Evaluation of biodiesel properties under accelerated thermal degradation

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Biodiesel is an alternative to fossil fuels and can be made from many different starting materials, as vegetable oil or animal fats. The use of such distinct feedstocks, types of alcohol, catalyst and production processes, result in biofuels with different compositions, physical and chemical properties. The most widely used feedstocks in Brazil are soybean and animal fats. The alcohol of choice is usually methanol and the preferred production process is transesterification. Oxidation stability is a major concern in the study of biodiesel. Degradation problems can be caused by storage conditions, such as: exposure to air, light, temperature and presence of metals. Since, there are different production processes, storage and handling, quality specifications need to be considered. In this study, we present a characterization of biodiesels to investigate how accelerated thermal degradation affects the biodiesel properties. Two different types of biodiesel, obtained commercially from distinct feedstocks, were tested. Properties such as viscosity, activation energy, gross caloric value, acid value, infrared absorption were used to study the thermal degradation of the biodiesel samples. The results show a significant difference in fuel properties before and after the thermal degradation process. The results suggest that the viscosity and acid values data presented the most noticeable dependence upon the thermal degradation. This study indicates fuel quality deterioration with the thermal degradation.