Degradation of Polymeric Components in Biodiesel Fuel System

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The worldwide demand for energy is ever increasing and biodiesel is gaining momentum an alternative renewable fuel against the ever shrinking fossil fuel reserves in the world. However certain concerns must be addressed before manufacturers and the general public fully accept it. There is a strong public opinion that the use of biodiesel could harm the polymeric components in the diesel fuel system. The purpose of this research is to investigate whether there is any degradation in polymeric components of the diesel fuel system of automobiles, such as the rubber fuel hose, with long term use of biodiesel.

Biodiesel was made after base catalyzed transesterification of extracted pure Domba *(Calophyllum inophyllum)* oil. Blends of biodiesel were made by mixing pure biodiesel with fossil diesel. Real fuel hose used in diesel automobiles and a garden rubber hose were treated with different blends of Biodiesel, B100 (pure Biodiesel), B80 (80% Biodiesel 20% Fossil fuel), B60, B40, B20 and BOO (Fossil diesel) using a special set-up to mimic the actual diesel fuel system of automobiles. Pre test and post test internal diameter changes, weight changes and length changes were measured for rubber and real fuel hoses. Internal surface observations were done under the magnification 4.0 x 10 of a Stereo Microscope with a digital imaging system, before and after the treatment with biodiesel blends. Degree of degradation in garden rubber hose and in real fuel hose was assessed using a five point grading system and the analysis of data was done using Minitab statistical software.

Garden hose treated with blends over B80 underwent significant structural changes such as increase in diameter and weight loss while no significant structural changes were observed with real fuel hose. No significant surface degradation occurred in the fuel hose used in the diesel automobiles with all the blends tested, since it has been treated with an oil resistant coating. Conversely, garden rubber hose showed severe surface degradation with blends B100 and B 80 while no significant degradation was observed with blends 820, B40 and B60. Automobile fuel hose can be used with any blend of biodiesel without any modification in existing diesel fuel system of all automobiles as an alternative to fossil diesel.

Key words: Bio diesel, Polymeric