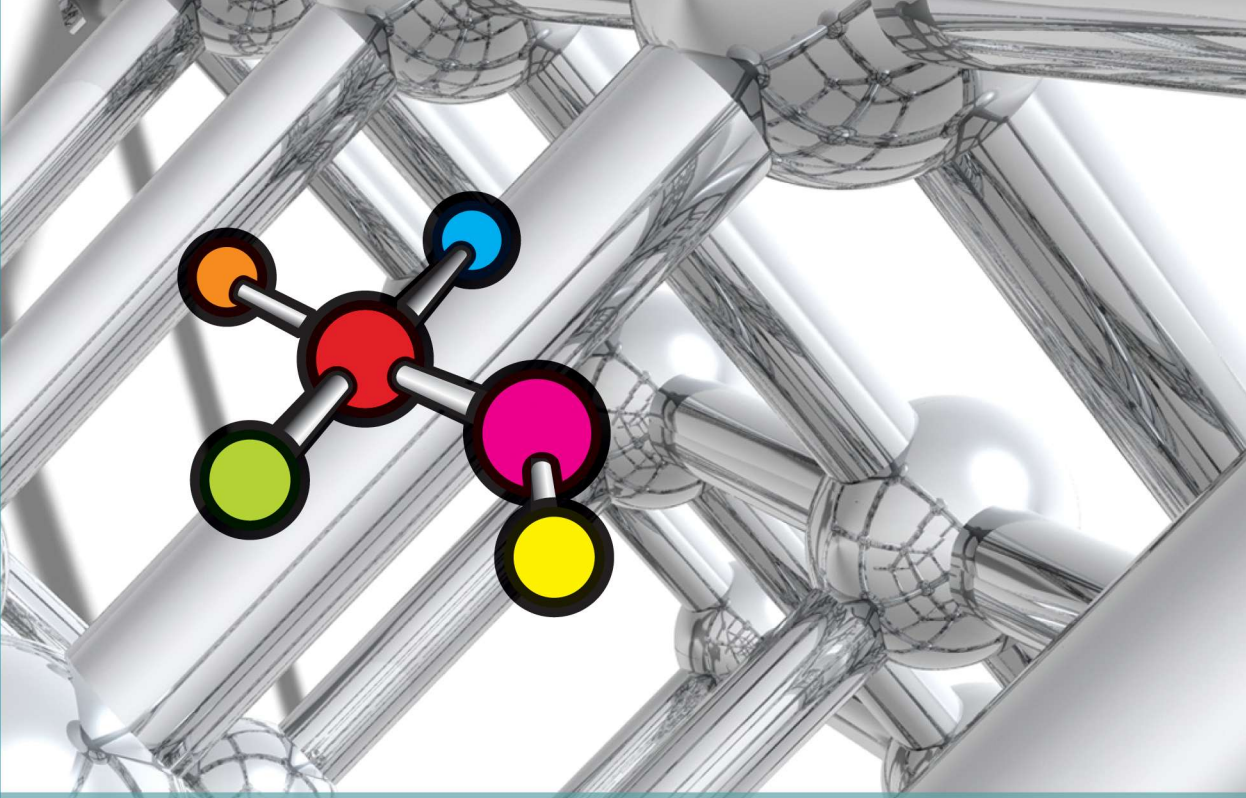

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PRODUCTION OF BIODIESEL USING HETEROGENEOUS ACID CATALYSTS

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The scarcity of known petroleum reserves will make renewable energy resources more attractive in the near future. Currently, biodiesel is the best candidate for diesel fuels in diesel engines, since it is environmentally friendly and easily produced by transesterification of triglycerides (vegetable oils and animal fats) with metanol, using homogeneous alkali or acid catalysts. However, as they are easily separated and recovered from the product mixture, heterogeneous catalysts are desired alternatives to optimize the biodiesel synthesis procedure. Several heterogeneous catalytic systems have been proposed in the last few years [1].

The purpose of this work was to investigate the performance of solid acid catalysts, such as resins containing sulfonic acid groups (Amberlyst-15 and Nafion SAC-13) in the transesterification of glycerol triacetate (a model compound representing larger triglycerides as found in vegetable oils and fats). The reaction runs were carried out at 323 K in a batch reactor, with a methanol/glycerol triacetate molar ratio of 3. The homogeneous sulfuric acid catalyst was also studied for comparison. The results obtained are shown in Figure 1.

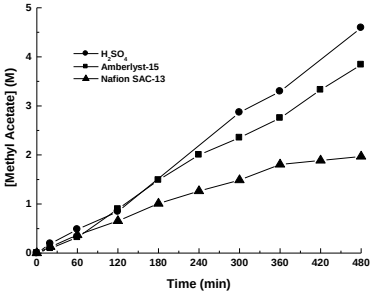

Figure. 1 Biodiesel Production.

Compared with H_2SO_4, the solid catalysts present reasonable performances, in particular Amberlyst-15, confirming previous results [2]. The acidic strength of the materials was assessed by pH_{PZC} measurements and acid/base titrations. The catalysts activities were found dependent on the concentration of acidic active sites. The presence of SO_3H groups in the materials seems to be determinant to the observed catalytic efficiency.

Acknowledgments: FCT (POCTI/1181/2003)

[1] M. Di Serio, R. Tesser, L. Pengmei, E. Santacesaria, *Energy and Fuels* 22 (2008) 207.
[2] D.E. López, J.G. Goodwin Jr., D.A. Bruce, E. Lotero, *Appl. Catal. A.* 295 (2005) 97.