

Title: DEGRADATION OF BLEND B7 (DIESEL-BIODIESEL) BY *Pseudomonas aeruginosa*

Authors Boelter, G. ¹, Cazarolli, J. C. ¹, Correa, C. ², Beker, S. A. ¹, Ferrão, M. F. ², Bento, F. M. ¹

Institution ¹ LAB-BIO - Fuels and Biofuels Biodeterioration Laboratory, Department of Microbiology, Immunology and Parasitology, Universidade Federal do Grande do Sul, (Rua Sarmiento Leite, 500, Porto Alegre, RS, Brazil), ² Chemistry Department, Universidade Federal do Rio Grande do Sul, (Avenida Bento Gonçalves 9500, Agronomia, CEP: 91501-970, Porto Alegre, RS, Brazil)

Abstract:

In Brazil, since 2014 the formulation of commercial diesel is a blend B7 (diesel and biodiesel). The use of biodiesel, from the environmental point of view, has advantages over other fuels such as pure diesel or gasoline. However, the presence of fatty acid esters, which can be easily metabolized by the microbiota, makes biodiesel more biodegradable. It can be a problem during the fuel storage, because some microorganisms can use the fuel as a carbon source and to cause its biodeterioration. The aim of this study was to evaluate the growth and potential biodegradation of *Pseudomonas aeruginosa*, isolated from contaminated oil storage, in blend (B7). Seventy milliliters of Bushnell–Haas mineral medium were sterilized in 150 mL glass flasks. Different concentrations of oily phase (about 7% and 28%) of B7 blend were added on the flasks and incubated in a shaker at 30 °C for 7 days. Measures for analyzing the growth of bacteria (CFU), pH, surface tension and emulsifying index (IE 24%) in the aqueous phase were performed in triplicate. The chemical changes in the fuel phase were analyzed by infrared spectroscopy (FT-IR/HATR) in a spectrophotometer Agilent Technologies Cary 630 FTIR coupled on horizontal attenuated total reflectance (HATR) accessory. We observed that the bacteria increased by 2 logs in cell number from 48 hours. From the 3rd day until the 7th day, the population was maintained in the range from 10⁷ CFU/mL in the two oil concentrations tested. No changes were observed in the pH and IE 24% (with or without cells) from the aqueous phase. Measurements of surface tension of the aqueous phase decreased from 61 (at T0 mineral medium) to about 38 mN/m after 7 days in control conditions (mineral medium + B7 blend without bacteria) and with bacteria. These results confirm the biodiesel surfactant activity, which increases the availability of the oil fraction to bacteria. The IR results of the oily phase were obtained by analysis of the range 1800-800 cm⁻¹ spectrum for the realization of hierarchical cluster analysis (HCA). The HCA of spectral data resulted in the formation of two distinct groups: at time zero and control samples and another group formed by samples with *Pseudomonas aeruginosa*, that suggests the degradation of the mixture B7 by bacteria.

Key-words: blend B7, biodegradation, bacterial growth

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