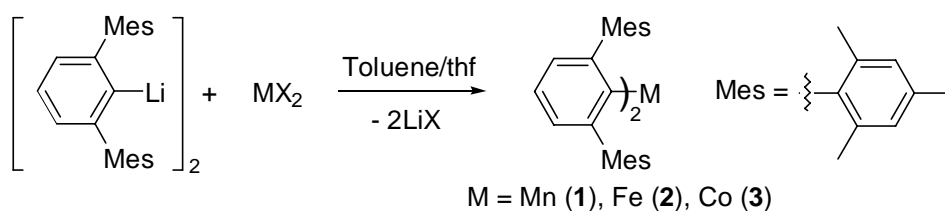


8.6 Prof. D O'Hare, Dr D.L. Kays, University of Oxford
The Stabilisation of Two-Coordinate Transition Metal Systems Using Bulky Terphenyl Ligands

Within the O'Hare group research is focussed on the synthesis of new and interesting organometallic compounds (i.e. those which contain metal-carbon bonds). This is both from an interest in the structures of these systems, but also with a view to exploiting these complexes in catalytic chemistry.

Compounds containing transition metals are central to many important processes in industrial chemistry, since they act as reaction catalysts. An in-depth understanding of the nature of the catalyst in solution is key to future developments. These compounds usually contain the transition metal in a low-coordinate environment i.e. with too few ligands around it. Given the relevance of these systems to fundamental and to more applied chemical studies, it is somewhat surprising that there are few low-coordinate transition metal complexes containing aryl and alkyl ligands reported in the literature.

This area of chemistry is particularly fascinating due to the synthetic challenges it poses. Complexes containing low-coordinate transition metal centres are highly reactive and often highly air and moisture sensitive. We have used extremely bulky *m*-terphenyl ligands to stabilize very rare examples of two-coordinate transition metal aryl complexes – (2,6-Mes₂C₆H₃)₂M [Mes = 2,4,6-trimethylphenyl; M = Mn (**1**), Fe (**2**), Co (**3**)], synthesized according to Scheme 1 below.



Scheme 1

Two-coordinate manganese and iron complexes **1** and **2** are only the second structurally characterised compounds featuring these metals in the II+ oxidation state with a single type of ligand coordinated to them, and even more interestingly cobalt complex **3** is the first example of a Co II+ compound with a single type of ligand coordinated to it which has not reacted with itself to form a dimer.

These very rare complexes are highly interesting from a structure/bonding viewpoint and also in terms of their reactivity. Further study is now being performed to fully characterise them and explore their reaction chemistry; firstly the fundamental reactivity of these compounds will be examined e.g. with small molecules such as carbon monoxide and hydrogen, with the ultimate aim of exploiting these species in catalytic chemistry. The paper detailing the synthesis of these systems has just been accepted into the RSC journal *Chemical Communications* and reactivity studies are now in progress.

The EPSRC National Mass Spectrometry has been instrumental in obtaining the EI accurate mass data for the above complexes, which are highly air sensitive and have a mass outside of the range of the machine we have at our facility here in Oxford.