

SO₄²⁻/ZrO₂的制备工艺对催化橡胶籽油裂解油酯化的影响

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Preparation of SO₄²⁻/ZrO₂ catalyst and its performance in the esterification of pyrolytic rubber seed oil

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摘要 以SO₄²⁻/ZrO₂为催化剂对橡胶籽油裂解油进行甲酯化。研究了锆源、焙烧温度及焙烧时间对催化剂活性的影响,分别采用氨气吸附程序升温脱附(NH₃-TPD)和吡啶红外(Py-IR)对固体酸SO₄²⁻/ZrO₂的酸性和酸型进行分析。实验结果表明,以ZrOCl₂为锆源,550℃焙烧4 h所得固体酸SO₄²⁻/ZrO₂的催化活性最好,性能较稳定。对酯化产物的组成及性能进行了考察,结果表明,酯化产物的各项性能均优于传统工艺制备的生物燃油,且与0#柴油相近。

关键词: 橡胶籽油裂解油 SO₄²⁻/ZrO₂ 酯化 生物燃油

Abstract: Esterification of pyrolytic rubber seed oil with SO₄²⁻/ZrO₂ solid acid as catalyst was investigated; the effects of zirconium sources, calcination time and temperature on the catalytic performance were considered. The acidic properties of the SO₄²⁻/ZrO₂ catalyst were characterized by temperature-programmed desorption of ammonia (NH₃-TPD) and pyridine adsorption infrared spectroscopy (Py-IR). The results indicated that the SO₄²⁻/ZrO₂ solid acid prepared by using ZrOCl₂ as zirconium source and calcined at 550°C for 4 h exhibits high catalytic activity and stability in the esterification of the pyrolytic rubber seed oil. The esterification product obtained as a bio-oil was superior to those prepared via conventional methods; its properties are similar to those of 0# diesel oil.

Key words: pyrolysis oil of rubber seed oil SO₄²⁻/ZrO₂ esterification bio-oil

收稿日期: 2013-05-08;

基金资助:

"十二五"农村领域国家科技计划(2011BAD22B05);无机合成与制备化学国家重点实验室(吉林大学)开发课题(2011-18);青岛市应用基础项目(10-3-4-1-jch);山东省高等学校科技计划项目(J11LB05)。

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引用本文:

张萍,李露,于凤丽等. SO₄²⁻/ZrO₂的制备工艺对催化橡胶籽油裂解油酯化的影响[J]. 燃料化学学报, 2013, 41(11): 1322-1327.

ZHANG Ping, LI Lu, YU Feng-li et al. Preparation of SO₄²⁻/ZrO₂ catalyst and its performance in the esterification of pyrolytic rubber seed oil[J]. J Fuel Chem Technol, 2013, 41(11): 1322-1327.

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