

# Boranephosphonates. Unraveling the chemistry of the P-BH<sub>3</sub> functionality

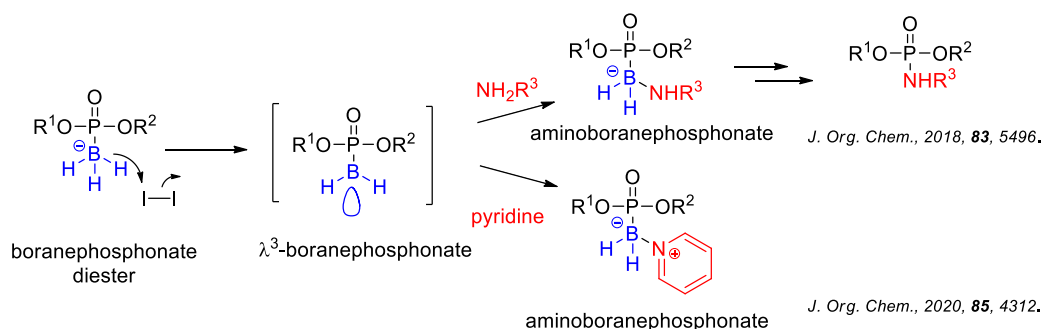
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Nucleoside boranephosphonates are an important class of nucleotide analogues in which one of the non-bridging oxygen atom has been replaced by a borane moiety (-BH<sub>3</sub>). The significant structural similarity to natural nucleotides and their higher stability in the cell medium make these analogues extremely useful in biological research. In contrast to their chemical and biological properties, reactivity of the borane group itself in these compounds has been poorly explored so far.<sup>1</sup> This issue has become the subject of our research in a last few years.

Exploration reactivity of the borane group of nucleoside boranephosphonate under oxidative conditions with diverse *N*-nucleophiles we observed that the order of the amine used determined the type of the product formed.<sup>2</sup> The 1° and 2° amines in the presence of iodine caused the conversion of nucleoside boranephosphonates into phosphoramidates,<sup>1a,2a</sup> while 3° and heteroaromatic amines generated new type of derivatives with a stable P-B-N bond system.<sup>1b,2b</sup> Based on the stereochemical correlation analysis we determined the correct stereochemistry of the formal replacement of the borane group by 1° and 2° amines.<sup>2a</sup> We have also shown that both types of the reactions proceed *via* a common mechanism, and the formation of different products was determined by the stability of the P-B bond in the intermediate aminoboranephosphonate<sup>2b</sup> (Scheme 1). An additional insight into the mechanism provided experiments with differing solvents and oxidizing reagents.<sup>2b,3</sup>



Scheme 1. Reaction of boranephosphonate with amines, promoted by iodine.

## References

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