Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad – 500 046

Seminar

Flat Boron Rings Stabilised by Transition Metal Templates

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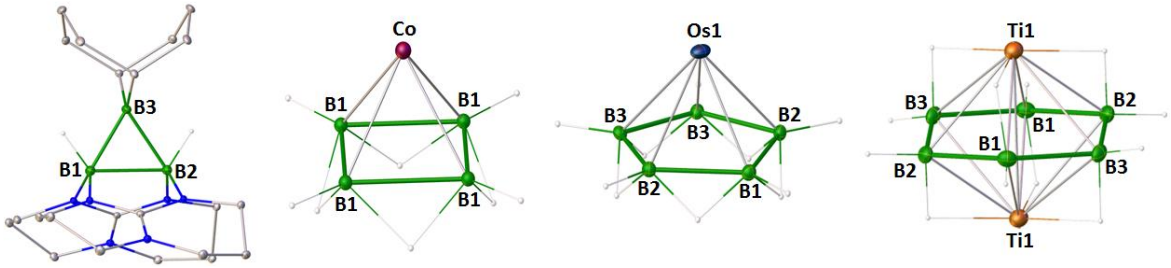
Unlike carbon, boron does not usually form ring compounds due to its electron deficiency-driven affinity towards polyhedral geometries. Therefore, the planar boron rings were ignored for a long time. However, recent developments by us and others demand further attention in stabilising planar boron rings. For example, Himmel synthesised a derivative of a doubly base-stabilised $[B_3H_6]^+$, the structural equivalent of $[B_3H_8]^-$ and $[B_3H_9]$. Although the smaller B_3 and B_4-rings are mostly isolated as individual species, larger B_5 and B_6-rings are stabilised by TMs, depending on the ring size and electronic requirements of the rings. In this regard, we have recently synthesised and structurally characterised tetraborane ring $[B_4H_8]^{2-}$ and pentaborane ring $[B_5H_{10}]^-$ stabilised by Os-template in η^4 or η^5-fashion which mimics $[C_4H_4]^{2-}$ and $[C_5H_5]^-$ rings, respectively. We have also isolated the first examples of a nearly planar $[B_6H_6]$ unit, stabilised as a part of $[(Cp^*Ti)_2(\mu\text{-}\eta^6\text{:}\eta^6\text{-}B_6H_6)(\mu\text{-}H)_6]$, where significant electron delocalisation was observed from the Ti–Ti bonding orbital to the μ-H atoms and B_6 skeleton. The selection of transition metals mostly depends on their diffuse orbitals, valence electrons, and ring sizes, while the bridging hydrogens balance the electron deficiency of the borane rings.



Friday, Sep 20th 2024

11:30 Hrs (Tea / Coffee 11:15 Hrs)

Auditorium, TIFR-H