

二维气相色谱法分析天然气水合物区沉积物间隙水中示踪气体的浓度

王虎^{1,2,3*}, 杨群慧², 季福武², 周怀阳², 薛翔⁴

1. 中国科学院广州地球化学研究所, 广东 广州 510640; 2. 同济大学海洋地质国家重点实验室, 上海 200092; 3. 中国科学院研究生院, 北京 100049; 4. 中国科学院深圳先进技术研究所, 广东 深圳 518055

Determination of tracer gas contents in sediment pore water of gas hydrate area by two-dimensional gas chromatography

WANG Hu^{1,2,3*}, YANG Qunhui², JI Fuwu², ZHOU Huaiyang², XUE Xiang⁴

1. Guangzhou Institute of Geochemistry, Chinese Academy of Sciences, Guangzhou 510640, China; 2. State Key Laboratory of Marine Geology, Tongji University, Shanghai 200092, China; 3. Graduate University of Chinese Academy of Sciences, Beijing 100049, China; 4. Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences, Shenzhen 518055, China

摘要	参考文献	相关文章
----	------	------

Download: PDF (211KB) HTML 1KB Export: BibTeX or EndNote (RIS) Supporting Info

摘要 利用微流路控制技术中心切割装置(Deans Switch)、两根色谱柱(PoraPLOT Q和Molsieve 5A)和3个检测器(脉冲氦离子化检测器、火焰光度检测器、热导检测器),建立了一种二维气相色谱分析系统,实现了海洋中多种示踪气体组分(氢气、甲烷、二氧化碳、硫化氢)的同时分析和精确测定。氢气、甲烷、二氧化碳、硫化氢的含量分别在2~1030、0.6~501、120~10500和0.2~49.1 μmol/mol范围内的校正曲线线性关系良好,检出限分别为0.51、0.17、82和0.08 μmol/mol,10次重复测定含量的相对标准偏差均小于10%。通过对南海天然气水合物区沉积物间隙水顶空气的测定,表明该方法方便、灵敏、可靠,易于实现海上现场测定;与以往采用多种分析方法分别测定示踪气体相比,大大节省了样品量。该方法适用于海洋天然气水合物、海底热液等资源的调查和海洋溶解态气体的研究等。

关键词: 二维气相色谱法 氢气 甲烷 二氧化碳 硫化氢 天然气水合物

Abstract: A two-dimensional gas chromatographic instrument was established by the capillary flow technology (Deans Switch) and two columns (PoraPLOT Q and Molsieve 5A) and three detectors (pulsed discharge helium ionization detector, flame photometric detector and thermal conductivity detector). The instrument can be used to measure tracer gases simultaneously including hydrogen, methane, carbon dioxide and hydrogen sulfide. The detection limits of the hydrogen, methane, carbon dioxide and hydrogen sulfide were 0.51, 0.17, 82 and 0.08 μmol/mol, and the calibration curves presented good linear relationships in the range of 2~1030, 0.6~501, 120~10500 and 0.2~49.1 μmol/mol, respectively. The relative standard deviations were less than 10% for the measurements of ten standard gases. By this method, the tracer gases in the sediment pore water of gas hydrate area in South China Sea had been detected. This method is simple, sensitive, and suitable for on-board detection. Compared with the usual methods for measuring tracer gases, the amount of a sample necessary is reduced greatly. It is useful for the survey of gas hydrate and hydrothermal resources below sea floor and for the research of dissolved gases in the ocean.

Keywords: two-dimensional gas chromatography (2D-GC) hydrogen methane carbon dioxide hydrogen sulfide gas hydrate

Received 2010-09-30; published 2011-01-21

Fund:

国家高技术研究发展计划(“863”计划)(Nos. 2007AA091902, 2007AA09Z208).

Corresponding Authors: 王虎, 讲师, 主要研究方向为海洋分析化学. Tel: (021)65987615, E-mail: wanghu@tongji.edu.cn.

Email: wanghu@tongji.edu.cn

引用本文:

王虎^{1,2,3*}, 杨群慧², 季福武², 周怀阳², 薛翔⁴. 二维气相色谱法分析天然气水合物区沉积物间隙水中示踪气体的浓度[J] 色谱, 2011, V29(01): 70-74

WANG Hu^{1,2,3*}, YANG Qunhui², JI Fuwu², ZHOU Huaiyang², XUE Xiang⁴. Determination of tracer gas contents in sediment pore water of gas hydrate area by two-dimensional gas chromatography[J] Chinese Journal of Chromatography, 2011, V29(01): 70-74

链接本文:

http://www.chrom-china.com/CN/ 10.3724/SP.J.1123.2011.00070 或 http://www.chrom-china.com/CN/Y2011/V29/I01/70

Service
▶ 把本文推荐给朋友
▶ 加入我的书架
▶ 加入引用管理器
▶ Email Alert
▶ RSS
作者相关文章
▶ 王虎