



INFORMATION

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PROJECTS

DGMK-COMMITTEE FUELS

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DGMK-Project 686 Influences and Parameters of Diesel Fuels with 10 % (v/v) FAME

Within the scope of discussions on the increase of the FAME amount, which may be added to fossil diesel fuel, questions came up, which were examined within this project under participation of the automobile industry and suppliers as well as the mineral oil industry and producers of biodiesel. The objective was to provide scientific/technical data for discussions in the standardisation committee of the FAM for the revision of the standard for diesel fuel. The investigations mainly focussed on diesel fuels with a FAME concentration of 10 % (v/v). The results achieved within this project do not allow any conclusions on concentrations, which have not been investigated. In this project, tests were run on the addition of fuel to engine oil, on the properties of the fuel (seal compatibility, oxidation stability, density, and density of energy, elements) and on the corrosion behaviour of fuels vis-à-vis steel. In addition, information on phosphorus content, polycyclic aromatic hydrocarbons, water content, micro organisms and acidity were reviewed and discussed. The results were included in the discussions of the standardisation committees on the establishment of the national required standard for diesel fuel.

Source: DGMK-Research Report 686
Influences and Parameters of Diesel Fuels with 10 % (v/v) FAME
(Einflüsse und Parameter von Dieselkraftstoffen mit 10 % (V/V) FAME-Anteilen)
Authors: Dr. Jens Baumgarten, Dr. Thomas Garbe, Dr. Jens Haupt,
Jan Ludzay, Margret Schmidt, Petra Sorsche, 2008
81 pages, 38 figures, 25 tables, 15 references
ISBN 978-3-936418-82-8 (German)
ISBN 978-3-936418-87-3 (English)
Price: EUR 150,00 plus VAT (DGMK-Members 50 %)

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DGMK-Project 639-2 Investigations on the Addition of 10 % (V/V) FAME to Diesel Fuels

With the Biofuels Quota Act, which came into effect in January 2007, a growing share of biofuels related to the total fuel sales is legally stipulated. An increase of the permissible share of biofuels in the required specifications for fuels is necessary, in order to reach the demanded proportion by the addition.

Within the scope of this project, a laboratory test programme (part I) was carried out with the focal points oxidation and storage stability as well as fuel influence on the quality of engine oils, in order to broaden the data basis for B10 fuels. In part II, deposit formation at diesel injection nozzles was investigated in coking test runs with four B10 fuels and one fossil reference fuel. Tests with two vehicles, driven by B10 fuel, were an element of project part III.

Diesel/FAME blends can exhibit a very sophisticated ageing behaviour. Basically, the oxidation stability of B10 fuels depends on the oxidation stabilities of the starting components. By the addition of FAME, the oxidation stability of a blend tends to decrease in comparison to the fossil reference diesel fuel.

Tests run within the framework of this project for the evaluation of the risk of coking with Euro 4 engines show, that the tendency for deposit formation of fuels with 10 % (v/v) FAME is slightly raised in comparison to straight fossil diesel fuel, when investigated under the selected test conditions of engine test benches. However, the influence on deposit formation is comparably small, especially when the variably strong tendency for coking of diesel fuels of different quality or the influence of different engine concepts is taken into account.

Vehicle tests with two cars, running on B10, showed a significant increase of oil dilution with B10 compared to B0. As for all other properties and parameters, respectively, no negative influence of B10 could be observed.

- Source:** DGMK-Research Report 639-2
Investigations on the Additive of FAME to Diesel Fuels
Part I: Laboratory test programme
Part II: Coking test runs with four B10 fuels and a reference fuel
with the analysis of deposits formed at the nozzles of diesel fuel injectors
Part III: B10 Vehicle Road Testing
(Untersuchungen zu 10 % (V/V) FAME in Dieselkraftstoffen
Teil I: Laboruntersuchungsprogramm
Teil II: Durchführung von Verkokungstestläufen mit vier B10-Kraftstoffen
und einem fossilen Basiskraftstoff mit Analyse der gebildeten Beläge an Die-
seleinspritzdüsen
Teil III: Durchführung eines Fahrzeug-Tests mit B10-Kraftstoff)
Authors: O. Loest, J. Ullmann, J. Winter, E. Leber, G. M. Beerens, 2009
116 pages, 61 figures., 20 tables,
ISBN 978-3-936418-84-2 (German)
ISBN 978-3-936418-89-7 (English)
Price: EUR 150,00 plus VAT (DGMK-Members 50 %)
- Further Information:** J. Ludzay, DGMK ludzay@dgmk.de

