

Compatibility of polymeric sealing materials with biodiesel heating oil blends at different temperatures

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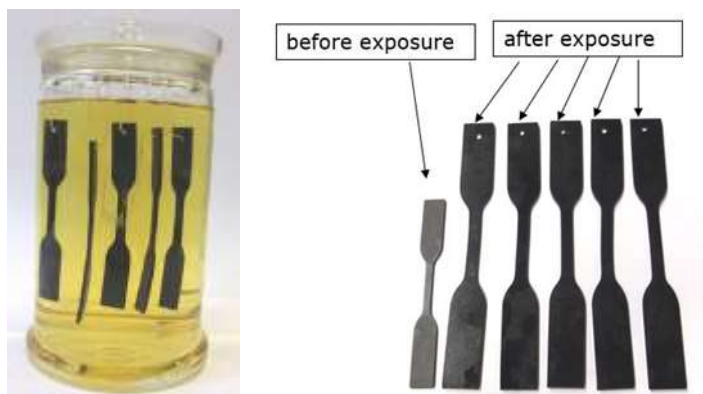
Abstract:

Biodiesel is subject to degradation processes like oil and grease. The oxidative degradation products of vegetable oil esters in biodiesel particularly lead to enhanced sedimentation in blended fuels.

The polarity of biodiesel increases its solvency and facilitates permeation and extraction. Solvation, swelling and/or extraction lead to changes in the physical properties and chemical changes of polymeric materials. It also accelerates the degradation (hydrolysis and oxidation) of these materials with the loss of additives and stabilizers.

The objective of this research was to determine the resistance of frequently used polymeric materials such as ACM, EPDM, FKM, FVMQ, CR, CSM, IIR, HNBR, NBR, PA, PE; POM, PUR, PVC and VMQ in biodiesel and heating oil with 10 %/20 % biodiesel (B10/B20) at 40°C and 70°C. Mass, tensile strength and breaking elongation of the test specimens were determined before and after the exposure for 84 days in the biodiesel heating oil blends. The visual examination of some elastomer test specimens clearly showed the great volume increase until break or partial dissolution. Shore hardness A and D were determined before and after exposure of the test specimens in the biofuels for 42 days.

The elastomers CR, CSM, EPDM, IIR, NBR and VMQ were generally not resistant to biodiesel and B10 at 40°C and 70°C. FKM, ACM, HNBR, PA, PE, POM, PVC and PUR showed high compatibility in B10/B20 at 40°C. A lower compatibility was determined for ACM in biodiesel. ACM and HNBR were not resistant in B20 at 70°C.



Biography:

Margit Weltschev is a chemist and has been working in the Federal Institute for Materials Research and Testing since 1987, since 1990 in the department: Containment Systems for dangerous Goods. The evaluation of the compatibility of metallic and polymeric materials for tanks, IBC and packaging's belongs to her work scope. These evaluations are part of the Database Dangerous Goods and the BAM-List – Requirements for Tanks for the Carriage of dangerous goods. She finished the PH thesis about the comparison of material parameters of polyethylene grades with the test performance behavior of packaging's for the transport of dangerous goods in September 2009.