

催化、动力学与反应器

## 低热固相合成磷酸铵铜微肥及信噪比控制合成

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**摘要** 对合成缓溶磷酸铵铜多元微肥的新方法进行了研究,以聚乙二醇-400 (PEG-400)为模板, CuSO<sub>4</sub>·5H<sub>2</sub>O和 (NH<sub>4</sub>)<sub>3</sub>PO<sub>4</sub>·3H<sub>2</sub>O为原料,用低热固相反应一步法成功合成得到磷酸铵铜。用产物XRD图谱数据计算得到的信噪比作为试验的考察指标,试验中应用了均匀设计试验法及数据挖掘技术,在数据挖掘成果的指导下进行了试验。试验结果表明,用最优工艺条件合成得到的产物为51nm的NH<sub>4</sub>CuPO<sub>4</sub>·H<sub>2</sub>O。该合成方法除了得到微溶的磷酸铵铜外,还得可溶的硫酸铵或者硫酸氢铵,这些产物均是肥料,故在实际应用中,用本文的合成法合成磷酸铵铜微肥时,无需分离,其产物混合物就可以作为肥料作用了,不仅合成的工艺甚为简洁,而且生产过程没有废水的产生,无论是从工艺上,还是环保上均比液相法具有优势,是一种颇具工业应用前景的合成法。

**关键词** [固相反应](#) [磷酸铵铜](#) [缓溶微肥](#)

分类号

## Synthesis and characterization of multi-micronutrient fertilizer ammonium cupric phosphate via solid state reaction

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### Abstract

A novel method for the synthesis of multi-micronutrient fertilizer ammonium cupric phosphate was studied, and the target product was obtained successfully with CuSO<sub>4</sub>·5H<sub>2</sub>O and (NH<sub>4</sub>)<sub>3</sub>PO<sub>4</sub>·3H<sub>2</sub>O as raw materials and PEG-400 as template via the one step low heat solid state reaction. SNR (signal-to-noise) calculated with XRD data of the products was used as testing indicators, and uniform experimental design as well as data mining technology were used in the test. The synthesis tests were carried out, and were guided by the results of data mining technology. The test results indicated that the product synthesized with the optimal technical condition was NH<sub>4</sub>CuPO<sub>4</sub>·H<sub>2</sub>O with size of 51nm. For the products are all fertilizer, so it is obvious that a mixture of the synthesis products can be used as fertilizer without any separation. The synthesis process is not only simple but also without any waste water, so the synthesis is a much more potential industrial process when it is compared with those syntheses in liquid state in view of the process itself or environment protection.

**Key words** [solid state reaction](#) [ammonium cupric phosphate](#) [micronutrient fertilizer](#)

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