

催化、动力学与反应器

## 混合型TS-1/CNF催化剂的过滤性能及催化活性

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摘要

纳米碳纤维(CNF)是一种新型的碳基催化剂载体。采用机械湿混的方式制得了混合型钛硅分子筛/纳米碳纤维(TS-1/CNF)催化剂,研究了其在水相体系中的过滤性能,以及在环己酮氨氧化反应中的催化活性。与单独TS-1相比,混合型TS-1/CNF催化剂的团聚体宏观尺寸较大,CNF交织形成的大量大孔非常有利于液体的穿透,使得TS-1/CNF催化剂具有良好的过滤性能,因而可改善TS-1在水相体系中的分离问题。SEM观察显示,CNF具有独特的长纤维结构以及较大的外表面,为TS-1微粒提供了较多的附着点,使得TS-1能均匀分布在CNF表面上。TS-1颗粒与直径处于相同尺度的CNF之间可能存在着较强的分子间作用力、静电作用力及疏水作用力,可避免分散和过滤过程中两者的分离。混合型TS-1/CNF催化剂上环己酮氨氧化反应的结果表明,环己酮的转化率接近100%,环己酮收率达98.4%,与纯TS-1的催化活性相当。

关键词

[钛硅分子筛](#) [纳米碳纤维](#) [混合](#) [过滤](#) [环己酮氨氧化](#)

分类号

## Filtration and catalytic performance of blended TS-1/CNF composite catalyst

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### Abstract

Carbon nanofiber (CNF) is a novel carbon based catalyst support. A TS-1/CNF composite catalyst was synthesized in liquid phase by using a method of mechanical blending. The filtration performance of the blended TS-1/CNF composite in aqueous system and its catalytic performance on ammoxidation of cyclohexanone were studied. As compared with pristine TS-1 catalyst, the TS-1/CNF composite was comprised of relatively larger particles, which could be easily filtrated from the aqueous system. Meanwhile, there were a great number of macro pores in agglomerates of TS-1/CNF composite formed via CNF interweaving, in favor of liquid penetration through the filter layer of TS-1/CNF. The SEM images revealed that TS-1 particles were uniformly adsorbed on CNF surface. The unique long filament and large external surface of CNF might offer abundant adhesion sites to TS-1 particles. Strong inter-molecular, electrostatic and hydrophobic forces might exist between TS-1 particles and CNF, preventing the supported TS-1 from detaching off the CNF during stirring and filtering. The results of ammoxidation of cyclohexanone over the blended TS-1/CNF composite catalyst showed that the conversion of cyclohexanone and the yield of oxime could reach 100% and 98.4%, respectively, as high as those obtained over pristine TS-1 catalyst.

### Key words

[titanium silicalite-1](#) [carbon nanofiber](#) [blending](#) [filtration](#) [cyclohexanone ammoxidation](#)

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