

论文

HP耐热钢裂解炉管服役弱化的组织特征及其成因

吴欣强;杨院生;詹倩;胡壮麒

中国科学院金属研究所;沈阳,110015;中国科学院金属研究所;沈阳,110015;中国科学院金属研究所;沈阳,110015;中国科学院金属研究所;沈阳,110015

摘要: 在分析测试服役HP耐热钢裂解炉管的基础上,探讨了使用过程中炉管内壁材质的弱化机制、结果表明,炉管内壁亚表层贫碳化物区及内部渗碳区的形成及加深主要与表面氧化层的剥落和重建、晶间氧化区的形成、碳及合金元素在基体中的扩散速度以及形成碳化物的临界碳浓度 c_{max} 密切相关;丝状催化焦炭的形成与发展促进了炉管内壁组织弱化,而非催化气相焦炭的沉积在一定程度上抑制了材料的弱化;反复的结焦和清焦是促使炉管内壁材质弱化的主要原因。

关键词: 耐热钢 裂解炉管 贫碳化物区 渗碳 结焦

STRUCTURE DEGRADATION OF HP CRACKING TUBE DURING SERVICE

WU Xinqiang; YANG Yuansheng; ZHAN Qian; HU Zhuangqi(Institute of Metal Research, The Chinese Academy of Sciences, Shenyang 110015)Correspondent:WU Xinqiang, Tel: (024) 23843531-55901, Fax: 23891320,E-mail: ysyang@imr.ac.cn

Abstract: The degradation mechanism of cracking tube material during service was discussed on the basis of analysing the structural morphologies of the HP tube used. The results reveal that the carbide-free zone and carburized zone in the inner wall of tube is closely associated with the spalling and regeneration of surface oxide layer, the formation of intergranular attack zone, the diffusion velocity of carbon and alloy elements in matrix and the solution limit of carbon in alloy. The formation and growth of filament catalyzed coke promote the structure degradation of inner wall of cracking tube, while the deposition of non-catalyzed gas coke can alleviate the degradation degree of tube material to some extent. The cycle operation of coking/decoking is the main reason for material degradation of cracking tube in service.

Keywords: heat-resistant steel cracking tube carbide-free zone carburization coking

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通讯作者:

作者简介:

作者Email:

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