

# Simple generation of neutral bimetallic aluminium and zinc alkyls Schiff bases bridged by a central resorcinol moiety

Research Article

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**Abstract:** Aluminium and zinc complexes bearing the N,O-chelating Schiff base ligand 4,6-bis-1-(2-(dimethylamino)ethylimino)ethyl)benzene-1,3-diol, (C<sub>6</sub>H<sub>2</sub>(OH)<sub>2</sub>(NCH<sub>2</sub>CH<sub>2</sub>NMe<sub>2</sub>)<sub>2</sub>) (**1a**), have been synthesized. Bimetallic aluminium and zinc alkyl complexes (**2a** - **4a**) were prepared by treatment of the hexadentate **1a** with the appropriate amount of AlMe<sub>3</sub>, ZnMe<sub>2</sub> and ZnEt<sub>2</sub>, respectively. **2a** has been characterized crystallographically, it lies on a crystallographic two-fold rotation axis and each aluminium centre adopts a five coordinate geometry. Complex **2a** was tested as a catalyst in the ring-opening polymerisation of  $\epsilon$ -caprolactone. We describe here the synthesis of two neutral ligands (**1a** and (C<sub>6</sub>H<sub>2</sub>(OH)<sub>2</sub>(C<sub>6</sub>H<sub>5</sub>NH<sub>2</sub>) (C=O(CH<sub>3</sub>)) (**1b**)) and demonstrate their application in the synthesis of molecular aluminium and zinc derivatives.

**Keywords:** Aluminium methyl • Zinc alkyl • Schiff bases • DAR • Binuclear complex

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## 1. Introduction

Schiff base ligands are easily synthesized and form complexes with almost all metal ions, many of their complexes show high catalytic activity [1]. Monometallic Al complexes containing a series of phenoxy-imine ligands or NN Schiff base ligands have been reported [2-11]. The monometallic pendant-arm single Schiff base complexes of aluminium provide active centers for ethylene polymerization due to the liability of the pendant donor arm, thus allowing a pathway for ethylene to approach the aluminium centre [6]. So far, considerable attention has been paid to the synthesis, structural determinations, and catalytic activity of metal complexes based on aluminium and zinc [12-15]. Among the reported catalysts, bimetallic complexes are relatively few [16-19], and those reported for binuclear zinc alkyl, aryl and aryloxide involved Cl, N and O bridging ligands [20-22].

The bifunctional carbonyl compound 4,6-diacetylresorcinol (DAR) serves as precursor for the

generation of symmetrical Schiff bases which are either di- or tetra-basic with two symmetrical sets of either O<sub>2</sub>N or N<sub>2</sub>O tridentate chelating sites [23-27]. Nevertheless, dinuclear Al(III) and Zn(II) alkyl complexes with 1,3-dihydroxybenzene bridging motifs are lacking.

Here we have synthesized the new double and single-Schiff-base ligands **1a** and **1b**, respectively, as shown in Scheme 1, starting from DAR by Schiff-base condensation with two equivalents of the appropriate amine. The resulting ligand (**1a**) provides hexadentate [N<sub>2</sub>O] binding pockets which are bridged by a central resorcinol moiety, while (**1b**) provides both tridentate N<sub>2</sub>O and bidentate OO chelating sites.

## 2. Experimental Procedure

### 2.1. Chemicals and physical measurement

All manipulations were carried out in an atmosphere of dry nitrogen using standard Schlenk techniques or in an inert-atmosphere glovebox. Solvents were dried from the appropriate drying agent, distilled, degassed

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