

能源和环境工程

烟气膜吸收法脱除SO₂的超声波强化处理

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摘要 本文提出了以柠檬酸盐溶液为吸收剂、中空纤维膜组件为脱除SO₂的基本设备,并配有超声波强化吸收的技术模式,首次将超声波和膜技术应用于烟气脱硫过程。重点探讨了超声空化作用及其促进传质过程的机理,利用自主设计的超声膜吸收器进行了烟气脱硫研究,同时分析了超声对吸收液和中空纤维稳定性的影响。研究表明:在超声频率为20kHz,柠檬酸盐溶液浓度为0.5mol/L, pH值为4.5的条件下,超声波对膜吸收SO₂有明显的促进作用,对吸收液温度有加热的副作用,同时超声波的加入对吸收液和膜材料的稳定性没有影响。

关键词 [超声波](#); [膜吸收](#); [烟气脱硫](#); [柠檬酸盐缓冲溶液](#); [二氧化硫](#)

分类号

Enhancement of flue gas desulphurization using membrane absorption with ultrasonics

Abstract

A new flue gas desulphurization (FGD) technology was developed to absorb SO₂ by using citrate solution as absorbing agent, with hollow fiber membrane and ultrasonic enhancement. Ultrasonic treatment and membrane technology were introduced into the process of FGD. Ultrasonic cavitation and its enhancement of the mass transfer process were discussed. By using the self-designed reactor, the effects of ultrasonic treatment on the stability of citrate solution and hollow fiber membrane for FGD were studied. The results showed that under the condition of frequency 20 kHz, citrate concentration 0.5 mol·L⁻¹ and pH 4.5, the absorption of sulfur dioxide from flue gas in the hollow fiber membrane module could be enhanced by ultrasonic treatment, but the solution could be heated up, which caused inhibition of absorption. In the process of ultrasonic treatment, citrate solution and hollow fiber membrane remained stable.

Key words [ultrasonic](#) [membrane absorption](#) [flue gas desulphurization](#) [citrate buffer solution](#) [sulfur dioxide](#)

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