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## Analytical task stemming from therapeutical prospects of electron deficient boron cluster compounds

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The existence, reactions, structures and properties of compounds occurring in nature, and their synthetic analogues are explainable by the idea of two-center two-electron bond. These families contain either electron exact or electron rich building blocks from the viewpoint of electron structure. Electron deficient building blocks have never been found in nature, and exist only in synthetic species. Boron cluster compounds (BCCs) create the most intensely investigated family of species with electron deficient cluster. Their existence has been explained by the accumulation of unique electron deficient bonds, which bind together three boron atoms or, sometimes, their substitutes, in clusters. Pronouncedly electron deficient clusters either determine or substantially affect properties of BCCs, and their prospects. Therapeutical prospects attract the highest attention now, and many compounds with boron clusters are synthesized as candidates for therapeutical uses. These compounds must pass through mandatory studies and checks, which require variety of chemical analyses, identically with other compounds. However, analytical methods do not exist for analyses of compounds with boron clusters. The pieces of knowledge from chiral separation of BCCs prove the dissimilarity of some analytical properties of species with and without boron clusters, and indicate the absence of criteria for the a priori estimation of different analytical properties for compounds with and without clusters. Thus, missing analytical methods cannot be derived from existing knowledge. Analytical research of BCCs motivated by their medical prospects is the best way to preventive elimination some obstacles, which may hamper medical uses of compounds with boron clusters.

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## Development of novel enrichment media of trace volatiles for real sample analysis

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Gas sampling techniques, especially for the enrichment and separation of trace gases from complicated matrix still remain one of the weak spots in analytical chemistry nowadays due to gas strong volatility, compared with liquid and solid sample.Efficient gas sampling techniques should possess the highest extraction capacity and selectivity and can be conveniently coupled with sequent analytical instruments. The core of developing efficient gas sampling techniques lies in the development of new enrichment media with higher extraction capacity and selectivity. In our previous reports, a series of novel enrichment media, including one-dimensional nano-arrayed, conjugated doping and Metal Organic Frame (MOF)-based coatings were developed, which mainly focused on the improvement of sampling capacity and selectivity for trace target gases from real samples with complicated matrices. The fabrication formats of these novel enrichment media, mainly involved sorbent tube, headspace stir bar and Solid-Phase MicroExtraction (SPME) coatings coupling with the consequent analytical instruments. These novels trace gas enrichment media have been successfully applied for the enrichment and analysis of trace target volatiles from food, environmental and biological samples.

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**Notes:**