SUPPORTING INFORMATION

Synthesis of Atropisomeric MeOBIPHEP Analogues and Their Application in Silver-Catalyzed Cycloisomerization of Allenols

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1. X-Ray crystal structure determinations of \((R)-5-(AuCl)_2\) complex and compound \((S)-11\)

A single crystal of each compound \([(R)-5-(AuCl)_2\] complex and compound \((S)-11\) was selected, mounted onto a cryoloop, and transferred in a cold nitrogen gas stream. Intensity data were collected with a BRUKER Kappa-APEXII diffractometer with graphite-monochromated Mo-Kα radiation (\(\lambda = 0.71073\) Å). Data collections were performed with APEX2 suite (BRUKER). Unit-cell parameters refinement, integration and data reduction were carried out with SAINT program (BRUKER). SADABS (BRUKER) was used for scaling and multi-scan absorption corrections. In the WinGX\(^1\) suite of programs, the structure were solved with Sir92 program\(^2\) and refined by full-matrix least-squares methods using SHELXL-97.\(^3\)

\((S)-11\)

\[(R)-5-(AuCl)_2\]

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\(^3\) Sheldrick, G. M. *Acta Crystallographica Section A* **2008**, *64*, 112.
2. $^1$H, $^{13}$C and $^{31}$P NMR spectra
$$\text{MeO} \text{PAr}_2 \text{MeO} \text{PAr}_2 \text{Br} \quad \text{Ar} = 4\text{-CF}_3\text{C}_6\text{H}_4$$

$$\text{Ar} = 4\text{-CF}_3\text{C}_6\text{H}_4$$
Ar = 4-\text{CO}_2\text{Bu}-\text{C}_6\text{H}_4
\[ \text{Ar} = 4\text{-CO}_2\text{Bu-C}_6\text{H}_4 \]

\[ \text{Ar} = 3,5\text{-} \left( \text{CF}_3 \right) \text{2-C}_6\text{H}_3 \]
\[ \text{Ar} = 3,5-(\text{CF}_3)_2\text{C}_6\text{H}_3 \]