

Animal Waste for the Production of Biofuels and Biopolymers

Katharina Strohmeier^{a*}, Sigurd Schober^a, Martin Koller^b, Martin Mittelbach^a



^aUniversity of Graz, Heinrichstrasse 28, 8010 Graz, Austria
^bGraz University of Technology, Petersgasse 12, 8010 Graz, Austria
 *katharina.strohmeier@uni-graz.at



Project Outline

Within the framework of the EU-project ANIMPOL [1] waste streams from slaughterhouses and rendering plants are converted into high value-added products and biofuels.

Animal waste samples are extracted with different methods to obtain the fatty material, which is analyzed and converted into different fatty acid esters, which are analyzed according to EN 14214 in order to evaluate the suitability as biodiesel. A method has been developed to separate efficiently saturated from unsaturated fatty acid esters. The saturated fatty acid fraction can be used as carbon source for the biotechnological production of high value added polyhydroxyalkanoates (PHAs), industrially important biodegradable biopolymers.

Preliminary Results

Different animal organs are extracted with hexane. The fat fractions are converted into fatty acid alkyl esters by transesterification with methanol, ethanol, 1-propanol, 2-propanol, 1-butanol and *iso*-amyl alcohol [2]. The products are analyzed according to the European biodiesel specification EN 14214.

Parameter	Limits EN 14214	FAME	FAEE	FAPE	<i>i</i> -FAPE	FABE	<i>i</i> -FAAE
Viscosity at 40°C [mm ² /s]	3.50 – 5.00	4.57	4.94	5.57	5.53	6.08	6.98
Oxidation stability 110°C [Hours]	≥ 6.0	1.01	2.70	1.55	2.96	2.92	0.91

Tab 1: Parameters of EN 14214, which are out of specs

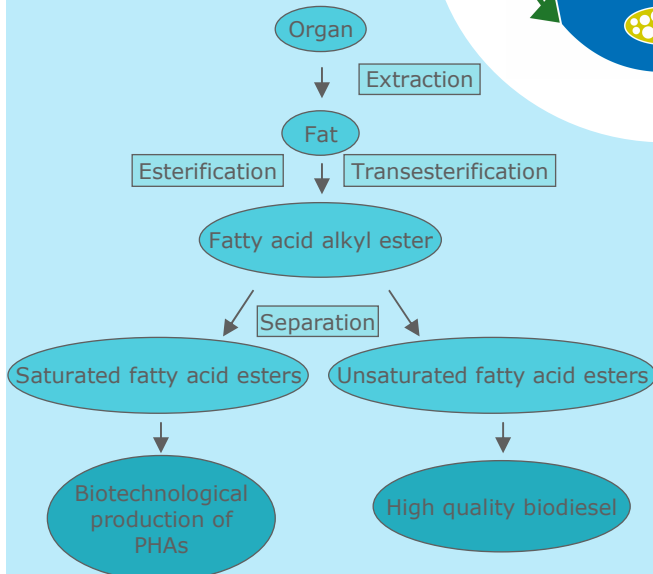
FAME: Fatty Acid Methyl Ester
 FAEE: Fatty Acid Ethyl Ester
 FAPE: Fatty Acid Propyl Ester
i-FAPE: Fatty Acid Isopropyl Ester
 FABE: Fatty Acid Butyl Ester
i-FAAE: Fatty Acid Isoamyl Ester



The separation of the esters into a saturated and an unsaturated fraction achieves an upgrading of the quality of biodiesel leading to excellent cold temperature behaviour.

CFPP	FAME	FAEE	FAPE	<i>i</i> -FAPE	FABE
Ester [°C]	10	7	4	0	3
Unsaturated ester fraction [°C]	-26	-14	-19	-11	-6

Strategy



References

[1] KBBE-2009-3-5-02 No.245084- ANIMPOL FP7

<http://www.animpol.tugraz.at/>

[2] M. Mittelbach, C. Remschmidt: Biodiesel-The Comprehensive Handbook. Ed.: M. Mittelbach, Graz (2006) ISBN 3-200-00249-2