

TRABALHO PUBLICADO EM PERIÓDICO

Chemical and microbial storage stability studies and shelf life determinations of commercial Brazilian biodiesels stored in carbon steel containers in subtropical conditions

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Abstract: In the present work long term storage chemical and biological stability of three different commercial Brazilian biodiesel fuels have been studied. Commercial biodiesel fuels from soybean, beef tallow, and blend soybean/beef tallow were initially kept for 60 days in their original containers at the laboratory. Subsequently, the biodiesels were transferred to 1 L carbon steel containers and stored at the laboratory for 90 days exposed to room temperature and humidity. Monthly analyzes of some biodiesel chemical characteristics were conducted. After 90 days, biodiesel samples were sent to be evaluated for their susceptibility to microbial contamination by biomass formation and fuel degradation by FTIR. Results show that after 30 days all biodiesel went out of specification to the water content parameter. Similar result was found for the oxidative stability parameter, except for pure beef tallow biodiesel, which went out of specification after 60 days to the acid value parameter. In terms of microbial contamination, at the end of 60 days, the highest biomass formation occurred in pure soybean biodiesel, followed by blend soybean/beef tallow, and neat beef tallow biodiesels. However, the higher ester carbonyl degradation was observed for 100% beef tallow biodiesel. Thus, in the experimental conditions of this study, the limited shelf life of all studied biodiesels was drastically reduced by the hygroscopicity of the fuel, which acts as a facilitator of other degradative processes, including microbial contamination. The commercial soybean biodiesel was considered more vulnerable to long term storage due to its reduced oxidative stability, as well as its higher susceptibility to microbial development. Special care should be addressed by the time that this sort of biodiesel is added to the diesel, unless more robust antioxidant and multipack additives are used, and special handling practices are adopted.