Hydrides, Low Valent Compounds and Carbenes – Taming High Reactivity

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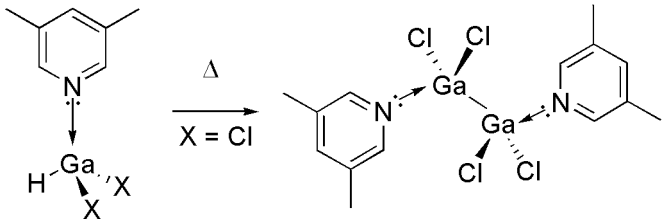
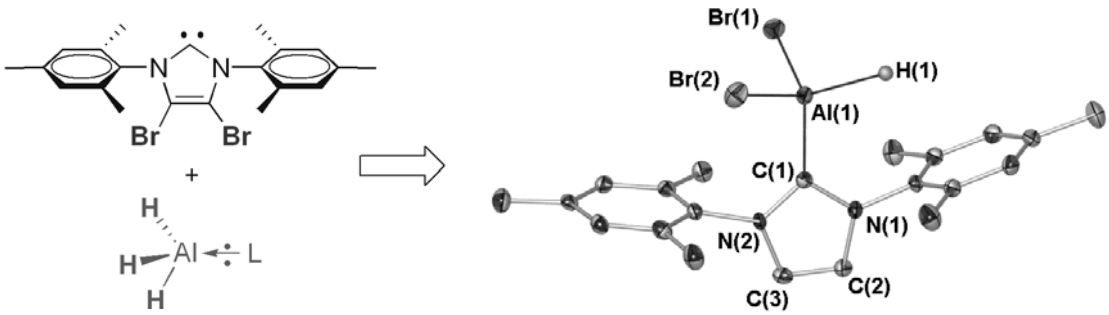
In recent times our research has focused on several aspects of group 13 chemistry. Most prominent amongst these has been the preparation of group 13 halohydrides. The binary hydrides of this group have been a source of fundamental interest to main group chemists for over 80 years.[1] By contrast, the study of partially halogenated variants, e.g. MXH_2 and MX_2H, where M = metallic group 13 metal and X = halogen, has received scant interest, presumably due to little perceived synthetic benefit.[2]



This presentation seeks to debunk this viewpoint and elaborate on some of the benefits of these species. Aspects of note include the tuning of chemoselectivity during hydrometallation,[3] entry to low oxidation state group 13 compounds by reductive dehydrogenation,[4] synthetic modification by salt-elimination metathesis, and unusual *umpolung* based outcomes when coordinated by *N*-heterocyclic carbenes.[5]



1 *Chemistry of Aluminium, Gallium, Indium and Thallium,* ed. A. J. Downs, 1993, Blackie, Glasgow, UK; (b) S. Aldridge and A. J. Downs, *Chem. Rev.,* 2001, *101*, 3305-3365.

2 S. G. Alexander and M. L. Cole, *Eur. J. Inorg. Chem.,* 2008, 4493-4506

3 S. G. Alexander, M. L. Cole and C. M. Forsyth, *Chem. Eur. J.*, 2009, *in press* (DOI: 10.1002/chem.200900365).

4 M. L. Cole, C. Jones and M. Kloth, *Inorg. Chem.,* 2005, *44*, 4909.

5 M. L. Cole, M. Hilder, J. C. Morris and J. B. Patrick, *Dalton Trans.,* 2008, 6361.