

多孔陶瓷滤料的亲油改性及其除油性能

Lipophilic modification of porous ceramic filter media and its oil removal performance

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英文关键词: [aluminate coupling agent](#) [porous ceramic filter media](#) [modification](#) [simulation oilfield-produced water](#)

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中文摘要:

研究了铝酸酯偶联剂对多孔陶瓷滤料的亲油改性及改性滤料的除油性能。用正交实验优化改性工艺,并对改性前后滤料用FTIR、SEM、密度、孔隙率及接触角等手段进行表征。结果表明:最佳改性工艺参数为铝酸酯偶联剂5%(改性液质量分数)、改性温度90℃、改性时间20 min和涂层次数1次。改性滤料FTIR图在2 920.95 cm⁻¹和2 851.63 cm⁻¹处出现了CH₃、CH₂等特征吸收峰,其密度和孔隙率减小,而对水的接触角明显增大,表明多孔陶瓷滤料亲油改性成功。用改性滤料处理模拟油田采出水,控制滤速15 m/h,20 min后采样测出水中油的浓度,其去油率由预处理65.18%增加到96.46%;穿透曲线的研究表明,原始、预处理及改性滤料运行时间分别为48、85和149 min,可见改性滤料的运行时间更长,其较原始与预处理滤料分别延长了101 min和64 min,且其去油率能持续45 min维持在90%以上。可见经亲油改性的多孔陶瓷滤料是一种良好的聚结除油材料。

英文摘要:

The orthogonal experiment was used to optimize the modification process. Before and after modification, filter media were characterized by FTIR, SEM, density, porosity and contact angle. The results showed that the best modification parameters included aluminate coupling agent (5%), temperature (90℃), modification time (20 min) and coating times (one). Proofs of porous ceramic filter media successfully modified included the characteristic adsorption peaks of CH₃ and CH₂ in FTIR from modified filter media, reduction of the density and porosity and increase of the contact angle to water. At a speed of 15 m/h and after 20 min, and oil removal rate of modified filter increased from 65.18% to 96.46% compared with pretreatment filter. The breakthrough curves showed that the working times of original, pretreatment and modified filter media were 48, 85 and 149 min, respectively, which implied that operation cycle of modified filter was 101 min and 64 min longer than those of original and pretreatment filter. The oil removal rate of 90% lasted for 45 min, which means that the modified filter is a good coalescence degreasing material.

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