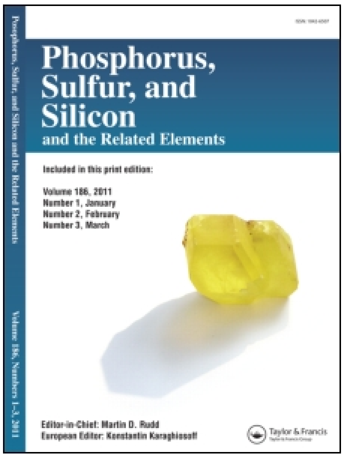


**Phosphorus, Sulfur, and Silicon and the Related Elements**
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713618290

# Stereoselective Synthesis and Complexation of a New Chiral Hybrid Phosphine-Phosphine Oxide Ligand from (S)-(+)-Prolinol

Bruno Faure[a]; Gérard Buono[a]
[a] Ecole Supérieure de Chimie de Marseille; U.R.A. 126; Faculté des Sciences et Techniques de S$^t$ Jérome; Université AIX-MARSEILLE 111; Av. Escadrille Normandie Niemen, MARSEILLE, CEDEX 13, FRANCE

**To cite this Article** Faure, Bruno and Buono, Gérard(1990) 'Stereoselective Synthesis and Complexation of a New Chiral Hybrid Phosphine-Phosphine Oxide Ligand from (S)-(+)-Prolinol', Phosphorus, Sulfur, and Silicon and the Related Elements, 51: 1, 367

**To link to this Article: DOI:** 10.1080/10426509008040896

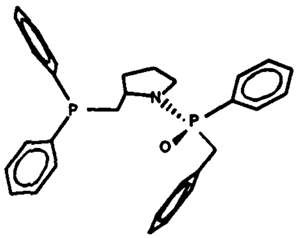
**URL:** http://dx.doi.org/10.1080/10426509008040896

*Phosphorus, Sulfur, and Silicon*, 1990, Vols. 51/52, p. 367
Reprints available directly from the publisher
Photocopying permitted by license only

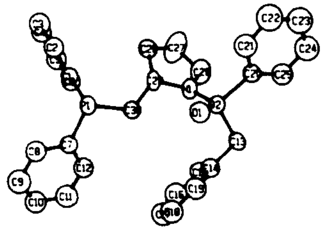
# Stereoselective Synthesis and Complexation of a New Chiral Hybrid Phosphine-Phosphine Oxide Ligand from (*S*)-(+)-Prolinol.

Bruno FAURE and Gérard BUONO*
Ecole Supérieure de Chimie de Marseille; U.R.A. 126; Faculté des Sciences et Techniques de S$^t$ Jérôme; Université AIX-MARSEILLE III; Av. Escadrille Normandie Niemen; 13397 MARSEILLE CEDEX 13.FRANCE

The synthesis and the complex formation of chiral heterotopic ligands with two different binding sites each capable of bonding a different type of metal are described. The action of bis(dimethylamino) aryl phosphine on (*S*)-(+)-prolinol gives rise to the kinetic stereoisomer (2*S*,4*S*)-2-phenyl-1,3,2-oxazaphospholidine **1** and the thermodynamic stereoisomer (2*R*,4*S*)-2-phenyl-1,3,2-oxazaphospholidine **2**. **1** is then totally converted into **2** at the end of the reaction. The Michaelis Arbuzov reaction of **2** with benzylbromide affords ($R_p$)-benzylaryl-(2-(*S*)-bromomethyl pyrrolidine-1-yl) phosphine oxide **3** in 80% yield. Compound **3** is an ideal chiral precursor for the synthesis of chiral hybrid phosphine-phosphine oxide ligands. The bromide atom is smoothly displaced by lithium diphenylphosphide to afford in 80% yield ($R_p$)-benzylaryl-(2-(*S*)-diphenylphosphinomethylpyrrolidine-1-yl) phosphine oxide **5**. These reaction are proved to be totally stereoselective : the Michaelis Arbuzov reaction does not change the configuration at C2 in the proline ring. The relative configuration ($R_p$) of **5** ( aryl = phenyl ) was determinated by X-ray diffraction, from the known configuration of (*S*)-(+)-prolinol.



**5**



Preliminary studies of complex formation with transition metals show that **5** can behave as mono or bidentate ligand. The transition metals, such as Pd, Pt, Rh are coordinated by the phosphine group, whilst the phosphine oxide group complexes either alkali or alkaline earth metals, or Lewis acids such as $TiCl_4$ and $nBu_2SnCl_2$. Chiral ligand **5** seems to be promising in the asymmetric synthesis catalyzed by transition metal complexes.