Electronic Supplementary Information

Conductivity measurements in nitrobenzene

In order to be able to understand the results obtained with nitrate salts of BTBP complexes it is vital to know the limiting conductivity and hydrodynamic radius of a homoleptic *bis*-BTBP complex. The perchlorate salts of the C_2-BTBP complexes of four metals (cadmium, copper, lead and silver) were studied and for comparison the perchlorate salt of the bis-$CyMe_4$BTBP complex of lead was also studied. The cadmium and silver complexes were made using the literature method,[1] while the perchlorate salts of the lead complexes were obtained by a modified method. In place of potassium hexafluorophosphate, sodium perchlorate was used for anion metathesis. The copper complex was obtained by the treatment of a copper(II) salt with two equivalents of C_2-BTBP followed by anion metathesis with sodium perchlorate.

It was found that the mobility of the mononuclear complexes of divalent metals was independent of the nature of the metal and indeed a change of the radius of the coordinated central metal cation had little effect on the experimentally observed limiting conductivity of the mononuclear complexes (Table S1). Using literature data for the hydrodynamic radius of a perchlorate anion in nitrobenzene (2.51 Å)[2] it was then possible to estimate the hydrodynamic radii of these metal complexes (Figure S1, Table S1). However, on changing to the dinuclear silver(I) the hydrodynamic radius increased and as the charge on the *homoleptic* complex is identical to that of the cadmium, copper and lead complexes it can be concluded the difference in hydrodynamic radius is due to that fact that the complex has a different shape.

References

1 E. Aneheim, B. Grüner, C. Ekberg, M. R. StJ. Foreman, Z. Hájková, E. Löfström-Engdahl, M. G. B. Drew and M. J. Hudson, *Polyhedron*, 2013, **50**, 154-163.

2 J. F. Coetzee and G. P. Cunningham, *J. Am. Chem. Soc.*, 1965, **87**, 2529–2534.

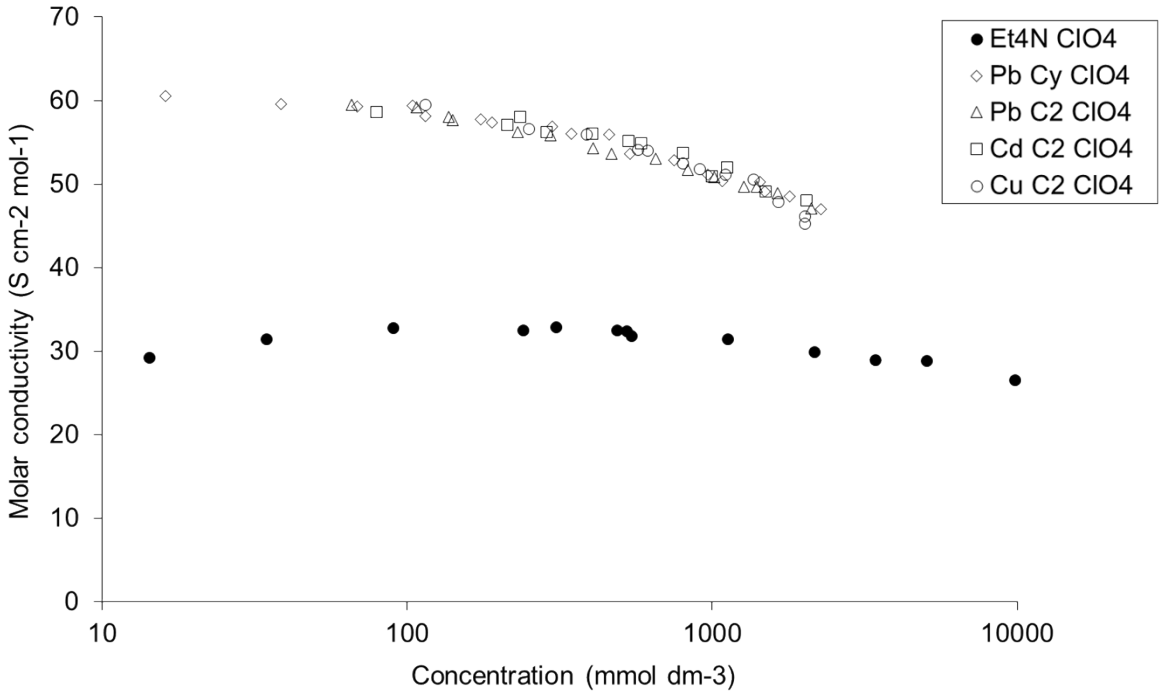

Figure S1. Molar conductivity of perchlorates of metal complexes and the tetraethyl ammonium ion in water saturated nitrobenzene.

Table S1. Measured limiting equivalent conductivity, Λ_+°, and calculated hydrodynamic radius, R_{hyd}, of different metal-BTBP complexes.

Complex	**Λ_+° /S cm^2 mol^{-1}**	**R_{hyd}/Å**
$[Cu(C_2BTBP)_2]^{2+}$	27.7	3.21
$[Cd(C_2BTBP)_2]^{2+}$	26.6	3.34
$[Pb(C_2BTBP)_2]^{2+}$	25.9	3.43
$[Pb(CyMe_4BTBP)_2]^{2+}$	26.4	3.36
$[Ag_2(C_2BTBP)_2]^{2+}$	21.2	4.20