

环境科学

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Shinella zoogloeoides BC026对吡啶的降解特性研究

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英文关键词 [Shinella zoogloeoides](#) [pyridine](#) [biodegradation](#) [nitrogen transformation](#) [metabolic pathway](#)

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中文摘要

从首钢焦化厂的污水处理系统中分离1株能以吡啶为唯一碳、氮源的细菌BC026,它具有自絮凝特性,对卡那霉素、氨苄青霉素和壮观霉素具有抗性,可在阿须贝无氮培养基中良好生长.通过16S rRNA序列分析和Biolog微生物鉴定系统鉴定,确定该菌为*Shinella zoogloeoides*.纯菌对单基质的降解实验表明,在30℃、180 r/min和pH为7的条件下,当投菌量为0.1 g/L时,BC026可在17 h内将400 mg/L吡啶完全降解;在吡啶初始浓度为99~1 806 mg/L的无机盐培养基中,BC026均能保持降解活性,较高初始浓度的吡啶对BC026的生长产生一定抑制,但BC026在适应后对吡啶的降解速率较快;降解最适温度为30~35℃,最适pH为8. BC026对吡啶的代谢途径研究表明:降解的第一步是断开吡啶的2条C—N键,生成氨氮和戊二醛,随后戊二醛被氧化为戊二酸,并最终转化为二氧化碳和水;吡啶中的氮有59.5%转化成氨氮.

英文摘要

A bacterial strain BC026 capable of utilizing pyridine as its sole source of carbon and nitrogen was isolated from the activated sludge in a coking wastewater treatment plant. The bacterium featured flocculability and antibiotic resistance to kanamycin, ampicillin and spectinomycin. It could grow well in Ashby nitrogen free culture medium. The strain was identified as *Shinella zoogloeoides* according to the results of 16S rRNA sequence analysis and Biolog microbial identification system. The experiments of pyridine biodegradation by the pure culture showed that pyridine of 400 mg/L could be degraded completely in 17 h under the condition of inoculum 0.1 g/L, 30℃, 180 r/min and pH 7. BC026 could keep high degradative activity in mineral salt medium containing pyridine with a concentration ranging from 99 mg/L to 1 806 mg/L. Higher initial concentration of pyridine caused repression on BC026 to a certain extent, however, the degradation rate became faster after the strain had been accommodated. The optimal conditions for the degradation were 30-35° C and pH 8. The research on metabolic pathway of pyridine by BC026 indicated that the first step of pyridine degradation was C—N bonds cleavage, generating NH_4^+ and glutaraldehyde. Then glutaraldehyde was oxidized into glutaric acid, and finally into CO_2 and H_2O . 59.5% nitrogen from pyridine was transferred into ammonium in the whole degradation.

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