

论文

煤系地下水的硫酸盐还原菌与水文地球化学效应

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摘要:

为探索煤系地下水的硫酸盐异常偏低的机理, 从井下705 m深钻孔地下水中分离得到1株硫酸盐还原菌GY-2, 经16S rRNA测序及序列对比, 鉴定为滴状脱硫肠状菌(Desulfotomaculum guttoideum)。实验结果显示, 该菌株只在厌氧条件生长, 适宜环境为中温、中性-弱碱性、中低矿化度的封闭含水地层, Fe²⁺对菌株生长有显著促进作用。菌株的发现证实了煤系深部地下水的还原作用和硫酸盐还原菌的存在, 对部分煤矿区地下水(HCO₃⁻+CO₂⁻³)/SO₄²⁻之比随着地层的埋深逐渐加大, 而由大到小再到大的规律用硫酸盐还原作用和地下水氧化还原电位与水质类型对应关系作出了解释。

关键词: 硫酸盐还原菌(SRB); 地下水; 煤系地层

Detection and hydrogeochemical feature analyses of sulfate-reducing bacteria in groundwater in coal measure strata

Abstract:

A sulfate-reducing bacteria(SRB) strain, named GY-2, was isolated from groundwater in a 705 m deep aquifer at a coal mine in Huaibei Plain for mechanism analysis on the abnormally low sulfate concentration in the coal measure strata groundwater, and was identified as Desulfotomaculum guttoideum by Phylogenetic analysis based on 16S rRNA gene sequence. The strain GY-2 is found to be anaerobes, mesophilic and suitable in neutral or alkaline, low or medium water mineralization environment, and Fe²⁺ significantly promote the SRB strain growth. It is explained with the relationship between sulfate-reduction, redox potential and chemical types of groundwater, why the ratios of(HCO₃⁻+CO₂⁻³)/SO₄²⁻ change from high to low and to high again as the depths of the water-bearing strata increase continuously.

Keywords: sulfate-reducing bacteria(SRB); groundwater; coal measure strata

收稿日期 2011-03-15 修回日期 2011-09-30 网络版发布日期 2012-02-21

DOI:

基金项目:

国家自然科学基金资助项目(41172216, 40902019); 安徽省科技攻关资助项目(11010401015)

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