

## **Title: EVALUATION OF MICROBIAL CONTAMINATION OF PURE AND COMMERCIAL SOYBEAN BIODIESEL**

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### **Abstract:**

Biodiesel is considered to be a promising alternative biofuel since it is derived from feedstock, such as vegetable oils, animal fats and used cooking oils. Biodiesel consists of fatty acid monoalkyl esters (FAME) and due to its chemical composition it is very susceptible to biotic and abiotic degradation that it can implicate final quality of biodiesel. Antioxidants has been added to biodiesel to maintain its chemical stability, on the other hand its influence on the microbiota of fuels is unexplored. The aim of this study was to estimate the native microorganisms growth and to measure pH and electrical conductivity values in microcosms with water phase and pure soybean biodiesel (no additives) and commercial soybean biodiesel (added commercial antioxidant), as oily phase. It was assembled microcosms with 130 mL of soybean biodiesel as received and 13 mL of Bushnell Haas mineral medium in two different pH values: acid (5.0) and neutral (7.0). These microcosms were incubated, without agitation at 30°C for 40 days in triplicate. During this period, the pH and the electrical conductivity values were measured and the estimating of the microbiological growth of the yeasts and total bacteria mesophiles in CFU.mL<sup>-1</sup> were obtained by using dipslides, with Ogye agar and PCA, respectively. After 40 days, the results showed that there was no yeast and bacteria mesophiles growth for pure biodiesel in the microcosms with acid and neutral pH values. Although for commercial biodiesel it was observed yeasts and mesophiles growth in the first 24 h, about 10<sup>2</sup> CFU.mL<sup>-1</sup>. From the 7<sup>th</sup> to the 14<sup>th</sup> day both pH values tested showed contamination level of 10<sup>5</sup> CFU.mL<sup>-1</sup>, representing a contaminated fuel condition. These values decreased to 10<sup>3</sup> CFU.mL<sup>-1</sup> at 40<sup>o</sup> day to both pH values. The electrical conductivity values of the aqueous phase of the commercial biodiesel decreased approximately 0.5 mS.cm<sup>-1</sup> whereas the values of the aqueous phase of the pure biodiesel remained the same. It was observed acidification of the aqueous phase of the commercial biodiesel. The pH value of the microcosm was reduced from 5.0 to 3.7, while the sample with initial pH value 7.0 was reduced to 4.7. The microcosm with pure biodiesel had pH 7.0 reduced to 5.6 and the samples of initial pH 5.0 had not showed a significant reduction (5.3). According to these results, it can be observed that the presence of the antioxidant in commercial biodiesel samples had influence on the microbial growth, on the conductivity and on the change of the pH values under the tested conditions.

**Keywords:** antioxidant, biodiesel, microorganisms

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