DGMK-Project 694 Microbial Contamination of Fuels (Literature search)

The literature search provides an overview of general and special microbiological phenomena and of their fundamentals in conjunction with the contamination of mineral oil based fuels. Thereby, the search considers environmental conditions for a successful colonisation by micro-organisms as well as occurrence of different taxa, which were identified in individual cases, thus trying to form a basis for the understanding of actual calamities with B5 fuels in Germany.

Source: DGMK-Forschungsbericht 694
Mikrobielle Kontamination von Kraftstoffen (Literaturrecherche)
(Microbial Contamination of Fuels (Literature search))
Author: Dr. Ralph G. Weyandt, 2009
12 pages, 95 references
ISBN 978-3-936418-95-8
Price: EUR 40,00 plus VAT (DGMK-Members 50 %)

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DGMK-Project 695 Diesel fuels with 5 % (v/v) FAME and Micro-organisms

Since FAME has been used as a fuel component in diesel fuels, varying incidents were observed, such as deposit formation in storage tanks and filter clogging at service stations. 150 samples of fuels and materials of the logistic chain were analysed, whether a microbial contamination was the cause for the occurrence of filter plugging at service stations. Bacteria (aerobic and anaerobic) and/or fungi were detected in about 95 % of all cases in the filters/filter elements and non return valves of the investigated service stations. These were always metabolically active, reproducible micro-organisms, i.e. living biological substance. In particular, partly massive contaminations by fungi were detected. The investigations show that micro-organisms are involved in the filter clogging at service stations to a considerable extent. In subsequent tests of samples of fall 2007 and 2008, numerous different species of bacteria, hyphae fungi and yeast were identified. This shows that a broad multitude of ubiquitously occurring micro-organisms is capable to colonise on the surfaces of filters and valves. The identified fungi and bacteria are classified not higher than risk group 1 according to TRBA 460 and TRBA 466, respectively. According to these technical rules, "it is unlikely that they cause any infectious disease in mankind". In vitro tests were carried out, in order to investigate, whether the presence of water or the fuel composition have any effect on the growth of micro-organisms. The test results prove a tendency towards a higher gain of biomass in the presence of a free water phase. It could be demonstrated that the gain of biomass is higher, if the samples contain FAME. Furthermore, the kinetics of the formation of biomass is accelerated.

Source: DGMK-Forschungsbericht 695
Dieselkraftstoffe mit 5 % (V/V) FAME-Anteilen und Mikroorganismen
(Diesel fuels with 5 % (V/V) FAME and Micro-organisms)
Authors: Jan Ludzay, Dr. Ralph G. Weyandt, 2009
139 pages, 56 figures, 57 tables, 4 references
ISBN 978-3-941721-02-9
Price: EUR 200,00 plus VAT (DGMK-Members 50 %)

Further Information: J. Ludzay, DGMK ludzay@dgmk.de

DGMK-Project 693 Solubility Properties of Blends of Diesel Fuel and FAME

Reason and Objective

Since FAME has been used as a fuel component, different conspicuities were observed (e.g. deposit formation in storage tanks, filter blocking during loading, filter blocking at service stations). Instigated by the DGMK Committee *Fuels* and in consultation with the chairmen of the DGMK Committees *Fuels and Storage, Transportation and Distribution*, technical questions are investigated by a small working group consisting of members of different technical committees.

Brief Description

Within the project, it is investigated, whether product compositions have any effect on the solubility properties of the fuel. Especially, the aromatics content of the fossil diesel fuel and the composition and stability of the FAME component are considered to be influential factors. The test programme is carried out with summer and winter grade fuels.

