硫酸铵对两株钾矿物分解细菌生长代谢和风化钾长石的影响

Effects of ammonium sulfate on the metabolism and Kfeldspar weathering of two potassium-bearing mineralsolubilizing bacteria

投稿时间：2011-10-8　最后修改时间：2011-12-21

中文关键词: 关键词: 钾矿物分解细菌,硫酸铵,有机酸,胞外多糖,矿物-微生物相互作用

英文关键词: Keywords: potassium-bearing mineral-solubilizing bacteria　ammonium sulfate　organic acid　extracellular polysaccharide　interaction between mineral and microorganism

基金项目: 国家自然科学基金(41071173)

作者	单位	E-mail
黄智	南京农业大学生命科学学院，农业部农业环境微生物重点实验室，南京210095	E-mail:xfsheng@njau.edu.cn
马光友	南京农业大学生命科学学院，农业部农业环境微生物重点实验室，南京210095	
何琳燕	南京农业大学生命科学学院，农业部农业环境微生物重点实验室，南京210095	
盛下放	南京农业大学生命科学学院，农业部农业环境微生物重点实验室，南京210095	

中文摘要:

摘要:【目的】为了明确钾矿物分解细菌Bacillus globisporus Q12 和Rhizobium sp. Q32 最合适的产酸和胞外多糖条件，并进一步阐明供试菌株对钾长石的溶解效应及其机制。【方法】分别向培养基中加入0－1.2 g/L(NH4)2SO4，选择菌株最适的产酸及合成胞外多糖条件，研究菌株对钾长石的溶解效果，并采用扫描电镜(SEM)观察钾长石表面形态及菌体分布特征。【结果】0.6、0和0.3g/L(NH4)2SO4分别能使菌株Q12、Q32和混合菌株(Q12 + Q32)产生较多的有机酸、胞外多糖以及有机酸和胞外多糖的复合物。菌株Q12、Q32 及其混合菌株均能够显著地溶解钾长石，并释放出矿质元素，其中混合菌株的溶解效果要优于单一菌株;SEM分析表明，混合菌株对钾长石的溶蚀作用最强。【结论】(NH4)2SO4的含量能够影响供试菌株Q12和Q32的生长代谢及其对钾长石的风化作用，混合菌株可以通过产生的有机酸和胞外多糖的联合作用加速对钾长石的风化。

英文摘要:

Abstract: [Objective] To determine the best conditions for Bacillus globisporus Q12 and Rhizobium sp. Q32 to produce organic acids and extracellular polysaccharides, respectively, and further elucidate the weathering mechanism of the two potassium-bearing mineral-solubilizing bacteria. [Methods] Different contents (0－1.2 g/L) of (NH4)2SO4 were added to media to analyze the ability of the strains to produce organic acids and extracellular polysaccharides, and assess the ability of Q12, Q32 and their mixture to dissolve potassium feldspar. Scanning electron microscope (SEM) was also used to observe the distribution of the bacterial cells on the surfaces of the feldspar and the mineral weathering. [Results] Results show that Bacillus globisporus Q12 produced more organic acids, when the contents of (NH4) 2SO4 were 0.6 g/L;Rhizobium sp. Q32 produced more extracellular polysaccharides, when there was no (NH4) 2SO4 in the media; and the mixture of two strains produced more organic acids and extracellular polysaccharides, when the contents of (NH4)2SO4 were 0.3 g/L. Mineral dissolution experiment showed that Bacillus globisporus Q12, Rhizobium sp. Q32 and the mixture (Q12 + Q32) significantly dissolved the feldspar and released the elements from the mineral, of which the mixture of Q12 and Q32 had the best weathering ability than strain Q12 or Q32; SEM also indicated that the mixture of Q12 and Q32 had more ability to weather feldspar than each tested strain. [Conclusion] The contents of (NH4)2SO4 in the media could affect the growth and metabolites of the strains Q12 and Q32 and the mineral bioweathering, the mixture of strains Q12 and Q32 had the more potential of feldspar weathering through the combined action of organic acids and extracellular polysaccharides produced by strains Q12 and Q32.

黄智,马光友,何琳燕,盛下放.硫酸铵对两株钾矿物分解细菌生长代谢和风化钾长石的影响.微生物学报,2012,52(2):206-213

查看全文　查看/发表评论　下载PDF阅读器

地址：北京朝阳区北辰西路1号院3号中科院微生物所内 邮编：100101
收信(款)人：《微生物学报》编辑部
电话：010-64807516 传真：010-64807327 电子信箱：actamicro@im.ac.cn