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A new generation of biodiesel formulation with unprecedented properties

Vegetable oils are the most available source of biomass that could be used as biofuels. However, their high viscosities and melting points cause many problems that make a direct usage in engines very difficult. Therefore, they are further processed to fatty acid methyl esters by a transesterification reaction with methanol. These low viscous liquids, that are usually called biodiesel, still possess high melting points and the processing leads to huge amounts of glycerol as a fuel, which is useless byproduct for fuel purposes. Because of all these problems, mixtures of vegetable oils and their corresponding biodiesels as main components seem to be not usable as biofuels. We successfully formulated biofuels that solve the above mentioned problems concerning the usage of vegetable oils (patent pending). We obtained a new class of biofuels composed of: A vegetable oil; a classical biodiesel and a very cheap glycerol derivative. Various physical-chemical problems that occur due to the usage of vegetable oils could be solved. Further, the difficulties concerning the miscibility of the components could be fixed without using any surfactants. The engine tests of the final formulations consisted of ignition delay, emission and consumption measurements as well as investigations on their combustion processes. It could be shown that the formulated biofuels are very close to diesel concerning their ignition delay properties. Surprisingly, the gaseous as well as soot emissions are comparable to or even lower than those of diesel. Especially at higher boost pressures, the formulated biofuels show distinctly less emissions than diesel. Even if the biofuels lead to slightly higher consumptions, their costs are lower than the current diesel price, which compensates this drawback. The already mentioned comparability to diesel can also be observed by the combustion processes, which are also very similar. With these new biofuel formulations, an important step towards completely sustainable biofuels was achieved including the applicability of vegetable oils without further conversion.

Biography

Werner Kunz has graduated from Regensburg University and obtained his first Professorship in France. Later, in 1997 he came back to Regensburg University as a Full Professor, Head of the Institute and later on as the Head of the Local Centre of Sustainable Chemistry. He has published more than 250 papers in international journals and filed several patents. He was also been awarded several international prizes such as the Rhodia prize of the European Colloid and Interface Society and the Humboldt-Gay Lussac prize of the French government.

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