Duration	2007 - 2010
Projectadvisors	Interdisciplinary DGMK working group
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DGMK-Project 695-3 Importance of the FAME Component for the Potential of Germ Formation

Reason and Objective

Since FAME has been used as a fuel component, different conspicuities were observed (e.g. deposit formation in storage tanks, filter blocking during loading, filter blocking at service stations). Instigated by the DGMK Committee *Fuels* and in consultation with the chairmen of the DGMK Committees *Fuels and Storage, Transportation and Distribution*, technical questions are investigated by a small working group consisting of members of different technical committees.

Brief Description

Bacteria and fungi from fresh filter samples were bred on a specifically developed B7 nutrient agar and isolated. In contrast to the culture media used so far, in this case, only those micro-organisms are grown which authentically utilise B7; so-called secondary colonisers are ignored. The isolated germs are lyophilised and inoculated into the test preparations. At the end of the test, biomass and the concentrations of protein and nucleic acid are analysed in the filter residue and also in the filtrate.

Duration	2009 - 2010
Author	Dr. R. Weyandt, SGS INSTITUT FRESENIUS GmbH
Projectadvisors	Interdisciplinary DGMK working group
Further Information	J. Ludzay, DGMK ludzay@dgmk.de

DGMK-Project 695-4 Studies of the Behaviour of water and micro-droplets

Reason and Objective

Since FAME has been used as a fuel component, different conspicuities were observed (e.g. deposit formation in storage tanks, filter blocking during loading, filter blocking at service stations). Instigated by the DGMK Committee *Fuels* and in consultation with the chairmen of the DGMK Committees *Fuels and Storage, Transportation and Distribution*, technical questions are investigated by a small working group consisting of members of different technical committees.

Brief Description

Following the results published in the DGMK Research Report 695, it is to be clarified in the current project, how water gets to the filters. For this reason, it shall be investigated, whether water in the fuel is present as micro-droplets. An instruction for the defined preparation of micro-droplets in fuels shall be compiled. The particle and size distribution shall be detected by means of the LD method before and after "heating of the sample" (elimination of the water droplets) at 10, 20 and 40 °C.

Duration	2009 - 2010
Author	Dr. R. Weyandt, SGS INSTITUT FRESENIUS GmbH
Projectadvisors	Interdisciplinary DGMK working group
Further Information	J. Ludzay, DGMK ludzay@dgmk.de

DGMK-Project 701-3 FAME in Gasoline (Premium 95) - summer grade 2009

Reason and Objective

After discussion of the results of the DGMK Projects 701 and 701 - 2, the MWV Working Group Fuels suggested that further studies are conducted focussing on the experiences with the analytical methods (in-house methods).

Brief description

In this project, 92 samples from service stations of a market survey (summer grade) are analysed parallel in two laboratories with regard to their FAME content by means of in-house methods available in the different companies. Furthermore, six samples with known contents of FAME or FAME/diesel fuel are analysed by all four participating laboratories, in order to allow a comparison of the results achieved by the different in-house methods.

Duration	2009 - 2010
Projectadvisors	DGMK-Committee Fuels
Further Information	J. Ludzay, DGMK ludzay@dgmk.de



DGMK-Project 722 Biodiesel Laboratory Aging Study

Reason and Objective

The ACEA Task Force Biodiesel studies the implications of fuel aging in the vehicle tank (so-called biodiesel pre-combustion study) in a joint project with CONCAWE. As suggested by CONCAWE, these vehicle tests shall be supplemented by a parallel conducted laboratory study. This study is conducted jointly by CONCAWE and DGMK. The objective of this study is to explore, whether the oxidation stability of the B10 fuels varies under the different storage conditions in the laboratory. The results shall be integrated into the discussion of future specifications and test methods.

Brief Description

In the laboratory study, the three B10 fuels used in the vehicle tests are considered. These are stored under defined lab conditions and analysed at certain time intervals. In this connection, priority is given to the determination of the oxidation stability by different procedures.

Duration	2009 - 2010
Project advisors	DGMK-Committee Fuels
Further Information	J. Ludzay, DGMK ludzay@dgmk.de