

RESEARCH NOTES

针对重质低硫含硫原油催化裂化重组分的研究
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摘要 Thiophene (C4H4S) and 3-methylthiophene(3-MC4H4S) are typical thiophenic sulfur compounds that exist in fluid catalytic cracking (FCC) gasoline. Oxidation of C4H4S and 3-MC4H4S were conducted in hydrogen peroxide (H2O2) and formic acid system over a series of silica gel loaded with metal oxide. The silica gel loaded with copper and cobalt (1:1) oxide was found very active for the model compound oxidation using H2O2/formic acid, while the silica gel unloaded with metal oxide was less active. The sulfur removal rate of thiophenes was different as solvent was changed. And the conversion of C4H4S and 3-MC4H4S was improved at higher temperature, but reduced when olefin was added. The sulfur removal rate of model sulfur compounds was enhanced when the phase transfer catalyst tetrabutylammonium bromide(TBAB) was added. The sulfur removal rate of simulated gasoline containing 524μg/ml-1 sulfur reached 90%. Interestingly, in a H2O2 and formic acid system with the addition of TBAB, a bromine substitution trend appeared in the oxidation of thiophenes, suggesting the influence of TBAB.

关键词 oxidative desulfurization, silica gel, thiophene, 3-methylthiophene

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Oxidation of thiophenes over silica gel in hydrogen peroxide/formic acid system
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Abstract Thiophene (C4H4S) and 3-methylthiophene(3-MC4H4S) are typical thiophenic sulfur compounds that exist in fluid catalytic cracking (FCC) gasoline. Oxidation of C4H4S and 3-MC4H4S were conducted in hydrogen peroxide (H2O2) and formic acid system over a series of silica gel loaded with metal oxide. The silica gel loaded with copper and cobalt (1:1) oxide was found very active for the model compound oxidation using H2O2/formic acid, while the silica gel unloaded with metal oxide was less active. The sulfur removal rate of thiophenes was different as solvent was changed. And the conversion of C4H4S and 3-MC4H4S was improved at higher temperature, but reduced when olefin was added. The sulfur removal rate of model sulfur compounds was enhanced when the phase transfer catalyst tetrabutylammonium bromide(TBAB) was added. The sulfur removal rate of simulated gasoline containing 524μg/ml-1 sulfur reached 90%. Interestingly, in a H2O2 and formic acid system with the addition of TBAB, a bromine substitution trend appeared in the oxidation of thiophenes, suggesting the influence of TBAB.

Key words oxidative desulfurization, silica gel, thiophene, 3-methylthiophene

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