



Efficient Large-Scale Synthesis of the Superweak Anions $B_{12}F_{12}^{2-}$, $H_3NB_{12}F_{11}^-$, and $1-H-CB_{11}F_{11}^-$

Weakly-coordinating (superweak) anions allow the isolation of extremely reactive salts of cations that are useful in industry and commerce, from lithium ions (Li^+) for next-generation, large-scale secondary lithium batteries to metallocene catalysts for a variety of polymerization reactions. Fluorinated boranes and carboranes are highly-robust, superweak anions with great potential for all of these applications, but their synthesis has – until now – required large amounts of extremely hazardous materials, expensive equipment and has not been amenable to production scales larger than one gram.

Researchers in the Department of Chemistry at Colorado State University have developed a novel technique for the efficient, large-scale synthesis of several super-weak, fluorinated boranes, carboranes and heteroboranes. In addition to the larger production scale, the improved reaction does not utilize the extremely hazardous HF gas ubiquitously required by current state-of-the-art syntheses, making this new technique safer and less expensive. In addition, simple Pyrex glassware may be used rather than the Teflon, stainless steel or Monel reactors required by HF gas.

Of even greater importance, this new reaction is dramatically more efficient. The scale of the reaction has been increased by a factor of 10, the reaction time has been decreased from six days (for the previous 1 gram scale) to two days (for the current 10 gram scale), the amount of expensive and hazardous F_2 has been minimized and all of this has been accomplished without a sacrifice in the purity or overall yield of the products.

To date, these researchers have demonstrated their novel reaction technique in the syntheses of $B_{12}F_{12}^{2-}$, $H_3NB_{12}F_{11}^-$, and $1-H-CB_{11}F_{11}^-$ anions. However, it is expected that this technique will prove broadly useful in the synthesis of a variety of fully-fluorinated polyhedral borane, carborane or heteroborane clusters. Furthermore, this new reaction scheme should be equally efficient in cases where the precursor salts are already partially fluorinated.

Contact us for more information on this exciting, new technology.

Features and Benefits

- Larger scale, more efficient synthesis of superweak fluoranions.
- Faster, safer, less expensive and no decrease in product yield or purity.
- Does not utilize hazardous HF gas.
- Useful fluorination procedure for a variety of polyhedral borane, carborane, and heteroborane clusters.

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Patent Information
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Related Technologies
CSURF 97-031
CSURF 98-003
CSURF 00-029
CSURF 00-044

Related Patents
US 6,130,357
US 6,180,829
US 6,335,466
US 6,448,447
US 6,645,903

