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A comparative study of solid carbon acid catalysts for the esterification of free fatty acids for biodiesel production. Evidence for the leaching of colloidal carbon

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4 **A Comparative Study of Solid Carbon Acid Catalysts for the Esterification**
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6 **of Free Fatty Acids for Biodiesel Production. Evidence for the Leaching of Colloidal**
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8 **Carbon**
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32 **Abstract**
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35 The preparation of a variety of sulfonated carbons and their use in the
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37 esterification of oleic acid is reported. All sulfonated materials show some loss in
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39 activity associated with the leaching of active sites. Exhaustive leaching shows that a
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41 finite amount of activity is lost from the carbons in the form of colloids. Fully leached
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43 catalysts show no loss in activity upon recycling. The best catalysts; 1, 3, and 6; show
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45 initial TOFs of 0.07 s⁻¹, 0.05 s⁻¹, and 0.14 s⁻¹, respectively. These compare favorably
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47 with literature values. Significantly, the leachate solutions obtained from catalysts 1, 3,
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49 and 6, also show excellent esterification activity. The results of TEM and catalyst
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51 poisoning experiments on the leachate solutions associate the catalytic activity of these
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53 solutions with carbon colloids. This mechanism for leaching active sites from sulfonated
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55 carbons is previously unrecognized.
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