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# Synthesis and characterization of diruthenaborane analogues of pentaborane(11) and hexaborane(10)<sup>ϕ</sup>

Benson Joseph<sup>a</sup>, Suman Gomosta<sup>a</sup>, Subrat Kumar Barik<sup>a</sup>, Soumya Kumar Sinha<sup>a</sup>, Thierry Roisnel<sup>b</sup>, Vincent Dorcel<sup>b</sup>, Jean-François Halet<sup>b\*</sup>, Sundargopal Ghosh<sup>a\*</sup>

<sup>a</sup>Department of Chemistry, Indian Institute of Technology Madras, Chennai 600036, India

<sup>b</sup>Institut des Sciences Chimiques de Rennes, UMR 6226, CNRS-Ecole Nationale Supérieure de Chimie de Rennes-Université de Rennes 1, F-35042 Rennes Cedex, France

<sup>ϕ</sup>Dedicated to our good friend and colleague Prof. Narayan Hosmane on the occasion of his 70<sup>th</sup> Birthday.

**Keywords:** cluster compound, borane, metallaborane, phenyl-chalcogenoborate, ruthenaheteroborane

## Abstract:

In an attempt to synthesize expanded-cage metallaheteroboranes containing heavier chalcogen atoms, the reaction of diruthenaborane analogue of pentaborane(9), *nido*-[1,2-(Cp\**Ru*H)<sub>2</sub>B<sub>3</sub>H<sub>7</sub>] (**1**) with phenyl-chalcogenoborates Li[BH<sub>3</sub>(EPh)] (E = S, Se or Te) was carried out. Thermolysis of *nido*-**1** with Li[BH<sub>3</sub>(SPh)] led to the formation of the dimetalla-pentaborane(11) analogue *arachno*-[(Cp\**Ru*)<sub>2</sub>B<sub>3</sub>H<sub>8</sub>(SPh)] (**2**). In parallel to the formation of **2**, the reaction also yielded three B-H functionalized compounds, namely [(Cp\**Ru*)<sub>2</sub>B<sub>4</sub>H<sub>7</sub>(Ph)] (**3**), [(Cp\**Ru*)<sub>2</sub>B<sub>4</sub>H<sub>7</sub>(Cl)] (**4**) and [(Cp\**Ru*)<sub>2</sub>B<sub>4</sub>H<sub>6</sub>(SPh)(Cl)] (**5**). On the other hand, reaction of **1** with Li[BH<sub>3</sub>(SePh)] led to the formation of the diruthenium analogue of hexaborane(10) *nido*-[(Cp\**Ru*)<sub>2</sub>B<sub>4</sub>H<sub>9</sub>(SePh)] (**6**), whereas Li[BH<sub>3</sub>(TePh)] yielded the capped *nido*-pentagonal-pyramidal [(Cp\**Ru*)<sub>2</sub>B<sub>4</sub>H<sub>6</sub>Te] (**7**). Compound **7** is a rare ruthenaborane cluster containing a heavier chalcogen element (Te). All the compounds were characterized by mass spectrometry and <sup>1</sup>H, <sup>1</sup>H{<sup>11</sup>B}, <sup>11</sup>B{<sup>1</sup>H} and <sup>13</sup>C{<sup>1</sup>H}NMR spectroscopy. The

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