

Performance Study of Experimental Ferritic Alloy with High Content of Molybdenum in Corrosive Environment of Soybean Methyl Biodiesel

Authors : Maurício N. Kleinberg, Ana P. R. N. Barroso, Frederico R. Silva, Natasha I. Gomes, Rodrigo F. Guimarães, Marcelo M. V. Parente, Jackson Q. Malveira

Abstract : Increased production of biofuels, especially biodiesel, as an option to replace the diesel derived from oil is already a reality in countries seeking a renewable and environmentally friendly fuel, as is the case in Brazil. However, it is known that the use of fuels, renewable or not, implies that it is in contact with various metallic materials which may cause corrosion. In the search for more corrosion resistant materials has been experimentally observed that the addition of molybdenum in ferritic steels increases their protective character without significantly burdening the cost of production. In order to evaluate the effect of adding molybdenum, samples of commercial steel (austenitic, ferritic and carbon steel) and the experimental ferritic alloy with a high molybdenum content (5.3%) were immersed separately into biodiesel derived from transesterification of soy oil to monitor the corrosion process of these metal samples, and in parallel to analyze the oxidative degradation of biodiesel itself. During the immersion time of 258 days, biodiesel samples were taken for analysis of acidity, kinematic viscosity, density and refraction. Likewise, the metal samples were taken from the biodiesel to be weighed and microstructurally analyzed by light microscopy. The results obtained at the end of 258 days shown that biodiesel presented a considerable increase on the values of the studied parameters for all the samples. However, this increase was not able to produce significant mass loss in metallic samples. As regards the microstructural analysis, it showed the onset of surface oxidation on the carbon steel sample. As for the other samples, no significant surface changes were shown. These results are consistent with literature for short immersion times. It is concluded that the increase in the values of the studied parameters is not significant yet, probably due to the low time of immersion and exposure of the samples. Thus, it is necessary to continue the tests so that the objectives of this work are achieved.

Keywords : biodiesel, corrosion, immersion, experimental alloy

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020