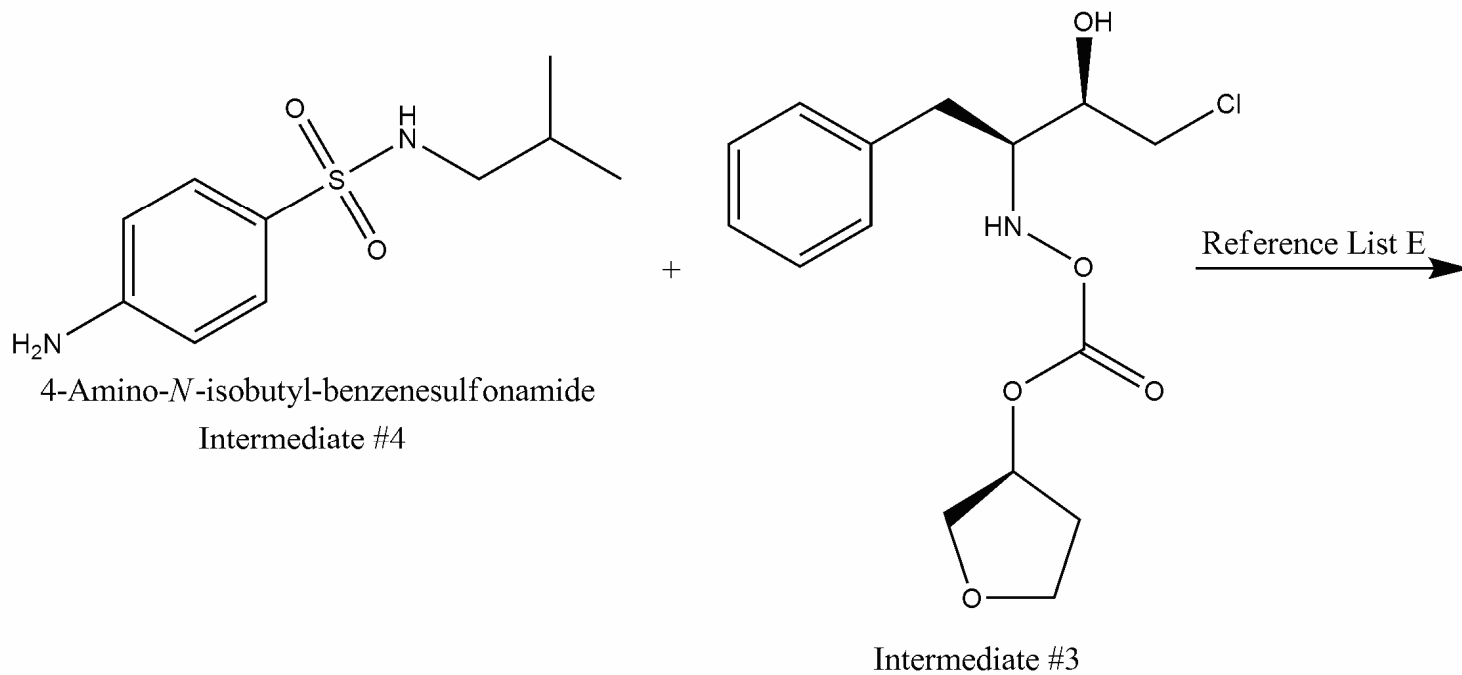


3-Amino-1-chloro-4-phenyl-butan-2-one



3-Amino-1-chloro-4-phenyl-butan-2-ol
Intermediate #2





References:

List A

Tetrahedron Letters, 36, 3401, (1995)

List B

Reviews:

Synthesis, 605, (1982) (stereoselective reductions included)

J. Am. Chem. Soc., 110, 4475, (1988) (Cram/anti-Cram)

List C

Reviews:

R.L. Augustine, "Catalytic Hydrogenation," Marcel Dekker, Inc. New York (1965)

P.N. Rylander, "Catalytic Hydrogenation over Platinum Metals," Academic Press, New York, (1967)

M. Freifelder, "Practical Catalytic Hydrogenation," Wiley-Interscience, New York (1971)

B.R. James, "Homogeneous Hydrogenation," J. Wiley, New York (1973)

F.J. McQuillan, "Homogeneous Hydrogenation in Organic Chemistry," D. Reidel, Boston (1976)

A.P.G. Kieboom, "Hydrogenation and Hydrogenolysis in Synthetic Organic Chemistry," Delft University Press, Delft (1977)

M. Freifelder, "Catalytic Hydrogenation in Organic Synthesis: Procedures and Commentary," J.Wiley & Sons, New York (1978)

Synthesis, 85, (1981) (homogeneous asymmetric hydrogenation)

Chemical Reviews, 85, 129, (1985) (heterogeneous catalytic transfer hydrogenation)

"Asymmetric Synthesis," Ed. J.D. Morrison, Academic Press, New York (1985), Vol. 5, Chpts 2,3,10

P.N. Rylander, "Hydrogenation Methods," Academic Press, New York (1985), Chpt 2

"Comprehensive Organic Synthesis," Eds. B.M. Trost and I. Fleming, Pergamon, Oxford (1991), Vol. 8, Parts 3.1 and 3.2, pp 417-470

"Comprehensive Organic Transformations," Richard C. Larock, 2nd Ed., (1999), pgs. 7-27

List D

- Chemistry Letters, 565, (1982) KBr, electrolysis/H⁺ or OH⁻
Organic Reactions, 3, 267, (1946) NaOBr
J. Am. Chem. Soc., 71, 3929, (1949) NaOBr
Chemistry Letters, 713, (1984) NaBrO₂, cat. NaBr, NaOH
Synthesis, 290, (1974) Br₂, NaOMe/H⁺ or OH⁻
J. Org. Chem., 53, 3513, (1988) Br₂, KOH
Chemistry Letters, 463, (1989) (PhNMe₃)Br₃, NaOH
Tetrahedron Letters, 31, 1559, (1990) NBS, AgOAc, ROH/H⁺ or OH⁻
Synthesis, 538, (1983) PhIO, HCO₂H, H₂O
J. Org. Chem., 58, 2478, (1993) PhI(OAc)₂, KOH, MeOH/H⁺ or OH⁻

There are additional references that utilize uncommon reagents and/or Hg,Pb compounds. These additional references are available on request as they are unlikely to be practical on a large scale synthesis.

List E

- J. Chem. Soc., 992, (1930)
J. Am. Chem. Soc., 54, 1499, 3441, 4457, (1932)
J. Am. Chem. Soc., 82, 6163, (1960)
J. Am. Chem. Soc., 112, 6696, (1990)
Org. Syn. Coll. Vol. 1, 102, (1941)
Org. Syn. Coll. Vol. 2, 290, (1943)
Org. Syn. Coll. Vol. 3, 256, (1955)
Org. Syn. Coll. Vol. 4, 466, (1963)
Org. Syn. Coll. Vol. 5, 88, (1973)
Tetrahedron Letters, 34, 4473, (1993)
Tetrahedron Letters, 35, 375, (1994)