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论文

密闭环境内循环催化氧化CO反应特性研究

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摘要:

为了研究高效可行的净化技术, 有效控制密闭环境内CO的浓度, 选取3种催化剂(PD-1, AU-1, HC-1)在密闭环境CO循环净化模拟装置上开展了CO循环净化实验研究。实验结果表明, 3种催化剂均有催化氧化CO的作用, 且均存在一个较优空速值, 分别为: 215 000, 215 000, 200 000 h⁻¹, 在该空速值条件下将浓度400×10⁻⁶左右的CO催化氧化至24×10⁻⁶附近所需反应时间最短, 反应速率最大。通过函数拟合和数学分析, 得出实验条件下3种催化剂反应速率与CO浓度的关系式以及最大反应速率的排列次序。进一步的分析表明, PD-1和AU-1两种催化剂在较优空速值条件下的CO催化氧化速率均能达到相关标准的要求, 可以实际应用于煤矿井下紧急避险设施内CO的净化, 且密闭环境中CO浓度理论上会在一定的平均值附近波动。

关键词: 密闭环境; CO; 催化氧化; 紧急避险

Study on the characteristics of CO circulation catalytic oxidation within closed environment

Abstract:

In order to study the efficient purification technology, effectively control the concentration of CO in a closed environment, a CO circulation catalytic oxidation experiment was carried out with three kinds of catalysts(PD-1, AU-1 and HC-1).The experiment results show that those absorbents have the CO oxidation ability, and the optimal space velocity for each absorbent is as follow: 215 000, 215 000, 200 000 h⁻¹.With those optimal space velocities, the reaction time is the shortest and the reaction rate is the highest when the oxidation makes the CO concentration decreases from 400×10⁻⁶ to 24 ×10⁻⁶.Through the function fitting and mathematical analysis, under the experimental conditions, the relationships between reaction rate and CO concentration, and the order of maximum reaction rate of three catalysts were obtained.Further analysis shows that the catalysts PD-1 and AU-1 are able to meet the requirements of relevant standards when the CO oxidation rates are under the optimal space speed value conditions, and that can actually be used in the catalytic oxidation of CO in a closed environment, while the CO concentration will be theoretically fluctuated around average values.

Keywords: closed environment; CO; catalytic oxidation; emergency refuge

收稿日期 2012-12-24 修回日期 2013-03-26 网络版发布日期 2013-09-17

DOI:

基金项目:

中央高校基本科研业务费专项资金资助项目(FRF-SD-12-007B, FRF-TP-12-074A)

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