

天然气地球化学

裂解热模拟实验中碳同位素变化特征及其地球化学意义

唐小强, 黄光辉, 张敏, 陈超, 韩金平, 吴迪, 周小淞

1. 吐哈油田公司工程技术研究院, 新疆 鄯善 838202;
2. 长江大学教育部油气资源与勘探技术重点实验室, 长江大学地球化学系, 湖北 荆州 434023;
3. 贵州煤田地质局113队, 贵州 贵阳 550023

摘要:

采用高温模拟技术, 对原油、氯仿沥青“A”、烃源岩、干酪根和原油族组分样品进行热模拟实验, 分析不同样品在裂解过程中产物碳同位素组成的变化特征, 研究其地球化学意义。原油、氯仿沥青“A”、干酪根、烃源岩和饱和原油族组分随热演化温度的增加, 热模拟气态烃碳同位素演化规律是由重变轻再变重的演化趋势, 700℃以前碳同位素分布呈正碳同位素系列分布, 750℃以后出现丙烷碳同位素倒转, 芳烃馏分和沥青质馏分的碳同位素值和正碳同位素系列分布出现差异; 各样品随热模拟温度的增加, $\Delta\delta^{13}C_{2-1}$ 值都呈增大的趋势; $\Delta\delta^{13}C_{3-1}$ 、 $\Delta\delta^{13}C_{3-2}$ 对原油、氯仿沥青“A”、饱和烃馏分与芳烃馏分和沥青质馏分随模拟温度的变化有差异; $\delta^{13}C_2$ - $\delta^{13}C_3$ 值和 $\ln(C_2/C_3)$ 值随模拟温度的增加呈正相关性。

关键词:

Stable Carbon Isotope Compositions of Gaseous Hydrocarbons in Pyrolysis Experiment and Geochemical Significance

TANG Xiao-Qiang, HUANG Guang-Hui, ZHANG Min, CHEN Chao, HAN Jin-Ping, WU Di, ZHOU Xiao-Song

1. Research & Development Center of Tuha Oilfield Company, Shanshan 838202, China;
2. Key Laboratory of Oil & Gas Resources and Exploration Technology, Ministry of Education, Department of Geochemistry, Yangtze University, Jingzhou 434023, China;
3. No. 113 Exploration Team, Guizhou Bureau of Coalfield Geological Exploration, Guiyang 550023, China)

Abstract:

In this paper, different types of samples, including crude oil, chloroform bitumen A, oil fractions (saturated hydrocarbon, aromatic hydrocarbon and asphaltene), source rock and kerogen, were performed in pyrolysis experiment at high temperature. Carbon isotope composition of gaseous hydrocarbons was measured. With increase of pyrolysis temperatures, $\delta^{13}C$ values of gaseous hydrocarbons from different types of samples (i.e crude oil, chloroform bitumen A, kerogen, source rock, and saturated hydrocarbon) were various, with heavy value of ^{13}C at low temperature, lighter value at moderate temperature, and heavier value at higher pyrolysis temperature. A normal serial of stable carbon isotopes for methane, ethane and propane occurred before pyrolysis temperature less than 700℃. But, reverse trend happened at pyrolysis temperature more than 750℃. The different change of stable carbon isotope values and normal serial for gaseous hydrocarbons from aromatic hydrocarbon and asphaltene existed. $\Delta\delta^{13}C_{2-1}$ values for gaseous hydrocarbon from all samples increased with pyrolysis temperature increasing. Values of $\Delta\delta^{13}C_{3-1}$ and $\Delta\delta^{13}C_{3-2}$ were various for samples. A position correlation between $\delta^{13}C_2 - \delta^{13}C_3$ and $\ln(C_2/C_3)$ occurred with pyrolysis temperature increasing.

Keywords:

收稿日期 2009-10-23 修回日期 2010-03-16 网络版发布日期

DOI:

基金项目:

国家“十五”重点科技攻关项目(编号:2004BA616A02-01-01-03)资助.

通讯作者: 唐小强 kisstangxiaoqian@163.com

作者简介: 唐小强(1982-), 男, 四川内江人, 硕士, 主要从事油气地球化学研究.

作者Email: kisstangxiaoqian@163.com

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(3182KB)
- ▶ [HTML全文]
- ▶ 参考文献[PDF]
- ▶ 参考文献

服务与反馈

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ 引用本文
- ▶ Email Alert

本文关键词相关文章

本文作者相关文章

- ▶ 唐小强
- ▶ 黄光辉
- ▶ 张敏
- ▶ 陈超
- ▶ 韩金平
- ▶ 吴迪
- ▶ 周小淞

PubMed

- ▶ Article by Tang, X. J.
- ▶ Article by Huang, G. H.
- ▶ Article by Zhang, M.
- ▶ Article by Chen, C.
- ▶ Article by Han, J. B.
- ▶ Article by Tun, D.
- ▶ Article by Zhou, X. S.

参考文献:

本刊中的类似文章

文章评论

Copyright by 天然气地球科学