Biodiesel Evaluation of quality using as parameter the viscosity measurement

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Keyword: *biodiesel, viscosity, sobean oil, ionic liquid, factorial design.*

Abstract

It was synthesized in the ionic liquid hydrogen 4-aminotoluene-3-sulfonate for the transesterification reaction using soybean oil as biodiesel quality parameter viscosity.

Introduction

Among the various environmentally sustainable energy sources, biodiesel has excelled, as an alternative to fossil fuels, using acids and basic catalysts in the conventional process and these are not ecologically recommended because they generate waste that impact the environment. The acidic ionic liquid (ILs) [1] are an alternative to catalysts in transesterification reactions with environmental advantages because they can be recycled and reused and has high catalytic activity in organic synthesis. The objective was to employ the IL $[HSO_3\text{-m-}C_6H_5NH_3^+\text{-}[HPO_4^-]$ in the transesterification reaction of soybean oil and evaluate quality biodiesel using as parameter viscosity.

Results and discussion

Caracterization do IL $[HSO_3\text{-m-}C_6H_5NH_3^+\text{-}[HPO_4^-]$ by spectroscopy in the IR region.

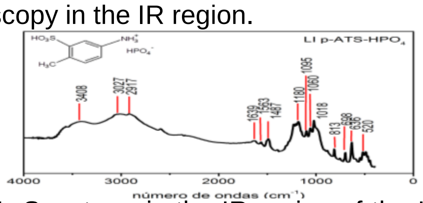

Figure 1. Spectrum in the IR region of the IL $[HSO_3\text{-m-}C_6H_5NH_3^+\text{-}[HPO_4^-]$.

LI $[HSO^3\text{-m-}C_6H_5NH_3^+\text{-}[HPO_4\text{-}]$ was characterized by FTIR and found to the N-H, C-H, C=C, S=O, POH, bonds (3408, 2917, 1417, 1180, 1095 cm^{-1}), respectivaly identifying the proposed structure. The graph of MSR indicated that the concentration of the catalyst and the temperature was not statistically significant at a 95% confidence level and found in Table 1 that there was no change in ester content in relation to viscosity. It was observed that the viscosity increase relative to ester content was quite close and consequently the catalytic activity of LI and vegetable oil composition are influencing the catalytic process. From the results, we can infer that the kinematic viscosity is a good parameter to assess the quality of the biodiesel transesterification process of soybean oil and ensure income above 89%.

Table 1. Analysis of the ester content and viscosity at BMS.

Test	Ester content (%)	Viscosity (mm^2/s)
01	89,87	3,43
02	88,25	6,68
03	85,58	7,63
04	87,35	4,36
05	87,77	4,68
06	88,93	6,28

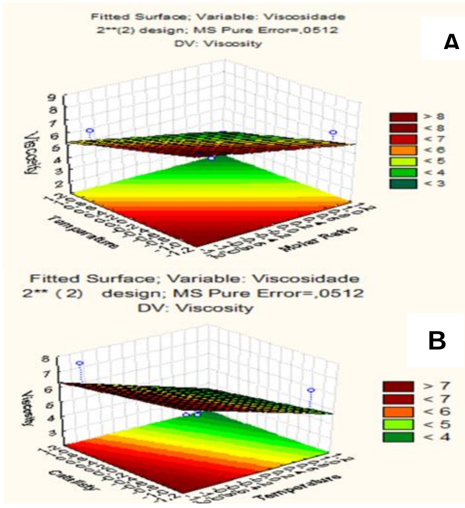

Figure 2. Response surface graph: (A)-temperature variables x molar ratio, (B)-temperature variables x catalyst of BMS.

Conclusions

In the factorial design using the MSR it was found that the variable molar ratio in relation to the viscosity was significant and there was a good conversion of ester content with an mean yield of 87.9%.

Acknowledgement

FAPEMA, CNPq

[1] Cordeiro, C. S.; Da Silva, F. R.; Wypych, F.; Ramos, L. P. *Quim. Nova*, **2011**, 34 (3), 477-486.