

论文

煤层气分离富集吸附剂抑爆隔爆性能实验研究

杨雄, 刘应书, 李永玲, 宋燕民, 张传钊, 孟宇

- 1.北京科技大学 机械工程学院, 北京 100083;
- 2.北京科技大学 冶金工业节能减排北京市重点实验室, 北京 100083

摘要:

针对含氧煤层气变压吸附分离过程中存在的安全问题, 通过实验的方法研究了吸附剂对瓦斯气体的抑爆和隔爆特性, 旨在为煤矿抽排瓦斯分离过程中的安全生产提供参考。实验以甲烷与空气的混合气及甲烷与氧气的混合气为研究对象, 其中甲烷体积分数分别为10%和36%。研究结果如下: 当吸附剂处于爆炸气氛的环境中, 在吸附剂装填区域进行点火引爆不会发生爆炸; 对不装填吸附剂的区域进行点火引爆, 火焰不能通过吸附剂层传递到其他区域; 压力波通过吸附剂层时出现了较大的衰减, 如甲烷与氧气的混合气在大气压下引爆后, 压力由起爆容器的5.5 MPa迅速衰减到了0.03 MPa。研究结果表明: 吸附剂具有抑爆和隔爆的特性, 可对吸附分离系统起到安全防护作用。

关键词: 活性炭; 碳分子筛; 煤层气; 抑爆; 隔爆

Research on the role of adsorbent for coal mine methane separation in explosion suppression and flameproof

Abstract:

For the hazardous problem existing in the separation of oxygen-bearing coal mine methane during the process of pressure swing adsorption, the role of the adsorbent in suppression of explosion and flameproof was studied experimentally. The experimental results offer a reference to the safe production of methane separating from the coal mines gas. Two samples were adopted, they were CH₄/Air and CH₄/O₂ with the volume fraction of methane account for 10% and 36% respectively. The results show that the ignition will not cause any explosions within the filling area of adsorbent, when the adsorbent is in an explosive atmosphere. The flame generating by ignition within the non-filling area of adsorbent will not go through the layer of adsorbent to pass on to other area. And there is a sharp decline after the pressure wave went through the adsorbent layer, the pressure has dropped to 0.03 MPa from 5.5 MPa rapidly after the mixed gas of methane and oxygen exploded under the condition of atmospheric pressure. The results illustrate the adsorbent has the characteristic of explosion suppression and suppression of explosion and flameproof, it could provide protective effects for the separation process.

Keywords: activated carbon; carbon molecular sieve; coal mine gas; explosion suppression; flameproof

收稿日期 2012-10-09 修回日期 2013-04-23 网络版发布日期 2013-09-17

DOI:

基金项目:

国家高技术研究发展计划(863)资助项目(2009AA063201); 中央高校基本科研业务费专项资金资助项目(FRF-AS-10-005B, FRF-TP-13-011A)

通讯作者: 杨雄

作者简介: 杨雄(1984—), 男, 湖南益阳人, 讲师, 博士后

作者Email: ustbyangx@163.com

参考文献:

本刊中的类似文章

扩展功能

本文信息

- Supporting info
- PDF(1222KB)
- [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
- 文章反馈
- 浏览反馈信息

本文关键词相关文章

- 活性炭; 碳分子筛; 煤层气; 抑爆; 隔爆

本文作者相关文章

- 杨雄
- 李永玲
- 张传钊
- 刘应书
- 孟宇
- 宋燕民

PubMed

- Article by Yang, X
- Article by Li, Y. L
- Article by Zhang, Z. Z
- Article by Liu, Y. S
- Article by Meng, Y
- Article by Song, Y. M

