Electronic Supplementary Material (ESI) for Environmental Science: Advances.
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Electronic Supplementary Information (ESI): Gaseous Emissions of a Heavy-Duty Engine Fueled with Polyoxymethylene Dimethyl Ethers (OME) in Transient Cold-Start Operation and Methods for After-Treatment System Heating

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Measurement methods of OME values

Table 1. Determined values of OME and the respective measurement method

	Value	Method
Cetane number	68.8	DIN EN 17155 :2018
Oxygen content in % (w/w)	45.0	DIN 51732 :2014 mod..
Sulfur content in mg/kg	< 5	DIN EN ISO 20884 :2011
Lower heating value in MJ/kg	19.21	DIN 51900-2 :2003 mod.
Density (15°C at 1 bar) in kg/dm³	1057.1	DIN EN ISO 12185 :1997
Boiling range at 1 bar in °C	144.9 – 242.4	DIN EN ISO 3405 :2011
Flash point at 1 bar in °C	65.0	DIN EN ISO 2719 :2016
Cold Filter Plugging Point in °C	-40	DIN EN 116 :2018
Cloud Point in °C	-38	DIN EN 23015 :1994
Kinematic viscosity at 40°C in mm²/s	1.082	DIN EN ISO 3104 :1999
Lubricity – HFFR at 60°C in µm	320	DIN EN ISO 12156-1 :2016
Formaldehyde content in mg/kg	233	ASG 1855 Voltammetry

FT-IR detection limits

Table 2. Detection limits of the FT-IR used

Species	Detection limit (5 Hz)
NO	2.0 ppm
NO_2	1.2 ppm
CH_4	1.0 ppm
CH_2O	1.5 ppm
CH_2O_2	1.0 ppm
CH_3OH	3.0 ppm
HCN	1.5 ppm
DME (OME_0)	8.0 ppm
OME_1	0.8 ppm
OME_2	2.0 ppm
OME_3	0.8 ppm
OME_4	2.2 ppm

Confirmation of NH_4^+-adducts

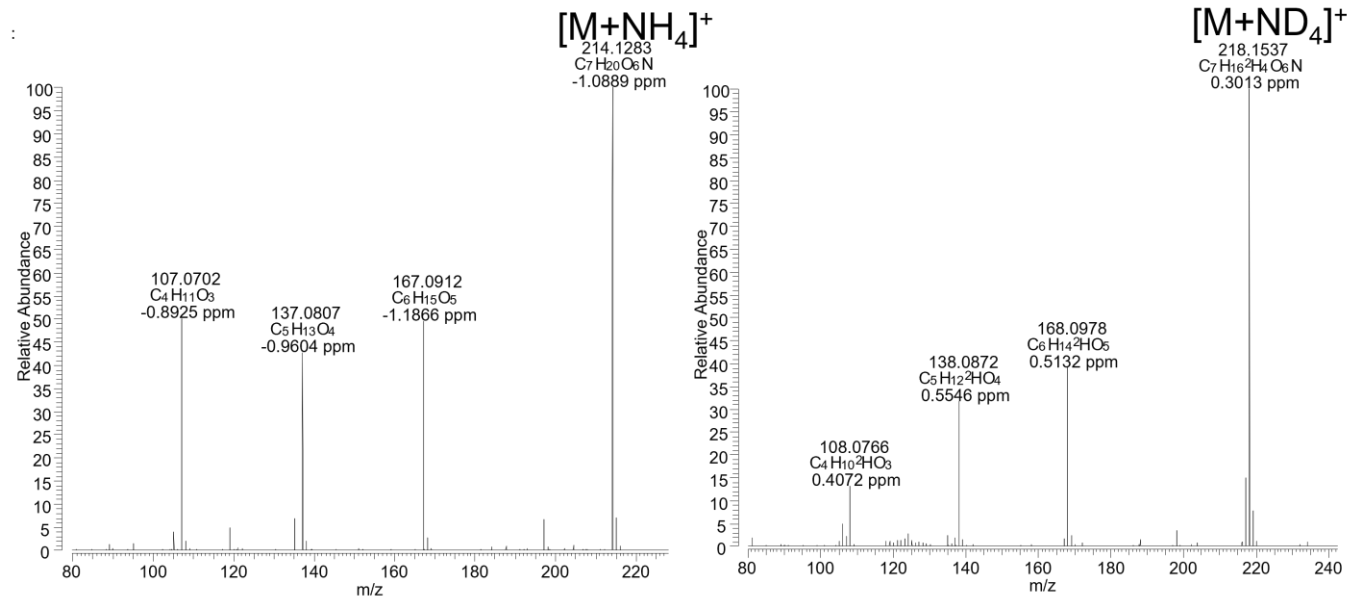

Figure 1. Comparison of high resolution spectra of OME_5 measured with nitrogen humidified with H_2O (left side) and D_2O (right side). The peaks are labeled with exact mass, corresponding elemental composition and mass deviation in ppm.